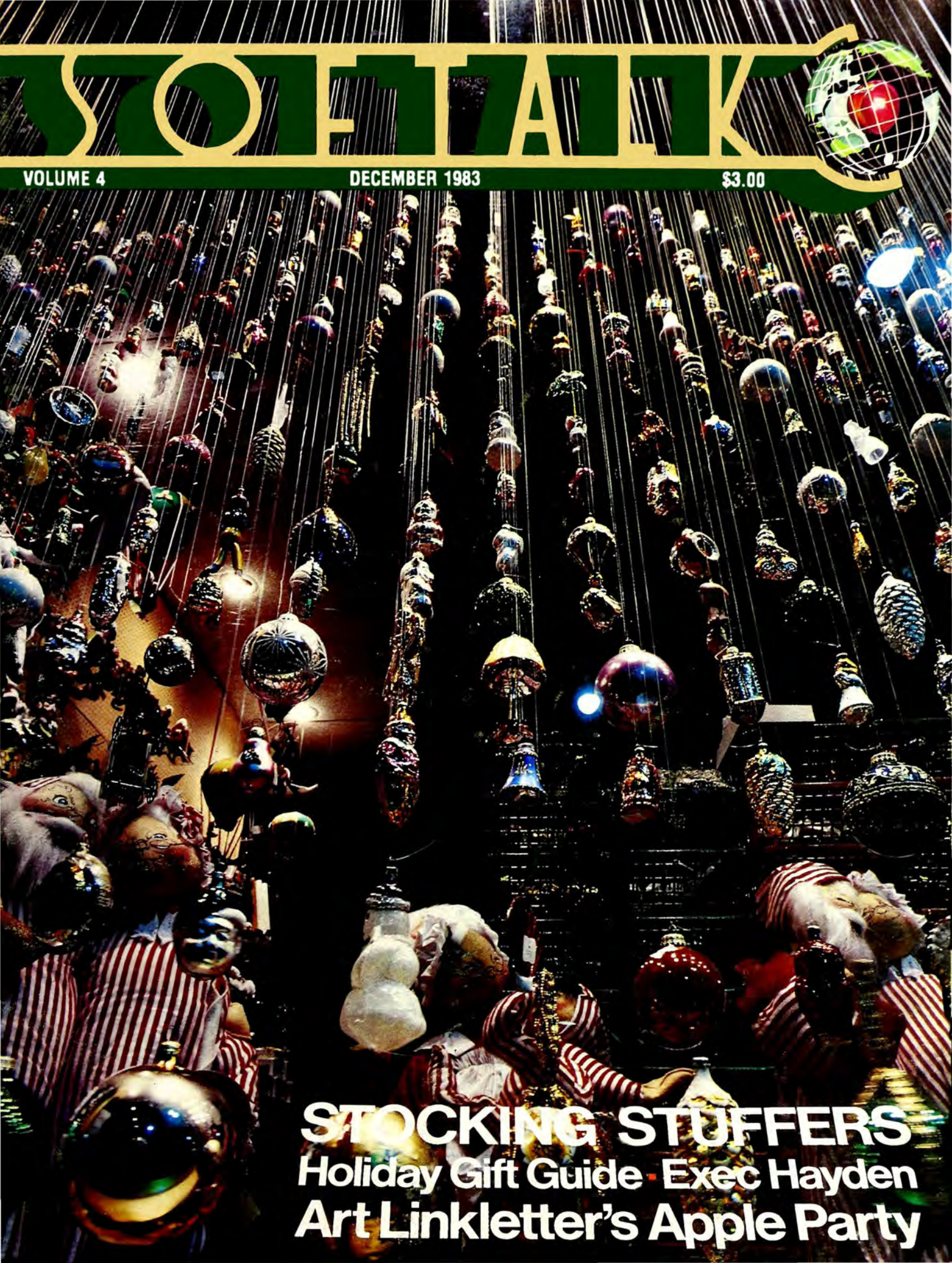
SOFTALK

VOLUME 4 DECEMBER 1983 $3.00



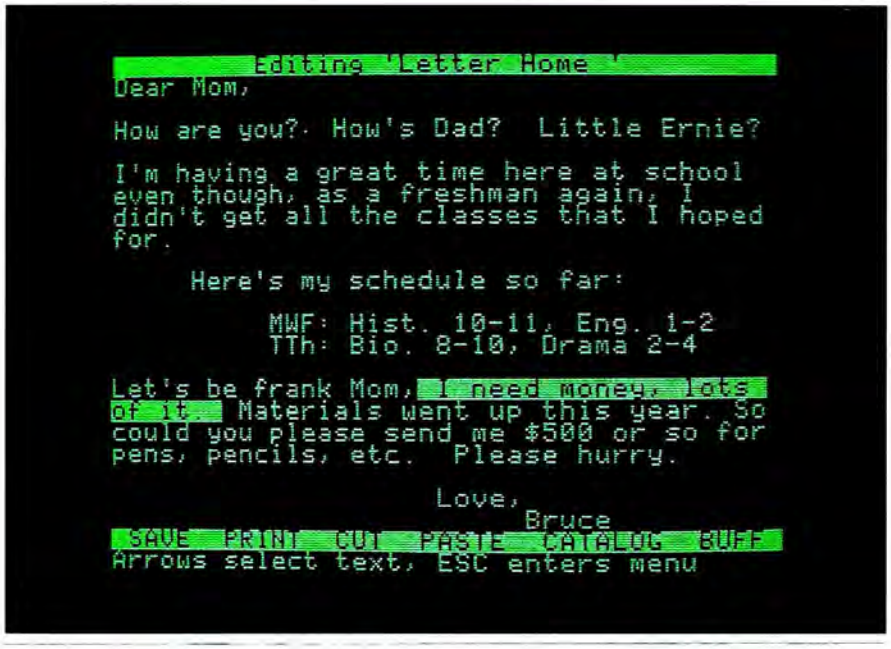
STOCKING STUFFERS

Holiday Gift Guide · Exec Hayden

Art Linkletter's Apple Party



If you can learn to use this word processor in 90 seconds, can it really be any good?



CUT & PASTE™ *displays its commands on a single line at the bottom of the screen. This makes working with it easier and also gives you more usable space on the screen.*

Of all word processors on the market today, Cut & Paste may well be the easiest to use. In fact, by the time you finish reading this section of the ad, you'll know how to work with Cut & Paste. So read on.

START TYPING. Working with Cut & Paste is like working with a typewriter. If you know how to use a typewriter, you already know how to type in your draft with Cut & Paste. The only real difference is, with Cut & Paste it's easier to correct typos.

MAKING CHANGES. Let's say you've decided to make a cut in your rough draft. To do this you put the cursor (the bright block) at the start of the text you want to delete, and stretch it through to the end of your cut. Then you send the cursor down to the "CUT" command on the bottom of the screen. Done.

If, on the other hand, you want to keep that line, but put it in a different part of your draft, you use the "PASTE" command. You mark the point of insert with the cursor. Then you put the cursor over "PASTE." That's all there is to it.

PRINTING IT OUT. When you like the way your work looks, you print it. Put the cursor on the "PRINT" command. Then set your margins, in inches. That's it.

You now know how to use Cut & Paste.

OKAY, IT'S SIMPLE. BUT HOW GOOD IS IT? Cut & Paste has all the features you'll ever need to use at home. Here are a few of them:

1. Scrolling dynamic menus
2. Automatic word wrap
3. Simple cut & paste editing
4. Block indenting
5. Set margins and paper size in inches
6. Tabs
7. Automatic page numbering
8. Controllable page breaks
9. Headings
10. Scrolling text windows
11. Automatic widow and orphan control
12. Clear and concise manual

In other words, Cut & Paste will do just about everything other word processors do. But Cut & Paste will do it more easily. Without complex commands and modes.

If you think about a word processor in terms of what it replaces (typewriters, pens and paper, files), Cut & Paste begins to look very good indeed.

And when you consider that *all this power can be had for approximately* $50, we think you'll see why we believe Cut & Paste is something of an achievement.

A PHILOSOPHY OF DESIGN. The people who designed, developed and programmed Cut & Paste have some fairly heavy credentials.

They are people who worked on the internationally-famous user interface designs that led to the Xerox Star® and Apple's Lisa.® They are also



THE CHANGING OF THE GUARD. *Until quite recently we used pens and paper and typewriters to write with, mostly because we knew how to use them. They have been good tools, but limited. You tend to make messes when you work with them, and getting rid of those messes makes extra work. Cut & Paste is an inexpensive and practical alternative. Because it is as easy to use as a typewriter, you really will use it. Which may make it the first sensible word processor for the home. Thus an alleged labor-saving device has come to a position where it really can save a significant amount of labor, i.e., yours.*



THE MEN WHO MADE CUT & PASTE. *The Linotype machine pictured here was the 19th century's most important contribution to word processing technology. It let typesetters compose and rearrange text in the form of metal castings. The importance of Cut & Paste, of course, must await the judgment of history. Nevertheless, the seven men who developed it look confident here. Standing left to right, they are: Norm Lane, Steve Shaw, David Maynard, Dan Silva, Steve Hayes and Jerry Morrison. Seated at the console is Tim Mott, whose idea this was in the first place.*

people who have in common a very lucid philosophy of design.

Computers and the programs they run are tools, they believe. Tools are never noticed unless they are bad tools. When they're good, they become, in effect, invisible. And if you want to make a good tool—an invisible tool—you'd best study the way people use the tools they already have.

As a result of this thinking, Cut & Paste was designed to work much in the same way that you already work with a typewriter or with pen and paper. The most complex and powerful parts of the program are hidden from view. The work they do takes place deep in the machine. All you get to see are the results.

But beyond that, there is something almost indefinable about a good design. Things about it just seem to work crisply. Little touches and features that you notice make you want to smile. If it's really good, it *feels* good.

Cut & Paste feels good.

ELECTRONIC ARTS™

THE PRODUCTS *of Electronic Arts can be found in your favorite computer stores, software centers, and in leading department stores throughout the country. Both Cut & Paste and Financial Cookbook™ are now available at a suggested retail price of $50 for the Apple IIe and the Commodore 64 and will soon be available for the IBM-PC and Atari.*

OUR COMMITMENT TO HOME MANAGEMENT.

Cut & Paste is just one of a growing number of products we're publishing within the category of "home management software." These products are all built around the same program architecture, making them all equally "friendly," as well as remarkably straightforward and practical. We believe that designs like these will soon make home computers as functional and efficient as today's basic appliances.

Our next product in this line is called *Financial Cookbook*. It's a realistic alternative to the complex, pre-programmed financial calculators we all wish we knew how to use. With a few, simple keystrokes, *Financial Cookbook* lets you make more than 30 key time-value-of-money computations—just about all the ones you'd ever use for personal finances—like calculating mortgages with changing interest rates, compounding the interest on IRA and savings accounts, and buy-versus-lease comparisons for automobile purchases.



To find out more about these home management products and about what we have planned for the future, call or write: Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403 (415) 571-7171.

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SOFTALK

December 1983

Exec Hayden Software: From *Sargon* to Sixteen Bits

Company profile. One man's Camelot is another man's software business. Hayden's got a slice of the Apple pie.

NORMAN MAYERSOHN 60



Welcome to Art Linkletter's Apple Party!

Kids are starting to type the darndest things on Apple keyboards. Art Linkletter brings his magic to computers.

DAVID HUNTER 92

Hardtalk: Boxing the Bugaboos

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Apples Loom over the Weaving World

How some folks are using Apples to design weaving patterns and control the looms as well.

MICHAEL FERRIS 368

Newspeak

The Wide and Wild World of Computing—computer games via cable, new protection scheme, user sexism, and more.

Edited by DAVID HUNTER..395

Storytalk: "M.A.C. Gate: Fat Men Can Not Jump down Chimneys"

T'was the night before Christmas and all through the house, the only creatures stirring were two crime-fighting computers and a certain hard disk drive.

RALPH MYLIUS 402

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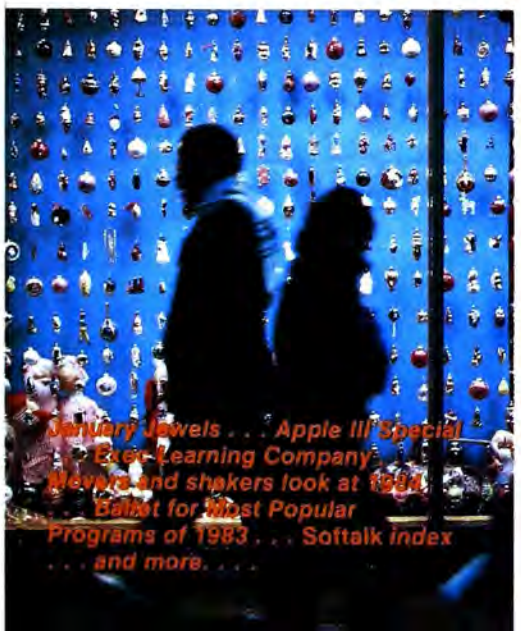

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On Our Cover: The things you can do with an Apple this holiday season are as varied as the ornaments in this window at Campbell-Tolstead's in Westwood, California. Photo by Kurt Wahlner.

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Back Issues: $2 through February 1981, $2.50 through July 1981, $3.50 through September 1982, $4.00 thereafter. November and December 1980, January, February, March, September, October, and November 1981, and December 1982 are sold out. December 1981, February and May 1982, and February 1983 are in short supply.

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.

Moving? Send new address and a label from a recent *Softalk* to Softalk Circulation, Box 60, North Hollywood, CA 91603, telephone (213) 980-5074. Please allow six to eight weeks for processing.



These Oracle contests just keep getting more popular all the time.

The Oracle 1984 contest contains more predictions, more challenges, and more prizes than any of the Oracle contests before it. Why? Because we're crazy! We're giving away prizes left and right because we don't know any better.

We do know that our readers love to win things, so the payoff is bigger for each part of the contest this year, and the grand prize . . . well, let's just say that we like to keep up with the latest developments at Apple (and we don't mean gossip).

To enter this contest is easy. Just take a look at all the events listed on this page and make your prediction. That's it!

Rules. You can enter as many times as you like, as long as each entry is different. Please submit no more than five entries per envelope.

All entries must be on standard 8½×11-inch paper. Nothing smaller, nothing larger. Be sure to print your name, address, phone number, and signature on each entry.

All entries must be postmarked by Saturday, December 31, 1983. No exceptions!

Anyone who hits a prediction exactly or comes closer than anyone else will win $200 worth of goods made by our advertisers. In case of ties, the fearsome random number generator will pick a winner. All decisions are final. Keep a close eye on the Contest Winners section for announcements of winners.

Each part of the contest will be scored. The person with the highest cumulative score at the end of the contest will reign as Softalk Oracle 1984. And here's the good part: That person will win not two, not three, but one bright and shiny mystery computer from the dark recesses of Apple R&D.

So, what are you waiting for? Get off the can and start predicting!

Oracle '84. Predict the following:

1. Who (or what) will be *Time* magazine's Man of the Year. Fifteen points.

2. The greatest number of medals won by the United States in one sport (ice hockey excluded) during the Winter Olympics. Minus one point for each medal off. Bonus: five points for predicting the sport.

3. Academy Award winners in the categories of best picture, best actor, and best actress. Ten points for each correct answer. Ten bonus points if you get all three correct.

4. The greatest difference between the high temperature in Sydney, Australia, and the low temperature in Juneau, Alaska, on any one day during the first seven days in April. Give your prediction in degrees Fahrenheit. Minus one point for each degree off.

5. The top three finishers (drivers) in the Indianapolis 500 stock car race. Ten points each. Bonus: five points for predicting the winner.

6. The number of undergraduates to graduate from the Massachusetts Institute of Technology at the end of the spring 1984 semester. Official count will come from the MIT office of the registrar. Minus one point for every hundred off.

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7. The number-one-seeded players in men's and women's divisions at Wimbledon and the winners in each division (four things are being asked here). Five points for each correctly named player in the right category (seeded or winner). Bonus: ten points if you can name the players (man and woman) the winners will beat in the finals.

8. How many runs will be scored (both teams combined) in the Olympics baseball final. Minus a point for each run off. Ten bonus points if you can name the country that will win.

9. The closing price of Apple Computer stock on September 10, 1984. Submit prediction in the form of 25½ to mean $25.50. Fractions of dollars don't count in scoring, but they will count in deciding ties. Minus one point for each dollar off.

10. The recording artist or group to have the number one single on *Billboard* magazine's Hot 100 for the week ending October 7, 1984. Twenty points for getting it right; ten points if the artist or group you predict has the number two single and is climbing.

11. Who will win the 1984 United States presidential election. Twenty points. Bonus: Predict the number of electoral votes received by the winner. An exact prediction wins ten points. Nine points for being ten votes off; eight for being twenty off, and so on.

12. The five companies to make the greatest number of appearances in the *Softalk* Top Thirty during 1984. Appearances in specialized categories don't count; only appearances in the Top Thirty count. Five points per company. Bonus: ten points if you can predict the number of appearances made by the top company.

List your predictions on an 8½×11-inch sheet of paper (or papers) and send it in with the following information:

Name: _____
Address: _____
City, state, zip: _____
My dealer: _____
What I'd like to spend $200 on: _____
_____
My autograph: _____

Your name and address must appear on every sheet of paper you send. Send in your Oracle '84 predictions to Softalk Oracle '84, Box 60, North Hollywood, CA 91603, postmarked by December 31, 1983.

CONTEST WINNERS

Oracle, Part Six. It's bad enough that we have to read it in the papers, see it on television, hear it on the radio, and fight about it over drinks. But to see such controversial subjects as politics in such a happy place as contests is too much.

Nonetheless, it was part of this year's Oracle contest, so here are the results. Part six required predicting who would have announced their candidacies for the 1984 presidential election by September 30, 1983.

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A sure bet would have been Ted Kennedy, except that he announced at the end of 1982 that he wouldn't run in 1984. Oracle contestants didn't take that too seriously, since the Massachusetts senator always says that. However, it appears he was serious this time. Kennedy wasn't one of the seven who took the big step.

Another name one would expect to see on the list is Ronald Reagan. So far, it looks like we'll be seeing his face on television a lot when campaign time comes around, but as of September 30 nothing was official. Just about every entry included Reagan as one who would have announced by now, so in that regard everyone came out even.

Pulling away from the pack of aspiring oracles was Eric Williams (Des Moines, WA), who correctly named all seven persons who declared themselves candidates by September 30. Each candidate was worth ten points; those named who didn't declare were worth minus-five points. Williams included Reagan on his list, so that gave him a total of sixty-five points, five more than the next highest contestant.

The credit for $100 went toward *PFS:File*, which Williams picked up at his local dealer, Empire Electronics in Seattle.

For those keeping score, the seven candidates were all Democrats: former vice president Walter F. Mondale, former Florida Governor Reubin Askew, Senators Gary Hart of Colorado, Alan Cranston of California, John Glenn of Ohio, and Ernest F. Hollings of South Carolina, and former Senator George S. McGovern of South Dakota.

As we come down the stretch in this year-long contest, a select few are waging a neck-and-neck battle for the contest's coveted prize, a brand-new Apple IIe. Part six of the contest turned the race completely around, bringing some new faces into the spotlight while dropping some others.

Coming out of nowhere to take first place is Paul Shanberg (Moraga, CA), with eighty-eight points. Shanberg was accidentally omitted from the standings in the August issue, where he would have been third, with forty-three points. For the third time in a row, second place belongs to David Miles (Gillette, WY), with seventy-four points. John Estell (Maumee, OH) is third, with sixty-three points, and Gordon Bitko (East Brunswick, NJ) debuts in the top five with sixty-two points. Fifth place is held by a persistent Carl Webb (Vista, CA), with fifty-nine points.

In January we'll find out who wins the Apple IIe. It might be one of the five contestants mentioned here; it might not. Who knows?

Teenage Apples. The comment found most frequently in Reincarnation contest entries was that "most of your contests blow me out the door. Finally, here's a contest simple enough for me to enter! Thanks!" The second most frequent comment was that "this contest was a good idea, but it was much too easy. Make them more challenging in the future."

Whether the contest was too easy or just right, everyone seemed to be having a good time, so we'll probably see more logic puzzles of this type in the future.

In logic puzzles like the Reincarnation contest, you know whether or not the solution you've come up with is right because it's possible to check the solution against the given clues. With that in mind, the contest staff was sure that every entry received would be a correct one, assuming that people wouldn't send in incorrect entries.

Not so! Surprisingly, there were about the same number of incorrect entries as there were correct ones. And from the heap of correct entries (six and a half shovelfuls), Jeff Withum (University Park, PA) was yanked by the spleen from the infamous random number generator. Ouch!

Withum's prizes include Megahaus's *Megawriter*, Creative Computer Products's Kleertex templates for *Apple Writer II* and *VisiCalc*, and some blank disks to round out the $100 tab. All prizes were picked up at Designware in nearby State College, Pennsylvania.

In case you're still trying to figure out which computer became which person and what they did, the answers and solution are given at the end of this column.

Humble Pie. As we said earlier, there were quite a few contestants who felt that the Reincarnation contest was below the *Softalk* stan-

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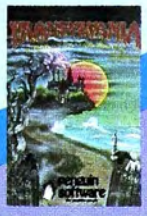
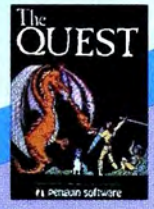
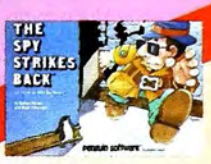






Arcade Fun

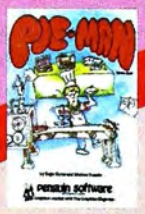














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dards and that it provided little challenge for them. "I solved this in fifteen minutes," "This was a cinch," and, "Too easy! Make 'em harder next time" typify comments made by many contestants.

Ironically, most of those who took the time to tell us how easy the contest was didn't take the time to double-check their entries. If they had, they might have gotten the correct solution. As it turned out, they ended up in the same pile as those who didn't know the difference between a word processing program and an arcade game (though some word processors behave like arcade games).

And Now, the News. As usual, contestants covered just about every age group and every occupation. They ranged from the Sisters of Saint Francis of the Holy Family in Dubuque, Iowa, to seven-year-old Michael Sussman of River Forest, Illinois (both submitted correct entries). There were a lot of college students who scribbled away madly to meet the October 11 deadline when they should have been studying for midterm examinations.

Workhorse of the month is Joe Basile (Naugatuck, CT), who wrote an eighteen-page Applesoft program (more than eight hundred lines of code) to solve the puzzle.

There were husband-and-wife teams and some who entered without their spouses. Prize selection usually tells the whole story of a couple's marriage. "I want to win a KoalaPad Touch Tablet for my hubby," wrote Kathy Miller (Irwin, PA). On the other side of things was Sue Hamilton (Central City, NE): "I wanna win cold, hard cash, 'cause if my husband wins, he'll just get some more junk for his computer."

There were the kiss-ups. "Please remind the random number generator of all them swell times he and I had back in the old days," wrote C.H. Simonds (Lakeville, CT).

Robert Hollister (Santa Barbara, CA) wrote, "Please tell the computer that runs the random number generator that if he could manage to pick my entry as the winner, there's a really cute word processor who'd just love to spend some time with him." Well, the RNG took a lot of offense to Hollister's remark because it was reincarnated as a female.

There were the beggars. "At the very least, can I have my name in *Softalk*?" and, "Even if I don't win, please mention my name in the magazine if my answer is right." Okay, you two have yourselves a deal.

There were the confused. "Is there any name for the detachable pieces of paper used to advance the paper in pin-feed printers? I call them phuzzies, but I doubt that this is an official name," says Leah Larkin (Lafayette, LA).

There were the proud. "The contest was so easy. I solved it before flight 554 got halfway from Nashville to Detroit," wrote Jim Bykowski (Falcon Heights, MN). From the looks of Bykowski's incorrect entry, it seems he should have kept flying.

Finally, there were the sobbers. For Paula Giese (Minneapolis, MN), winning this contest was "wishful thinking. The only time I ever won anything in a contest was when I was twelve. I won a musical instrument called a cocolele for writing some loathsome advertiser's limerick. It had an awful tone, and eventually a horse stepped on it."

Enough rambling for this month. Next time, we'll see who got the most treats and the fewest tricks.

Logically Speaking. And now, the solution to the I Was a Teenage Apple contest:

To follow along, set up five rows of five squares. In the top row, put in the names of the computers and fill in the answers as we go along.

Clue one tells us that the Lisa used to play fantasy games.

Clue two says the Cobol-speaking computer was divorced. Put this one aside for now.

Clue three tells us that the II Plus was engaged. He had a date with his fiancee.

Clue four says that the III programmed things in assembly language. SOS, which stands for sophisticated operating system, is the Apple III operating system.

Clue five lets us know the IIe spoke Cobol. Combined with clue two, this tells us that the IIe was divorced.

Clue six says several things. The II was divorced twice, and "saved games in progress" implies he used to play either adventure games or fantasy games. Since the Lisa plays fantasy games (clue one), the II must have been playing adventures.

Clue seven reveals that the single man didn't speak a high-level language. That means he didn't speak Basic, Pascal, Cobol, or Fortran. Therefore, he spoke assembly. Combined with clue four, we find out that the III is the single man. By elimination, this leaves the Lisa as the married person.

Clue eight, "The one who wrote in Pascal did a lot of word processing." Put this aside for the time being.

Clue nine lays out an order of computers. All it tells us is that the samurai warrior was a more sophisticated Apple than the comic, and that the lawyer was an earlier model Apple than the comic.

Clue ten tells us that the disc jockey played fantasy games (assuming *Ultima XII* is the same kind of game as *Ultimas I, II,* and *III*) and that it programmed in Basic (print and goto statements and for-next loops). Therefore, combined with clue one, we know that the Lisa, which spoke Basic, is now a disc jockey.

Clue eleven tells us the doctor didn't play adventure games. He was listening to someone else talk about taking inventory, collecting axes, and parsing f-words, which are all actions performed in adventure games. Combined with clue six, we know the doctor was not the II.

Clue twelve says the comic used to do database work (all his punch lines ended with "how many fields to sort" and other database phrases).

At this point, the only languages left unassigned are Pascal and Fortran, which must be either the II or the II Plus, since all the other computers have languages assigned to them. We know from clue eight that the Pascal speaker did word processing; we know from clue six that the II played adventure games. Therefore, the II Plus must have spoken Pascal and done word processing. Also, by elimination, the II spoke Fortran.

Now let's combine clues nine and eleven. We know the Lisa is the disc jockey and the II is not the doctor. This means the II is the samurai, the comic, or the lawyer. Clue nine lets us know that because the II is the earliest form of Apple, it can't be the comic (the lawyer is an earlier model than the comic) and it can't be the samurai (the samurai is more sophisticated than the comic). Therefore, the II must be the lawyer.

Three occupations and two applications are left to fill. Clue twelve says the comic did database work, so we know he couldn't have been the II Plus, which did word processing. That means the comic must be either the III or the IIe. Clue nine says the samurai was a more sophisticated Apple than the comic, so that makes the comic the IIe, and the samurai the III. The doctor must have been the II Plus.

Now that we know the comic was the IIe, we can fill in the IIe's application as database management, and the III's as arcade games.

The result:

The Lisa spoke Basic, played fantasy games, and became a married disc jockey.

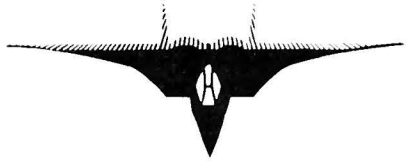
The III spoke assembly language, played arcade games, and later became a single samurai warrior.

The IIe spoke Cobol, ran database programs, and was reborn as a comic who got divorced.

The II Plus spoke Pascal, did word processing, and was reincarnated as a doctor who became engaged.

The II spoke Fortran, played adventure games, and became a lawyer who went through two divorces (he handled his own cases). ◻■

CARRIER COMBAT



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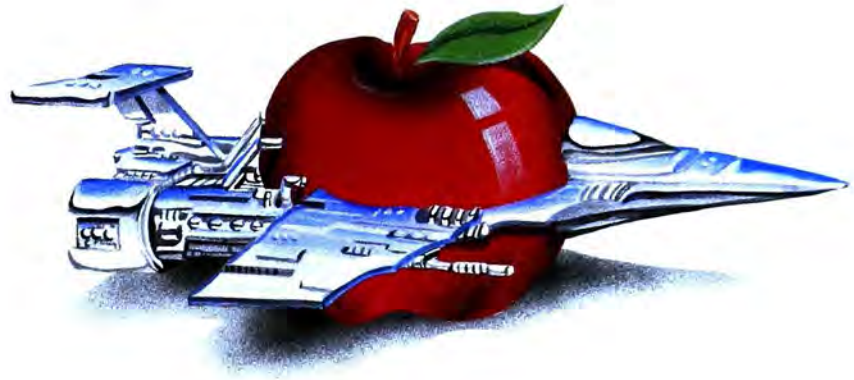



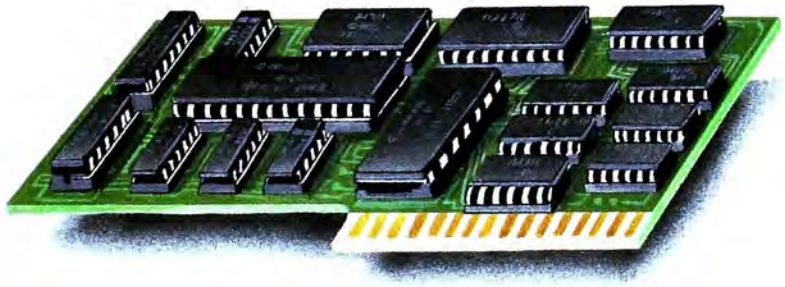

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Other entries in Fastalk are there either by virtue of current activity (the programs are selling at least as much as the least-selling entry on any of the bestseller charts) or because they are representative of the best of programs for a special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

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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, 830 4th Ave., Geneva, IL 60134. $19.95. *11/83.*

● **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 *Zork*s 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.*

Gruds in Space. Sommerville, Dudar. Solve puzzles, teleport to different planets while on mission to deliver fuel to stranded ship. Cute spacelings try to stop you. Challenging and frustrating. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *11/83.*

● **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.*

✓ **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, Edu-Ware. 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. *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, 830 4th Ave., 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.*

Secret Agent: Mission One. Ha ha, you're dead. Jor-And, Box 9180, Glendale, CA 91206. $32.95. *9/83.*

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Transylvania. Antiochia. Some of best graphics ever in a hi-res adventure. Excellent puzzles and logic—no unfair tricks. Enjoyable. Penguin, 830 4th Ave., Geneva, IL 60134. $34.95. *6/81.*

Witness. Galley. It's 1938, a society woman is dead, the killer is loose and may strike again. You have 12 hours to figure out whodunit before someone else takes the deep six. It may be you. 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.

Cdex Training for VisiCalc. Brandt. Self-contained Apple-assisted training program and reference guide for the #1 electronic spreadsheet. User-selectable information. Cdex, 5050 El Camino Rd., Los Altos, CA 94022. $49.95. *3/83.*

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flo, Box 7115, Murray, UT 84107. $59.95.

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

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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.*

✓ **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.*

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.*

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 11e. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $275.

PFS:File. Page, Roberts. User controls data in totally unstructured database. Up to 32 pages (screens) of information in each record. 11e 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 11e 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. 11e, 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.*

Videx Preboot VisiCalc. Prepares *VisiCalc* to run in 80 columns, u&lc. Advanced version uses mixture of existing memory cards. Videx, 897 N.W. Grant St., Corvallis, OR 97330. $49; advanced: $89.

● **VisiCalc.** Bricklin, Frankston. 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.*

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

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 111 and most lower-case adapters. Southeastern Software, 6414 Derbyshire Dr., New Orleans, LA 70126. $65. *7/81.*

Hayes Terminal Program. Standalone disk designed for the Micromodem 11 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 11 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.*

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

Missing Ring. Romine. Find wizard's missing ring alone or with the help of up to four independent characters. Task becomes more complex as number of players increases. Datamost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *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;



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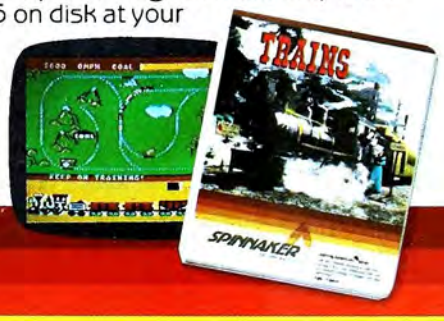

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first in hi-res; first to bargain with merchants; and more. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $17.50.

- **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.

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 mode; create 3-D figures and shape tables. Manual features complete outline of command structure. Penguin, 830 4th Ave., Geneva, IL 60134. $69.95; Apple Graphics Tablet version, $119.95. *7/81.*

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, 830 4th Ave., Geneva, IL 60134. $59.95; Apple Graphics Tablet version, $69.95. *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 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, 4962 El Camino Real, #125, Los Altos, CA 94022. $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

The Accountant. Forman. Simple-to-use double-entry finance system features seven integrated files and a set of automatic transactions. A sleeper just beginning to get wider distribution. Decision Support, 1438 Ironwood Dr., McLean, VA 22101. $129.95. *1/82.*

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 you 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.

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.

Health-Aide. Tracks food intake, exercise, and personal data on daily, monthly, or yearly basis. Calculates calories, helps plan menus, evaluates diet for nutritional requirements. Comprehensive. Knossos, 422 Redwood Ave., Corte Madera, CA 94925. $79.95. *10/83.*

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.*

Know Your Apple, Apple IIe. Visually oriented computer tutorials with manuals cover disks, drives, and peripherals. Models of clarity. Muse, 347 N. Charles St., Baltimore, MD 21201. *Know Your Apple*, $34.95; *Know Your Apple IIe*, $24.95. *Know Your Apple, 3/83.*

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.

✓ **Natural Family Planning Personal Charting Program.** Ringsmuth. Charts, stores daily information on womens' fertility signs. Includes both 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.

OpVal. Emmons. Stock option analyzer forecasts prices, tracks risk/reward potential, locates better trades. Receives market prices from Dow Jones or keyboard. CalcShop, Box 1231, W. Caldwell, NJ 07007. $250.

Personal Finance Manager. Gold, Software Dimensions. Handles 200 entries a month from 14 separate accounts. Search-sort-enter routine. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $75. *11/81.*

Personal Inventory. Benson. Organizes your home library, personal property for easy access to 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



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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.*

Real Estate Property Management. Thomas, Marlow. Helps real estate owners monitor the expenses and income generated by each property. Keeps track of security deposits, upcoming vacancies, slow-paying tenants; keeps accurate reports for tax purposes. Tomar Productions, Box 740871, Dallas, TX 75374. $49.45.

ThinkTank. Idea processor program allows you to see ideas in outline form. Outline can be collapsed to see the big picture or expanded to reveal hidden details. Living Video Text, 450 San Antonio Rd., #56, Palo Alto, CA 94306. $150. *8/81.*

Home-Arcade

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.*

Apple Cider Spider. Strand. Good but limited hopping and dodging game. Three preset levels. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $33.33. *9/83.*

● **Apple Panic.** Serki. Rid a five-story building of crawling apples and butterflies by running up and down connecting ladders, digging traps, then covering critters before they devour you. Extremely addictive, excellent hi-res play. 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.*

Axis Assassin. Field. Blast-away arcader that gives 3-D perspective of fighting grid, allows bottom-to-top movement. Twenty possible grids, five zones. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $35. *7/83.*

Aztec. Stephenson. Graphic fantasy arcade with animation throughout. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95. *1/83.*

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.*

Buzzard Bait. Ryeburn. Save the humans from man-eating buzzards in three-level shoot-'em-up-and-catch-'em. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *11/83.*

Caverns of Callisto. Chuckles. Arcade adventure by author of *Laf Pak* and *Lunar Leepers.* Retrieve stolen jet parts from cave-dwelling alien monsters. Origin Systems, 1902 Back Bay Ct., Box 58009, Houston, TX 77258. $34.95. *11/83.*

● **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.*

Cubit. Oswal. An adult, well-made interpretation of classic cube-hopping game. Clean-lined graphics; requires strategy. Micromax, 6868 Nancy Ridge Dr., San Diego, CA 92121. $39.95. *10/83.*

● **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. *10/81.*

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.

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.*

Jawbreaker 2. Bueche. No relation or resemblance to *Jawbreaker I* or Bueche's first. Very playable and addictive. Fun and refreshing. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34.95. *1/83.*

Lancaster. Harvey. Exciting play and fine graphics in colorful bug and bubble blasting shoot-'em-up. Silicon Valley Systems, 1625 El Camino Real, Belmont, CA 94002. $29.95. *10/83.*

The Last Gladiator. Field. Gross me out, like totally. Snakes, spiders, bats, lizards, octopi, vampires and you, the gladiator. Good but grody. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $35.

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.*

● **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.*

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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.*

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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.

Serpentine. Hypnotic snake-chase maze game. Clean action, thrills, hairy escapes. Recommended. Broderbund, 17 Paul Dr., Sacramento, CA 94903. $34.95. *10/82.*

● **Sneakers.** Turmell. Many-layered shooting game; one of the best. Stomping sneakers and other creatures requires 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.*

The Spy Strikes Back. Hardy, Pelczarski. Follow-up to *Spy's Demise* proves that sequels are sometimes better. This one's a sneak-and-hide game, technically impressive, challenging, and lots of fun. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95. *10/83.*

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.*

Stickybear Basketbounce. Worthington, Hefter, Worthington. Involving fun for the whole family features 16 challenging screens, a handsome bear, and no shooting, squishing, or hacking. Just dandy. Xerox Education Publications, 245 Long Hill Rd., Middletown, CT 06457. $39.95. *10/83.*

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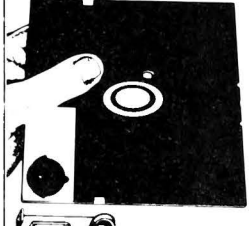

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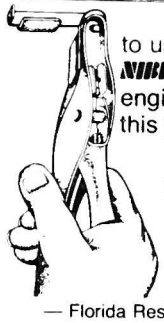

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Zaxxon. Garcia. 3-D scrolling air raid brought to the Apple with little sacrifice in playability. Datasoft, 9421 Winnetka Ave., Chatsworth, CA 91311. $39.95. *9/83.*

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Algebra 5-6. 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.*

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✓ **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.*

Bumble Plot. Grimm. Colorful musical introduction to concepts of graphing and plotting. Teaches positive and negative numbers. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $39.95. *1/83.*

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.

College Directions. Flanagan-Margolis, Gardner. Helps up to 20 students choose a college by exploring the features of more than 1,200 colleges. Assists students in developing a strategy for gaining admission. Systems Design Associates, 723 E. Kanawha Blvd., Charleston, WV 25301. $250. *11/83.*

Compu-Spell. Edu-Ware. 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.

Decimals. Edu-Ware. Master those elusive decimals. Eight programs including pretest and learning units directed at conversion, addition, subtraction, rounding off, multiplication, division, and percentage. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $39.95.

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.*

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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.*

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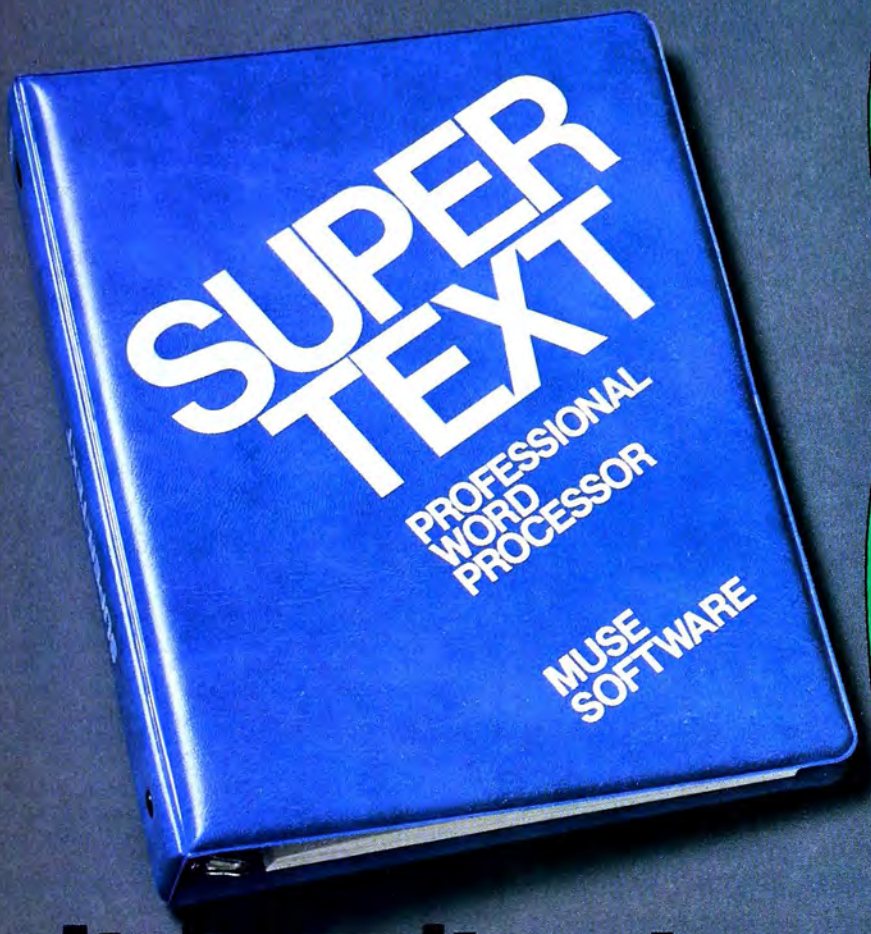



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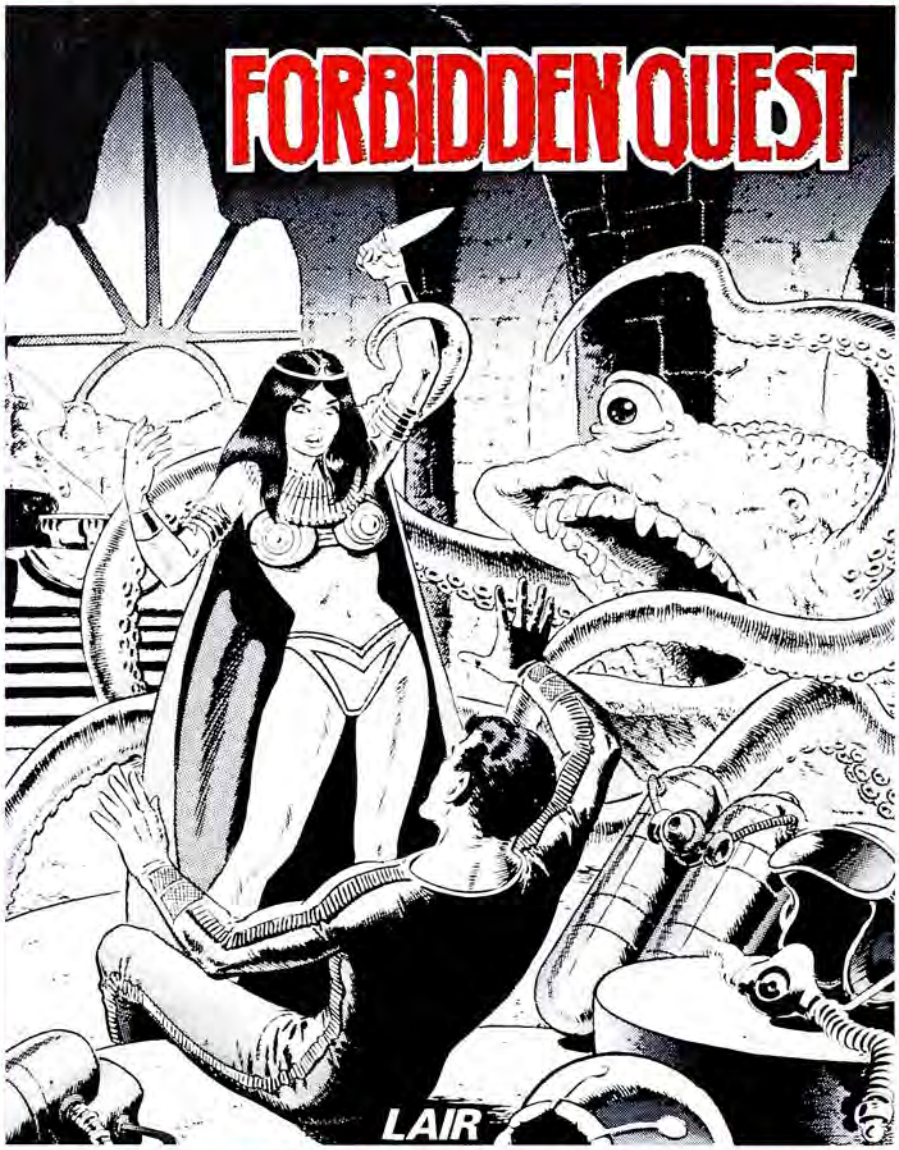

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Jenny of the Prairie. Stott, Ewell. Adventure designed specifically for girls ages seven through twelve involves a pioneer girl who gets separated from her family and must survive a winter alone. Rhiannon Computer Games for Girls, 3717 Titan Dr., Richmond, VA 23225. $34.95. *9/83.*

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Krell Logo. Concentrates on underlying principles of Logo; sections on assembly language interfaces and music creation, plus Alice in Logoland tutorial. Krell, 1320 Stony Brook Rd., Stony Brook, NY 11790. $149.95. *7/82.*

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Magic Spells. Grimm. Children ages 6 to 10 sharpen spelling skills by spelling and unscrambling words, creating their own spelling lists. Delightful. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $34.95. *11/82.*

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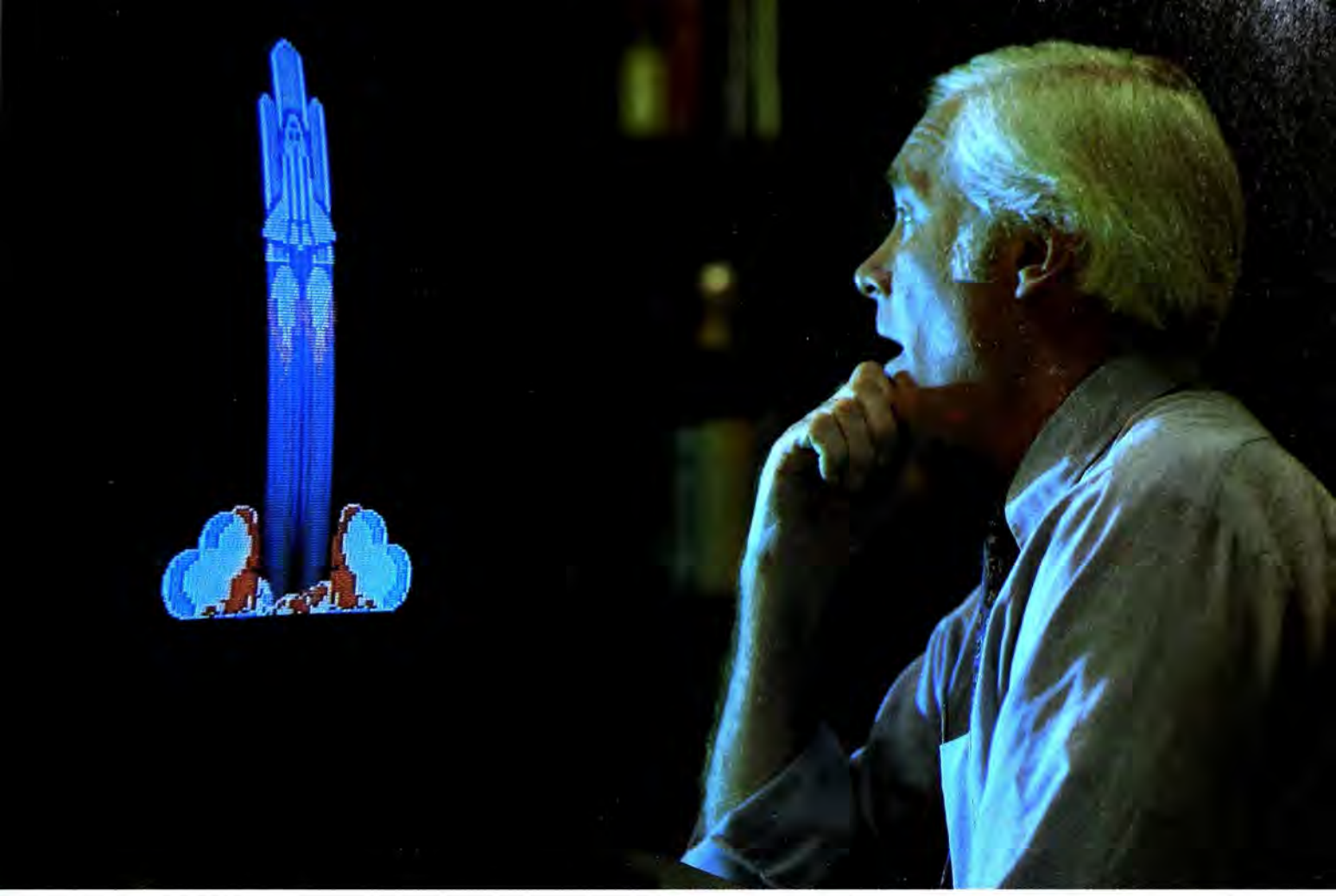

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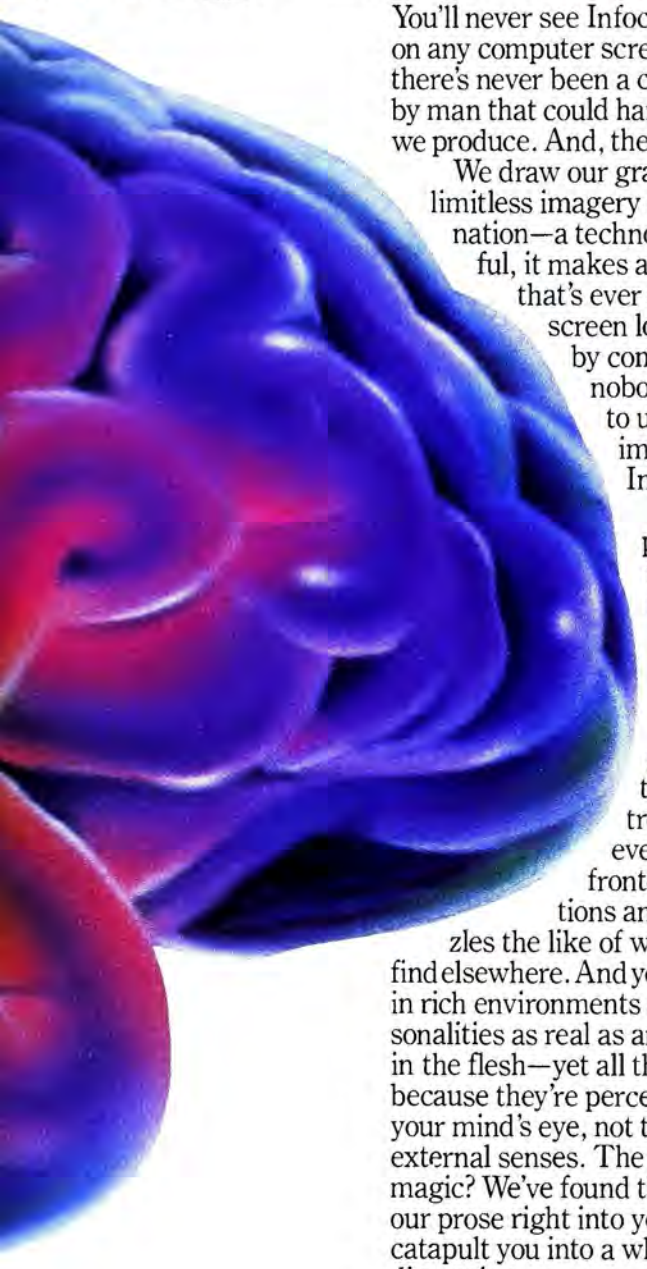

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✓ **The Scaredy-Cat.** Nidorf. Extremely well done digitized artwork illustrates animated children's book. Encourages kids to grow beyond fear. Psychological Psoftware, 4757 Sun Valley Rd., Del Mar, CA 92014. $29.50. *11/83.*

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.*

Spelling Bee Games. Edu-Ware. 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.*

Spotlight. CTW. Simple geometry for preteens. Games involve number estimation and angles of reflection. Good and fun. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50.

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. *5/83.*

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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.

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Strategy

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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.*

Broadsides. Garris. Re-creates famous naval battles from the days of sail. Plays in either arcade or strategy mode. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95.

Casino. Five hi-res games, Vegas style: blackjack, baccarat, keno, poker, and roulette. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95. *10/82.*

● **Castle Wolfenstein.** Warner. First game to fuse successfully strategy, home-arcade, fantasy. Escape from Nazi stronghold with secret plans. Room layout changes with each new game. Enemy speaks (in German). Muse, 347 N. Charles St., Baltimore, MD 21201. $29.95. *10/81.*

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Eagles. Raymond. World War I aviators climb, dive, shoot, run for home in historic aircraft. Be either German or Allied ace. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95. *11/83.*

● **Flight Simulator.** Artwick. Uses aerodynamic equations, airfoil characteristics for realistic take-off, flight, and landing. Two years on Top Thirty. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $33.50.

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Germany 1985. Keating. NATO forces tangle with Soviet troops in West Germany in the first act of SSI's *When Superpowers Collide* saga—accompanied by *RDF 1985* and *Baltic 1985*. Includes rulebook necessary for play of the other acts. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95. Others, $34.95. *4/83.*

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Hi-Res Computer Golf 2. A masterpiece; requires judgment, strategy, and visual acuity. One of the few computer sports simulations that require dexterity. Avant-Garde, Box 30160, Eugene, OR 97403. $34.95. *6/83.*

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North Atlantic '86. Grigsby. The Soviet Union has seized Europe. NATO has retreated to Iceland. Desperate land-sea-air strategy for one or two players. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95. *9/83.*

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Program X, the Ultimate Puzzle. Gips. Extremely challenging cryptography in brain teaser that lives up to its name. National Software, Box 686, Dover, MA 02030. $29.

✓ **Reach for the Stars.** Keating, Trout. Beautifully designed, detailed, complex interstellar strategy game with a fascinating wealth of alternatives. For one to four players. Strategic Studies Group, Ground Floor, 336 Pitt St., Sydney 2000, Australia. $50. *11/83.*

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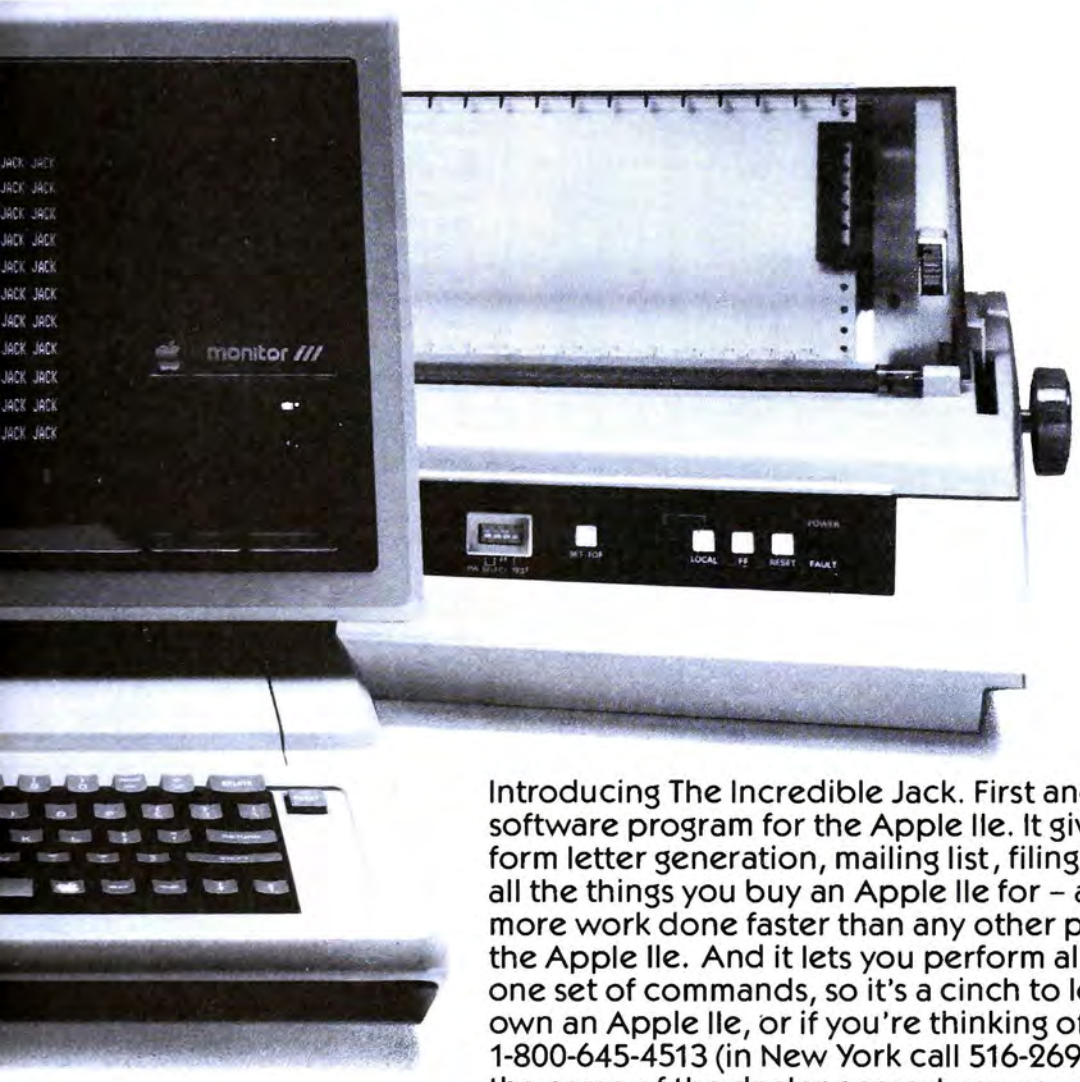

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ming. Muse, 347 N. Charles St., Baltimore, MD 21201. $39.95. *1/81.*

● **Sargon II.** Spracklen, Spracklen. Computer chess game with seven levels of play. Hayden, 600 Suffolk St., Lowell, MA 01853. $34.95.

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Apple Mechanic. Kersey. Multiple disk utility with shape editor, custom typefonts, byte rewriter, and tricks to facilitate music, text, and hi-res generation. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50. *9/82.*

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Apple Pascal. Structured operating system featuring enhancements of color graphics, sound generation, and Apple's I/O features. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $495.

Audex. Collection of utilities to create, edit, and play back sounds, in Basic and assembly language. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

Bag of Tricks. Worth, Lechner. Four utility programs for dumping and examining raw tracks, sector editing, reformatting tracks, and repairing damaged catalogs. Indispensable. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $39.95. *6/82.*

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.*

DOS Boss. Kersey, Cassidy. Utility to change DOS commands; customize catalog. Good ideas and witty presentation. Beagle Bros, 4315 Sierra Vista. San Diego, CA 92103. $24. *10/81.*

DOS 3.3. Increases disk storage capacity more than 20 percent over 3.2. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. $60.

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Einstein Compiler. Goodrow, Einstein. Translates Applesoft programs into machine language for run-time up to 20 times faster. Supports all graphics modes, defined functions, and DOS commands. Einstein, 11340 W. Olympic Blvd., Los Angeles, CA 90064. $129. *5/83.*

Flex Text. Simonsen. Adds graphics to text and vice versa; prints variable-width text with no hardware. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

Frame-Up. Weishaar. High-speed display utility generates professional presentations of graphics, text frames. Text screen editor lets you create text slides, add type live during shows. Optional preprogrammed display for unattended shows. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

● **Global Program Line Editor.** Enhanced version of *Program Line Editor* with programmable cursor and listing control. Edit line by line or by range of lines and search for strings. Beagle Bros., 4315 Sierra Vista, San Diego, CA 92103. $60. *12/82.*

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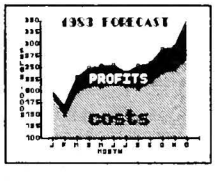



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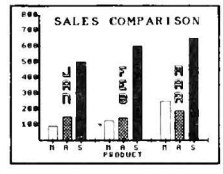

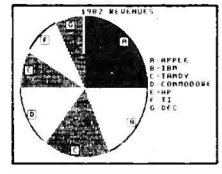

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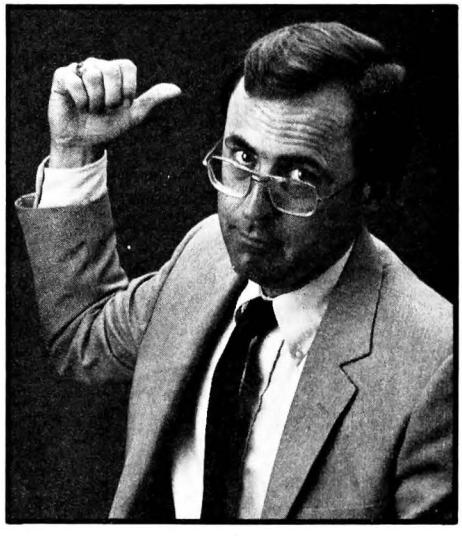

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with a dozen editing commands and 28 pseudo-ops. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $64.95. *1/83.*

ProntoDOS. Weishaar. High-speed disk utility cuts about two-thirds of the time off bload and save functions. Compatible with all DOS commands; frees up to 15 extra sectors per disk. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

Sphinx. Software giving single-pass encryption beyond 10 to the 400th power. Crane Hill, Box 273, Gonzalez, FL 32560. $37.50.

● **Super Disk Copy III.** Hartley. Easy-to-use menu-driven software utility; correct file sizes, undelete, free DOS tracks, more. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48003. $30. *10/81.*

Super Disk Labeller. Latona. Creates disk labels, configures with many printers. Requires little typing. Lakefront Software, 7754 Balboa Blvd., Van Nuys, CA 91406. $34.95.

Tip Disk #1. Kersey. One hundred *Beagle Tip Book* programs on disk. Includes Apple command chart and peeks/pokes chart. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $20.

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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Apple Writer II and **IIe.** Includes WPL (word processing language). Additional functions menu; continuing features and functions menu; continuous readout of characters and length. *IIe* has shift, shift-lock, and tab, four-arrow cursor control, and delete key; data files compatible with *II*. Apple, 20525 Mariani Ave., Cupertino, CA 95014. *II*, $150; *IIe*, $195.

Apple Writer II Preboot. Armstrong, Borgersen. Allows you to run *Apple Writer II* in 80-column format with the Videoterm 80-column card. Videx, 897 N.W. Grant Ave., Corvallis, OR 97330. $19.

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.

Lexicheck IIe. Spell-checking companion to *Word Juggler IIe* has 50,000-word vocabulary, room for auxiliary personal dictionary, features global replacement of misspelled words. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $129. Requires *Word Juggler IIe*, 128K. *10/83.*

Magic Window II. Forty, 70 (in hi-res) or 80 columns in this expanded version. Compatible with Pascal 80-column. With user-tailored, fast menu; underlining; global search and replace. IIe version uses all 64K, more if you have it. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95.

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.*

Pen-Pal. Moller, Moller. Small, friendly word processor that's particularly gentle with beginners. Includes almost every feature needed for manuscripts or correspondence. Howard W. Sams, 4300 W. 62nd St., Indianapolis, IN 46268. $59.95. *10/83.*

✓ **PFS:Write.** Edwards, Crain, Mitchell. 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.

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.*

● **Sensible Speller.** Hartley. Spell-checking program sports listable 85,000 words, extensible up to 110,000 words. Recognizes contractions, gives word counts, word incidence, number of unique words. Clear documentation and simplicity of operation. Works with many word processors' files. Best of breed. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $125. *11/82.*

Super-Text Professional (40/80). Automatic 80-column, u/lc on equipped IIe; with appropriate equipment on II Plus. On-screen formatting and help reference guides. Muse, 347 N. Charles St., Baltimore, MD 21201. $99. *12/82.*

Word Handler II. Elckman. 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.

Write Away. Stinson. Manages a mailing list, interfaces with *VisiCalc* DIF files, uses predefined macros. Includes five tutorials. Powerful and full-featured. Midwest Software Associates, Box 301. Saint Ann, MO 63074. $175. *10/83.*

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 time-sharing and standalone tasks; gives access to remote information services, minis, and mainframes. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

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gramming 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.

BPI General Accounting. BPI Systems. Includes *General Ledger, Accounts Receivable, Accounts Payable*, and *Payroll*. Maintains customer, employee, and vendor files; prints customer statements, checks. Analyzes budget, compares historic information, keeps independent financial records for 99 different departments and locations. Provides password protection for each company, can be maintained on one disk. Requires 256K Apple III, ProFile hard disk. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. $495.

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

Hardisk Accounting Series, 2.0. General ledger, accounts receivable, and accounts payable handle 32,776 customers or accounts; inventory features five methods of evaluation. Also payroll, management analysis, and mailing labels. Great Plains, 1701 S.W. 38th St., Fargo, ND 58102. $395 to $595 per module.

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.

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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 corporate wide 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. *10/83.*

VisiCalc III. Software Arts, Bricklin, Frankston. 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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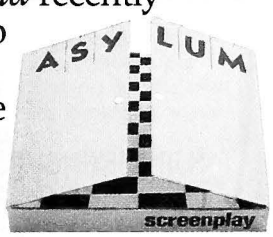

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Open Discussion gives you the chance to air your views and concerns, to seek answers to questions, to offer solutions or helpful suggestions, and to develop a rapport with other readers. It's what you make it, so share your thoughts, typed or printed, 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.*

Computer Survives Disaster

Many of the letters I've read in Open Discussion talk about the reliability of certain products. Recently both my hardware and software got the worst environmental testing that Mother Nature could possibly dish out.

On May 31 I was enjoying a quiet Memorial Day weekend at my in-laws' home in Farmington, Utah, when I heard the snapping and cracking of what sounded like a large bulldozer. Hurrying outside I saw a fifteen-foot wall of mud and rocks coming down the mountain, taking out everything in its path! Having rushed to get a program finished for a company I write software for, I had taken my entire system to Farmington. This included my Apple II Plus, monitor, disk drive, Epson MX-100 printer, and three hundred disks of software—not to mention all of my Apple manuals.

As the mountain came crashing down, I ran back into the house to get my two-month-old daughter. I put her in the car and, making one last attempt to save something, I ran back into the house. I grabbed my Apple, disk drive, and monitor all in one handful. I was unable to get anything more before the mudslide completely destroyed the 150-year-old rock house as I fled to safety.

Five days later, we were able to get back to the property to see what was left to salvage. There was nothing left standing of the house except one portion of a wall. The rest was either buried in fifteen feet of mud or crushed by giant boulders the size of cars. The roof was still intact but had shifted away from the rest of the house. While we were exploring under the roof, we found the microwave oven. As I was digging in the mud to get the oven, I found my Epson MX-100 completely buried in the mud under the microwave. It was pinned between the microwave and a rock, and the entire weight of the roof was on the microwave. We used a hydraulic jack to lift the roof away and remove the printer. The paper separator was mangled beyond recognition, the ribbon cartridge looked like it had been run through a shredder, the dust cover was shattered, and the power cord had been severed—not to mention that the whole thing was completely filled with mud. Thinking that I could do no worse, I took off the cover and squirted out the mud with a hose. Then I sprayed it with silicon to keep it from rusting.

A close examination revealed that both of the circuit cards had been broken into pieces, severing more than twenty circuit paths. I stripped the printer down to its barest essentials and began the painstaking task of cleaning every little component. I glued the circuit cards back together and resoldered all of the paths. The IC sockets were so corroded that I desoldered and replaced them. After installing a new power cord and fixing the last of the broken paths, I plugged it in, and to my surprise the crazy thing worked! (This letter was printed on that same MX-100!) I really must thank Epson for the quality of their printer. The insurance company said that a mudslide is an act of God; therefore they would not pay for anything, and there was no way I could afford to replace the printer given the cost.

Instead of ending this amazing story here, I must go on to explain that after two more weeks of searching we found all of my software. All of the disks were in pretty bad shape, being buried in the mud for two weeks. I took my disks home and turned the hose on them and then let them dry for a couple of weeks. Finally, when they were dry, I opened the plastic jackets and removed the disks. I cleaned off each disk with alcohol and put it back in a clean jacket from a new disk. Then I booted it up in my drive. I was able to recover almost all of the programs and copy them onto new disks. I haven't been able to afford to replace all three hundred disks as of yet, but it looks like after some time I will be able to recover about 85 percent of all my software. I can't give credit to any one disk company because I have a variety of different brands, which include Dysan, Verbatim, Scotch, and Control Data. I never did find the manuals for my Apple or my game paddles, but there is still a lot of mud left to search through.
Mike Ostler, Bountiful, UT

Strictly Okay

I would like to put in my plug for Strictly Software, because of a recent incident I had with them. I ordered a copy of Beagle Bros' *Double-Take* and found that the disk wouldn't boot. Strictly Software not only accepted my collect call but sent a new disk and paid for returning it by UPS as well. Then I found out that *Double-Take* and my *Program Line Editor* weren't compatible. I again called Strictly Software collect and they called Beagle Bros, got some information on how to patch *Double-Take*, and sent it to me. Strictly Software has my business from now on!
Rob C. Knauerhase I, Hilliard, OH

Eden's Repute

Permit me to be the first to take exception to Frank Hammers's misguided condemnation by association that appeared in the October Open Discussion. In that letter Mr. Hammers complimented *Softalk* on the lowered incidence of "advertisements for things like strip poker, Garden of Eden computers, and such."

While I share his distaste for the "and such," methinks his brush is too wide. After looking over the past six months of *Softalk* for evidence to justify Mr. Hammers's tarring of

the Garden of Eden, I've concluded that he regards the company logo showing a Disneyesque Eve and Adam as too, too. . . .

Try as I might, I just could not see the offense. I even searched Garden's free catalog for evidence of "strip poker . . . and such." Garden doesn't sell it.

What Garden of Eden does sell is the paper, word processor, and printer with which I write to *Softalk*. The store has earned my continuing trade for its consistently low prices and benefits generously extended to the two local computer clubs to which I belong. The store's ability to offer such prices depends in part upon reputation, which I feel Mr. Hammers's letter unfairly assails.

John R. Vallaster, Tustin, CA

Great Beginnings

I just wanted to say how pleased I am with one of *Softalk*'s contributing columnists, Matthew Yuen. I consider myself at a very low level of computer expertise. It takes a lot for me to pick things up as far as computer language goes. But the last four installments of Beginners' Corner have been incredibly easy to understand. Mr. Yuen writes in a way no textbook or Apple DOS handbook can. His articles have all been interesting, with a bit of humor and detailed explanations. I know I am probably asking a lot, but is Mr. Yuen planning a book for beginners? If so, send me one! I feel that a tutorial written by Matthew Yuen would benefit many other people greatly. My wife, who has never touched a computer before, asked me to explain to her what RAM and bytes and kilobytes meant. Well, who was I to tell her when I did not know myself? After reading the appropriate articles by Mr. Yuen, she understood perfectly.

Chuck Grubb, New York, NY

Lamentable Limerick Louse-up

At your contest announcement let's gander
Face it, folks, you have got up my dander!
With your phrases unkind
These words spring to mind:
Defamation . . . and libel . . . and slander!

Ballot box stuffing? Who are these people anyhow? What right do they have to call me names like this?! Why, those . . . no! I will not lower myself to their level with name calling.

H'lo, Stu? As my lawyer, I want you to define "ballot box stuffing." Yeah? Oh, yeah? Well, not only did I not send in more than one vote for myself, I never voted at all. Sure, George sent in a vote for me, but husbands are allowed to be prejudiced, aren't they? Yeah, I asked friends to vote for me, but the rules never said that was wrong. And I'm sure no one voted more than once.

Gee, Stu, I was so proud of being a finalist in a nationwide contest! Not a sweepstakes, mind you, but a contest where I felt I had to show some talent! So I stood up in front of the computer club and told 'em all about it. First I asked how many people there read *Softalk*, the magazine that ran the contest. Several people raised their hands. Then I stood there and gave the magazine a big plug (I probably increased their circulation, darn it). I told all the people who hadn't raised their hands that it was about the only magazine I read cover to cover. I told them about the contest and that I was one of the finalists. Then I asked if, after looking the limericks over, they could vote for me "in good conscience."

No, Stu, I don't really want to sue. I despise today's lawsuit mentality. But gosh, here I stand, your basic uptight, upright, Corn Belt, Bible Belt citizen, and I'm suddenly sorry I ever entered that contest. Oh, not because I didn't win. I would have liked to have won; at the time I even felt like a winner, being a finalist. If that was as far as I went, okay. But I do want my good name back.

From North, South, East, and West
The votes came in for the best.
And though a rule ne'er was broken
Softalk *has spoken*
Seeing crime that we hadn't guessed.

There's a reason for my deep, heartfelt shame.
I have cheated . . . or at least that's the claim.
What I told with pride
It was thought I should hide,
And for this you have dirtied my name.

My name—it's always been something I could point to with pride! I told my children, there were very few things in the world you could call your own. One was your integrity and another was your sense of humor. I don't feel at all like laughing about this. And I feel like my integrity was raped. What's next? Do I find that the *National Enquirer* has named me tax evader of the year?

And what about the other two people who were named? The lady who won threatened her students with failure. Humph! Who'd want to defend someone like that? But wait a second! People who write limericks are known to have a strange sense of humor. What would I have said if someone had called to tell me I'd won the contest—and by the way, how did I get that many votes? I'm perfectly capable of announcing flippantly, "I just told all my friends at the computer club that unless they wanted their homes TP'd they'd better vote for me." Well, it would be half true. I did ask for votes at the computer club. I wonder how well the facts were checked.

And then, of course, there's Mr. Sour Grapes. It's right to say that the matter of which limericks are best is a matter of opinion. Who's to say which limericks will have the widest public appeal? It's all very subjective.

Sounds to me like the contest editor at *Softalk* saved those sour grapes, squeezed them, fermented them, drank them, let them go to his head, and then let them run through his fingers. Come on, Nancy, think a bit more positively. Lofty thoughts, lofty thou. . . .

We should all give our thinking some loft.
Not just once in a while, but oft.
So please be advised
That as you've advertised
In your title, your talking is soft.

Assure me dear "softalk"ing folk
That those statements were just a bad joke,
By one out of line
Who'd had too much bad wine,
Or amazingly strange things to toke.

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Well, do I stand a chance of being heard by these people? Am I wasting my time trying to be decent and hold my head up at the same time? Will the editors admit that there might be two sides to this story, and that we might not be the nefarious creatures they painted for all America to see? Stay tuned, America! It ought to get interesting real soon.

I can't tell you just how much frustration
Comes from bad-mouthing across the nation.
But when all's said and done
This has been as much fun
As three months of nonstop constipation.

Nancy C. Docken, Minneapolis, MN

Nancy Docken has explained to me her side of the limerick contest story. What is upsetting to her is that she has been accused of "stuffing the ballot box" in her behalf, and I can't blame her for that.

Surely you must have realized that the potential for this existed when you invited your reading public to vote for their favorite limerick. I am not about to speculate on who might have stuffed the box for Nancy's limerick, or what the motive might have been. However, I assure you that the Nancy Docken I know would never do such a thing herself, nor would she condone anyone's doing it in her behalf. I have known her as a member of our congregation for a number of years. She and her husband were the principal youth group advisers for many years, and their influence was both appreciated and solicited. I sincerely hope the recent misunderstandings can be cleared up.

Otto A. Sotnak, pastor, Lake of the Isles Lutheran Church, Minneapolis, MN

When I read in the contest section of the September issue about voting for the best limerick and of all the attendant ballot box stuffing, bullying of voters, nepotism, griping from all quarters about the outcome, and Lord knows what all—there probably was pressure on some voters from the mob as well—it made me think of a bunch of children squabbling over a new toy. Too bad *Softalk* didn't give the contestants the chance to campaign and hold debates. I would have had a great time watching them scrambling around, digging up dirt on one another, slinging mud back and forth, and in general acting like children. Good sport, no?

Vincent Morton, Underhill, VT

The scatterbrained contest staff regrets that Docken took offense to the remark. Though many computer-generated ballots with the same handwriting, all mailed from the same post office on the same day, were sent in for Docken's limerick, Docken states that this devious act was not of her doing. And, of course, we believe her.

Nancy Docken is a law-abiding citizen who abhors such things as crooked voting. She didn't even vote for herself! The reference to Docken as a ballot box stuffer should be taken nonseriously. Her minister attests to her character and we accept this as the gospel truth.

Good Scientific Sense

As researchers working in humanistic and transpersonal psychology, we would like to take this opportunity to comment on Melissa Milich's article, "The Sixth Sense" (June *Softalk*), which discussed the study of ESP by Dr. Tart and his use of an Apple computer in his research efforts.

It seems to us that the article had three themes: the use of the Apple computer in a new area; the research and theoretical contributions of Dr. Tart to the philosophy of science and to the empirical investigations of ESP phenomena; and the scientific attitude toward, and empirical evidence supporting, the belief in ESP phenomena.

We heartily support the use of microcomputers in all research (as long as they are used in a humanistic fashion), including parapsychology, for they permit greater experimental control, assist in stimulus presentation, help with recording and scoring data, eliminate human error and bias, and reduce routine and drudgery. In this regard, we support the article's general orientation.

We are also in agreement with the important suggestions Dr. Tart has made in his book, *Transpersonal Psychologies*, regarding how science may have led us to make serious and erroneous assumptions about humans, their potential, and their relationship to the universe around them (such as the possibility that through the use of thought we can manipulate objects). Nonetheless, simply because science has made certain assumptions does not mean that the assumptions are wrong; nor does it mean that these alternative assumptions are correct.

Furthermore, it should be obvious that the advancements in physics, chemistry, medicine, as well as in computers, artificial intelligence, and programming theory have been the result of our current scientific and technological assumptions and not the outcome of belief in witches, flying saucers, auras, ghosts, or ESP. These latter concepts have been around for thousands of years and have added nothing to our accumulation of knowledge regarding the prediction or control of natural phenomena. They seem to act only as potential hypotheses for retesting in each new generation of believers. We suggest that, because of the lack of ESP research, many an experimenter testing ESP hypotheses has wasted time and money. In spite of this negative evaluation, however, we do applaud researchers and granting agencies who are willing to take on the sizable risk of investigating a difficult but testable area of research.

Our most serious disagreement with the article centers on the presentation of the concept of ESP. In our judgment the author creates the impression that ESP exists but we simply do not have the right tools and scientific method to get it out. This is an unjustifiable impression given the current state of ESP knowledge. In fact, we propose an alternative hypothesis well known to computer freaks: garbage in, garbage out. The same lack of understanding and bizarre results



can be generated in scientific research if you try to investigate a phenomenon that does not exist.

We certainly agree that there are numerous strange phenomena in the world around us, but we do not believe it wise to fall back automatically on paranormal explanations to understand what is happening. Scientists do not fear or avoid these topics, as the Milich article suggests; rather they have found, as we have through personal experience, that ESP occurrences are unreliable and difficult to validate. Moreover, it must be remembered that the vast majority of personal, cultural, and even scientific ideas about nature turn out to be wrong. There is no life on Venus, as pictured in ancient books; the sun is not eaten by a dragon during an eclipse, the earth is not carried by a large turtle in an ocean; and mental illness is not possession by the devil. While we certainly cannot disprove the existence of ESP, we believe that, given the frauds, mistakes, the natural phenomena involved, as well as the weak and inconsistent ESP research findings, the strong popular belief in these paranormal phenomena is misplaced.

It is our feeling that this positive attitude toward the paranormal, the occult, and the mysterious is partially the result of countless present-day movies and books such as *Chariots of the Gods*, *Psychic Discoveries behind the Iron Curtain*, and *The Bermuda Triangle*, all of which lead people to become less skeptical than normal. We would like to suggest that people read the following nonbestsellers, which present a totally different and, in our judgment, more accurate evaluation of the whole paranormal field: *The Psychology of Transcendence* by A. Neher, *Psychology of the Psychic* by D. Marks and R. Kammann, *Science and the Paranormal* by G. Abell and B. Singer, and *The Skeptical Inquirer*, a journal on paranormal phenomena.

Finally, we leave you with this small problem: We are going to adopt the belief that the reason your Apple computer works is because a little devil eats electricity, likes to live in a clean little house called a microprocessor, and gets mad and won't work when you send him letters (programs) that are not up to his spelling standards. Furthermore, we get to use circular arguments, ignore contradictory data, make our theory as complex as we like, create new concepts to explain away inconsistent results, and distort facts and overemphasize the importance of positive experimental results. It is now your job to conclusively disprove the existence of the little devil.

If you come to the conclusion that you cannot do so, you are right! In the same fashion, if you want to believe in ESP, as most people do, then you can always find some manner of explaining away the poor experimental findings. If you are willing to face the facts, however, you will eventually come to the conclusions that it is better to use the concepts of electricity or Boolean logic to explain computer phenomena and that it is better to use psychology, learning, and social interaction than ESP terms to explain human behavior.

James J. Forest, Sherrie Lipson, Department of Psychology, University of Manitoba, Winnipeg, Manitoba, Canada

A Closer Examination

I would like to follow up on the Lisa article by Roger Wagner and Joe Holt ("Lisa—Up Close and Personal," September 1983) with some comments on Lisa's virtual memory. The article overlooked a very real barrier to fully utilizing Lisa's virtual memory capability.

Although sixteen megabytes of space may sound rather magical to the legions of eight- and sixteen-bit micro users, virtual memory is not magic. As described in the article, virtual memory is only a process that manipulates memory images so that RAM appears (to the user and the processor) larger than it really is. But there must be some kind of auxiliary memory medium available to carry out that manipulation. And the size of RAM plus the auxiliary memory must be big enough to hold all of the used portions of the logical address space. Lisa's auxiliary memory device is Apple's five-megabyte ProFile Winchester disk.

The bottom line is that, while Lisa's architecture provides a sixteen-megabyte address space, it isn't nearly all usable in the presently available configuration. The five-megabyte ProFile (less the portion used for system and application software) plus one-megabyte RAM defines the maximum extent of usable virtual memory. (I don't know if Lisa allows using the two 0.8-megabyte "twiggies" to extend that, but it would be slow anyway.)

Lisa's thirty-two-bit processor, one-megabyte RAM, and other state-of-the-art features are certainly exciting—but don't get carried away just yet figuring out how to use all sixteen megabytes of address space. If Apple is really serious about touting Lisa as a sixteen-megabyte logical address space machine, it had better get

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serious about offering a fast twenty-megabyte Winchester disk as part of the deal.
Henry Burks, Dallas, TX

I eagerly read the Lisa article in the September *Softalk*, but when I got around to studying the accompanying pictures, I noticed something strange. In figure 12 on page 151 there is no left parenthesis above the 9 key. There is a right parenthesis above the 0, but the other parenthesis is missing. If you look carefully at figure 10 on the previous page, you'll notice it is missing there, too. To see if this was a one-time phenomenon, I started to look at the other reviews of the Lisa. I finally found a picture of the keyboard in another magazine. In the two pictures showing the Lisa keyboard, the left parenthesis is above the 9 key, but there is no asterisk above the 8 key. What gives? Is someone going around replacing normal keycaps with mutant keycaps? Is this another "feature" of the Lisa—nonphotographable keycaps? Please enlighten me. I personally believe it is either Apple's way of marking free Lisas or a silly photographic effect.
Richard H. Burns, Independence, MO

The pictures of Lisa in Softalk*'s article were of a prerelease model on loan from Apple. Since then, the keyboard has undergone some minor changes. Rest assured that production models have both the parenthesis and the asterisk. Another discrepancy you might run across is that early keyboards had a key marked "command" where the apple key is now.*

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Every week Softsel publishes a bestsellers sheet that presumably is the result of sales from some three thousand retail stores in all fifty states. *Softalk* publishes its monthly Bestsellers. Why is it that the two lists vary so much? Don't these stores give you guys the same information? The most obvious "error" is that *Softalk* has listed the *Apple Writer IIe* word processor as the nation's bestselling disk for the past several months, but it doesn't even appear among the top thirty-five business programs (where the word processors are listed) on Softsel's listing! Hey, what's the story? Who's screwed up, and why is there such a difference?
James C. Benton, Lake Bluff, IL

Softalk *and Softsel aren't reporting on the same kinds of sales, which is why their reports do not agree.* Softalk *measures only sales made to end users. Softsel measures only sales they make to retail stores. The obvious difference there is that, when an end user takes home a disk, it's his. When Softsel sells a disk to a retail store, they may get it returned.*

Second, Softsel is only a portion of the marketplace, albeit the biggest portion. Softalk *polls practically no stores that use Softsel as an exclusive source of supply. Most retail stores buy from more than one distributor and, in the cases where it's more practical, directly from the software publishers.* Softalk*'s numbers are therefore more inclusive.*

Third, Softsel is reporting all their sales of a given title in all markets. When they report Zaxxon*, for example, they are reporting Apple and Atari sales.* Softalk *measures only Apple sales.*

The final difference comes from the fact that Softsel doesn't carry every product. All they're reporting on is what they carry. In the specific instance you cite, Softsel is not authorized to carry Apple Writer*, so they don't report it. That doesn't change the fact that* Apple Writer *is outselling everything else.*

One last word: Don't be so anxious to impose order on an unorderly market. Both Softsel's and Softalk*'s numbers are accurate. But both are only reflections of the market from different perspectives. By observing the differences and understanding them, rather than being frustrated by them, the astute observer will come to understand more about the market dynamics than most of the so-called experts being quoted hither and yon in other journals these days.*

Striking Notes

Congratulations to Tom Weishaar on his September DOStalk article. It was most interesting, since I'm one of those considering use of *Diversi-DOS* to load DOS onto my language card. I usually have at least one short program between DOS and its buffers, and I use a slightly modified DOS. Therefore, the warning to commercial writers about finding DOS and himem, as well as watching error flags and restoration, struck a responsive note. It would be



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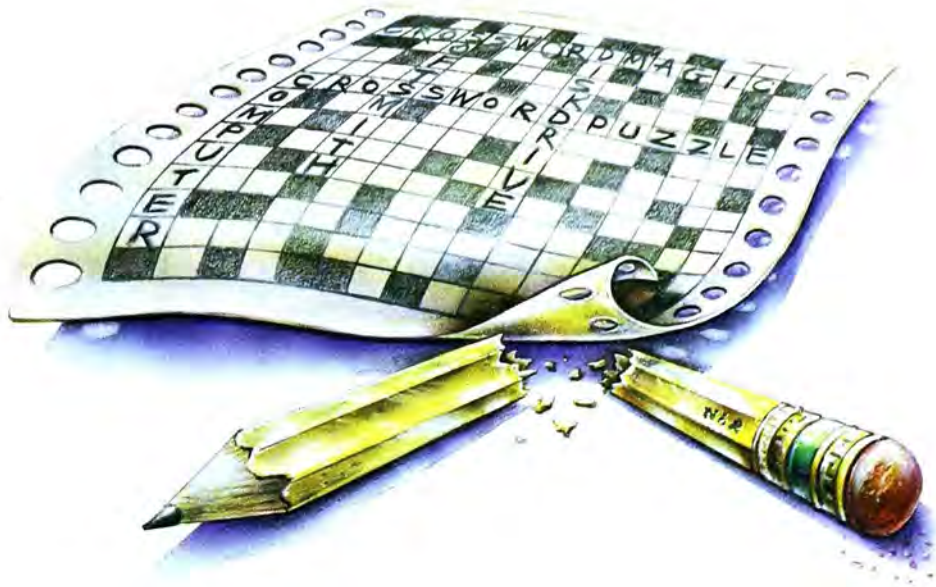

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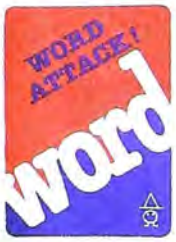

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appropriate, if it could be arranged, for every software house that is writing or nationally marketing assembly language programs to have these and similar rules carved in stone (or at least plastic) on their premises and included in some sort of prepublication check list. This would avoid "stuff" that might cause user problems from getting out the door and reflecting badly on the entire industry.

Old subject with perhaps a new twist: How about a real reader service card in *Softalk*? Limit the numbers of inquiries to perhaps three to five items and also have those requesting more information to briefly describe their equipment on a check list of some kind. The twist is that suppliers privileged to be included on such a card should be restricted to an elite few who agree to respond with hard information more fully describing their products, pointing out slot or communication card conflicts that might occur, and including information on what else is needed. No surprises!

It is frustrating to send back the standard bingo card from other magazines only to receive a photocopy of the original ad—when what you really wanted was hard information on which to base a buying decision. Too often the local dealer hasn't got the product in question and (unbelievably) knows less about it than you do.

I enjoy and look forward to *Softalk* each month. I do wish, however, that you would consider a second CP/M card column, only this time at the beginner's level. Also, how about an occasional guest columnist discussing Forth?

The new If Then Maybe column is a great addition. Keep it up! Relating to Tom Weishaar's response about the disk I/O problem (September issue), he is probably right about the shielding. I had similar problems with one drive. At first I thought it might be speed-related. The repair shop also failed to find any electrical or mechanical problem. At home again, after checking for possible low voltage at the outlets, I hooked up the system on the floor and tried again. It worked perfectly. It seems my newly repaired television set was now putting out more interference; so if I keep that drive about eighteen inches from the television, it works just fine. Maybe this experience will help others and save them a few dollars in unnecessary shop time.
Ralph C. Moredock, Campbell, CA

Ups and Downs in Pascal

After reading the letters concerning the use of Apple Pascal on the Apple IIe, I too would like to make a comment. I have been working in Pascal recently and I always felt it was a shame not to use the up and down arrows on my keyboard. After some searching in the very confusing and not very helpful mess known as the *Apple Pascal Operating System Reference Manual*, I realized that it could be done. Since external terminals may be configured for Apple Pascal, I realized that the key to my modification existed in the file System.Miscinfo, on Apple1:. To make Apple Pascal use the up and down arrows (control-K and control-J respectively), make the following change to your Apple1: copy (I don't suggest modifying your original): Change bytes $4E and $4F on track $09, sector

$01, from 0F0C to 0B0A.

Please note that the track and sector given are those for DOS 3.3 skewing, thus allowing the modification to be made with a sector editor designed for Basic. After all, not everyone has Zap and its Pascal option from *Bag of Tricks*. Also be prepared for the tremendous difficulty in breaking the control-O and control-H habit. I speak from experience.

Michael Yang, Williamsville, NY

A Clue to the Culprit

I have a question regarding the *Base Converter* program listed in the October Basic Solution. After loading the program, I found that I could not use the escape key (ASCII code 2) to return to the menu. It just wouldn't respond. I substituted "Hit M key to get Menu" and its ASCII code, which works just fine.

Can you give me a clue as to the reason the escape key won't work? I have an Apple IIe with the Apple eighty-column card and the Microsoft Z-80 SoftCard installed. I do use the escape key with the *Program Line Editor*, so I know it can work.

Duane Allman, New Berlin, WI

David Durkee responds:

Unless *PLE* intercepts escape codes (I tried it with *GPLE*, which turns out not to), the only thing I can think of is that your eighty-column firmware was on when you ran the program. With the eighty-column card active, escape turns on escape editing, even within a get statement! If this is what is happening, the cursor on the screen will turn into an inverse plus sign. To prevent this, add the statement:

```
5 PRINT CHR$(27); CHR$(17)
```

If this doesn't work, I can't imagine what the culprit could be. Leave it at "Hit M to get Menu."

David Durkee, Burbank, CA

More Contest

One of the contest answers in the September *Softalk* is inaccurate, if not incorrect (page 299, the answer to question 5a). The first Apple II reference manual was a conglomeration of Steve Wozniak's notes and assorted listings from engineering, though Chris Espinoza did write the authoritative and erudite second *Apple II Reference Manual*.

Bana Tognazzini, San Francisco, CA

The question in the June quiz was to name the work written by Christopher Espinoza, not to name the source of the first Apple reference manual.

Rank Response

As a rank beginner who had the misfortune of starting with an Apple III, I would like to comment on the letter from Julian LeRoi in the September Open Discussion. I find that throwing the letter out of the window is preferable to sending it to Apple. When one throws the letter out the window, one needn't put postage on it; anyone who has had this experience will find that the results are identical.

David L. Nelson, Racine, WI

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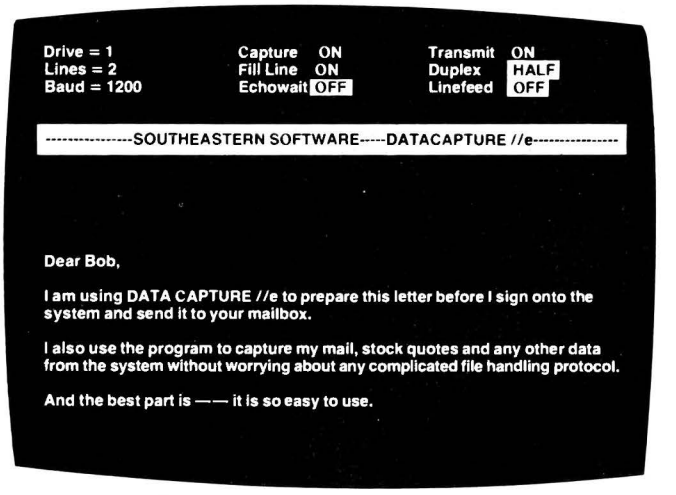

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More If Then

I would like to comment on some of the things that have appeared in the new column, If Then Maybe. First of all, about using both sides of disks: If you can use a hole punch, kits are absolutely useless. I may not be a computer-repair person, but I do have over one hundred disks. I use the back of every single disk I buy that does not have a program on it. Even though I have never used one of those disk head cleaners, and my disk drive is about three years old, I have never had a single disk go bad (without messing it up myself, that is). Also, the disks I use are not fancy; most of them are the cheapest I could find at the time I bought them. All are single sided and single density. So I would say that, unless your information is incredibly important, there is absolutely no problem with using both sides of any disk.

I'd also like to comment on Ed Melo's letter in the September If Then Maybe. *Word Handler* uses A-type files for all its data. This has its merits, I suppose. Another program can't accidentally mess up the files. However, this does pose problems when you try to use a spelling program with a *Word Handler* file: Forget it. The only way would be to change the files to text or binary in the VTOC, run the spelling program, and then change the files back. That is not worth the trouble.

Next, I would like to add to the list of software and hardware companies that have been praised; my contribution is Sir-tech. When I bought my *Knight of Diamonds* disk, I had many problems with it, but the main problem was very subtle and I wasn't sure whether the error had been there for a long time. I eventually sent in the disk with a letter describing the problem. I knew that there was usually a ten-dollar charge for replacing damaged disks, but I just crossed my fingers. What I got back was a brand-new disk—free of charge—which, by the way, was a newer version of the program than my old disk. Also included was a friendly, handwritten letter that fully explained the problem. So now that *Legacy of Llylgamyn* has been released, I have one thing to say: Don't give a second thought to after-sale support from the company.

Matthew Machlis, Temple City, CA

I just wanted to make a little addition to the comments made by Roy Hicks in the September If Then Maybe column. Hicks was answering a question on how to adjust an Apple Monitor III so that the display from a Videx Videoterm would not go off the screen.

I recently had a similar problem when I was shopping for a monitor, and I tried my Videoterm on a friend's Monitor III. The picture rolled off the screen slightly. I called up Videx and asked them whether the problem was due to the board or monitor. They replied that this problem occurs due to a small incompatibility between the Videoterm and the Monitor III. They also mentioned that if I decided to get a Monitor III, they could reburn the firmware chip on my Videoterm so that the display would be moved over. This would eliminate the need for messing with the controls on the Moinitor III. All I would need to do is send my firmware chip back to Videx, and they would reburn it and send it back to me—all at no cost! I think that this is just another example of great support from a great company.

Alex Maluta, Redondo Beach, CA

SoftGraph Mods

To David Durkee:

I have been running *SoftGraph* since last April and have found it to be one of the most useful programs in my file. I am using it to keep track of the high, low, close, and net asset value changes of my mutual funds with the line graphing function and the data editor. However, I have spent considerable time trying to incorporate an improvement with no success; perhaps you may be able to help.

As an example, I bought a fund at thirty-two dollars a share and it is now about thirty-seven dollars a share. When I try to graph the price-per-share movements (with the base at thirty dollars and the top at forty dollars) the high- and low-finder routine (lines 2950 through 3060) always sets the low Y at 0, thereby crowding the data at the top of the graph. (I realize that I could set the high Y at sixty dollars and get the data in the center of the graph, but the changes would be restricted to a very narrow range on such a large scale.) In this example, I would like to set the low Y at thirty dollars and go from there. I have tried setting LV at the initial V(Y,X) in line 2960, rearranging lines 3000 and 3010, and other modifications that either did not work or caused unwanted changes elsewhere.

Perhaps I'm asking for more sophistication than was originally intended in the program, but if you have a solution it would be super.

Paul M. Wood, Danvers, MA

David Durkee responds:

This has been an oft-requested change to *SoftGraph*. The code differences aren't that sophisticated, but it isn't as simple as changing the default value of zero for the low value to some value known to be included in the actual data, as you have tried. That is only part of the problem. There is also the consideration that zero was the assumed baseline for all graphs, meaning that the bars in bar charts start at the Y = 0 line, and a solid line is drawn at Y = 0 after the bars are plotted. The trick in allowing graphs in which the Y range doesn't include zero is assigning an alternate baseline value (BL) and substituting it for the zero in a number of equations.

BL will equal zero, if zero is within the Y range. If the whole Y range is greater than zero, BL will equal LY (the lowest Y value). If the Y range is entirely negative, BL will be equal to GY (the greatest Y value), meaning bars will extend from the top instead of the bottom. This emphasizes that the values are negative. Removing the new line 1296 will defeat this feature if you don't like it.

Here are the necessary changes. These should be typed in to the *Bar/Line Chart* program from the article in last April's issue. Some of the lines are new; some are modifications of old lines. If you've added your own changes to *Bar/Line Chart*, try to make these on an original

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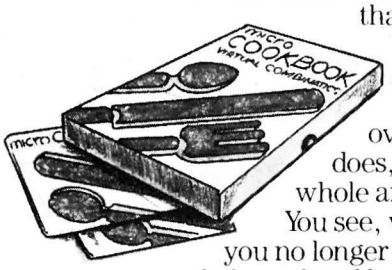

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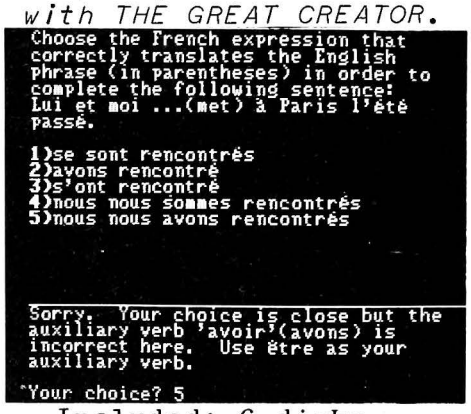

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version. If you must make the changes to a modified version, there is no guarantee that these changes won't interfere with your own:

```
1295  BL = 0: IF GY > 0 AND LY > 0
      THEN BL = LY
1296  IF GY < 0 AND LY < 0 THEN BL =
      GY
1600  HPLOT X1, FN Y(V(C,N)) TO X1, FN
      Y(BL)
1690  HPLOT X1, FN Y(V(C,N)) TO X1, FN
      Y(BL)
1730  FOR Y1 = FN Y(C(C,N)) TO FN Y(BL)
      STEP 2 * SGN (FN Y(BL) - FN Y(V
      (C,N)))
1770  HPLOT FN B(C + 1 - FX), FN Y(BL)
      TO FN B(C + 1 - FX), FNY(V(C,N))
      TO FN B(C + 1 - FX) + BW, FN
      Y(V(C,N)) TO FN B(C + 1 - FX) +
      BW, FN Y(BL)
1930  HCOLOR = 3: HPLOT YW, FN Y(BL)
      TO FN X(LX - FX + 1.5), FN Y(BL)
2955  X = 0
2960  X = X + 1: IF CT(X) = 3 THEN 2960
2965  LV = V(FX,X): GV = LV: LL = 0
```

David Durkee, Burbank, CA

Conveniently Copyable Data

First, I want to compliment David Chandler on his fine review of *Money Street* in the September issue of *Softalk*. A review can be so important for growing companies.

Second, I want to clear up one minor inaccuracy, which is really more our fault than Chandler's. He mentioned that our utility disk was necessary to copy data disks. We failed to make clear in our documentation that any track copy program, like *CopyA*, will copy our data disks. The copy program on the utility disk is for convenience.

Donald A Hill, Jr., program author, Bullseye Software, Incline Village, NV

Quote Unquote

In a letter in the October Open Discussion, I asked about the name of CHR$(96). It appeared in the magazine as a backslash, CHR$(92), whereas it should have been an alternate quotation mark (').

Jerry Van Cleeff, Montgomery, AL

I have been an Apple II Plus user for about a year and a half now, and I am always out to improve the hardware. I bought the Videx Videoterm and redefined most of the character fonts to my specifications. Now when I run *Apple Writer II*, everything looks real nice. I also made an inverse set. I recommend the Videx card to anyone serious about eighty columns. The customer service is the best!

To answer Jerry Van Cleeff (October Open Discussion): This is a tilde (~). This (|) is simply a vertical bar; it can be handy in text formatting. Lastly, the opposite of (/) is the backslash. *Apple Writer* cannot print the backslash because it is an underline command; (_) is an underscore!

Martin Veider, Camarillo, CA

Penguin's Improvements

Finally I get to give a simple answer to a simple question in Open Discussion! David Moore wrote a letter in the October issue asking about software available for the Houston Instrument Hipad. He even mentioned that he was looking for something like *Special Effects* or the *Complete Graphics System* from Penguin Software. Well, guess what! The new *Complete Graphics System* is actually a vastly improved combination of both the *Complete Graphics System* and *Special Effects*, and it works with paddles, joystick, trackball, Apple Graphics Tablet, Hipad, or KoalaPad—all in one version. (The stores should appreciate having to stock only one version instead of half a dozen.) Everything in the package has been modernized to make it a lot easier to use, from selection screens using icons to automatic packing of all graphic images. Users who own the *Complete Graphics System* and *Special Effects* should ask Penguin Software about updating their old versions. There is a fee that varies depending on what you currently have. Dealers should return any old stock for credit against the new versions. The way to identify the new version is that it's in a box, as opposed to flat packaging.

Back to the Hipad: The new version of *Graphics Magician* is also compatible with all the input devices listed above. There are no longer separate versions of it either, and updates are available.

Mark Pelczarski, Penguin Software, Geneva, IL

Write-up Request

We are in need of a CPA client write-up program for the Apple III. If any readers could suggest a couple, I would appreciate it.

Helen B. Faust, Birmingham, AL

Fishing for Facts on the *Factory*

I bought *Data Factory* version 4.0. I now have the 5.0 version but have never really used it. I feel it has uses I am not implementing. Any ideas or suggestions from readers about this program would be appreciated.

E.A. Jaksha, Omaha, NE

Legal Sleuth

I recently heard that a lawyer in California had developed software for the Apple that would prepare certain legal documents. Perhaps someone could provide some more information regarding this.

Thomas R. Leithauser, Saint Petersburg, FL

Count Your Blessings

I was moved by the October Backtalk that told of Leslie Evans and her Apple. I hope I am but one of many to respond. If Leslie can operate the computer, designing an on/off device that she can operate is simplicity itself. I can think of any number of simple relay devices that would allow her to control her Apple.

If there is a need, I will be happy to provide design and construction services, and I think it should be easy to get materials donated. Any donors among *Softalk* readers? Write me through Open Discussion. Let's get Leslie's Apple under her own direct control.

I would also like Leslie to know that I admire her spunk and her smile. She helps me realize how great my blessings and small my problems are.

Michael A.F. Mills, Aptos, CA

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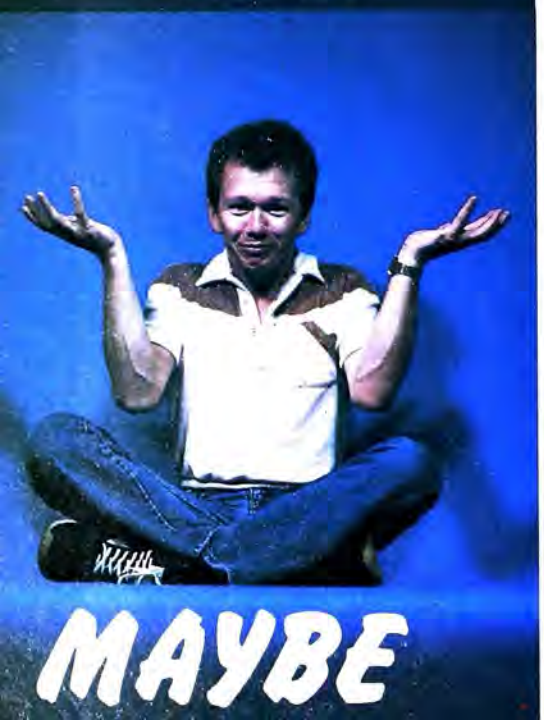

Softalk *to the rescue! If you've been stumped by something Apple, then take heart; maybe someone from the Softalk Applewise Guild and Experts' Syndicate can help. Choose an expert from among the likes of Doug Carlston, Bob Clardy, David Durkee, Roy Hicks, John Jeppson, Mark Pelczarski, Jock Root, Roger Wagner, Tom Weishaar, and Matthew Yuen. You can direct your questions, typed or printed, and double-spaced (please), to a specific expert or just write to this column. Send all letters to Softalk Sages, Box 60, North Hollywood, CA 91603. We can't answer questions about the products of specific vendors; instead, we recommend you contact them directly or see your dealer.*

IF I need help. I recently bought an Apple IIe, two drives, a dot-matrix printer, Thunderclock, and Hayes Micromodem. That was in March 1983. I'm still floundering on making my equipment function; I'm trying to learn. The manuals and the other books I have don't seem to cover things clearly. What do you recommend I do? Is there any disk with lessons that I can buy? Which disks do you recommend? *John Ricksen, Arden, NC*

THEN The first thing to do is to try getting help from the dealer who sold you your system. Though the dealer has little to gain by helping you, except your future business, some dealers are quite helpful when it comes to after-sale support. If that proves futile, the best place to start is with someone who once was in the same situation.

People with Apples like to band together in user groups. These are usually found wherever there are people with Apples. In other words, virtually everywhere. When user groups meet, members share Apple-related information in the form of help sessions, product demonstrations, and tips on how to do things better. This includes getting the most out of printers, clock cards, and modems. Computer dealers can sometimes recommend a local user group. Sometimes groups hold their meetings at the dealer's store; large groups sometimes meet in the local high school gymnasium.

If your dealer can't recommend a group, the International Apple Core (908 George Street, Santa Clara, CA 95050) can probably let you know of one of its member groups in your area. *Matthew Yuen*

IF A couple of issues ago Roger Wagner presented a hi-res character generator in his column. As I was going over some of my back issues, I saw an earlier program that gives the user 560 half pixels. Suddenly I realized it was probably possible to have eighty-column text. You would need to write a program to define shapes for use with the 560 half pixels. Then you could have the normal seven-by-eight Apple characters with eighty columns! *Jeff Cook, Arlington, VA*

THEN You're right! You can use the Apple hi-res screen to give more than a forty-column text display. The bad news is that you can't do eighty columns. The good news is that you can do seventy!

Here's why: On each line of the hi-res screen you've got forty bytes that hold all the data for every possible dot that can be illuminated. Since 7 bits are used in each byte (the eighth is not displayed), that gives a total of 280 bits (7 times 40) to store our information in. For seventy characters, we should allocate 4 bits (280/70) per character. Unfortunately, for eighty characters the result is 3.5 bits (280/80) per character. I know you're thinking that the 560-dot routine should somehow get around this, but the inescapable fact is that you can't avoid sharing a half bit each for two adjacent characters. Since you can't have a half bit, the last plotted character has the possibility of dominating that middle bit and thus distorting the first character. The 560 mode is possible, but remember it came with the warning that adjacent positions can affect each other. With seventy characters, each bit "knows" who it belongs to, so you don't have the obvious distortion pattern.

Mom always said not to believe authority (and since she was my mom, I *had* to believe her), so here's an experiment you can do to verify the 70/80 debate.

First, here's an Applesoft Basic program to type in. It uses the PLOT.560+ routine given in the July '82 installment of Assembly Lines. If you don't have that issue handy, then shame on

```
                        1  *.....................
                        2  *   HI-RES PLOT 560+   *
                        3  *                     *
                        4  *.....................
                        5  *
                        6  *
                        7          OBJ  $300
                        8          ORG  $300
                        9  *
                       10  CHKCOM  EOU  $DEBE
                       11  FRMNUM  EOU  $DD67
                       12  GETADR  EOU  $E752
                       13  LINNUM  EOU  $50
                       14  COMBYTE EOU  $E74C
                       15  *
                       16  X       EOU  $E0
                       17  *
                       18  HPLOT   EOU  $F457
                       19  COLBYTE EOU  $E4
                       20  HNDX    EOU  $E5
                       21  HBIT    EOU  $30
                       22  GBAS    EOU  $26
                       23  *
0300: 20 BE DE         24  ENTRY   JSR  CHKCOM
0303: 20 67 DD         25          JSR  FRMNUM
0306: 20 52 E7         26          JSR  GETADR
                       27  *
0309: 46 51            28  CALC    LSR  LINNUM+1
030B: 66 50            29          ROR  LINNUM
030D: A9 7F            30  CO      LDA  #$7F
030F: 85 E4            31          STA  COLBYTE
0311: 90 04            32          BCC  C1
0313: A9 FF            33          LDA  $SFF
0315: 85 E4            34          STA  COLBYTE
                       35  *
0317: A5 50            36  C1      LDA  LINNUM
0319: 85 E0            37          STA  X
031B: A5 51            38          LDA  LINNUM+1
031D: 85 E1            39          STA  X+1
                       40  *
031F: 20 4C E7         41  GETY    JSR  COMBYTE
0322: 8A               42          TXA
0323: A6 E0            43  PLOT    LDX  X
0325: A4 E1            44          LDY  X+1
0327: 20 57 F4         45          JSR  HPLOT
                       46  *
032A: A5 30            47  CHK     LDA  HBIT
032C: C9 C0            48          CMP  #$C0
032E: D0 11            49          BNE  DONE
0330: A4 E5            50  FIX     LDY  HNDX
0332: C8               51          INY
0333: B1 26            52          LDA  (GBAS),Y
0335: 24 E4            53          BIT  COLBYTE
0337: 30 04            54          BMI  HISET
0339: 29 7F            55  HICLR   AND  #$7F
033B: 10 02            56          BPL  STORE
033D: 09 80            57  HISET   ORA  #$80
033F: 91 26            58  STORE   STA  (GBAS),Y
                       59
0341: 60               60  DONE    RTS
```

you, but don't despair; the source listing is reprinted here for your convenience.

```
0   REM 80 CHAR EXPERIMENT
10  D$ = CHR$ (4)
20  PRINT D$;"BLOAD PLOT.560+,A$300"
30  HOME : HGR : VTAB 22
100  REM PLOT A CHARACTER
110  XINC = 7:Y = 20
120  FOR I = 0 TO (560 / XINC) - 1:X = I *
     XINC
130  PRINT I;" ";
140  RESTORE : READ A$
150  READ X1,Y1: IF X1 = 9 AND Y1 = 9
     THEN 180
160  CALL 768,X1 + X,Y1 + Y: GOTO 160
170  NEXT I: PRINT
180  IF XINC = 7 THEN XINC = 8:Y = 28:
     GOTO 120
190  END
1000  DATA "A",3,0,2,1,4,1,1,2,5,2
1010  DATA 1,3,5,3,1,4,2,4,3,4,4,4,5,4
1020  DATA 1,5,5,5,1,6,5,6,9,9
```

When you run this program, you should get two rows of letter A's: one with eighty characters per line, the other with seventy. The program also counts the characters it's printing at the bottom of the screen, so you won't get eyestrain counting all those little buggers. The data statement at the end of the program is just an X,Y data table of all the points in the letter "A" pattern. If you really want a challenge, rewrite the program in machine language or, better yet, come up with a bit-mapping seventy-character generator. *Roger Wagner*

IF I really enjoyed entering the final graphics program in Mark Pelczarski's series. However, I found that I needed to use the shift key to perform the functions of paddle 1. Could this be because I have modified my Apple II Plus for upper/lower case? Paddle 1 seems to be fine with other programs. *Heather D. Mayor, Houston, TX*

THEN Yes and no. (Don't you hate those kinds of answers?) "Yes," because the only way that the shift key could be mistaken for a paddle button is if a standard shift-key-mod wire were installed. The shift-key mod, as read by a number of Apple II Plus word processors, works by acting as button 2 (most joysticks and paddle sets use only buttons 0 and 1). The modifying of the typed characters to upper or lower case is done in software (see lines 20 through 140, especially line 40, of the program in IInd Grade Chats, October 1983, page 210, to see how this works).

"No," because chances are that there is an error in the code for the Graphically Speaking program as you typed it. Check line 292 of the listing against the magazine. This is where paddle 1 is read. If the address in the peek statement there is −16285 instead of −16286, that is where your problem is. Peek (−16286) reads button 1. Peek (−16285) reads button 2, or the shift-key mod.

The other possibility, and this is highly unlikely if your shift-key mod works with any of your programs, is that the modification wire is attached to the wrong line of the game I/O port. Examine it carefully: The wire should be connected to the fourth pin from the front of the computer on the right-hand side of the game connector. *David Durkee.*

IF I own an Apple III and I need a program for dumping the graphics screen to my Epson printer. How .GRAFIX is coded is a mystery to me. All I really need is an efficient way to read the grafix driver (black and white, hi-res) into any sort of array; I can handle the printer in its graphics mode. The *Pascal Programmer's Manual* suggests reading a sequence of successive pixels with UNITREAD(3,...,12). This seems wrong; it reads only one pixel. My programs using this take twenty-five minutes to print one screen. Also, by accident I found that SEPARATE is a forbidden identifier in Pascal. Is it a secret reserved word? *Harley Flanders, Boca Raton, FL*

THEN UNITREAD will return as many bytes from .GRAFIX as you request (up to 32K). Unfortunately, however, it is just reading the same pixel over and over again—the pixel at the current cursor position. According to the *Pascal Programmer's Manual* and the *Standard Device Drivers Manual,* UNITREAD should return successive pixels in a given direction on the screen, and you are supposed to be able to pick the direction with a command to the driver. But no such command is documented. We assume that this entire section simply never got written or debugged in time for publication.

There is a fairly quick way to move pixel information into a Pascal array. Just save the screen to a fotofile on disk with GSAVE and then move it back into an array with BLOCKREAD. It's clumsy, and you will have to figure out the storage scheme within the array, but it works. For real speed, however, the grafix dump should be an assembly module that directly reads the graphics memory area (with extended addressing) and immediately transfers the data to the printer driver by a SOS call.

You are absolutely right: SEPARATE is not allowed. Apparently it is an undocumented reserved word used at Pascal's system level. *John Jeppson*

IF My first question is about the USR (X) function in Applesoft. I would like to know the what, where, and how of this function.

In the September If Then Maybe column a question was raised about using the character fonts in ROM. The person answering stated that this couldn't be done because the chip with the fonts was separate from everything else. My question is, can't you use the CHRGET routine in the Apple to get these characters? The CHRGET routine is supposedly found at $00B1 through $00C8. This routine is used by Applesoft every time it wants another character. *Chuck Heatherly, Raleigh, NC*

THEN Regarding the USR(X) function of Applesoft, the simple answer is that the USR function is identical to a call 10 except that the expression in the parentheses is also evaluated and the result put in a part of memory called the floating point accumulator (FAC), which specifically corresponds to locations $9D through $A3. This is contrasted to a normal call statement, which just jumps to the memory address of your choice without processing any data from the Applesoft program unless you use your own special techniques. The USR function is in some ways more like the ampersand (&) function because it always jumps to the same location (1013 decimal for the &) and then expects to find a jump vector there. Like the call, the ampersand also has no provision for evaluating data following the ampersand, so the programmer must provide for this in his or her own routine. For the in-depth answers to the USR function and the finer points of call and ampersand statements, see the January, February, and November 1982 installments of *Softalk*'s Assembly Lines column.

The reason you can't use CHRGET (or anything else, for that matter) to read the character generator ROM is that, although the ROM is a digital device with readable addresses, none of those addresses are wired to the normal Apple memory address lines. In any given program you can examine only memory locations $0 through $FFFF. Because the character generator ROM is not wired into any of these locations, no program can see what the data in the ROM is. By the way, sorry about the length of that character set. It had to be that long to include the complete character set. *Roger Wagner* ■

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Box 60
North Hollywood, CA 91603
Attention: Linda McGuire Carter
(213) 980-5074

Utility

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The Scrambler prevents your disks from being Catalog'd, CopyA'd, FID'd, etc. For people who need password capabilities, a *complete password system* is included. Supports use of data disks. Menu driven. Send $28.95 to: *The Scrambler*, 127 Albany Ave. S.E., Orange City, IA 51041; (712) 737-2678. Send SASE for free information.

PASCAL UTILITY PACK

Use inverse and flashing text, access the disk directory, perform Filer K)runch and T)ransfer functions, use lo-res graphics and much more, *all through your own programs.* Written in UNITs so they're easy to use. Documentation, *source code included*: $24.95. MACH 2 SOFTWARE, 106 Fairfax Building, 43rd and Locust Sts., Philadelphia, PA 19104.

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Play real poker with your Apple II. You play against 4 computer gamblers who randomly bluff and sand-bag. PLAY BOTH DRAW AND STUD. Choose from 3 levels of betting. Options for saving a game and seeing all cards. Uses full graphics. Includes a casino style poker game. Needs 48K II+ or IIe. Send $24.95 to Excel Software, P.O. Box 240942, Charlotte, NC 28224.

AMPER-EXPANDER I

Have *fast* machine language routines in *your* Applesoft programs. *Input anything*—enter those commas & colons from keyboard or disk. *Print Using*—print those amounts. *Ring Bell. Clear to End of Line. Clear to End of Page. Swap Variables*—make fast sorts. *Music*—notes & noise. *If/Then/Else*—put the *else* back in the *if/then. Wait*—for specific time. *Wait Key*—time or key. *DOS Free Space.* $29.95+$2 ship. Apple II+, IIe, DOS 3.3.

ShadeTree Software
P.O. Box 12161, Columbia, SC 29211

64K/128K RAMDRIVE IIe

RAMDRIVE IIe is a fast disk emulation (up to 40 times) for all extended 80-column cards, including Applied Engineering's Memorymaster IIe. All DOS 3.3 and Apple Pascal 1.1 F(iler commands, double hi-res, and 80 columns will work. Features audio-visual access indicator, reinitialize directory ability, menu-driven documentation, and easy turnkey operation. Send $29.95: Precision Software, 6514 N. Fresno St., Milwaukee, WI 53224; (414) 353-1666.

EXXPAND-A-COMMAND with Amper-Magic. Add more commands to Applesoft without knowing any machine language. Add PRINT USING to your program. Vol. 1: 23 commands, $75. Vol. 2: 27 for $35. $2 shipping. Anthro-Digital, P.O. Box 1385, Pittsfield, MA 01202; (413) 448-8278.

DOCTOR DOS

Utility programs to improve the health of your disk. CREATE UNIQUE DOS COMMANDS AND ERROR MESSAGES. Help ailing catalogs. Implant undeletable lines and REM statements. Exhume deleted files. Delete tracks for limited COPYA protection. Edit tracks and sectors byte by byte. For II+ or IIe. Send $24.95 to Excel Software, Box 240942, Charlotte, NC 28224.

IIe PASCAL 1.1 RAMDISK

Turns extended 80-column card into a 126 block RAM disk drive. Speeds up compiling, editing. Easy to use; files remain after rebooting; uses only 13 bytes of main memory. Source code included! $16.95. David Neves, 2801 Monroe St., #2e, Madison, WI 53711; (608) 238-0020.

Word Processing

EPSON FX-80 GLOSSARY FOR APPLE WRITER IIe

Confused about getting all the FX-80 print options to work when using Apple Writer IIe? Our EPSON GLOSSARY makes it easy! Just load the file and use a 1 character command. Quality disk comes with glossary, sample AWII files, manual and free AWIIe "cheat sheet." $14.95+$1 shipping (NYS sales add sales tax). AEROCAL, Box 799, Huntington, NY 11743.

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The word processor for professional typists and non-typist professionals is now available on the APPLE II (CP/M) for the amazingly low introductory price of $59. **PC Magazine** (April) says: "Because of its excellent manual and logical integration of printing, file-handling, and editing, this package is a good choice for personal or small office use."

(603) 456-2111 VISA or MASTERCARD
Eastern Mountain Software, Warner, NH 03278

CHEAP'N EASY WORD

A no-frills word processor that will do most of your occasional jobs at a price everyone can afford. Send $9.95 plus $1.50 postage and handling. Coyote Ridge Software, 51649 Coyote Ridge Road, Oakhurst, CA 93644; (209) 683-5235.

APPLE WRITER II/IIe

Introducing FORM WRITER for use with Applewriter. Lets you create your own form letters in an easy to use menu format. Manual and 2 disks, $75. Manual only, $25. Specify type of machine. Software Associates, 177 Rodgers Quad, Bowling Green, OH 43403.

APPLE WRITER II USERS

Retrieve selected items from mailing lists or other small databases as done in database management programs. Utility disk includes programs and documentation to enhance list management and Epson glossaries. $14.95. Melzac, Box 21655, South Euclid, OH 44121.

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EXEC

From Sargon

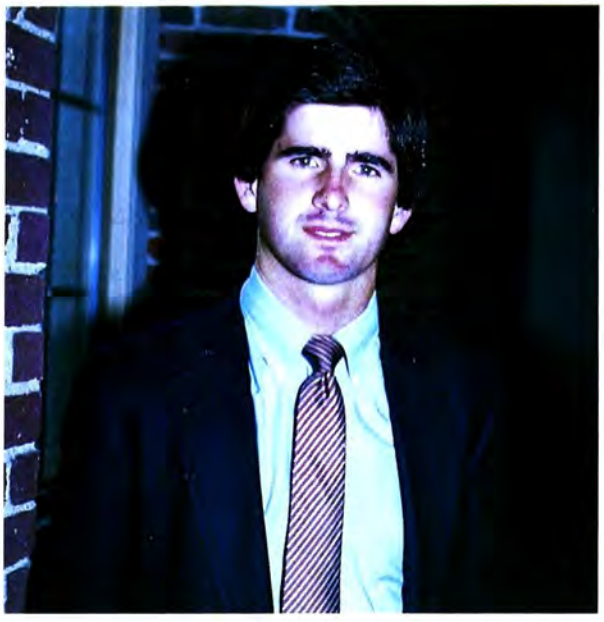


BY NORMAN

While the Computer Revolution may be an unprecedented force over on the Left Coast, such upheavals are old news in traditionally conservative New England. It is here, after all, that America's revolution was conceived and propagated, and, not long after, this corner of the country became the cradle of the Industrial Revolution. Manufacturing thrived, supplying the growing nation with everything from machine tools to armaments and later with the finer things of living, including quality tableware and woven cloth. Textiles in particular made efficient use of the Northeast's abundant water power, and mill towns that sprang up on the banks of every river came to be the economic hubs of the region.

It was in this setting that the first industrial software was employed, in an era before the 1849 Gold Rush had elevated California from

The Hayden team (clockwise from left): Bruce Lustig, director of business products; Bill Overholt, group director of commercial products; Oscar Rodriguez, president; Bruce Twickler, vice president of marketing; Scott





HAYDEN

to Sixteen Bits



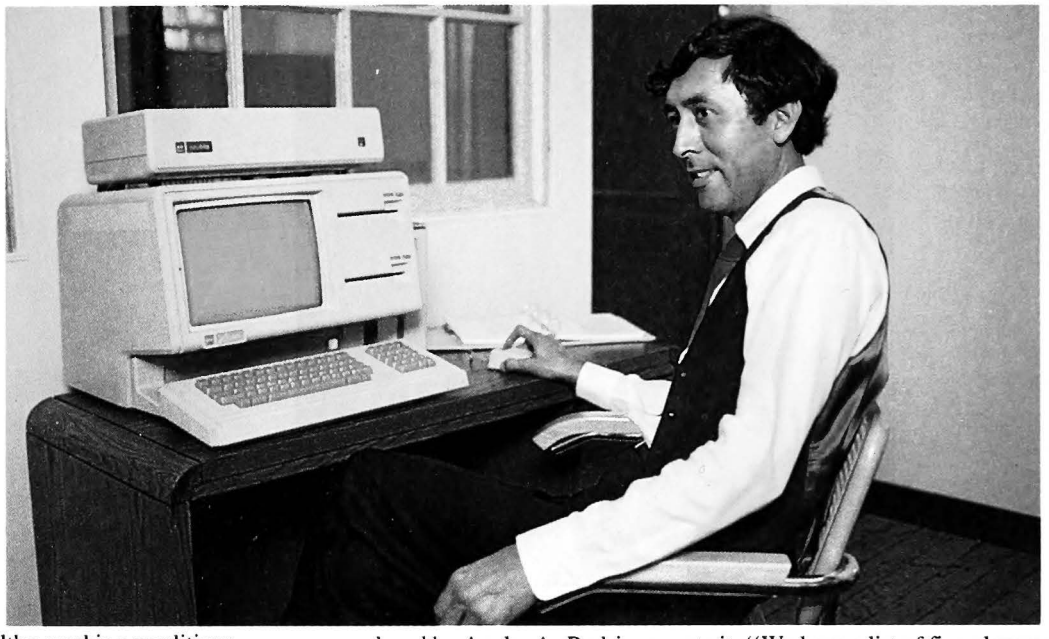
MAYERSOHN



frontier wilderness to an important population center. Borrowing technology from the mills of Europe, the early innovators in the Boston area used an ingenious punchcard device to program weaving patterns into their looms, dramatically reducing the amount of operator time and attention required to produce the raw material of clothing and upholstery. The mills themselves, even from our perspective a century and a half later, were remarkably advanced.

In the city of Lowell, Massachusetts, a system of canals was built to distribute better the forces of an eastward-flowing river, and along those canals a highly refined manufacturing center flourished. Enormous turbines, doubly driven by the fall and the flow of the river, powered miles of machines that converted cotton to cloth; through these came great ad-

Marshall, manager of marketing communications; David Eyes, director of technical products; Dick Leonard, product director for professional software; Gail Rothenberg, director of home software.



When he isn't challenging staffers to a round of squash, Hayden president Oscar Rodriguez works out on the company's Lisa.

vances in efficiency and in achieving healthy working conditions.

Home on the Technology Highway. It was to this setting that Oscar Rodriguez brought the newly formed Hayden Software Company in 1982. Nowadays, of course, the Boston area's driving force is brainpower, not water power. State Route 128 is billboarded as America's Technology Highway; that's not an overstatement, but simply a reflection of the many leading-edge, think-tank business concerns that are headquartered here.

Oscar Rodriguez holds the title of president at Hayden Software, but that hardly describes his role. He was chosen for the post when the software division separated from the parent, Hayden Book Company, a subsidiary of Hayden Publishing that had been involved in microcomputer software since 1979.

Rodriguez's first task in the creation of a front-line software company was to locate office space, and it was a refurbished textile mill along a canal of the Merrimack River that he chose as "the proper creative atmosphere." The city of Lowell is a bit removed from the bustle of Boston but still near enough to tap into the intelligence pool that flourishes throughout the collection of colleges and universities in the vicinity.

The challenge presented to Rodriguez was considerable—essentially, he was starting up a whole new software company with aspirations to become influential on every front of computer applications. Working from the basis of the original company's game offerings, Rodriguez expanded the product line to include professional, educational, business, and technical programs. That meant, for all practical purposes, forming a total of five companies to compete in an already hotly contested marketplace and making what Rodriguez terms "a breathtaking investment on the part of Hayden." Fortunately he did not come to this arena unprepared; he already held degrees in math and physics from the University of Texas, and an MBA from Harvard. Rodriguez's expertise in the field of computer science and his interest in artificial intelligence matters led to work as a consultant to Digital Equipment Corporation, and later he helped to found American Business Systems, which specializes in accounting software.

Rodriguez sums up his psyche and enthusiasm best with a revelation of his boyhood dreams. "You know, I always wished I had grown up in King Arthur's time—I would have looked great in armor. But now I realize that this is the perfect point in history, both exciting and fun. For me, this is Camelot."

Hayden Software's modus operandi reflects the transition of this industry from small companies funded from the dedicated pockets of computer buffs to a world of wealthy publicly held corporations. A staff of fifty operates the Lowell facility, but a great many of the research and development duties are carried out by "captive groups"—outside program suppliers who are working for an essentially guaranteed income on Hayden projects. Together with the in-house R&D and on-call authors, the company can produce enough software to keep a considerable sales staff on its toes. And much of that work is directed toward the hardware produced by Apple. As Rodriguez puts it, "We have a list of five players who we feel certain will survive in this business, and Apple is definitely on it. We are what we are today because of Apple, so we feel a special, close relationship with them. They cleared the path for us."

Under Pressure. The pressure of competition from the outside hardly rattles Hayden's president; really, it's what inspires him most. It even applies to the company's promotions—things like the $5,000 *Kamikaze* game contest held this year or the new dealer incentive program that could net a BMW automobile for workers who excel. In nonworking hours, Rodriguez's competitive urge is directed toward the game of squash, and there's a standing invitation for a round with every Hayden employee. "I think anyone would find it therapeutic to beat the boss at times," Rodriguez allows, but among the staffers it's hard to turn up anyone who has. His entirely infectious enthusiasm goes full throttle when the subject turns to the future of microcomputing, though, and the excitement is unmistakably genuine.

"Most important, computers will have to learn to deal with people. Anyone who thinks it is the people who must adapt is missing the boat. Delivery systems will expand to include telephone and satellite broadcast, and the 1985 marketplace is going past computers as tools to computers as decision-making partners, presenting alternative scenarios, not just performing calculator or data storage functions.

"Games will be moving into participatory fiction. We've already progressed from the simple maze game to the logical chess scheme, and with videodiscs the player can be an interactive participant—in effect, becoming a character in a story. The technology is close by. It might be too slow or too costly today, but that's only a temporary obstacle." To that end Hayden is actively recruiting expertise in the field of artificial intelligence and computer simulation, either to hire or to finance as a captive resource.

The wide range of Hayden's products and the enormous number of competitors make it especially appropriate that the company's head of marketing, Bruce Twickler, comes from the heady battleground of consumer electronics. Trekking back east from his former position at Pioneer Electronics, Twickler is all too aware of the consumer point of view and the fact that it often conflicts with that of some narrow-minded software producers.

"Our fundamental difference is our belief that the concept of *user-friendly* does not mean the user's willingness to tolerate complex procedures. We strive to make it easy for the user and to present the highest level of value."

Twickler's out-of-the-mainstream views are especially useful in an industry populated by so many enthusiasts that they often cannot see what the consumer needs, only what they can make the micro do. "We see no end to the technical development for at last five years, but we must direct our work toward utility. Better program performance is in reach with the newest machines, but does no good if people don't need it and won't pay for it." Suffice it to say that Bruce Twickler tries to keep Hayden pointed at what the market yearns for, rather than at the slickest



The personal, portable daisywheel printer.

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Transtar

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tricks that the program writers can dream up.

The Eyes Has It. David Eyes, Hayden's director of technical products, is a little past the point of being a prodigy, but he's the youngest visible member of the management team. Actually he's the company's most senior employee, dating back to its New Jersey origins, and his considerable mastery of the subject matter belies his limited formal training.

Dropping out of his college computer science course after two weeks, Eyes did not get infected with the computer virus until his mother bought an Apple four years ago. Already settled in the New York book-publishing world, Eyes began commuting to his mother's Apple on weekends, and his fascination with the device led him to apply it to his full-time vocation.

Perhaps because of his thorough technical understanding of them, Eyes is overwhelmingly sold on the superiority of Hayden products, patiently explaining their virtues to the most computer-shy listener. No doubt his New York University degree in English literature helps his communication abilities, even if most of his conversations are held with an Apple.

Eyes's biggest new project is a sixteen-bit processor for the Apple. In fact, Eyes is supervising the development of software for the processor, which is being developed by Bill Mensch of the Western Design Center in Mesa, Arizona.

Western Design Center recently released the 65C02, the first 6502-compatible processor to use CMOS technology. The 65C02 expanded the 6502 instruction set and added a few new addressing modes to the old set. The new chip is the 65816, which, together with the software being developed by Hayden, will bring enough power to the Apple II to give the IBM pc a serious run for its money, according to Eyes.

Sixteen bits refers to the amount of data that can be shuffled around in a single operation (that is, one machine language instruction). A sixteen-bit number is the equivalent of an integer from 0 to 65,535. By comparison, the 6502 can handle only eight bits in a single operation. Eight bits is the equivalent of an integer from 0 to 255. In order to handle larger numbers, the 6502 has to do things one byte at a time.

Stated simply, a one-instruction task on the 65816 would require two or more instructions to perform on the 6502. This means that, although the instruction set and addressing conventions will be the same on the 65816 as they are on the 6502, the sixteen-bit chip will be easier to program and will perform equivalent tasks more quickly.

The 65816 will actually go far beyond that. It is capable of dealing with twenty-four bit addresses through either a bank-register scheme or actual three-byte addresses. This translates into direct access of sixteen megabytes of memory, or 256 times the addressable storage of a 6502, and hence, of your Apple. Unfortunately, this feature renders the 65816 incompatible with the Apple and any other existing 6502 machine.

In Like Flint. Enter the 65802, with everything the 65816 has except the sixteen-megabyte capability. The 65802 can replace the 6502 in a standard Apple II. When initially powered up, an Apple with this chip installed will act like an Apple with a 6502; all the old software will still run. However, there's an unused bit in the 6502 processor status register, and there are several unused op-codes in its instruction repertoire. With the 65802, the previously unused bit is used to indicate sixteen-bit status. So any current instruction affecting the accumulator or either of the index registers can be made to handle sixteen bits of data at a time instead of just eight. In addition, several new instructions and addressing modes will be available. Among the most exciting of these is a single instruction to move an entire range of memory from one location to another.

Assembly language programmers will recognize the wide range of opportunities this chip opens up. What it means for the typical Apple user won't be clear, however, until there's software on the market to take advantage of the power of the new chip.

This is where Hayden and Eyes come in. Hayden's assembler, *ORCA/M*, is being revamped to generate code for the 65802. Starting early next year, it will begin to run under Apple's ProDOS as part of a new package called *ORCA* (Object Relocatable Code Assembler) *HOST* (Hayden Operating System Tools). *HOST* provides an MS-DOS-like command level for ProDOS and a set of tools to be used in software development.

The *HOST* tools will include a full text editor, code generators, disk utilities that act like an extended *Fid*, a symbolic code debugger, and other utilities. Hayden plans to use the text editor from *PIE Writer* as the *HOST* editor; as *HOST* will eventually play host to new versions of Pascal and Basic, in addition to the *ORCA/M* assembler, this will be the first time Apple programmers will be able to use the same editor that they use for word processing for a variety of programming languages. A text formatting and printing program to complete the word processing package will be available as a separate item.

Talking Heads. Throughout the company, the various departments are headed by involved individuals charged with a personal mission. One such individual is Gail Rothenberg, director of the home software group, which covers the games and educational programs. Another is marketing communications manager Scott Marshall.

"Hayden aims to provide substantive learning in our educational software—not simply play, but challenges to memory and intelligence," says Marshall. The same goes for the games division. We intend to provide more cerebral products, with strategy as the cornerstone."

Hayden's commercial products group manager, Bill Overholt, is responsible for the direction of business and professional software. Overholt is dedicated to supplying consumers with what they need without requiring that they buy capabilities they have little use for. To get Bill Overholt excited, you'll have to start talking low-priced, high-function productivity tools for the casual user—in other words, sensible software applicable to the average home micro user who has no desire for a corporate accounting system.

While it would seem that there are already enough accounting programs to cover anyone's needs, Hayden has gone in the other direction, simplifying rather than complicating. Bringing accounting and marketing experience with him, business products manager Bruce Lustig did an internship at Wang before landing at Hayden. "We're after first-time users, giving them a sophisticated but flexible system that mimics the simplest manual accounting methods," says Lustig. That also includes the development of industry-specific systems, tailored precisely to the needs of the business owner without the excess complications found in general accounting programs.

Professional software product manager Dick Leonard is typical of Hayden Software's atypical management team. A man who'd be just as comfortable as the corporate pilot or ski instructor, Leonard, a biologist by training, is charged with the responsibility of eliminating every bit of inefficiency from the company's products before they go out the door. The time-is-money axiom really hits home for this man—eighteen dollars an hour for simulator flight time at the airport versus a one-time cost of thirty-four dollars for a simulator program is one juicy example of how today's microcomputer revolution can come home to people no matter what their avocations.

Pie Talker. Soft-spoken to the point of sometimes being hard to hear, Rodriguez is nonetheless confident of his mastery of the turf. Clearly recalling the beginnings of the software business as a cottage industry, Rodriguez believes that things are very different today. "We're getting more like the record industry. Marketing and merchandising capital requirements are high, so it's no longer so easy for newcomers to break in. Most of the other companies are single-product-based, but Hayden has the edge in being broad-based." As company president, and now a step removed from the hands-on involvement of his earlier ventures, Rodriguez sees Hayden's future closely tied to building consumer awareness.

"A recognizable brand identity, fostered by advertising, packaging, and promotions, will be vital for survival as consolidation hits the software world and the less prepared companies disappear," he says. "In the late 1970s, there was a large, friendly fraternity of program writers, but today the stakes are much higher. No longer is it good enough simply to have one good product."

From the president's desk, Rodriguez sees that perhaps twenty companies account for 95 percent of the market, and that field will narrow as user profiles mature from enthusiasts to everyday folks who need the utility a computer offers.

The principals of Hayden Software are as aware as any astute observer that, although market penetration of computers will continue to grow, the number of sources for both hardware and software will diminish as the boom reaches a point of saturation. Hayden's broad base of attack, on every front, ought to go a long way toward making the company what marketing communications manager Scott Marshall calls "the Sears of software." ■

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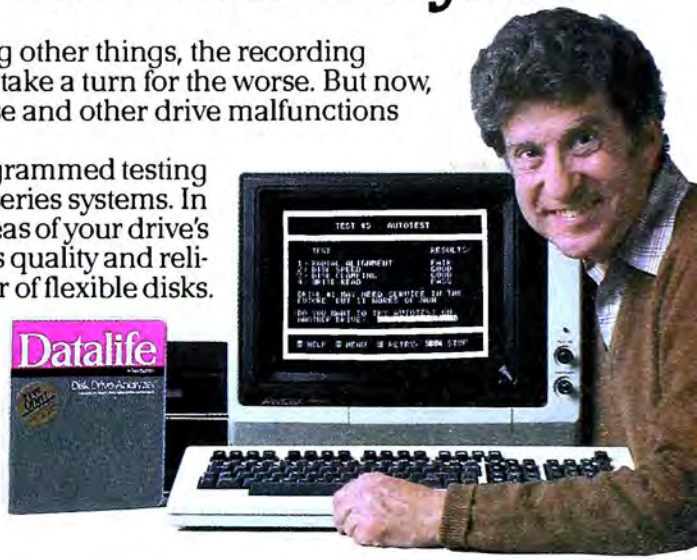

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Mind Your Business

BY PETER OLIVIERI



Here it is December—holiday time and time to consider what gifts to get for your friends, your loved ones, your Apple, and yourself. There are lots of goodies for the Apple that make good presents. Can you think of items you'd like to buy as Christmas gifts? If so, don't just put them on your shopping list and forget about them; order them today.

If you're like most people, items you put on a list too often stay on that list or wind up on some other, more elaborate list. Some people even have lists that refer to other lists. To put things in a computer context, you might say that these people have trouble managing their data. That's what this month's column is all about—managing data. We first discussed database management systems some time ago. Enough has changed since then, however, to warrant additional coverage.

Stick with Lists. Why not just stick with lists, you ask? Why bother involving the computer? Well, if you have a list of moderate size, the computer can do a lot better job of managing the data than can any human being. And if some of your lists refer to other lists, and those lists to still others, keeping track of the available information from various lists becomes an almost impossible task without computer assistance. (Actually, lists is probably not the right term here. We should actually be talking about *files*, since most of our data needs can take this form.)

Most organizations need information, not just data. Data is simply some grouping of letters and numbers stored together in some form. Once some action designed to affect the data is taken—once it has been organized, sorted, summarized, classified, and/or manipulated—data becomes information. And it is information that drives most businesses. Managers rely on it to contact customers, prepare financial reports, forecast the business environment, keep track of inventory, and much more. Thus, there are two concepts to consider when dealing with data: how to record it, and how to process it so that it becomes information.

In most organizations, raw data is kept in file cabinets. One cabinet may hold personnel records, another may contain detailed information about customers, a third might hold financial data, and a fourth might contain information about the products in inventory. This collective set of file cabinets could be called a *database*. In fact, such a collection of data could rightfully have been called a database long before computers came along. Yet it is only since the arrival of computers that many of the terms we'll discuss here have come into common use.

Say we have a database for a hypothetical company. Our database contains files of personnel records, customer and financial data, and information about the products in inventory. If you were to open a file, such as the customer file, and withdraw one of the file folders, you'd be accessing one of the *records* in that file. A record contains all the information about one member of the file. Looking at the record more closely, you might notice the professional title of the individual whose record you were examining. That item (the job title) would be called a *field*.

These terms—database, file, record, and field—are used in reference to database programs that have been developed for computer users. Such programs constitute *database management systems* (often abbreviated DBMS).

General Expectations. A database management system is a collection of programs designed to allow computer users to manage their data. Usually, the fact that a DBMS is a collection of programs, rather than a single program, is transparent to users—that is, it seems to most that the package is a single program capable of performing all necessary tasks.

As we touched on last time, there are certain capabilities a database management system must have if it is to be worthy of the name.

1. The system must provide a way of creating a database: A file must be designed and named, disk space must be prepared, and initial data must be entered.

2. There must be a provision for adding new members (records) to the database at any time. (After all, our business will probably get some new customers after the original database has been created.) Similarly, the system must provide a way to delete records from the database.

3. Since there will always be changes, it must be possible to change any item in a file. Any field might, at some time or another, be a candidate for change.

4. Since data is of little use until it is recalled, the system must provide the user with a variety of ways to search through the database looking for particular records. As the sophistication of a database increases, so does the variety of ways in which data can be retrieved.

5. For data to become meaningful information, it must usually be manipulated and formatted into a report. Thus, we would expect a database management system to provide us with the ability to generate a variety of user-defined reports.

6. Maintaining only the original database is a very risky business. A database management system must therefore provide some means of making copies of all the files being used. Many systems have a copy facility allowing the user to make a backup copy of the database at any time.

In summary, a database management system should be able to create, add, delete, update, search, report, and copy.

More Data for Your Mental Database. The preceding discussion should give you a pretty good idea of what a database is and what general features it should have. However, several other terms you might encounter in your travels around Databaseland are worthy of mention.

A *file management system* can be distinguished from a database management system in that the former simply contains independent records that relate neither to one another nor to those in any other file. A list of customers' names and addresses might be considered an example of a file management system. A database management system, by contrast, manipulates files; thus, data in one file of a DBMS may point to or relate to data in another file.

The database in a database management system may be one of (or some combination of) three basic types.

A *hierarchical database* is structured much like a topical outline; it has various levels of data. For example, a hierarchical database for a company might divide that company into departments. The department files might in turn contain another level of information on the products manufactured by each department.

A *network database* offers some flexibility not available in the hierarchical design. In this system, additional "pointers" are inserted that create additional relationships between data items. Search criteria can then go beyond the limited boundaries provided by the hierarchical design, allowing the user to establish linkages of interest. To illustrate the kind of flexibility a network database makes available, let's return to our earlier example using departments and products. Instead of searching one department at a time for a particular product (say, paper clips), with a network database you could search through all departments for all such occurrences.

A *relational database* essentially organizes the relationships in a database into tabular form—that is, into rows and columns. This arrangement allows users to define literally any relationship that might interest them. From their standpoint, such a collection of files resembles one great big file.

One other term you might come across when learning about database management systems is *record key* (or keys). The key is the most direct way of looking up data in a database when a search request has been initiated. For example, in a customer file the key might be the field containing the client's last name. There can be primary keys and secondary keys, but searching always goes faster when primary keys are used.

While the terms we've been discussing are no doubt terms you'll encounter at some time or other, they are not as important in the choosing



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of a database management system as they might seem. If the system you're interested in does what you want it to, then it's the right system for you.

Homework Time. No one knows your business as well as you do. The best way to ensure that you consider only software packages that are appropriate for your purposes is by doing some homework. This involves using your imagination, making various lists, and estimating your data storage needs.

To begin, start at the end. Although it may seem odd, beginning by thinking about the design of all the reports you'd like your database to generate is one of the best ways to ensure that the DBMS you wind up with will suit your needs. Pretend that your database already exists and that you are sitting at your desk looking over the final batch of reports. What do they look like? What are the report titles? What are the column titles in each report? What data (information) does each contain? Are there subtotals? Totals? Are some columns derived arithmetically by manipulating others?

Take your time here; this is a very important step. If you do a thorough job of imagining at this stage, it will not only be easier to select a software package, but it will be a good deal easier to design and implement the system once you have it.

Next, make a list of all the data items (fields) necessary to create the reports you wish to generate. Identify which fields are calculated and which are independent, original items. (You might wish to verify at this time that all the fields you've identified represent data that can actually be collected; sometimes the reports that are part of a wish list request data that simply isn't available.)

Once you've identified all the data items to be included, look through your list for any redundant entries (some data may be used in several reports). Try to group all the data in a logical way; the idea is to identify individual files. It may help to keep in mind the file cabinet analogy used earlier.

When you've finished organizing the data, you will have the skeleton of your database system: files, records, and fields. From here you can begin to estimate your data storage needs. How much data a particular system is capable of storing may be a significant factor in your choice. Do you need a hard disk? This is important to know, for several reasons. For one thing, some database management systems won't work with a hard disk. But if you have a lot of data to work with, you may find that using several floppy disks is somewhat unwieldy. The fact that data retrieval speed is dependent to some extent on the device on which it is stored is also relevant here.

To assess your data storage needs, first determine how many fields are in one record of one of your files. Next, count the number of characters in each field to calculate the total number of characters in one record. Multiply this number by the number of records your database is likely to contain. Don't forget to allow room for growth; if you're unsure, it's better to overestimate than to underestimate.

Now go through this same process for each of the files you'll be needing. When you've finished, add up all the totals. This will give you an estimate of the total amount of storage your system will have to have. As a rule of thumb, consider that a typical floppy disk stores less than one hundred fifty thousand characters, while a typical hard disk may store approximately five million characters.

Armed with this information, you'll be in a much better position to match particular products with your needs.

What To Look For. Obviously, the first step is to find a system that can meet the data storage needs you've just identified. If your application requires enough data to warrant a hard disk, you won't want to spend much time examining database management systems that can't accommodate one. In addition to data storage capacity, various other capabilities may be important, essential, or just nice to have, depending on your application.

1. *Mathematical manipulation.* Does the system allow you to manipulate your data arithmetically? Is it easy to get subtotals and totals? Does the system accommodate "derived" columns (arrived at by working with one or more columns of data)? How easy is it to use the arithmetic functions?

2. *File size limitations.* How much data can be stored in a file? How many fields can be contained in a single record? Are there any limitations on the number of records?

3. *The data input process.* Can you design your own data collection

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instrument on-screen so that the entry of data is a relatively simple task? The ability to customize a database application program to your own specific needs is a big plus. If your system allows you to create such data collection forms, you'll be able to make your system much easier for others to use.

4. *Printed reports*. In the end, the reports a system generates are of great importance to you. They'll provide the information that motivated you to get organized in the first place. The more flexible and powerful a system's report generation capabilities, the better that system is likely to be. Can you design the formats of the reports yourself? Can data be placed anywhere on the page? Will it handle special forms in addition to standard and wide paper?

5. *Sorting*. Very few reports are useful until the data they contain has been arranged in some meaningful way. Does the package you're considering allow for the sorting of data? Sometimes you'll need an additional disk drive in order to do this; sometimes you'll need more main memory, and sometimes the ability to sort data is just not available. Another relevant question: Does the system allow you to do multiple-level sorts? For example, if you have a report that has department names in column one and the names of employees in column two, can you print a report that's alphabetized by department and, within departments, by employee? Finally, sorting takes time. How long it takes to sort the size of the files you plan to use may be an important consideration.

6. *Retrieval speed*. The time it takes the system to find and display (or print out) a particular item is called the retrieval speed. If your application requires rapid access to data, this is a critical concern. Speed is the real problem with most microcomputer database management systems, and you may find that the only way to get the speed you need is to go to a system that can accommodate a hard disk.

7. *Multiple users*. If you're part of an organization in which several people need to use the same database, you'll want to know whether the system you're considering allows for several stations to be connected so that each user can access the data whenever necessary. This setup is more difficult to arrange than it might at first appear, because in order for a system to accommodate multiple users, special file-handling characteristics must be built into it. The list of available software for the system will also narrow considerably.

8. *Documentation*. If you (a) can't read the manual, (b) need a Ph.D. to get through it, or (c) are told that the system is so easy to use that it doesn't need a manual, watch out! Look through the instruction manual accompanying any system you're seriously considering. Judge the system by the quality of the documentation that comes with it.

9. *Relationship to a mainframe*. If you wish to use your microcomputer database management system to manipulate data contained in a company database on a mainframe, you'll need to take a variety of elements into account. You'll need a modem to dial in to the host computer. You'll also need to ascertain whether the host computer will recognize the machine you're dialing in on. The DBMS package you have will have to accommodate downloading, which is the process of transferring all or part of the host computer's file to your particular system. This is not a common feature at present but is certain to become one.

10. *Backup*. At the risk of belaboring the point, it bears repeating that one of the most important characteristics of a system is the provision it makes for backing up files. Be sure you understand what's involved in the backup process before you purchase a system.

By all means, arrange with your dealer to try out the systems that interest you before you buy. Prepare and bring along a sample of twenty-five records from one of your files (more if you think it would help you determine the appropriateness of a particular system). Enter the data, try out some searches, and make comparisons. Make a note of how long it takes to retrieve a record and how long the sorts take.

Over the next two months, we'll look at some of the database management packages currently available and evaluate them in terms of the criteria we've established this time. There will be some old friends, some familiar faces with revisions, and some newcomers. Among the packages we'll look at are the new version of *DB Master*, the PFS series, FlowerSoft's *Data Bank*, *Quick File IIe*, and some Apple III database management systems, to name a few. We'll also take a look at some integrated packages.

Until then, why not prepare by doing some serious thinking about your own database management needs? ◨

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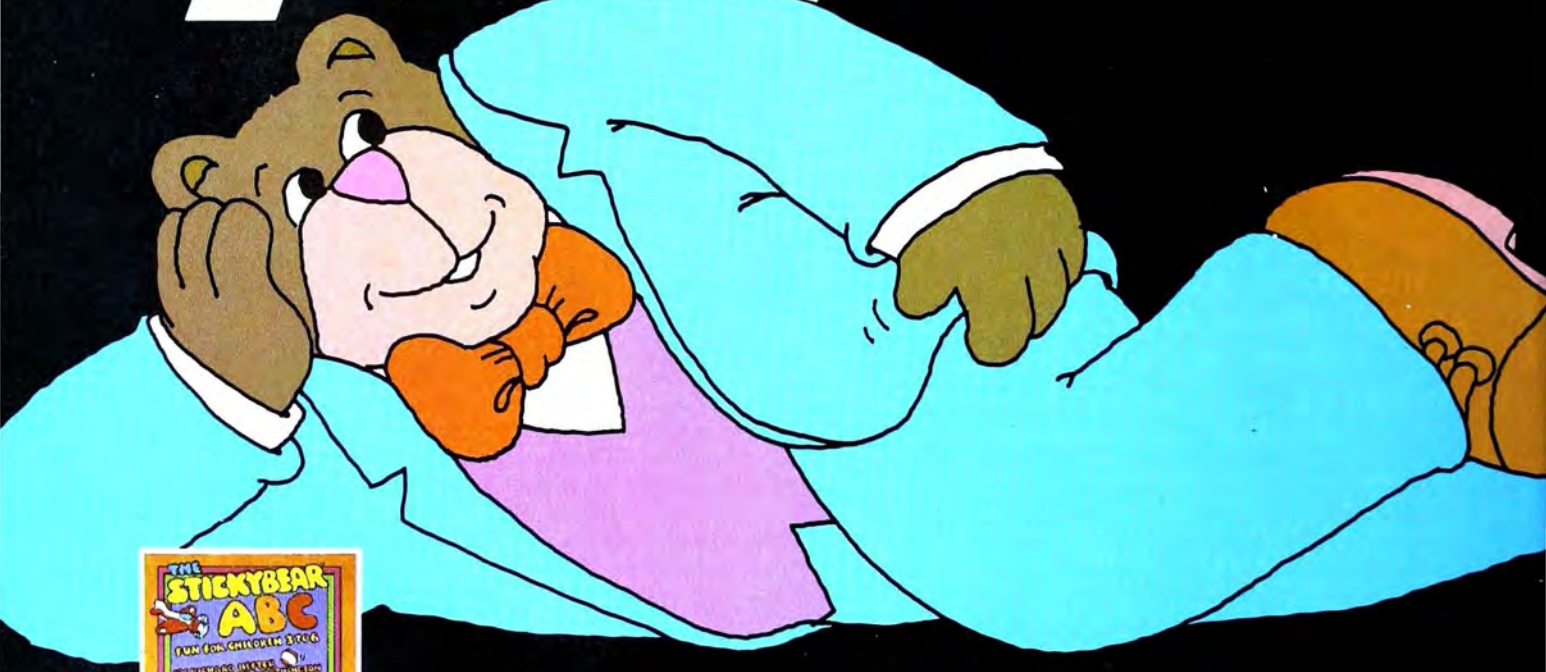

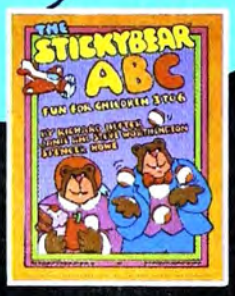

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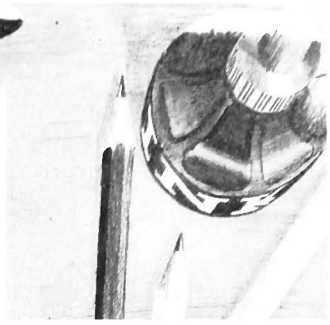
The Schoolhouse Apple

by Jock Root



Assuming that we all agree that the computer is potentially a powerful teaching tool, somehow it doesn't seem to be living up to its potential. There's getting to be quite a lot of good software around, but most of it is simply an enhancement of things we could already do. Where is the "revolution in teaching techniques" we were promised?

Perhaps it's still ahead of us. After all, the computer is a very new tool, in the classroom as everywhere else, and we're still learning how to think about it. Let's take a look at what we've done so far and see if it suggests any new directions.

One of the most exciting things computers have given us is the self-motivating drill program—a series of problems in arithmetic, grammar, or something equally boring offered in the format of an arcade game. The old pack of flash cards, which used to be a punishment, has become a game of skill and is now used as a reward.

This mixture of teaching and entertainment makes some educators uncomfortable. They feel that with too much emphasis on entertainment, teaching is likely to suffer. Certainly, learning requires both effort and discipline—no "magic software" is going to change that.

Teaching versus Learning. Maybe we're looking at the problem the wrong way. We know that most kids dislike "schoolwork," but also that any kid loves a new toy. There is a paradox here—namely, that from the kid's viewpoint, schoolwork has very little to do with learning.

Every time you buy a new program for your Apple, you are faced with a "learning threshold"; you have to learn how to control the program before you can get any use out of it. This is true for any kind of program, from *Zaxxon* and *Wizardry* to *WordStar* and *VisiCalc*. In fact, if you're a wise buyer of software, you give some thought to this before you pay for a program: "How difficult will it be for me to learn?"

The same goes for any new toy, be it a stereo, a sewing machine, or a sports car. You have to learn how to use it before you can have any fun with it. And because you know this before you buy, you're probably looking forward to the prospect of getting acquainted with your new toy. You're looking forward, in other words, to a reasonably difficult learning experience—and you can hardly wait!

On this level, kids are just as smart as you are. They know perfectly well, if they stop to think about it, that they will have to learn to use whatever it is they want, but does that stop them from asking for it? No way.

Children have no objection to learning as such; what they resent is having to learn stuff that seems to them to be meaningless nonsense—information they have no immediate use for. While it may seem silly to a teacher to invest time (and quarters) in learning to chop up a caterpillar or fly a spaceship in a video game, to a child it seems just as silly to spend time learning how to divide by seven, or memorizing the date Columbus sailed for America.

If you want to see serious learning, watch a child who wants to get on a team—any team. She will exercise like you wouldn't have thought possible, change her eating and sleeping habits, and practice, practice, practice. All of this, you understand, for the privilege of playing a game.

Clearly, a child can be motivated to learn by himself. In fact, children love to learn, need to learn, and cannot stop learning. In a sense, learning is the whole purpose of childhood. The question is, can we use the computer to help shape this drive? Or, more precisely, how can we use the power of the computer to motivate children to learn what we think they need to know?

Game Behavior. We all know how video games can fascinate a person—child or adult, it makes no difference. And the effect is not confined to fast and highly visual arcade games; there are some pretty hypnotic programs of the "slow and deep" variety as well (*Wizardry*, *Sargon*, the *Zorks*, and various other strategy games). These games require a good deal of learning to play at all—and a whole lot of learning (plus experience, or practice) to play well. There is strong motivation here, but how can we apply it to learning French, or algebra?

What does a game program do? For one thing, it offers you a trip to another world—an alternate reality, with its own rules and purposes. An imaginary world, but who cares? Thanks to the principle of cause and effect, you can manipulate that whole world through your keyboard. What more could you ask?

In this imaginary world, the game program offers you challenges. You have to master physical techniques (hitting the right key at the right time or moving the joystick in precisely the right pattern) and mental techniques (solving puzzles, anticipating dangers, managing resources). You have to learn a whole lot of new behavior, and learn it well, before you can even begin to win anything. And most games have several levels of difficulty, each requiring more learning than the last.

Alas, once you have learned the game well enough to win at it fairly consistently, you've probably spoiled it for yourself by getting so good at it. The behavior patterns you have learned in order to win are probably not useful outside of the game, unless, of course, the program is *Sargon* (a chess program). In that case, you could use it to practice for the



Masters' Tournament, but then it wouldn't be a game program at all; for your purposes, it would be a teaching program.

How To Use the Computer. Let's take another look at that. A chess-playing program is a game if you just like to play chess with your Apple. But if you're sharpening your skills to play against other people, then the program is regarded as drill-and-practice courseware. In other words, the factor that ultimately discriminates between "game" and "courseware" is *purpose*. If you're running the program because you like it, it's a game; but if you're running it because you need the skill, it's a teaching program.

And that could be the answer we're looking for, or at least a pointer toward it. The computer might bring a revolution in teaching techniques by turning the school experience into a series of carefully designed games. These games would have the same challenge and excitement as today's entertainment games, but as you played one of them you would also be shown the principles of, say, algebra, which is the "magic language" in the world of this particular game. In order to win the game, you would have to learn those principles and use them correctly in your "spells." Winning the game would depend on mastering the subject.

If that's what the "revolution" is going to be, what can we do to hurry it along? If you're into writing software, the answer is obvious—but suppose you're a software user? If the software you want isn't written yet, you can't very well start using it.

In fact, though, you can't be sure it isn't written yet. All you know is that it isn't in the courseware catalogs—but have you tried the game software? For example, if you teach history, look at the strategy games. There are probably at least two or three games based on your favorite war, maybe even one based on your favorite battle. Some strategy games might be more appropriate to economics—they involve management of resources, development of weak economies, and the like. If you're looking for a way to demonstrate some event or situation to your students (or your children), try to find a computer game based on it. If you can find a reasonably accurate model in game form, it will probably teach them more successfully than any other tool you could provide.

SpecialWare. We recently received a new kind of courseware catalog, the first major catalog we have seen that focuses specifically on courseware for the handicapped. It's called *The SpecialWare Directory*, from Linc Associates.

The main body of the catalog is an alphabetical listing, by publisher, of over two hundred educational programs. Those programs that are suitable for special education use are marked with an asterisk, and a few programs have two asterisks, meaning that they were specifically designed for special education. Both teaching and evaluation programs are included.

One-third of the catalog is a set of cross-indexes: by handicap or special audience, by computer (Apple, Atari, Commodore, IBM pc, TRS-80, and others), by curriculum or subject, by educational level, by instructional approach, and other classifications. These listings could be useful to a teacher in any field, not just special education.

The program descriptions given are based on manufacturers' information, and no attempt has been made to evaluate programs. The preface to the catalog advises you to "consult colleagues or professional review sources to obtain evaluative information."

The catalog suffers from a few data-handling problems. Some of the programs don't appear in every cross-reference list, and programs are not always on the exact pages they're supposed to be, but you can usually find what you're looking for without difficulty. The convenience of having these listings in *any* form far outweighs the occasional lapses. The catalog also includes a user feedback form; the implication is that they're trying as hard as they can and will probably get rid of these minor bugs by the next edition. It costs $13.95.

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The Voice of THE TURTLE

A Schoolhouse Apple Tutorial

LOGO

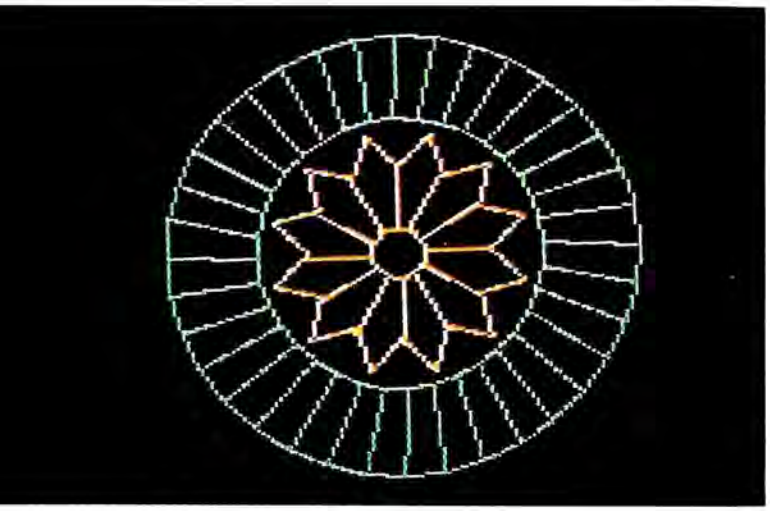
DONNA BEARDEN

There was something about the way the shapes went together that had a look of a wreath with poinsettias. Someone else suggested a stained glass window; so off we go on another adventure of study, experimentation, learning, and playing.

What you can learn about stained glass windows and the geometry involved in creating the Rose masterpieces dating as far back as the twelfth century is awesome. It would take from now until next Christmas to transfer some of the more complex basic designs into Logo procedures. For this year's Christmas greeting, you'll have to settle for some fairly simple combinations of shapes and colors that give only a hint of what's possible. So Merry Christmas! Enjoy! And come back next year!

Patterns and color can be very exciting to work with in Logo. Each of these designs was colored on and off the computer. Various pen colors were tried within the procedures and then the designs were printed and colored in a variety of ways, emphasizing a variety of shapes.

Many of the famous Rose windows are divided by twelve spokes radiating from the center. Thus the first design evolved from a twelve-petaled flower.



CIRCLE was defined as:

```
TO CIR :N
REPEAT 36 [FD :N RT 10]
END
```

Various circles were tried and CIR 2 seemed to be a good size to start with. To divide the circle into twelve segments, divide 36 by 12. Therefore, each segment or arc can be drawn with:

```
TO ARC
REPEAT 3 [FD 2 RT 10]
END
```

SPOKE was defined with a variable to make it easy to try different sizes of spokes:

```
TO SPOKE :N
LT 90 FD :N BK :N RT 90
END
```

RAYS was defined to draw the twelve spokes and the twelve arcs of the circle simultaneously:

```
TO RAYS
REPEAT 12 [SPOKE 30 ARC]
END
```

After much experimenting, POINTS were added:

```
TO POINTS
LT 90 FD 30 RT 45
REPEAT 12 [FD 21 RT 120 FD 21 LT 90]
END
```

To add the second ring of spokes, the turtle was positioned and several different sizes of circles were tried. CIR 11 was chosen and RAYS1 was defined. Once you figure out the size of the circle you need, it's not necessary to draw the circle first. You can combine it with drawing the spokes as we did earlier.

```
TO RAYS1
PU FD 27 RT 68 PD
REPEAT 36 [SPOKE 40 FD 11 RT 10]
END
```

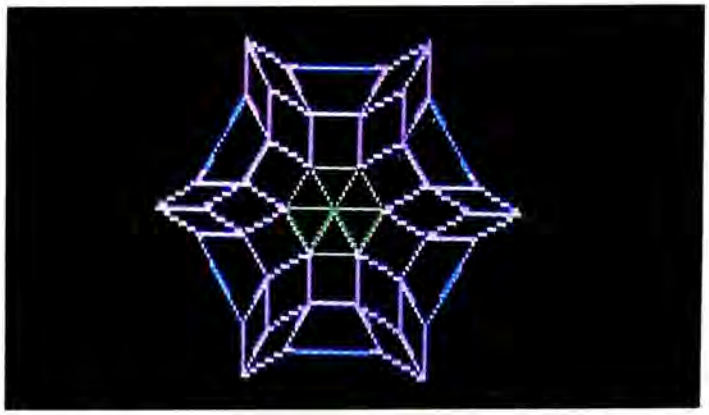
Another circle was added around the outside. It takes some experimenting with various positions and sizes of circles to find the correct one. So don't be afraid to try several. Think of your screen as a scratch pad. Then when you find something you're pleased with, put it in a procedure.

```
TO ADD.CIR
LT 90 FD 40 RT 92 CIR 18
END
```

ROSE was defined with two pen colors. Try other combinations and try changing the background color. Then, if you have a printer, dump the graphics, find some markers or colored pencils, and create your own Christmas cards.

```
TO ROSE
SETPC 4 RAYS
POINTS
SETPC 2 RAYS1
ADD.CIR
END
```

WREATH began as an exercise in combining regular polygons. With the exception of the trapezoid, every side of every polygon in the design is the same length. The long side of the trapezoid is twice as long as the other sides.



First, put six triangles together to form a hexagon. Add squares at each side of the hexagons. Use diamonds to fill in the spaces between the squares. Then add trapezoids at the outer sides of the squares and, finally, pairs of "skinny" diamonds to complete the design.

To add each new ring of shapes, two moves need to be figured out: one to move the turtle into the correct position to draw the first shape in the ring and the second to move the turtle from shape to shape within the

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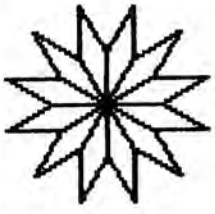
ring. Raise the pen for each move so color can be added to individual rings. Here is the entire list of procedures:

```
TO WREATH
HT
SETPC 2 HEX SQUARES
SETPC 3 DIAMONDS
SETPC 5 TRAPS
SETPC 3 S.DIAMONDS
END

TO HEX
REPEAT 6 [TRI RT 60]
END

TO TRI
REPEAT 3 [FD 20 RT 120]
END

TO SQUARES
PU FD 20 RT 30 PD
REPEAT 6 [SQ RT 90 FD 20 LT 30]
END

TO SQ
REPEAT 4 [FD 20 RT 90]
END

TO DIAMONDS
LT 60
REPEAT 6 [DIA PU LT 90 FD 20 RT 30 PD]
END

TO DIA
REPEAT 2 [FD 20 RT 60 FD 20 RT 120]
END

TO TRAPS
PU FD 20 LT 90 PD
REPEAT 6 [TRAP PU FD 20 LT 90 FD 20 RT 120 FD 20 LT 90 PD]
END

TO TRAP
FD 20 RT 60 FD 20 RT 120 FD 40 RT 120 FD 20 RT 60
END

TO S.DIAMONDS
FD 20 RT 30
REPEAT 6 [S.DIAS LT 120 FD 20 RT 30]
END

TO S.DIAS
S.DIA
FD 20 LT 120 FD 20 RT 150
S.DIA
END

TO S.DIA
REPEAT 2 [FD 20 RT 30 FD 20 RT 150]
END
```

What would happen if we rotated the turtle and continued drawing the skinny diamonds? Aha! A poinsettia!



Let's add a ring of poinsettias to the wreath! Instead of S.DIAMONDS, add POINSETTIAS.

```
TO POINSETTIAS
MOVE
REPEAT 6 [POINSETTIA MOVE2]
END

TO POINSETTIA
REPEAT 12 [S.DIAS RT 30]
END

TO MOVE
PU
REPEAT 2 [FD 20 RT 30]
FD 20 PD
END

TO MOVE2
PU BK 20 LT 150
REPEAT 3 [FD 20 RT 30]
FD 20 PD
END
```

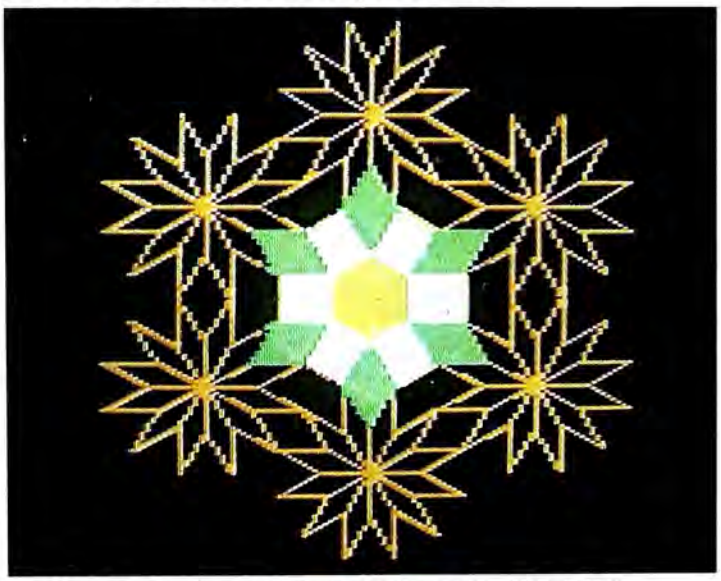
Have you experimented with filling shapes in with color? This is a beautiful design to try it on. Since Logo doesn't have a fill command, we'll have to define one. Let's start with the triangle. If we have the turtle draw progressively smaller triangles, we'll end up with a triangle filled with color. Try this:

```
TO FILL.TRI :N
IF :N = 0 [STOP]
REPEAT 3 [FD :N RT 120]
FILL.TRI :N - 1
END
```

Define similar procedures for the square and the diamond:

```
TO FILL.SQ :N
IF :N = 0 [STOP]
REPEAT 4 [FD :N RT 90]
FILL.SQ :N - 1
END

TO FILL.DIA :N
IF :N = 0 [STOP]
REPEAT 2 [FD :N RT 60 FD :N RT 120]
FILL.DIA :N - 1
END
```

When you use shapes filled with color next to each other, some colors bleed. Experiment with different color combinations. In this design, the poinsettias were found to bleed into the diamonds if the diamonds were filled with color first. However, if the poinsettias were drawn first and then the diamonds were colored, there wasn't a problem. So BRUSH.UP was defined to go back and brush up the diamonds.



Here are the other procedures you'll need for WREATH2:

```
TO WREATH2
SETPC 4 HEX2
SETPC 1 SQUARES2
SETPC 2 DIAMONDS
SETPC 4 TRAPS
POINSETTIAS
SETPC 2 BRUSH.UP
END
```



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```
TO HEX2
REPEAT 6 [FILL.TRI 20 RT 60]
END

TO SQUARES2
PU FD 20 RT 30 PD
REPEAT 6 [FILL.SQ 20 RT 90 FD 20 LT 30]
END

TO BRUSH.UP
PU HOME FD 20 LT 30 PD
REPEAT 6 [FILL.DIA 20 PU LT 90 FD 20 RT 30 PD]
END
```

Another Christmas symbol is the star. If you connect all the diagonals in a pentagon, you'll discover a star. This design just evolved from playing around with pentagons and stars.



First define a star and a pentagon:

```
TO STAR :N
REPEAT 5 [FD :N RT 144]
END

TO PENT :N
REPEAT 5 [FD :N RT 72]
END
```

Now try drawing a small star and surround it with a pentagon:

```
TO PENT.STAR
STAR 30 LT 36
REPEAT 5 [FD 19 RT 72]
END
```

How about adding another star:

```
TO STAR2
BK 30 STAR 80
END
```

And a pentagon:

```
TO PENT2
PU FD 15 LT 72 BK 24
PD PENT 40
END
```

And another pentagon:

```
TO PENT3
PU FD 24 RT 72 BK 15
LT 36 PD PENT 50
END
```

Put it all together and add some color:

```
TO STARS
SETPC 4 PENT.STAR STAR2
SETPC 5 PENT2
SETPC 2 PENT3
END
```

That's nice, but how about rotating the turtle and repeating it? This is the trickiest part of this design. You have to figure out how much to rotate the turtle and how to get him back into position to begin drawing STARS again.

Some hints. The interior angle of the pentagon is 108 (180 − 72). If you rotate three pentagons, you'll have 36 degrees left over to complete the circle (3 × 108 = 324; 360 − 324 = 36). Therefore, to divide the space equally, we should allow 12 degrees between each pentagon. Since we need to rotate the turtle through one interior angle of a pentagon, through the 12-degree space between the pentagons, and then through one-third of the interior angle of the next pentagon (the point of the star divides the interior angle of the pentagon into thirds), the first rotation of the turtle should be RT 156. Then go FORWARD 30 and turn RT 36 (one-third of the interior angle of the pentagon) and you'll be ready to draw the next STARS pattern.

```
TO TRI.STARS
REPEAT 3 [STARS MOVE]
END

TO MOVE
PU RT 156 FD 30 RT 36 PD
END
```

The spaces between the three STARS patterns suggest an equilateral triangle, so let's add one:

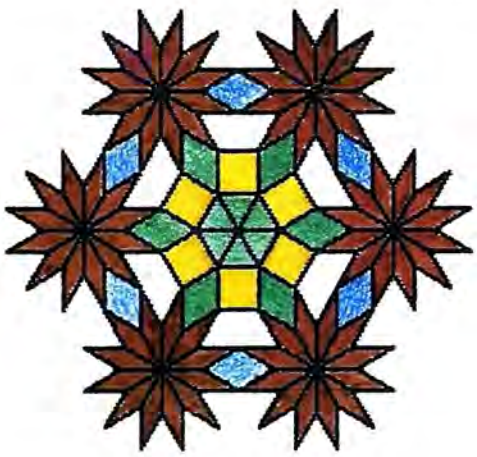
```
TO ADD.TRI
RT 72 BK 40
REPEAT 3 [FD 100 RT 120]
END
```

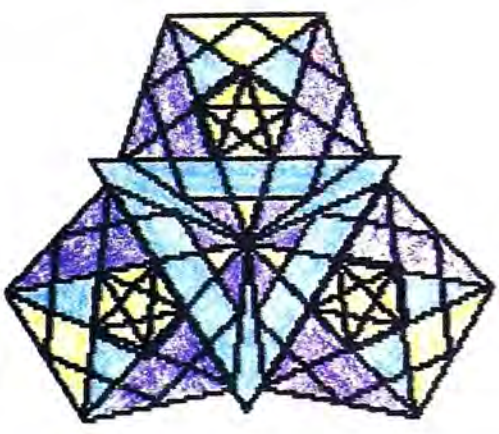
Edit the TRI.STARS procedure so it's level on the screen and add some color to the final triangle:

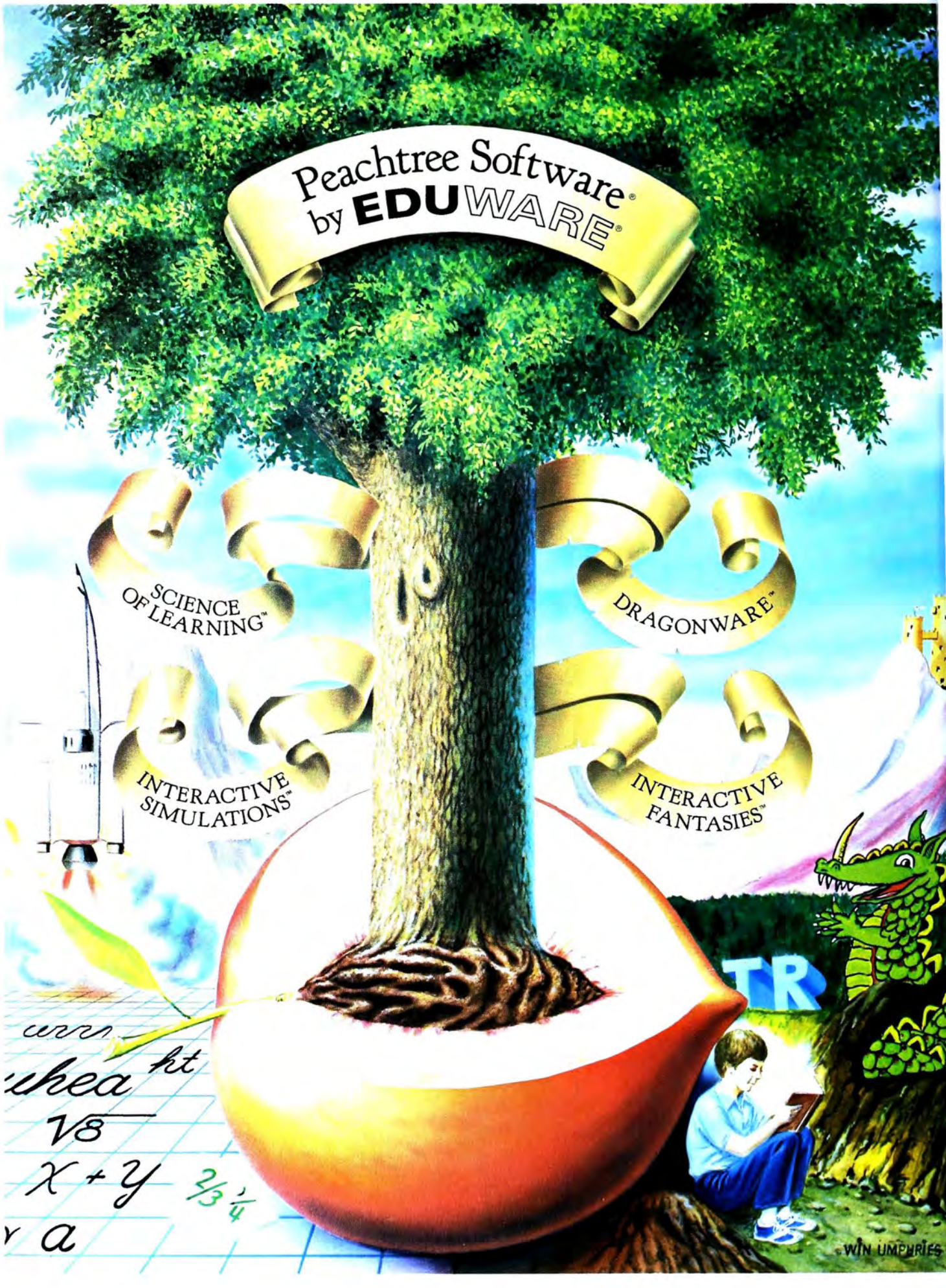
```
TO TRI.STARS
RT 18
REPEAT 3 [STARS MOVE]
SETPC 3
ADD.TRI
END
```

And have a happy new year! ◨





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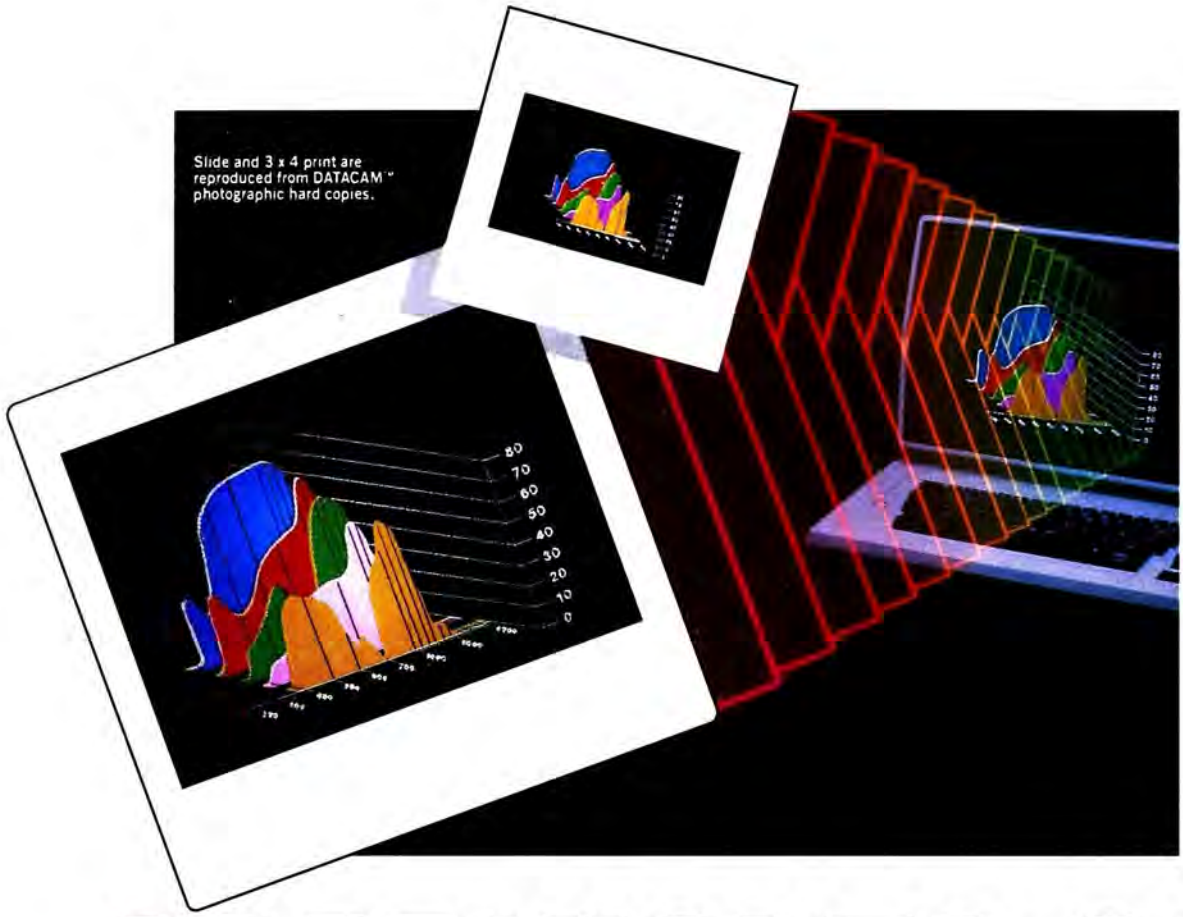

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THE PASCAL PATH

By Jim Merritt

Jungle Fever, Part 10

The end of yet another year also brings us to the end of our tutorial overview of Apple Pascal's UNIT facility. We covered the major issues in the October and November columns; this month, we'll conclude with glances at some of the subtler aspects of UNITs. Accordingly, the material presented below presumes that you are at least passingly familiar with the UNIT mechanism. If you missed one or both of our previous discussions, read carefully the relevant portions of Apple's Pascal manuals, specifically chapter 5 of the *Apple Pascal Language Reference Manual*, as well as chapter 7 and the "System Librarian" section of chapter 8 in the *Apple Pascal Operating System Reference Manual*.

Choosing Your "Favorite Flavor." Suppose you make your living developing software for the mass market. In a frenzy of inspiration and activity, you create *CEO* (*Chief Executive Officer*), the world's most comprehensive, well-integrated business software system. You expect sales volume to reach into the millions, or at least the hundreds of thousands. At the core of *CEO* is a marvelous package of subroutines, which you have named WHIZUNIT. This UNIT is so handy that you plan to use it in several future software products. Given all this, should WHIZUNIT be a regular UNIT or an INTRINSIC one? This question was posed at the end of the column last month; finding an answer (no easy task!) naturally involves comparing the relative strengths and weaknesses of the two types of UNITs.

Let's assume that you make a regular UNIT out of WHIZUNIT. This decision will probably cause you a great deal of inconvenience during the software development process, since every time you change either *CEO* or WHIZUNIT, you must invoke the Linker to merge the client and UNIT object code together into a single, executable code file. During product development, both *CEO* and WHIZUNIT are likely to change several times, and you must invoke the Linker after recompiling either entity. The selling price that you ask for *CEO* will have to be calculated to compensate you for enduring such inconvenience. Furthermore, the final *CEO* object code file—using only regular UNITs—will be *complete* and *self-sufficient*. To move *CEO* to a customer's computer system (or to make a backup copy), it will be necessary to transfer only *one* file. Installation of *CEO* on the customer's system is thus as simple as it can get. Consequently, you will find it reasonably easy to document and support this aspect of the software!

Now, suppose that you bring your other products—all dependent on WHIZUNIT—to market. Because WHIZUNIT is *not* INTRINSIC, the object code file for each program must include its own, separate copy of the UNIT. If your software system involves many programs and WHIZUNIT is very large, a great deal of disk space will be occupied by redundant copies of WHIZUNIT. As a result, you or your customer may find it impossible to put all the code files on a single Apple-format disk and still leave room for any system software files or data files that may be required for successful execution. Of course, it's in your best interests to ensure that all files relating to *CEO* can fit comfortably on one disk. Your production costs (not to mention your customer's potential confusion) are likely to rise with the number of disks included in the *CEO* package.

What if you find a bug in WHIZUNIT at some future time? You must repair it, relink the UNIT to each and every client, and supply entirely new, improved versions of each client program to those of your customers who decide to participate in your software update offer.

Designating WHIZUNIT as INTRINSIC would alleviate several of the aforementioned difficulties, but it would cause others. On one hand, your task of product development might be eased somewhat, because no linking is necessary between INTRINSIC UNITs and their clients. If you change a client, you can execute the compiled object code directly; merging of client and INTRINSIC UNIT code is done automatically by the system at execution time. On the other hand, every time you change the INTRINSIC version of WHIZUNIT, you must reinstall it in the System.Library, so the time you save by not having to link could be lost if WHIZUNIT changes more often than its clients during the software development cycle.

The client of an INTRINSIC UNIT does not actually include any of the UNIT's object code; one copy of the UNIT code—residing in the System.Library file—serves for all clients of that UNIT. Therefore, by making WHIZUNIT an INTRINSIC, you may be able to shrink the object files for *CEO* and other clients by a margin sufficient to allow all of them to fit easily onto a single disk, while still leaving room for data files and any necessary Pascal system code files.

The installation of software that depends on INTRINSIC UNITs is rather tricky, for several reasons. First, no client of an INTRINSIC UNIT can execute unless the object code for that UNIT is available in System.Library at execution time. Thus, in order to use *CEO*, the customer must not only transfer the client code file to her system, but also install any appropriate UNITs in the library. We saw in November that it is not easy to construct a code library, partially because the process involves interaction with an esoteric utility program, *Library*. In general, library manipulation involving the *Library* utility should not be attempted by any but seasoned programmers. Certainly, your customers should not be responsible for merging WHIZUNIT into their own libraries.

But suppose now that you take it upon yourself to write a program called *Install* that will do the job of the *Library* utility but in an automated fashion, without human intervention. Even if you learn everything there is to know about how code libraries are organized and how to duplicate the functions of the *Library* program, you will still encounter two major problems. Given the requirement that *Install* should never require programming expertise on the part of its user, one of those important problems is *probably* insoluble, while the other one is definitely so.

Last month, we saw that every INTRINSIC UNIT declaration must include at least one (and sometimes two) explicit segment numbers (for CODE and DATA respectively). These numbers are permanently and irrevocably associated with the INTRINSIC UNIT, unlike the variable, "dummy" segment numbers that are assigned by the compiler to regular UNITs. If an INTRINSIC UNIT is given the CODE segment number 25, it will always be associated with segment slot 25 at execution time. In contrast, a regular UNIT that is given segment number 25 when it is compiled may in fact be reassigned to segment 7 when it is finally linked to a client.

The first of our tough problems hinges on the inflexibility of INTRINSIC UNIT segment numbering: What if another INTRINSIC UNIT in the customer's library has already been assigned to WHIZUNIT's segment number? For reasons that we won't go into here, no two INTRINSICs in the same library code file should ever bear the same segment number. Facing a conflict such as this, the *Install* program should probably give up and admit its failure to the user (perhaps also mentioning the name of the conflicting UNIT in its "swan song" error message).

Your Pathfinder is unsure at the time of this writing whether it is possible for a program to identify all references to a specific segment number within an arbitrary sequence of Pascal object code. If it is possible, *Install* could sidestep the problem of conflicting segment numbers by assigning another, unused segment number to WHIZUNIT. After installing the altered UNIT code in System.Library, *Install* could proceed to alter all of WHIZUNIT's clients so that they would use the new segment

numbers. Even if such a scheme is feasible, however, devising it would involve much head-scratching and laborious effort on your part—perhaps too much to be worth the trouble.

The other problem (the truly insoluble one) entails dealing with a full library file. Like any code file, System.Library can accommodate only sixteen segment definitions because its segment dictionary has only sixteen "slots." In the standard Apple Pascal library, seven of these slots are occupied by Apple's own INTRINSIC UNITs, while nine are left vacant. Nine is not a very big number. It isn't hard to imagine filling all the available slots with INTRINSIC UNITs belonging to only a few different applications software systems, especially if some of the UNITs declare both CODE and DATA segments. (The DATA segment of an INTRINSIC UNIT is actually little more than a "dummy." Still, it must occupy its own slot in the library segment dictionary.)

Should the *Install* program find the library full when it tries to install WHIZUNIT, it would simply have to admit its failure to the user, and then quit. There is no recourse, short of removing one of the established UNITs from the library. The decision of which (if any) UNIT to remove should be left to a programmer. This, of course, violates our requirement that successful use of *Install* should not require any programming expertise.

It seems that no matter how much effort and ingenuity we put into our hypothetical *Install* program, it is very unlikely that we can automate INTRINSIC UNIT installation in anything approaching a foolproof fashion. We must reluctantly conclude, therefore, that as convenient as INTRINSIC UNITs are for experienced programmers, they probably cause more trouble than they're worth when used in freely distributed production software. Despite any drawbacks we've mentioned, then, it would probably be better to implement WHIZUNIT as a regular UNIT.

When 16 Equals 32. We mentioned previously that a code file's segment dictionary has only sixteen "slots." This affects the number of segments and (regular) UNITs that may be employed by any particular program. Although a program may consist of any mixture of UNITs and SEGMENT subroutines, the sum of the total number of regular UNITs and the total number of segments (counting the main program as a segment) may not exceed sixteen. In other words, a main program may call upon up to fifteen additional segments, where a segment is either a SEGMENT subroutine or a regular UNIT. Thus, if your program uses five SEGMENT PROCEDURES, it may call upon up to ten regular UNITs. A program that does not contain any SEGMENT subroutines (other than its own main body) is free to use up to fifteen regular UNITs.

We've mentioned in previous months that the *run-time segment table* is a sort of master dictionary maintained jointly by the p-machine simulator and Pascal operating system. It contains entries that describe all segments that are part of the currently executing program. The segment table has room for thirty-two entries, and this means that the currently executing program may include thirty-two different segments. Remember, however, that the only program the p-machine knows how to execute is the operating system. *That* is the program that may consist of thirty-two segments. Segment zero is the operating system core, for instance, and segments two through six are permanently allocated to other SEGMENT subroutines that are called by the core from time to time. Thus, six of the thirty-two available segments are reserved for use by the operating system, leaving twenty-six for your programs. One of those twenty-six segments—segment number one, to be precise—is always your main program, and this leaves twenty-five segment slots that may be filled by any combination of SEGMENT subroutines and regular or INTRINSIC UNITs.

But wait, you say. If a code file can contain only sixteen different segments, due to limitations on the size of its segment dictionary, how can a program make use of the other ten segment slots in the run-time segment table? It can make up the difference by calling upon INTRINSIC UNITs, because the code for such a UNIT does not appear in any of its clients' code files, nor does an entry for it take up space in any of its clients' segment dictionaries. Indeed, a particular program's segment dictionary can be completely filled with entries for regular UNITs and SEGMENT subroutines, yet the program may *still* use up to ten INTRINSIC UNITs. Of course, a program is certainly not limited to using just ten INTRINSIC UNITs. If a main program uses fewer than fifteen "conventional" segments (in other words, if its own segment dictionary

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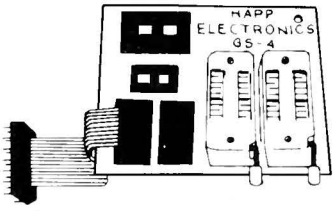

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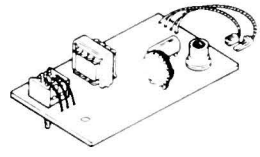

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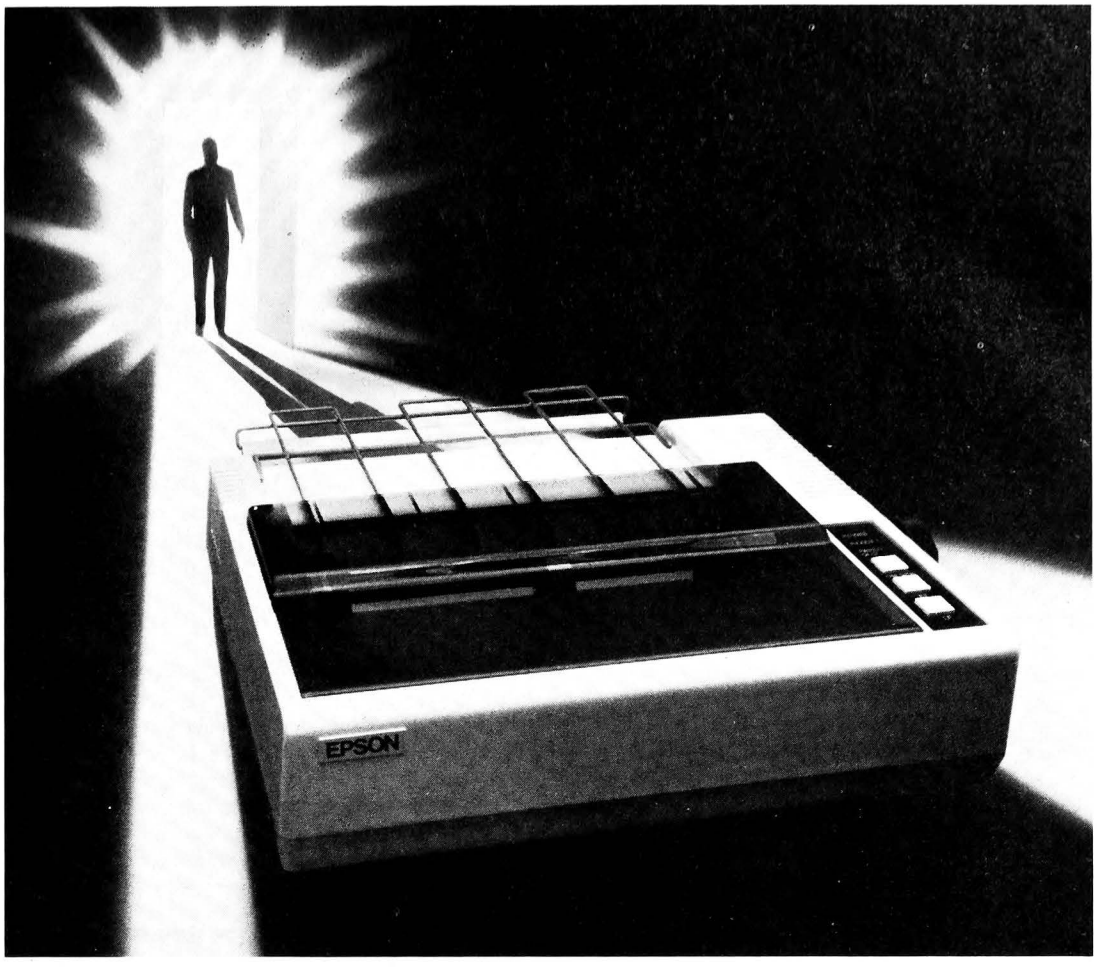

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is not completely full), it may call upon more than ten INTRINSICs.

Noload. Normal SEGMENT subroutines are not loaded into primary memory until they are called, while all of a client program's UNITs reside in primary memory at once. This doesn't have to be the case, however. You can make UNITs (even INTRINSIC ones) act like the SEGMENT subroutines they really are by placing the "noload" compiler directive instruction, *(*$N+*)*, at the beginning of your program. Then, when your program calls a UNIT subroutine, the appropriate code segment will be loaded into RAM memory from disk. When that segment is no longer active, the space it occupies in RAM will be reclaimed by the Pascal system for the benefit of incoming segments and data storage. Just as with segments, you may use the "resident" compiler directive instruction, *(*$R filename*)*, to "hold" a UNIT in RAM for an arbitrarily long period of time, whether or not any subroutines in the UNIT are active. Space limitations prevent a thorough recap of the "resident" instruction here; see the September 1983 issue for more details.

"Gotchas." A few aspects of UNIT usage are neither immediately obvious from Apple's documentation nor amenable to brief explanation. We'll note them here, with little or no elaboration:

1. Any UNIT may use another UNIT of the same type. A regular UNIT may use another regular UNIT, and an INTRINSIC UNIT may use another INTRINSIC. Regular UNITs may even use INTRINSICs. But no INTRINSIC may use a regular UNIT. If you violate this rule, you will receive error message number 353 ("Nonintrinsic unit called from intrinsic unit").

2. When one UNIT uses another—that is, when one UNIT is the client of another—the appropriate USES declaration must be the first thing in the client's INTERFACE section. Refer to syntax diagrams in the September and October columns or in Apple's own manuals.

3. No USES declaration may appear within an IMPLEMENTATION section. If you try to do this, the compiler will complain of error number 192 (" 'Uses' must be in interface section").

4. Files may be employed by UNITs only if they are declared in the INTERFACE section. If you declare a "private" file within the IMPLEMENTATION section, you will receive error message number 191 ("No private files"), and the compiler will refuse to process your UNIT.

5. Suppose your program uses a UNIT named ToolsC, which uses another, ToolsB, which in turn uses a third, ToolsA. (Let's assume that each is an INTRINSIC UNIT, though one or more could just as easily be of the "regular" persuasion.) Even though your program does not make direct use of either ToolsB or ToolsA, its USES declaration must look like this:

```
USES ToolsA, ToolsB, ToolsC;
```

In other words, the USES declaration in a client must name all UNITs that are relevant to the compilation, whether or not the client itself uses them explicitly. What's more, the most indirectly used UNITs must be named first (which accounts for the fact that the identifiers ToolsA and ToolsB precede ToolsC in the example above).

6. UNITs may not contain SEGMENT subroutines. Your attempts to include such subroutines in your own UNITs will earn you error message number 185 ("Segment declaration not allowed in units").

7. Although UNITs may be defined within programs, they may not be defined within other UNITs. For instance, you may "nest" MyUnit within MyProgram, so long as you observe the syntax rules for doing so. But defining OtherUnit within MyUnit is out of the question and will cause the compiler to report error condition number 182 ("Nested units not allowed").

Moving 1984-ward! With a veritable armload of "dos and don'ts," you should now be reasonably well prepared to develop your own UNITs, both regular and INTRINSIC. However, your Pathfinder is not so naive as to believe that you will actually spend your holidays slaving over a hot Apple! And why should you? Enjoy yourself and the company of friends and family with our blessings and best wishes. When you return in January, however, be prepared to give your undivided attention to absolute and pure rationality—in numeric computation, that is! If you hated working with fractions in elementary school, you'll whistle appreciatively when you see how next month's special-purpose UNIT allows you to foist the drudgery onto your trusty Apple. ■

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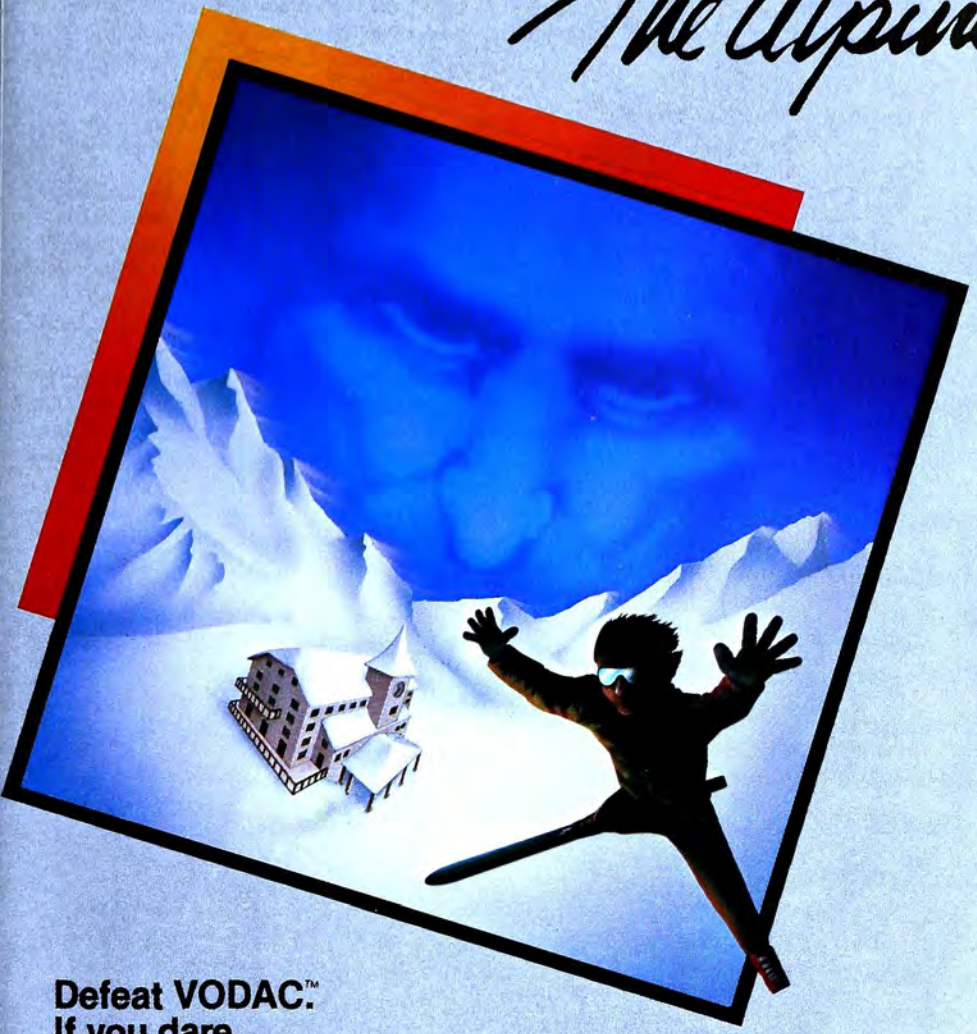

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Welcome to ART LINKLETTER'S Apple Party

By DAVID HUNTER

"I see that you have a tooth missing."
"Two of them. And the Good Fairy brought me $2.00."
"Did you see what she looked like?"
"Yes, she had two arms, two legs, one head, a moustache, and she was wearing pajama tops."

"Did you see Santa this year?"
"See him? I fixed him a bourbon and water."
—From *Kids Say the Darndest Things!*

On July 15, 1929, with ten dollars in his pocket, seventeen-year-old Art Linkletter hit the road. For a long, memorable year and a half, Linkletter and his friend of the same age, Denver Colorado Fox, rode the rails and explored the United States.

The pair began their stint as hoboes in San Diego. The ride up the California coast to the state of Washington was educational and tiring for the tall, big-boned Linkletter, who was fresh out of high school. The self-reliant Linkletter—always sure that his presence of mind would get him out of tough situations—was just beginning to enjoy the experience when he and Fox were robbed and scared out of their wits by two hoboes with a gun in a freight car near a Walla Walla switching yard.

It was a momentous and frightening beginning of a vagabond trek across the tense, stormy landscape of the Great Depression. Continuing their journey, Linkletter and Fox worked and rode their way east. The times were rough. Some towns didn't like hoboes and some railroad yards had tough guys with fists like rocks and names like "Big Stick." Other towns were friendly to the two teenagers, providing temporary jobs at which they could earn an honest buck or two.

Hoboes Say the Darndest Things. Linkletter left San Diego with at least one skill that would serve him well on the road. He could type about ninety words a minute. At a time when Underwood prowess was a first-class ticket to instant employment, Linkletter's earnings made the two hoboes respectable temporary citizens in many large towns and cities across the country.

Now you know part of the reason why Art Linkletter has no trouble getting along with those strange computer things called Apples. The man has known his way around a keyboard since before many of us were born.

It's now been a dozen years since Linkletter's *House Party* left TV, but the funny nice guy who entertained millions of people five days a week, every week, for two and a half decades with his quick-witted, humorous style and natural folksy manners is still a familiar name and a familiar face across the nation.

This holiday season, a company called HomeComputer Software (Sunnyvale, CA) is marketing an education/entertainment software program—*Kids Say the Darndest Things to Computers!*—that combines some of the spontaneity of *House Party* and the fun and philosophy of the book *Kids Say the Darndest Things!* with the computer's unique abilities to involve the whole family in the game-playing process.

The program is targeted for kids five to eleven years of age. *Kids Say the Darndest Things to Computers!* can be played by kids younger than five, but they'll usually require assistance to feel comfortable at the keyboard. Linkletter sees the product as more entertaining than educational, but it's far more than just another home computer game.

A fifty-year veteran of radio, TV, stage, books, and movies, Linkletter is the man who can cause an interviewee to lose all semblance of a stable mental makeup, the man who gets kids to embarrass the hell out of their parents on national television, the man who can deliver devastating one-liners with the true aim of a comedic marksman.

Linkletter's *People Are Funny* played on national TV for nineteen years and his book, *Kids Say the Darndest Things!*, with illustrations by Charles Schulz and an introduction by Walt Disney, appeared in 1957. The book, which includes hilarious bits from Linkletter's countless TV and radio interviews of children, was a bestseller for two years.

With his mature mind and an easy style that made him a friend to kids of all ages, Linkletter was a funny and friendly pyschologist on the tube. He didn't make fun of people and there was more to his shows than just endless gags. He interviewed adults and kids, parents and their offspring, coaxing them to say what was on their minds, asking them about their everyday lives, uncovering the one element of humor that could be cleverly poked and then amplified into hysterical laughter across the nation.

Linkletter helps people feel good about themselves. He likes to go into the homes of American families, one way or another, and stir things up with the ultimate goal of bringing people together. He's taken his responsibilities as an internationally known celebrity very seriously through the years and is continuing to do so right on into the computer age.

Bound for Glory. There were countless other, nontyping, jobs in store for Linkletter during his youthful odyssey. He worked in steel mills, theaters, hotels, meat-packing plants, and restaurants. Eventually he and his friend found their way to New York City where Linkletter got a job as a typist at the National City Bank on Wall Street. It was a hell of a time to be working on Wall Street—Linkletter arrived in town on October 11, 1929—but it was an interesting time in Linkletter's life.

Linkletter did not fully comprehend what the stock market crash of 1929 signified. But he would not always be in the dark about the matters of high finance. After he became a successful entertainer, first in radio and then in the young TV industry, Linkletter made many investments and had his hand in a lot of commercial schemes—in 1969, *Forbes*



Kids today may not be as familiar with Art Linkletter as their counterparts were in the fifties and sixties, but the funny nice guy who has made millions laugh is still getting kids to say the darndest things. A fifty-year veteran of TV and radio and the author of seventeen books, Linkletter is best known for his family-oriented entertainment. Linkletter's *House Party* aired on

magazine estimated his holdings at $20 million.

He's had his business successes, failures, and near-misses. In the late fifties he got into the Hula-Hoop craze. Linkletter Spin-a-Hoops were manufactured by twelve factories across the United States. Fortunately, Linkletter got out of the business before the craze melted away.

These days, Linkletter is into oil wells, livestock, tamper-resistant bottle caps (following through with a project started by his late son Robert), mining, gas, and he is on the boards of several large companies, such as MGM/UA, Western Airlines, and a national insurance company. And now he's getting involved with the software business.

Apples Compute the Gosh-Darndest Things. Linkletter's involvement with the Apple software business began when he was approached by a software company to act as a spokesperson for its products. He says the original plan at that company was to provide both software and hardware to churches for bookkeeping applications. In addition, Linkletter was asked to help design a Biblical education program for the family. When the company split in two, Linkletter stayed with the folks who founded HomeComputer Software.

It was his eldest son Jack who first introduced Linkletter to the Apple II. Jack Linkletter lives in Emerald Bay, California, and bought an Apple for the usual reasons—home finance, some programming, telecommunications. During one visit with Jack and his family, Art started playing around with the computer. Now, when he visits, Linkletter uses the Apple to look at the Dow Jones News/Retrieval Service.

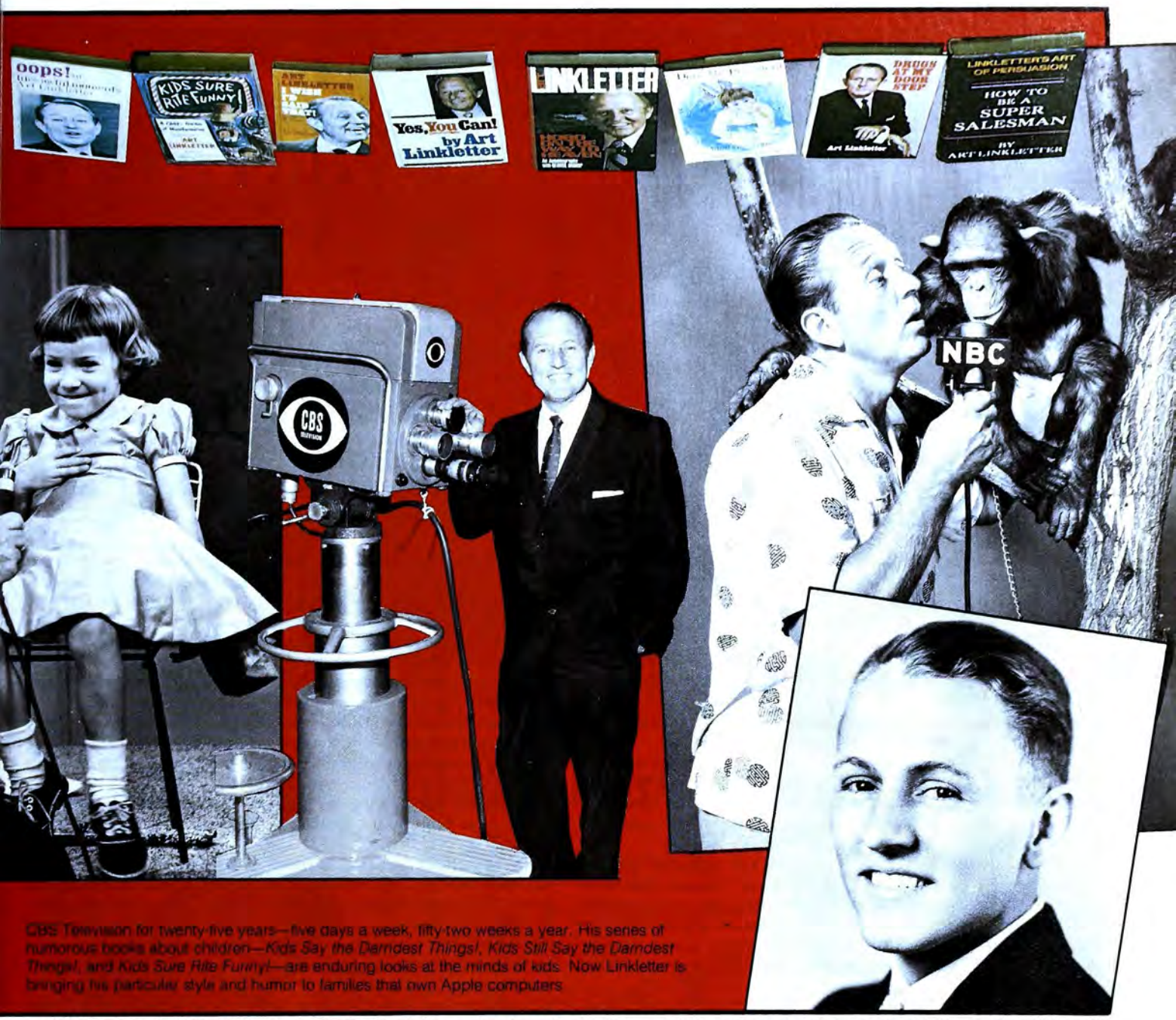
Will Linkletter ever get a computer of his own?

"I'll have one as soon as I need one," he says. "For right now, I get along just fine using Jack's."

A consultant on all of HomeComputer Software's products, Linkletter has even done his own programming. His days as a typist on Wall Street and on the S.S. *American Legion* were long ago, but Linkletter remembers them when he thinks about sitting in front of a computer. "I was one of the original Kelly Girls. I was also a sailor on this ship. When the captain found out I could type, I never chipped paint again."

Linkletter came up with the first version of *Kids Say the Darndest Things to Computers!* on Jack's Apple. The concept was crude and not up to commercial standards, but the example Linkletter set here is indicative of his belief that kids should work hard and learn useful skills they can carry with them through life. Linkletter's skill as a typist, besides keeping him above water at other times in his life, helped make it easier for him to learn the basics of programming.

The version of *Kids Say the Darndest Things to Computers!* that is now showing up in computer stores around the country was a collaborative effort between Linkletter and a couple of professional programmers at HomeComputer Software.



CBS Television for twenty-five years—five days a week, fifty-two weeks a year. His series of humorous books about children—*Kids Say the Darndest Things!*, *Kids Still Say the Darndest Things!*, and *Kids Sure Rite Funny!*—are enduring looks at the minds of kids. Now Linkletter is bringing his particular style and humor to families that own Apple computers.

Welcome to Art Linkletter's Apple Party. A hi-res drawing of Linkletter greets you when you first boot up the program. A dialogue balloon, where the text of Art's interview questions is displayed, fills up almost half the screen. After the greeting, the hi-res Linkletter asks you to type in your name at the keyboard. Then you're asked if that is really your name. The interviewer makes occasional comments, such as, "Oh, Jill is a nice name," or "It's hard for me to see out of this computer; is there anybody else with you?" It's a nice touch.

When parents get hoodwinked into playing the game, they needn't fret about answering the question of "How old are you?" If you're honest, the interviewer replies, "Okay, have it your way. You look younger than thirty-five to me." Similarly, the interviewer doesn't let the young user get away saying no to playing a game. "Are you kidding me?" he says. "Here's a game that even people who don't enjoy playing games will like to play."

Once the initial interview is finished, a menu of ten games appears on-screen—with the name of the interviewee incorporated in the titles. Another nice touch. The ten games are story-creation exercises, wherein a child's answers to seemingly unrelated questions are used to construct short tales. The stories are a lot of fun and each conveys a lesson about life.

As voice synthesis and voice recognition technologies improve, Linkletter and HomeComputer Software would like to allow kids really to say their darndest things straight to the computer, without having to use the keyboard. But for the moment, it's worthwhile to recall a chapter in *Kids Say the Darndest Things!* entitled "Kids Write the Darndest Things!" (Who could argue with the insight of the well-meaning kid who wrote to the president of the United States: "If you keep on doing so great, I'll bet you will probably go down in history like Rodolf the Red Nose Raindear.")

Once a selection has been made from the menu, the electronic Linkletter asks: "Do you want to help me make a story?" If you say yes, the program proceeds normally; if you answer no, the program supplies random responses to the questions normally answered by the child and constructs a story anyway.

The second story creation on the menu is called "Visitors from Outer Space." The young computerist is first asked to supply the name of his or her best friend and then to name a favorite food. Several of the questions are simple requests for such things as a random number, your second favorite color, the town you live in, and a place you visited. Others are designed to stimulate the imagination: "Spell a sound you can make with your mouth besides talking" and "What is one way to spell the sound the straw makes when you get to the end of your milkshake?"

Still other questions are designed to cause kids to think about their



At seventy-one, Art Linkletter is still a very funny guy. He likes to go into the homes of American families, one way or another, and stir things up with the ultimate goal of bringing people together. He sees home computers as having the same ability as radio and TV to unite families while educating and entertaining both children and parents.

emotions and feelings: "Picture something that feels very unpleasant. Can you touch it in your mind? Good! What is a word for how the thing in your mind feels?" The last question asks you to name something you'd like to do with friends when they come to visit.

Once all the questions have been answered, the story is created and it starts out something like this: "One day Jack and Jill were walking down the street when they saw a bright orange spaceship from the planet Giggle (sound the mouth can make) land in the street and 1,238 (random number) pea green (second favorite color) Pluurruups (sound the straw makes) jump out its window (part of house)."

Aliens Say the Strangest Things. As the main character in the story, the child displays no fear of the 1,238 pea green Pluurruups: "They are trying to be friendly. They want to taste our burritos." The Pluurruups leave and Jack and Jill are sad to see them go. "Maybe they'll come back to North Hollywood again and play cards with us sometime!"

After the finished story has been read, there's an opportunity to learn "more about what the story means." In the case of "Visitors from Outer Space," the lesson to be learned is not to judge strangers by appearances alone. Other lessons include patience, selflessness, and gratitude. In at least one of the story explanations, children are advised to seek out more information about the lesson from someone they trust, such as a parent, or a best friend.

"The goal of the games is to make kids think about life, their house, and family," Linkletter says. "At the same time, we're trying to teach them positive values like humility, kindness, and hard work. The program will help kids improve their reading and it will help develop their imaginations."

The family unit is very important to Linkletter—he and his wife Lois raised five kids—and he has written several books on the subject of raising kids. Linkletter himself was denied a stable, happy childhood by circumstances beyond his control.

Linkletter was born in the little town of Moose Jaw, in the Canadian province of Saskatchewan. An illegitimate child, Linkletter was adopted as a baby by John and Mary Linkletter. An unsuccessful insurance salesman in Moose Jaw, John Linkletter first moved the family to Lowell, Massachusetts, where he opened a general store. When that venture proved unsuccessful, the Linkletters moved all the way across the continent to Point Fermin, near Los Angeles.

When the family moved again, to San Diego, the elder Linkletter resumed the shoemaker's trade he had learned as a boy. The family was forced at first to live in a charity home run by a local church. While living in this house, the grateful and impressionable John Linkletter heard the call. The Reverend Mr. Linkletter, as he dubbed himself, believed in the direct approach to spreading the Lord's word, and his congregation consisted largely of passersby on the street corners of San Diego.

Old-Time Religion. Young Art Linkletter would often be called upon to assist his father in helping people to see the light. More than a few times young Linkletter felt humiliated by the situation and, with the knowledge that he was adopted, grew more and more convinced that life with the Linkletters was a temporary thing. When the time came, he would strike out on his own. And he did.

The situation hasn't changed much, fifty-four years after Linkletter and Denver Fox first hit the road. Seventy-one-year-old Linkletter still spends a large part of his time traveling, lecturing, and speaking to students, parents, and youth groups about drug abuse. He has become a crusader, a preacher in his own way, with an audience that he cares very much about.

The death of his youngest daughter Diane, in an LSD-related incident, gave Linkletter something to fight against and something to defend.

"Problems like drug abuse occur when parents aren't communicating with their kids. It's very important for kids and parents to do things together," Linkletter believes. The family unit has a lot to offer the growing child—love and companionship, friendship and support. Linkletter also believes that the teachings of Christianity are invaluable in the raising of kids, though there are no religious elements in *Kids Say the Darndest Things to Computers!*

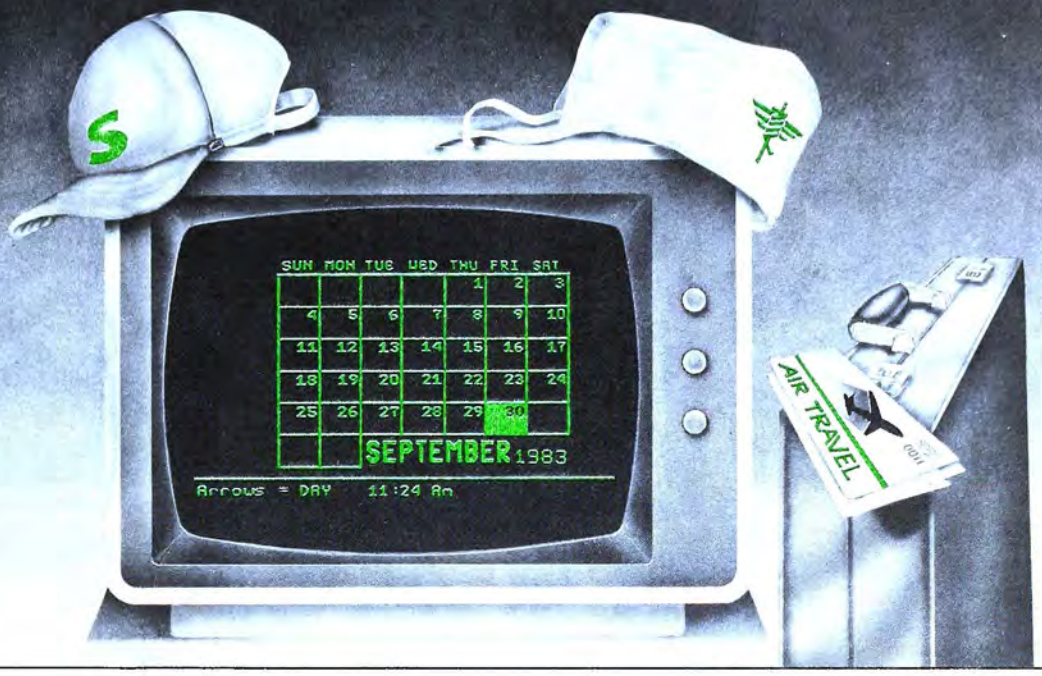
Linkletter and HomeComputer Software are working on software programs based on some of his other books, such as *How To Be a Supersalesman*. Through the years, Linkletter has written several times about such subjects as positive thinking and self-improvement. He sees current crazes such as aerobics classes and health club membership as indications that people like to improve themselves.

"What's that joke going around? If God had wanted us to exercise he would have put Jane Fonda in the Bible."

Computers Are Funny. Linkletter is perhaps the first big personality in the entertainment world to become directly involved with the merchandising of personal computer software. More will surely follow him. HomeComputer Software has released a golf game designed by pro golfer Tom Weiskopf, and other sports stars are getting into the act. The desire to link computers with such popular pastimes as entertainment activities and athletics is increasing as the software industry serves more consumers each year.

Thirty years ago, Linkletter turned down an offer from Walt Disney to have first chance at acquiring the land immediately surrounding the site that would become Disneyland. Linkletter has kicked himself in the pants over that decision for the last quarter century. Luckily, kids and grown-ups never stop learning. As we enter the new year, Linkletter is not about to miss out on the fun, fame, and fortune of the computer revolution. ■

Suzie's First Softball Game. . . The Two Places-At-Once Schedule . . .Meeting With The Boss.



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KEYS TO THE WORLD BY MATT YUEN

Not too long ago, we said something about terminal programs and how they instruct the computer to perform all sorts of nifty tricks with the modem. This time we're going to look at some of those nifty tricks. More important, we'll discover exactly what a terminal program is, what it's used for, who needs one, and why.

What the Heck Is It? A terminal program is software that makes the modem and computer work together. Modems usually have programs built into them in the form of ROM chips, but these programs are of limited capability. For the most part, they offer sets of operating commands, access to memory locations, and routines that can be used by other programs, namely terminal programs.

A terminal program allows you to manipulate the modem, much the way a word processing program lets you manipulate the computer. In this way, a terminal program acts more like a link between you and the modem than between computer and modem.

For example, *Smartcom I*, the terminal program that comes on disk with the Hayes Micromodem IIe, lets you change from pulse dialing to Touch-Tone dialing at the touch of a key. To do this without software would require a moderate knowledge of programming.

It should be understood that it's possible to operate a modem without a terminal program, just as it's possible to use a computer without software; however, the scope of such use is extremely limited. It's also possible to communicate with someone who's using a terminal program on the other end, even though you're not using one. What it comes down to is this: Using a modem doesn't require having a terminal program, but having one allows you to perform more functions. Terminal programs are the muscles that allow us to get the most out of the bare bones of a modem.

What's in a Name, Revisited. Before we start finding out what terminal programs are for and how they work, it would help to know why they're called terminal programs.

Information that moves along the phone lines can stop only where there's a "place" for it to get off, such as a telephone. When you reach out and touch Mom to tell her you love her, those endearing words jump onto the phone lines and don't stop until they get to her phone (unless the line is tapped somewhere along the way, in which case, the nosy person can eavesdrop, but the data continues to Mom's phone).

Information that's being sent from one computer to another via telephone lines travels similarly. Just like passengers on a train, all those bits sent out from one computer are put on a nonstop ride to the other computer; they can't get off until they reach a terminal. For train riders, it might be Grand Central Station; for computer bits it could be an Apple, an IBM Personal Computer, or a DEC 10 mainframe.

Because computers with modems can act as either points of origin or as destinations for information, they're referred to as *terminals*. A terminal program, then, is software that helps the computer function as a terminal.

Two confusing words often used in describing terminals are *smart* and *dumb*. Dumb terminals are those whose sole purpose in life is to manipulate other computers. An example would be the terminal an airline agent uses to book reservations and write tickets for passengers. This kind of machine is hooked up to a much larger computer and does nothing but let the agent communicate with it. Without the main computer, the dumb terminal is useless.

Educated Apple. Smart terminals are like wise sages that the dumb terminals come to for enlightenment. In the previous example, the smart terminal is the airline's main computer that stores flight schedules and passenger lists. A dumb terminal can have access to this information, but it doesn't retain any of it permanently; rather, a dumb terminal looks up information in the smart terminal's storage system, sometimes modifies it, and then sends it back to the smart terminal.

Think of a smart terminal as the teacher and dumb terminals as students. Students who want to learn consult and communicate with the teacher, but a teacher who wants to learn doesn't often go to the students for help (unless it has something to do with the latest in pop music). Instead, the teacher asks other teachers, preferably those who specialize in a particular field of knowledge.

With a modem, the Apple functions as a smart terminal, but it can also act as a dumb one. An Apple-run bulletin board service is an example of a smart terminal, while an Apple used at home to communicate with the company computer at the office is an example of a dumb terminal.

Whether your Apple functions as a smart or dumb terminal depends on the software running on it. Some terminal programs can turn the computer into a smart terminal or dumb terminal only; others let you switch the computer between being smart or dumb.

When trying to determine what sort of terminal program is right for your needs, it helps to know what various programs can do. What follows is a summary of some common terminal program features and how they work.

Walk This Way, Please. One of the most valuable features of a terminal program, if you plan to use it for calling up systems like BBSs, CompuServe, or the Dow Jones News/Retrieval Service, is its ability to route information to an area of the computer's memory known as the

buffer. Though it sounds rudimentary, this function is not built into the modem. The modem knows only how to receive information and send it to the screen or a printer for the user to see. Terminal programs can open the computer's memory so it can hold information to be read later.

At a transmission speed of 300 baud (bits per second), information comes in at almost forty characters per second; at this speed, it's hard enough to read information without having the screen scroll up for each new line. Most of the time, it's possible to stop temporarily the flow of data coming through, but that just means the computer has to be on the phone longer. As a result, phone bills go up, as do charges if you happen to be logged on to a subscription service.

A *capture* feature puts all the information being transmitted into the buffer. With a capture feature, you can let the Apple receive all the information you're interested in without interrupting it and then read it after logging off the remote system. If the information is something you'd like to refer to later, such as stock market reports or news items, you can store the contents of the buffer on disk in the form of a text file or print a hard copy for permanent record.

Message in a Bottle. The opposite of receiving and storing is the process of sending prepared information. A terminal program doesn't affect the way two people can "talk" to each other via modem; the program's terminal mode allows them to type back and forth the same way they can without a terminal program. That's one way to send information, but it's usually reserved for conversation. When you want to send information in bulk, file transfer is the way to go.

In telecommunications, there are two kinds of files: text files and nontext files. That's not a very detailed description, but it's all that matters when we're talking about transferring files by modem. The modem doesn't care what is being sent; it only cares whether it's a text file.

Nontext files include Applesoft, binary, Pascal, and CP/M files that aren't composed of text characters. We'll look at how to transfer these kinds of files in a moment. But first, let's examine text file transfer.

From the modem's point of view, sending a text file is the same as typing very fast; the modem thinks someone is at the keyboard inputting all the characters, when the data is really coming from a text file on disk or from the buffer. Earlier we said that inputting text characters from the keyboard and having the person at the other end see it doesn't require both parties to have the same terminal program. Thus, sending text files doesn't require both parties to have the same program either, since the modem thinks there's really somebody typing.

Text files can be prepared with any word processor that stores data as standard text files, or they can be prepared by using a terminal program's editor. An editor is like a miniature word processor that's built into the terminal program. With it, you can create messages and store them on disk as standard Apple text files to be sent wherever and whenever you want.

Editors are normally used to create brief messages such as business memos or public messages to be posted on a BBS. Letters, reports, and other lengthy documents are usually generated by a word processor and then sent by a terminal program.

The text editors of different terminal programs have different capabilities, depending on the aim of the program.

Programs like *ASCII Express:The Professional* include a simple editor which you can use to create text and edit lines. A program like *Micro/Courier*, which is intended for people who plan to transfer interoffice memorandums, includes an editor with a few more capabilities. *Micro/Courier*'s editor lets you delete and reposition words or even whole paragraphs with just a few keystrokes.

Object Code Objection. Currently, it's not possible to exchange anything but text files if the communicating Apples aren't using the same terminal program. That means programs (object code files) can't be sent unless they're converted to text files first (the instructions for converting Basic and binary files to text and vice versa are found in *The DOS Manual*). Once a program is in text file form, it can be transmitted like a normal text file.

Text files are transferred byte by byte as standard ASCII characters, which are generated by using a combination of seven bits. For the purpose of creating a character, the eighth bit doesn't matter; it does matter when defining whether to display a character in a normal or flashing mode.

When text files are transferred, terminal programs sometimes manipulate the eighth bit for various reasons specific to each program.

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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.

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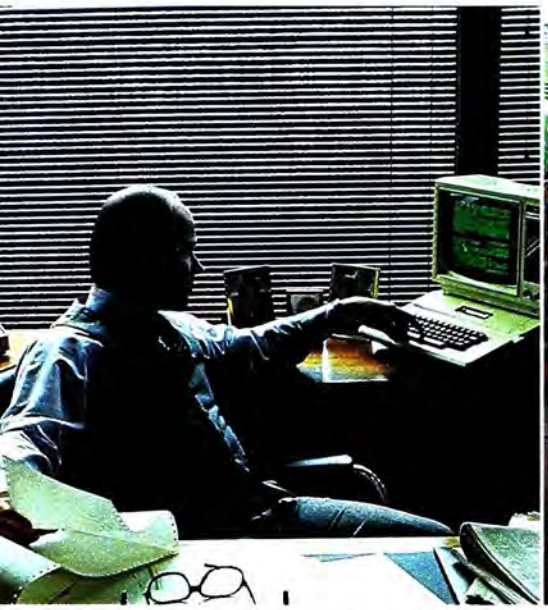
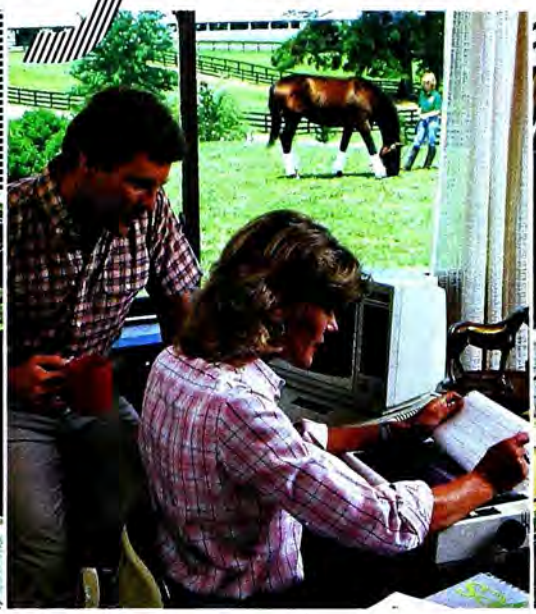
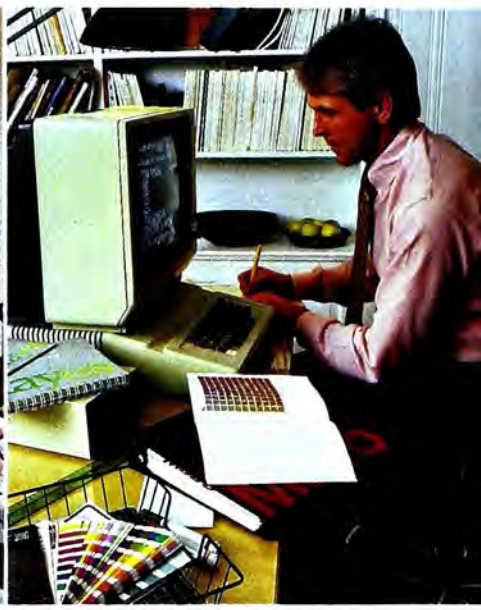


"Thanks for the prompt reply. Sure was a lot faster than waiting for the mail!"



"Gary: The pedigrees for next week's auction are as follows..."



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This doesn't affect the character; with the eighth bit on or off, an A is an A, a B is a B, and so on, because the other seven bits that define the character are still the same.

The reason we don't send programs this way is because the bytes contained in a program's code use all eight bits. Thus, if the terminal program altered the eighth bit in any way, the program being sent would be garbled. Likewise, Pascal and CP/M program files aren't sent in the same manner as text files—data integrity must be ensured.

Two computers using the same terminal program can perform something known as *protocol transfers*, which make it possible to send and receive DOS, Pascal, and CP/M program files (nontext files).

(Here, protocol transfer doesn't mean sending protocol from one place to another; it refers to a method of transferring information.)

In political circles, protocol is a set of points that negotiators agree upon before signing a formal agreement. In telecommunications, protocol means the same thing; it refers to a format of data transmission that both computers agree to use.

This is very important because if the receiving computer expects data to come in a certain way and the sending computer sends it a different way, all sorts of confusion will result. Imagine what would happen if you decided to hold a formal party complete with shellfish, sushi bars, ice sculptures, and a string quartet. But you forgot to mention formal attire on the invitations, and your guests were too dim to call for more information. What a surprise everyone would be in for when they showed up in chinos and designer jeans and you (or the butler) greeted them wearing a tuxedo.

And More Objections. Many terminal programs, including *Transend*, *ASCII Express:The Professional*, *Smartcom I*, and *Micro/Courier*, have protocol transfer features. However, an Apple using *Transend* can't do a protocol transfer with another Apple that's using *Smartcom I*. Makers of terminal programs can't be sure that another Apple you're communicating with will be using the same protocol. So the general rule is that, if you want to perform a protocol transfer, then both sides of the transfer must be running the same terminal software.

The transfer of program files is done through *verification protocol*, which transfers all types of files (text or nontext) without any errors; if it can't transfer without error, it won't transfer at all.

A constant source of aggravation for nontechnical users is the proliferation of initials and abbreviations that technical users introduce to the computing field. In protocol transfers, CRC is one of those abbreviations, and it stands for *cyclic redundancy check*, which is what verification protocol uses to find errors.

Very simply, here's how a CRC process works. Bytes of data are sent in blocks. By looking at certain characters, CRC compares how the block looked when it was sent and how it looks when it's received. If there are any discrepancies, the same block is sent again. Verification protocol is much like a music teacher; it demands that the process be performed repeatedly until it's done right. But even a music teacher's patience has a limit; after about ten tries, the program gives up the transfer process as futile.

For Strong Stomachs Only. For a detailed description of how a CRC works, let's look at a popular verification protocol, the Christensen protocol. This method transfers data in blocks of 128 bytes, with a checksum byte slapped onto the end of the block. A *checksum* is a crucial device in Christensen protocol that verifies that all data has remained intact. When a 128-byte block of data is sent, the sum of all the bytes' values is sent with it; that sum is called the checksum. At this point, try to imagine this 128-byte block as a train carrying 128 people. The train's checksum would be the total weight of all the passengers and their baggage.

When the other computer receives the block, it starts adding up all the bytes as they arrive (picture all the passengers stepping onto a huge scale as they get off the train). Once it's done that, it compares its checksum with the checksum of the sending computer. If the checksums match, it means all the bytes arrived safely, so the receiving computer sends back an "okay" character, signaling the sender to transmit the next block of data.

But what if they don't match? That means that a byte was altered somehow, which is comparable to the train's losing baggage or unauthorized passengers hopping aboard the train on the way. If the checksums don't match, the receiving computer sends back a "not okay" character, signaling the sender to transmit the same block again.

Here's where things get hairy. Let's suppose everything arrived intact and the receiving computer sent the "okay" character, but the sender didn't receive it. The sending computer waits awhile, concludes that things are "not okay," and sends the same block again. But now the second block will be a duplicate of the block the receiving computer just received.

The Christensen protocol takes care of this potential problem by assigning a number to each block. If, as described, the sending computer resends the same block, the receiver sees the block number and recognizes that it's the same block all over again. When this happens, it sends back the "okay" character, discards the block, and waits for the next one. Now the two computers are caught up with each other.

No More Busy-work. Logging on to remote systems can require anything from simply hitting the return key to spending several minutes typing in your name, identification number, password, and any other pertinent information. To help you get through the log-on procedure with minimal effort, some terminal programs provide macros.

In assembly language programming, a *macro* is a type of instruction that represents several instructions. In culinary arts, the instructions "Fill the pot with water, put the egg in the pot, and boil the egg for three minutes" could be simplified to the macro "Fix a soft-boiled egg."

Terminal program macros let you execute several instructions with one command. Using the program's macro editor, it's possible to assemble the kinds of input that would normally be typed at the keyboard.

Let's suppose a BBS requires Jimmy Jack to input his name, phone number, and password in order to gain access to the system. He can put together a macro that would send all that information when prompted to do so. If the prompt looks like this:

Please type your full name:

Jimmy can create a macro to send the string *Jimmy Jack*, followed by a carriage return when the BBS sends the : (colon) character.

Next, when the prompt asks for his phone number:

Please enter your phone number (XXX-XXX-XXXX):

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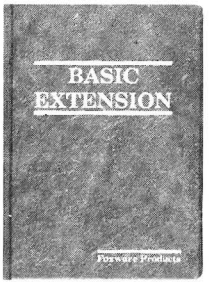

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Jimmy's macro will send the string *(617) 555-4334*, followed by a carriage return when it sees the : character again.

So, not only can macros send the information Jimmy would otherwise have to type himself, they can send it when prompted by the remote system to do so.

And Wait, There's More. The usefulness of macros goes far beyond the log-on process. They can send commands to read any mail sent to you, store it on disk, and even send messages stored on disk to the remote system. You have only to touch a few keys. Some terminal programs can be configured to call a system at particular times (if a clock card is part of the computer's setup) and execute macros automatically. This little feature comes in handy when you want to take advantage of nighttime telephone rates.

Macros can be thought of as very simple programs that run in the form of "Perform the first action on the list when the first prompt comes along; perform the second action on the list when the second prompt comes along, and so on." To use macros effectively, it's necessary to be familiar with the kind of system you'll be logging on to. In our earlier example, Jimmy Jack knew exactly what information the remote computer would ask for, in what order it would ask for it, and what character would be the prompt for his response.

A typical *ASCII Express* macro for Jimmy Jack's favorite BBS might look like this:

```
%^G'%:Y'%?42JJ3'
```

Whoa! Say what? Here's what it all means:

%^G	That ^G stands for control-G, which represents the bell sound. The percent sign tells *ASCII Express* to wait until it receives a specific character; in this case, control-G is that character.
'	This sends a carriage return, which tells the BBS to send its greeting message.
%:	Wait for the : character. On this BBS, the first occurrence of this character asks if Jimmy has a password.
Y'	Send a Y and a carriage return to tell it Jimmy has a password.
%?	Wait for the BBS to send the question mark, which asks Jimmy to enter his password.
42JJ3'	This is Jimmy's password followed by a carriage return.

Jimmy is now logged on to the system. This is a very simple example. When Jimmy calls up the Source or CompuServe, things get much more complicated; the macro can read mail, post and remove messages, and download the latest sports stories from the wire services.

Miscellaneous Junk. Text file transfer, text editors, protocol transfer, and macros are generally the most powerful features of terminal programs. Of course, which features are considered important depends on how the modem is being used. Someone who intends to call Dow Jones News/Retrieval will find macros invaluable, while someone who uses a modem for exchanging programs with a friend will look for a program with protocol transfer abilities.

Other things to consider when deciding on which terminal program to get: Does it handle CP/M and Pascal files (if that's pertinent)? What baud rates does it work with? Does it run in an unattended mode? How large is the capture buffer? Can it send text files to multiple addresses automatically? And how much does it cost?

Don't Talk to Strangers. So far we've looked at a communication setup between two Apples only. It's possible for modem-equipped Apples to call and communicate with other kinds of computers, but it's not possible for Apples to exchange files with them.

No matter what the setup, an Apple can't send a binary file to an IBM Personal Computer; it can't receive files from a DEC VT100; and it can't exchange text files with a TRS-80. Why not? Because each of these machines uses a different microprocessor and operating system. Whereas a standard Apple II uses a 6502 microprocessor and DOS 3.3 as an operating system, most IBM pcs run the MS-DOS operating system through an 8088 microprocessor.

Because of these differences among various computers, the exchange of information among them has been a problem. It can't be done. That is, not yet.

Next time, we'll look at a change in the telecommunications field that should eliminate the problem of dissimilar computers not being able to talk to each other. ◨

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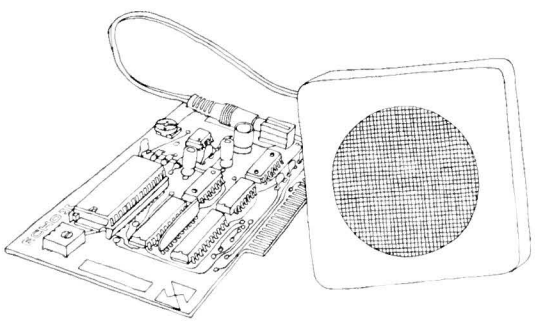

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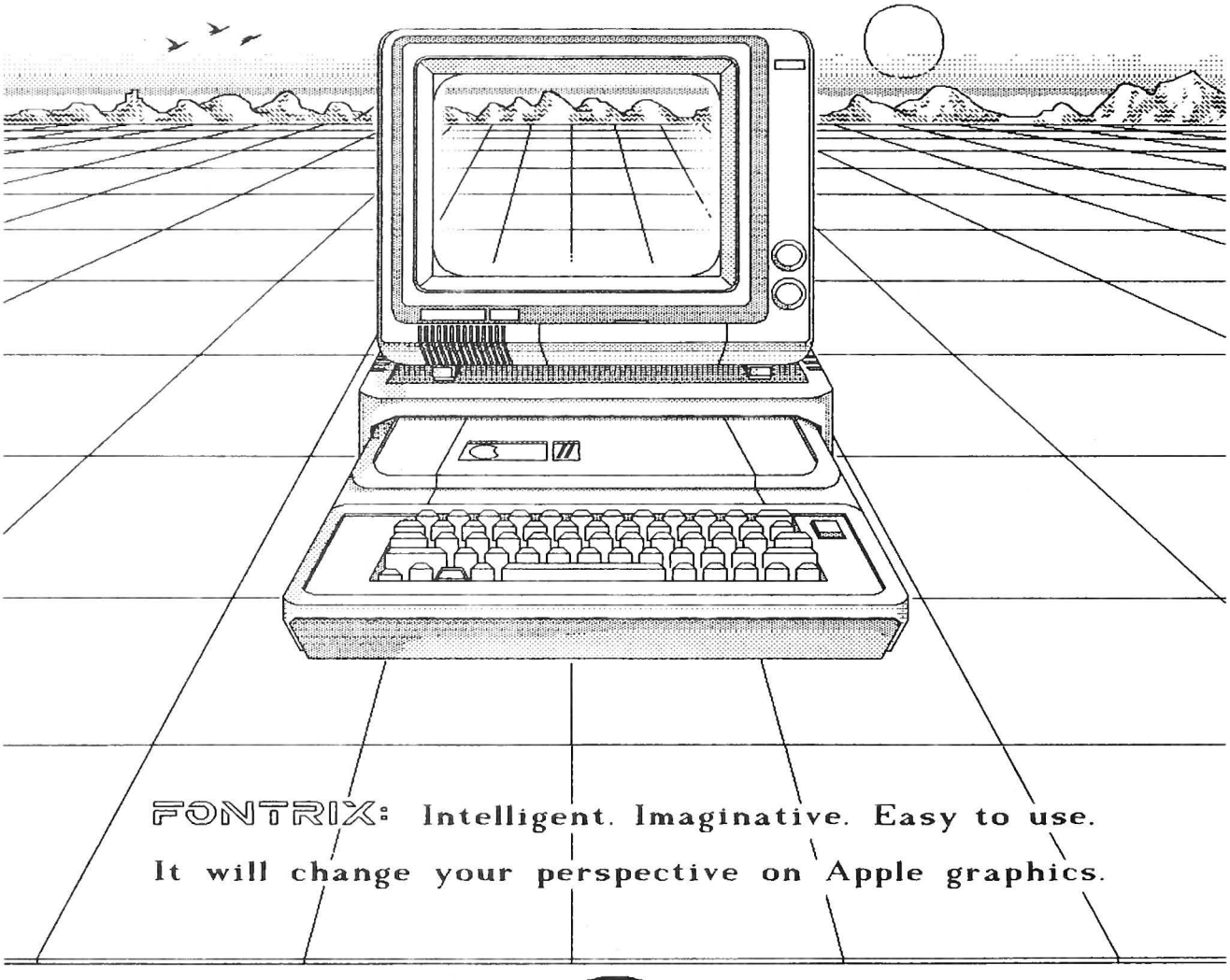

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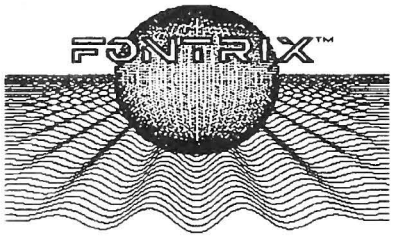

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Lining Up the Straight Facts

From the information presented in last month's column, we now know a little about the Apple II and how its hi-res graphics screen works. The most important thing we learned was how to overcome the technical problems posed by the Apple's screen mapping. We saw how to do this very effectively using four simple tables.

Hidden in all of that tech talk were some important facts about the Apple II that should be brought out now. These hi-res facts, like the axioms underlying a mathematical theory, shape much of what follows.

Hi-Res Fact Number One: The hi-res screen is really just a piece of the Apple's memory, and it can be easily and quickly modified by the Apple's microprocessor chip, the 6502.

This hi-res fact describes the architecture of the Apple II. While it seems obvious, we make a point of stating it because it is so important. Including the display screen in the computer's memory space is earth-shaking because it represents a new focus on rapid interaction.

Before the personal computer explosion, most computers had display terminals attached to them, almost as if the user's relationship to the computer was an afterthought. Interaction was limited by the rate at which the computer could talk to the terminal, which was extremely slow compared to the rate at which the computer could execute instructions. Many of the first microcomputers followed in this tradition. They were just like little mainframe computers.

But Wozniak and Jobs were visionaries. They put the text and hi-res display screens in the memory of the Apple II because they anticipated many of the highly interactive uses to which their new toy could be put. In this sense, they really did invent the personal computer, as Apple has sometimes claimed.

Almost every personal computer that has followed the Apple II has had the same architecture: processor, plus memory, *plus* built-in display memory. In the future, this architecture may be the definition of "personal computer," and it may become the only real difference between the microcomputer on your desk and the office mainframe.

Hi-Res Fact Number Two: The hi-res screen memory is organized into scan lines. All of the dots on the same horizontal row of the video display are stored near each other in memory.

Hi-res fact number two implies that, if we have just changed a dot, it isn't much more work to change another dot that's on the same scan line. Since all the controlling bytes of any horizontal line in the screen memory are always within forty bytes of each other (the width of the scan line in bytes), we can use the same scan line address to get at both dots. We saw this demonstrated last time when we wrote a simple loop to clear a scan line to black. We had to calculate the address of the scan line only once, even though we cleared 280 dots. Clearing 280 dots randomly located on the screen would have taken much longer because we would have had to have calculated the scan line address for each dot.

Therefore, if we're smart, we'll design our algorithms so that they draw in what is called *scan line order*. What this means is that when we draw something, we will try to draw it in the same way that a bricklayer might build a brick wall: one row at a time, starting at the bottom and working upward (or going from top to bottom, since there's no such thing as gravity inside a computer program).

If we wanted to draw a rectangle, for example, we would draw it as a series of horizontal rows of dots, or bars, of the same length, each bar or row directly over (or under) the previous one. We would be crazy to try to draw it as a series of vertical bars, because we would be calculating the same scan line addresses over and over. The hi-res screen has a definite grain, and we'll always want to go with that grain.

Hi-Res Fact Number Three: Each byte in the hi-res screen memory controls exactly seven dots on the video display. The seven least significant bits of the byte are switches, each of which turns one dot on or off.

At the end of last month's column, we listed a program for turning on a dot on the hi-res screen. You may have noticed that it was some trouble to isolate a single bit from a byte and change it. This is always the case: It is easier to get a byte than it is to get a bit within a byte. Thus, fact number three implies that it is easier to change seven dots than it is to change one! (As long as the seven dots are all in the same byte.)

If we are clever, then, we'll try to change the screen a byte at a time whenever we can. This will speed up our graphics operations by a factor of more than seven. For those of you who aren't sure, this is good.

Now we have a much better idea of how we should operate on the hi-res screen. The most obvious approach would be to draw objects by breaking them up into individual dots and then use a point-plotting subroutine to put them on the screen. While this strategy is simple, we saw that, because it doesn't take advantage of the peculiarities of the Apple's screen mapping, it requires a lot of extra calculation. It isn't efficient.

A better drawing utility would be one that draws a horizontal row of dots in a single operation. Such a utility would be generally useful since we can break up any shape on the display screen into a collection of rows of dots. Geometrical shapes like rectangles, circles, triangles, and lines can be easily reduced to rows of the proper widths. Even a single point can be thought of as a very short row consisting of a single dot.

This row-drawing utility, which we will call HLINE, clearly takes

advantage of the Apple II screen mapping. We saw that we won big when we were able to draw a lot of dots on the same scan line at one time; this is just what HLINE tries to do. Also, it is easy to implement HLINE in such a way that, for long rows of dots, it operates on the screen memory one byte, rather than one bit, at a time. In fact, it's hard to implement HLINE poorly.

HLINE exploits facts number one and two, and we can expect very good performance using it. There is, however, a danger. If the objects that we want to draw are composed of many tiny rows of dots, we will again find ourselves doing a lot of repetitive calculations, and losing big. HLINE will thrive on a few long rows of dots, but it will choke on lots of little rows. Unfortunately, objects like text and icons are made up of lots of tiny rows and will glut HLINE, so we'll have to think of a better way to draw them. Note that, for the same reason, point plotting is also unsatisfactory for drawing text and icons.

For now we'll be satisfied with drawing simple geometrical objects. HLINE will let us draw these fast. We're almost ready to begin.

But first, we need to explain what we mean by the word *draw*. What exactly do we want HLINE to do to a row of dots? We'll want to be able to turn dots on and off, but are there any other operations that we'll find useful?

We are limited in our choice of operations only by the instruction set of the 6502 processor in our Apple. This is not really much of a limit. In fact, most people would be hard put to give an example of a function that was not computable on an Apple II.

What operations make sense? We could multiply bytes in the screen memory, since screen bytes are, after all, just like other bytes in memory. This would not make sense because bytes in the screen memory are not numbers or characters. Rather, they are sets of seven switches, each one independent of the other six. We noted before that we should think of a byte of screen data as a group of separate bits, so we should really consider only operations that work on bits or groups of bits.

The simplest operation on a bit is to leave it alone. This isn't terribly useful.

The next simplest operations are those that force bits to either 0 or 1. Forcing screen memory bits to take on the value 0 is the same as turning dots off on-screen, while forcing bits to take on the value 1 is the same as turning dots on. We have already decided that we need to be able to perform these operations. We will call them *clear* and *fill*.

Another simple operation reverses the state of a bit. This operation will change 0s to 1s and vice versa. It is an interesting operation, because it is its own inverse. That is, it can be used to undo itself. Suppose, for example, that we invert some screen bits that are set to 0. This will turn on the bits and their corresponding display dots. Now we invert the same bits again. The screen bits that were just set to 1s will be reset to 0s, and the display dots will be turned off. The reversibility of this operation will make it a useful addition to our repertoire. We will call this operation *invert*.

There are more complicated operations that are also quite useful. Sometimes, we will want to turn bits on or off according to a predetermined pattern. For example, we might want to draw a rectangle filled with a checkerboard pattern. This would be hard with the simple operations we have already described.

What this requires is an operation that looks at the position of the bit in the screen memory and sets or resets it so that it complies with the required pattern. This is a very different kind of operation, which we'll call *pattern fill*.

The choice of these four operations might seem arbitrary. That's because it is. We could have chosen some very different operations. This particular set of four has proven useful for a lot of different applications, so our HLINE subroutine will be able to perform them.

Well, we seem to have made it through a column without any machine language. Instead of coding we have talked philosophy and developed a strategy for drawing geometrical objects.

Next month we'll take the plunge and write the HLINE subroutine in assembly language. Because a lot of drawing programs will be depending on HLINE, we'll pull some tricks to make sure it is as fast as we can make it. ■

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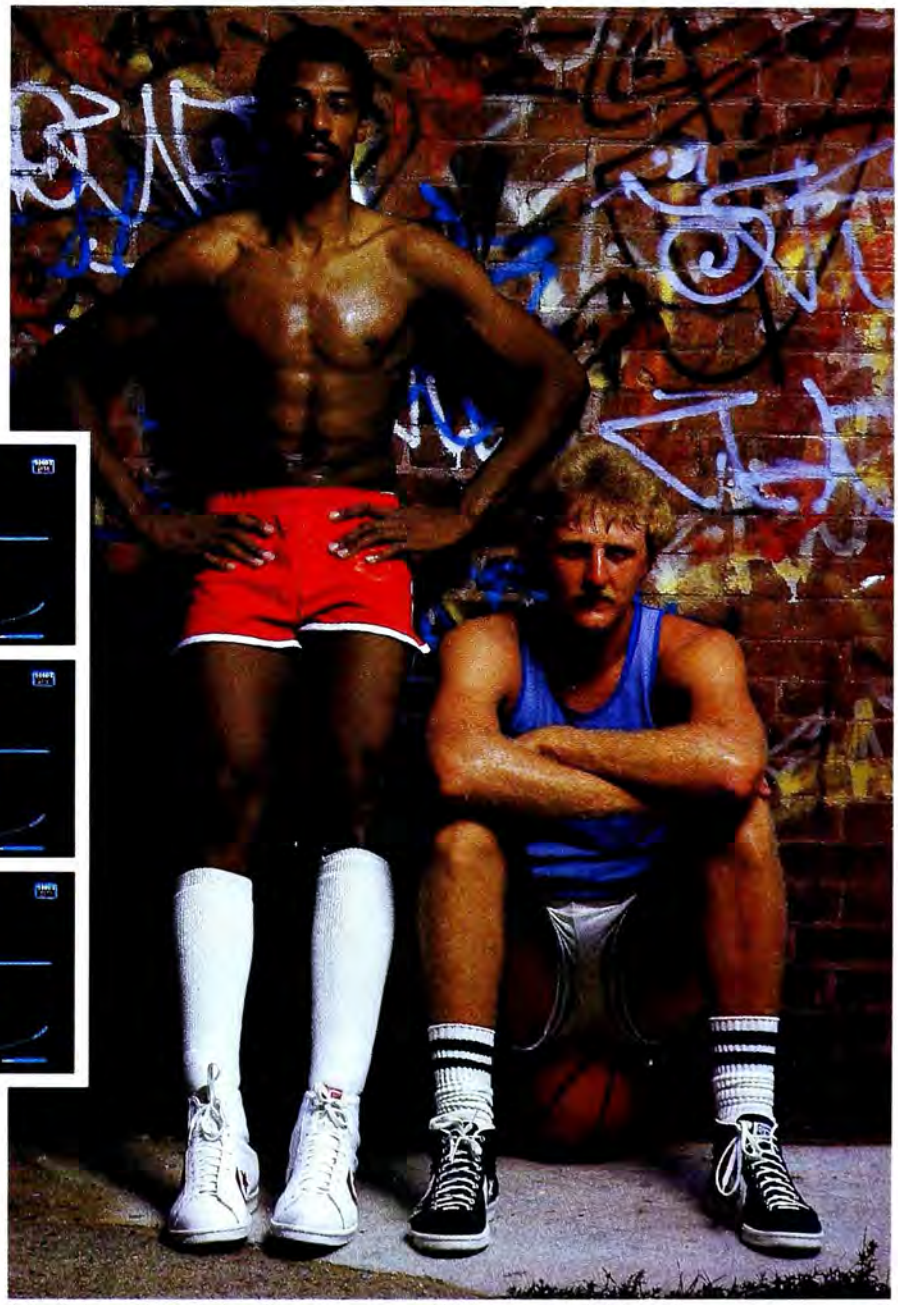

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ELECTRONIC ARTS™

THE BASIC Solution

By Wm. V. R. Smith

This month the Basic Solution presents *BasicGraph*, which uses two subroutines presented in earlier Basic Solution articles to create a visually appealing pie and bar graph program.

The subroutines used are the seventy-column hi-res character driver (*Softalk*, November 1982) and the circle-drawing routine presented a few months ago. Both of these routines have been modified slightly to perform the desired functions, so the program is presented here in its entirety.

Those of you who have had a chance to see Apple's new computer, the Lisa, and its charting program, *Lisagraph*, will recognize *BasicGraph*'s style of presentation. Apple's Lisa is an extremely powerful machine. Of course, its video display is greatly enhanced over that of the Apple II. If *BasicGraph* gives you some feeling of the power of Lisa, then it will have accomplished a great deal.

The first thing regular readers will notice is that the remarks statements are greatly reduced in *BasicGraph*. This program makes use of the hi-res screen and a fair number of variables to do the seventy-column character display. This eats up a large amount of the available memory in the Apple II.

The first problem caused by the memory limitations was that Applesoft started to store variables in the hi-res screen memory, destroying the appearance of the *BasicGraph* display. The solution to this problem was quite easy. We simply used lomem:16384 in line 10, which starts variable storage above the hi-res memory. The program itself stops just short of $2000, the beginning of hi-res page one. Adding further remarks would put it over the edge. Any part of the program that was higher in memory than $2000 would be cut off when the hgr command was executed.

The accompanying illustrations show the two types of graphing functions available in *BasicGraph*. The pie chart and the bar chart sections can use the same data so you can compare the two different types of graphs. Of course, the type of data will usually dictate which one you use. Both graph functions will graph up to sixteen titles and values. Your information can be stored to disk for later retrieval.

The titles and amounts can be edited by selecting the appropriate command with the blinking cursor and hitting return. You can switch between pie graph and bar graph by choosing one at drawing time. You can even clear the entire display and start again from scratch.

Now let's spend a little time and discuss the operation of *BasicGraph*. After you get the program entered in and type *run*, the program should go to the hi-res screen, draw the *BasicGraph* screen, and display a blinking bar under the *edit titles* prompt. If you press any key other than return, the bar will advance to the next prompt. After the fourth prompt, it cycles back to the first. By placing the flashing bar under any one of the prompts and pressing return, you can perform the specified operation.

Let's begin with *edit titles*. Place the bar under the edit titles line and press return. You will be prompted with the number 1 and asked to type in the first title. Type *January* and press return. You will be prompted for the second title; type *February*. Enter all the months through June. When you have completed this and you are on title number 7, simply press return without entering a value and you'll leave the edit mode and return to the prompt command mode.

Next, go to the *edit values* prompt and press return. You will then be prompted with the first title you typed in and asked for a value. Enter any positive values you wish for each of the six months. As soon as you have entered the value for the last title, you'll be sent back to command mode. If you have made any mistakes in entering the titles or amounts, you can go back to the edit titles or edit values mode. For each piece of data, you will be shown the current title or value. If it is correct, simply press return. If it is incorrect, you can retype it and continue on.

After you have typed in the proper information, place the bar under the *draw graph* prompt and press return. You will be asked to type 1 for a pie chart or 2 for a bar graph. Make your selection and watch the chart appear. If you wish, you may go back to the draw graph function and select the other type of display.

Now go to the disk I/O section and press return. You will be prompted with:

1 – LOAD 2 – SAVE 3 – CLEAR

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If you select load or save, you will be presented with a catalog of the disk and asked to enter a file name. If you select clear, the graph and all of the data will be erased and the system will restart.

One other feature has been added into the edit title system. If you wish to chop off data from the end of your list, edit titles and press return until you get to the first one to delete. Then enter a period and press return. The system will then remove everything beginning with the line on which you entered the period. This little trick will help you graph smaller sections of your data.

The speed at which the Basic version of *BasicGraph* operates is acceptable but can be greatly improved by compiling. For those of you who have the *SpeedStar* compiler from Southwestern Data Systems, line 2265 has the *SpeedStar* command to jump the compilation around the hi-res screen. The pie chart shown takes forty-three seconds to draw in Applesoft but only fourteen seconds when the program is compiled with *SpeedStar*. If you have another compiler, we'd be interested in hearing how much it improves the speed of *BasicGraph*.

Note: Lines 2500, 2515, 2930, 3250, 7040, 9320, and 9410 contain remarks concerning the number of spaces between quotes. Do *not* type these remarks in, as they will make the program too long, causing it to crash.

```
1  REM  ***
2  REM  * BASICGRAPH
3  REM  ***
10  LOMEM: 16384
11  PRINT CHR$ (27); CHR$ (17)
12  GOTO 3000
15  GOTO 4000
100  REM  ** PLOTTER ***
110  ON PL GOTO 200,210,220,230,240,
     250,260
115  HCOLOR= 0: HPLOT X1,Y1 TO X1 +
     2,Y1: RETURN
150  HCOLOR= CO: HPLOT X1 + 2,Y1
155  HCOLOR= 0: HPLOT X1,Y1: HPLOT
     X1 + 1,Y1: RETURN
200  HCOLOR= CO: HPLOT X1 + 2,Y1
205  HCOLOR= 0: HPLOT X1,Y1: HPLOT
     X1 + 1,Y1: RETURN
210  HCOLOR= CO: HPLOT X1 + 1,Y1
215  HCOLOR= 0: HPLOT X1,Y1: HPLOT
     X1 + 2,Y1: RETURN
220  HCOLOR= CO: HPLOT X1 + 1,Y1:
     HPLOT X1 + 2,Y1
225  HCOLOR= 0: HPLOT X1,Y1: RETURN
230  HCOLOR= CO: HPLOT X1,Y1
235  HCOLOR= 0: HPLOT X1 + 1,Y1:
     HPLOT X1 + 2,Y1: RETURN
240  HCOLOR= CO: HPLOT X1,Y1: HPLOT
     X1 + 2,Y1
245  HCOLOR= 0: HPLOT X1 + 1,Y1:
     RETURN
250  HCOLOR= CO: HPLOT X1,Y1: HPLOT
     X1 + 1,Y1
255  HCOLOR= 0: HPLOT X1 + 2,Y1:
     RETURN
260  HCOLOR= CO: HPLOT X1,Y1: HPLOT
     X1 + 1,Y1: HPLOT X1 + 2,Y1
265  RETURN
300  REM  ***OUTPUT CHAR ***
305  X1 = ((VX - 1) * 4) + 1
310  FOR LX = 1 TO 5
320  PL = VAL ( MID$ (C$(C),LX,1))
330  Y1 = ((VY - 1) * 8) + 1 + LX
340  GOSUB 100
350  NEXT
360  VX = VX + 1
390  RETURN
400  REM  *** DATA
405  DATA 00000
409  REM  START AT ! THRU ]
410  DATA 22202,55000,25052,27672,
     51245
411  DATA 24257,22000,12221,21112,
     27225
412  DATA 02720,00212,00700,00033,
     11244
413  DATA 75557,22222,71747,71717,
     55711
414  DATA 74717,44757,71111,75757,
     75711
415  DATA 22022,22024,12421,07070,
     42124
416  DATA 71202,35742
420  DATA 25755,65656,34443,65556,
     74747
430  DATA 74744,74757,55755,72227,
     11157
440  DATA 56465,44447,77555,57775,
     25552
450  DATA 75744,25577,75655,34216,
     72222
460  DATA 55557,55552,55577,55225,
     55711
470  DATA 71247
480  DATA 74447,44211,71117
500  REM  ** INIT ROUTINE ***
505  DIM C$(60): FOR X = 0 TO 60
510  READ C$(X)
520  NEXT X
525  VX = 1:VY = 1
527  CO = 3
530  DIM A$(16),A(17),B(17),C(17),D(17)
540  RETURN
1000  REM  ***
1001  REM  HI-RES CHARACTERS
1002  REM  ***
```

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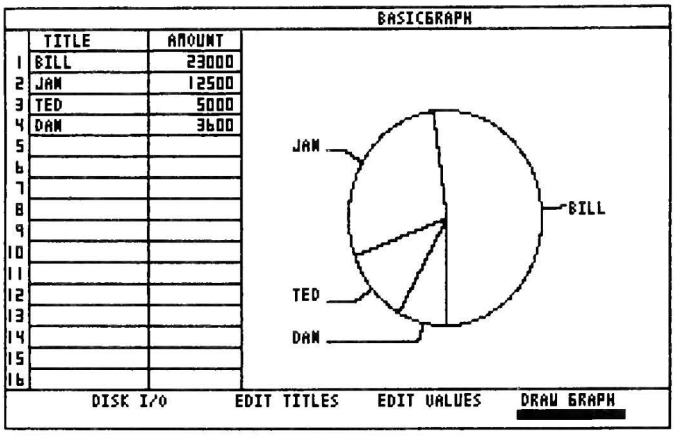

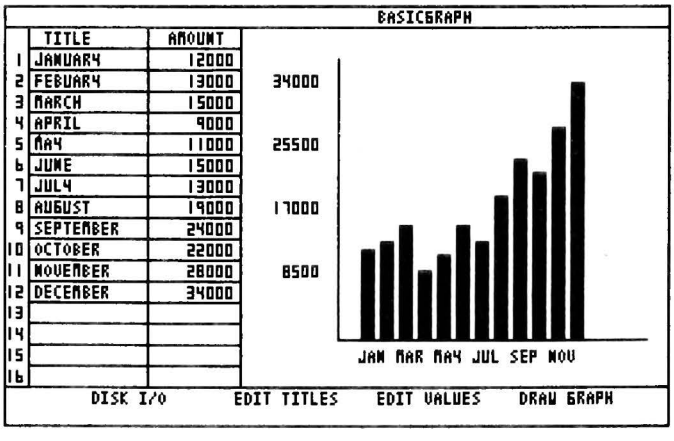



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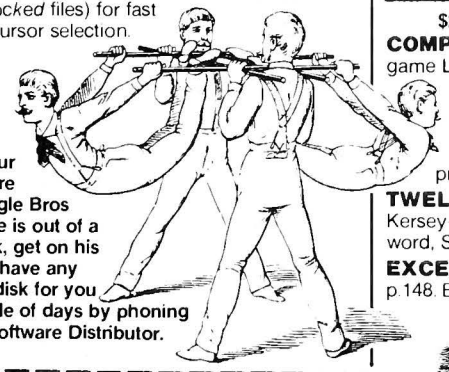

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```
10 LIST: LIST: LIST: FOR ZZ=PEEK(175)+PEEK
(176)*256+36 TO 3072: POKE ZZ,216: NEXT
20 FOR XXX=1 TO 2: POKE-16299,0: POKE
-16300,0: XXX=1: NEXT: REM Experiment
with different length variable names.
```

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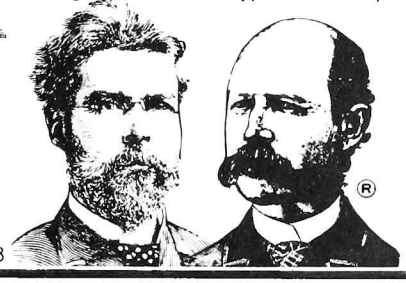

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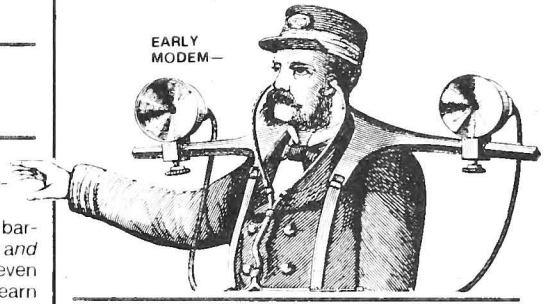

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```
1010  OL = LEN (O$)
1015  IF OL =0 THEN RETURN
1020  FOR LO = 1 TO OL
1030  C = ASC ( MID$ (O$,LO,1)) - 32
1035  IF C < 1 OR C > 60 THEN GOSUB
      360: GOTO 1050
1040  GOSUB 300
1050  NEXT LO
1060  RETURN
2000  REM  ***
2001  REM  * PIE CHART
2002  REM  ***
2005  IF SF <> 0 THEN GOSUB 2700
2006  SF = 1
2010  T = 0
2020  FOR I = 1 TO NE
2025  IF D(I)< 0 THEN A(I) = T: GOTO
      2040
2030  T = T + D(I):A(I) = T
2040  NEXT
2050  IF T < 1 THEN RETURN
2090  FOR I = 1 TO NE
2100  B(I) = A(I) / T
2110  C(I) = (B(I - 1) + B(I)) / 2
2120  NEXT
2130  C(NE) = 100
2140  REM
2150  HCOLOR= CO
2160  R = 40:CX = 185:CY = 80
2170  REM  ***
2220  N = 0
2230  PX = CX + R + 10
2240  V = 1
2250  N = N + 1
2260  IF (2 ^ (N - 1) > R) OR (R > =
      2^ N) THEN 2250
2265  REM  $$J 16384
2270  RD = 2 ^ ( - N)
2280  CS = COS (RD):SN = SIN (RD)
2290  X = .5:Y = R + .5
2300  FOR N = RD TO 6.3 STEP RD
2310  IF N > 6.3 / 2 THEN PX = CX -
      R -  10
2320  IF N / 6.3 > C(V) THEN GOSUB 2440
2330  IF N / 6.29 < B(V) THEN 2370
2340  V = V + 1
2350  HPLOT CX,CY TO CX + X,CY + Y
2360  GOTO 2380
2370  HPLOT CX + X,CY + Y
2380  X2 = X * CS + Y * SN
2390  Y = Y * CS - X * SN
2400  X = X2
2410  NEXT
2420  B(NE) = 100
2430  RETURN
2440  REM
2450  C(V) = 100
2460  X3 = CX + X + INT (X / 5):Y3 = CY
      + Y + INT (Y / 5)
2470  HPLOT CX + X,CY + Y TO X3,Y3
2480   HPLOT TO PX,Y3
2500  O$ = LEFT$ (A$(V) + "          ",10) :
      REM 10 SPACES
2510  VX = 2 + INT (PX / 4):VY = 1 + INT
      (Y3 / 8)
2515  IF PX < CX THEN VX = VX - 9:O$
      = RIGHT$ ("          " + A$(V),8)
      : REM 10 SPACES
2520  GOSUB 1000
2530  HCOLOR= CO
2590  RETURN
2700  REM  ***
2701  REM  * CLEAR GRAPH
2702  REM  ***
2710  HCOLOR= 0
2720  FOR Y1 = 9 TO 143
2730  HPLOT 100,Y1 TO 278,Y1
2740  NEXT
2750  HCOLOR= CO:SF = 0
2760  RETURN
2800  REM  ***
2801  REM  * PLACE TITLE
2802  REM  ***
2810  VX = 4:VY = EN + 2
2820  O$ = LEFT$ (A$(EN),10)
2830  GOSUB 1000
2840  RETURN
2900  REM  *******
2901  REM  ***
2902  REM  ***
2910  VX = 17:VY = EN + 2
2920  O$ = STR$ ( INT (D(EN)))
2930  O$ = RIGHT$ ("          " + O$,8) :
      REM  9 SPACES
2940  GOSUB 1000
2950  RETURN
3000  REM  ***
3001  REM  * SET UP SCREEN
3002  REM  * SET UP SCREEN
3003  REM  ***
3004  REM  ***********
3005  HOME : HGR
3006  GOSUB 500
3010  HCOLOR= CO
3020  HPLOT 0,0 TO 279,0
3030  HPLOT 279,0 TO 279,159
3040  HPLOT 279,159 TO 0,159
3050  HPLOT 0,159 TO 0,0
3060  HPLOT 0,8 TO 279,8
3070  HPLOT 10,8 TO 10,143
3080  HPLOT 99,8 TO 99,143
3090  HPLOT 60,8 TO 60,143
3100  HPLOT 10,16 TO 99,16
3110  HPLOT 0,144 TO 279,144
3150  O$ = "DISK I/O":VX = 10:VY = 19:
      GOSUB 1000
3160  O$ = "EDIT TITLES":VX = 25:VY =
```


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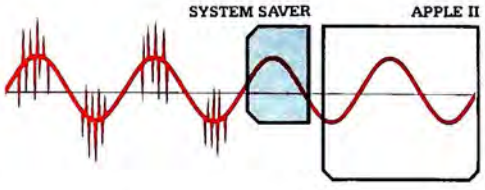

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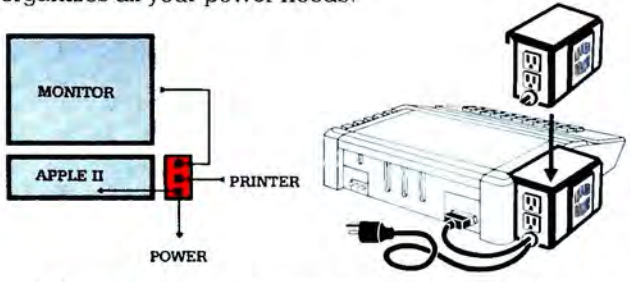

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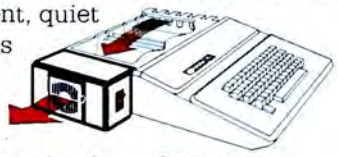

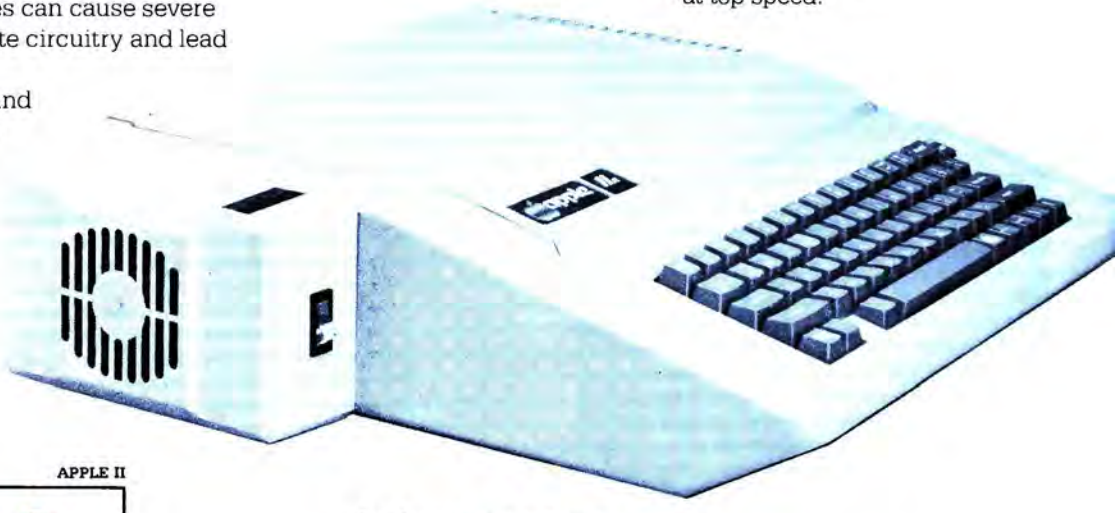

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*Softsel Computer Products Hot List. **PC Magazine: March 1983.

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```
      19: GOSUB 1000
3170  O$ = "EDIT VALUES":VX = 40:VY
      = 19: GOSUB 1000
3180  O$ = "DRAW GRAPH":VX = 55:VY
      = 19: GOSUB 1000
3200  O$ = "BASICGRAPH":VX = 40:VY
      = 1
3210  GOSUB 1010
3220  O$ = "TITLE":VX = 5:VY = 2:
      GOSUB 1010
3230  O$ = "AMOUNT":VX = 18:VY = 2:
      GOSUB 1010
3240  FOR Z = 1 TO 16
3250  O$ = RIGHT$ ("  " + STR$ (Z),2) :
      REM  2 SPACES
3260  VX = 1:VY = Z +2: GOSUB 1010
3270  NEXT
3275  HCOLOR= CO
3280  FOR Z = 24 TO 143 STEP 8
3290  HPLOT 10,Z TO 99,Z
3300  NEXT
4000  REM  ********
4001  REM  * SELECT OPTIONS
4002  REM  ********
4010  MO = 2
4020  X1 = (MO * 15 * 4) - 25
4025  HCOLOR= CO
4030  FOR T = 1 TO 5
4040  HPLOT X1,T + 150 TO X1 + 45,T +
      150
4050  NEXT
4065  HCOLOR= 0
4070  FOR T = 1 TO 5
4080  HPLOT X1,T + 150 TO X1 + 45,T +
      150
4090  NEXT
4100  IF PEEK ( - 16384) < 128 THEN
      4020
4110  GET A$
4120  IF A$ = CHR$ (13) THEN 4200
4130  MO = MO + 1: IF MO > 4 THEN
      MO = 1
4140  GOTO 4020
4200  ON MO GOSUB
      4800,6000,7000,8000
4210  GOTO 4130
4300  REM  ***
4301  REM  * DISK OUTPUT
4302  REM  ***
4310  HOME
4320  POKE - 16298,0: POKE - 16303,0
4325  PRINT
4330  PRINT CHR$ (4);"CATALOG"
4340  PRINT : INPUT "SAVE TO FILE
      NAME : ";A$
4350  IF A$ = "" THEN 4460
4360  PRINT CHR$ (4);"OPEN ";A$
4370  PRINT CHR$ (4);"WRITE ";A$
4375  PRINT NE
4380  FOR X = 1 TO 16
4390  PRINT A$(X)
4400  PRINT D(X)
4410  NEXT
4440  PRINT SF
4450  PRINT CHR$ (4);"CLOSE"
4460  POKE - 16297,0: POKE - 16304,0
4470  RETURN
4500  REM  ***
4501  REM  * DISK INPUT
4502  REM  ***
4510  HOME : POKE - 16298,0: POKE
      - 16303,0
4515  ONERR GOTO 4620
4520  PRINT : PRINT CHR$ (4);"CATALOG"
4530  PRINT : INPUT "FILE NAME TO
      LOAD : ";A$
4535  IF A$ = "" THEN 4600
4538  PRINT CHR$ (4);"UNLOCK ";A$
4540  PRINT CHR$ (4);"OPEN ";A$
4550  PRINT CHR$ (4);"READ ";A$
4555  INPUT NE
4560  FOR X = 1 TO 16: INPUT A$(X)
      INPUT D(X): NEXT
4580  INPUT SF
4590  PRINT CHR$ (4),"CLOSE"
4595  POKE 216,0: GOTO 5500
4600  POKE - 16297,0: POKE - 16304,0
4610  RETURN
4620  POKE 216,0: PRINT CHR$
      (4);"CLOSE"
4630  GOSUB 4600: GOTO 4000
4800  REM  *****
4801  REM  * FILE I/O
4802  REM  *****
4810  HOME : VTAB 21
4820  PRINT "1 - LOAD      2 - SAVE
      3 - CLEAR";: GET A$: PRINT
4830  X = VAL (A$): ON X GOSUB
      4500,4300,5000
4840  HOME : RETURN
5000  REM  ***
5001  REM  * RESTART
5002  REM  ***
5010  HOME : VTAB 21: PRINT "PRESS Y
      TO CLEAR";: GET A$: PRINT
      HOME
5020  IF A$ < > "Y" THEN RETURN
5030  FOR EN = 1 TO NE - 1
5040  GOSUB 6100: GOSUB 7100
5045  D(EN) = 0:A$(EN) = ""
5050  NEXT
5060  IF SF < > 0 THEN GOSUB 2700
5070  NE = 0:EN = 0
5080  RETURN
5500  REM  *****
5501  REM  * REDRAW SCREEN
5502  REM  *****
5505  GOSUB 4600
5510  ON SF GOSUB 2000,9000
```


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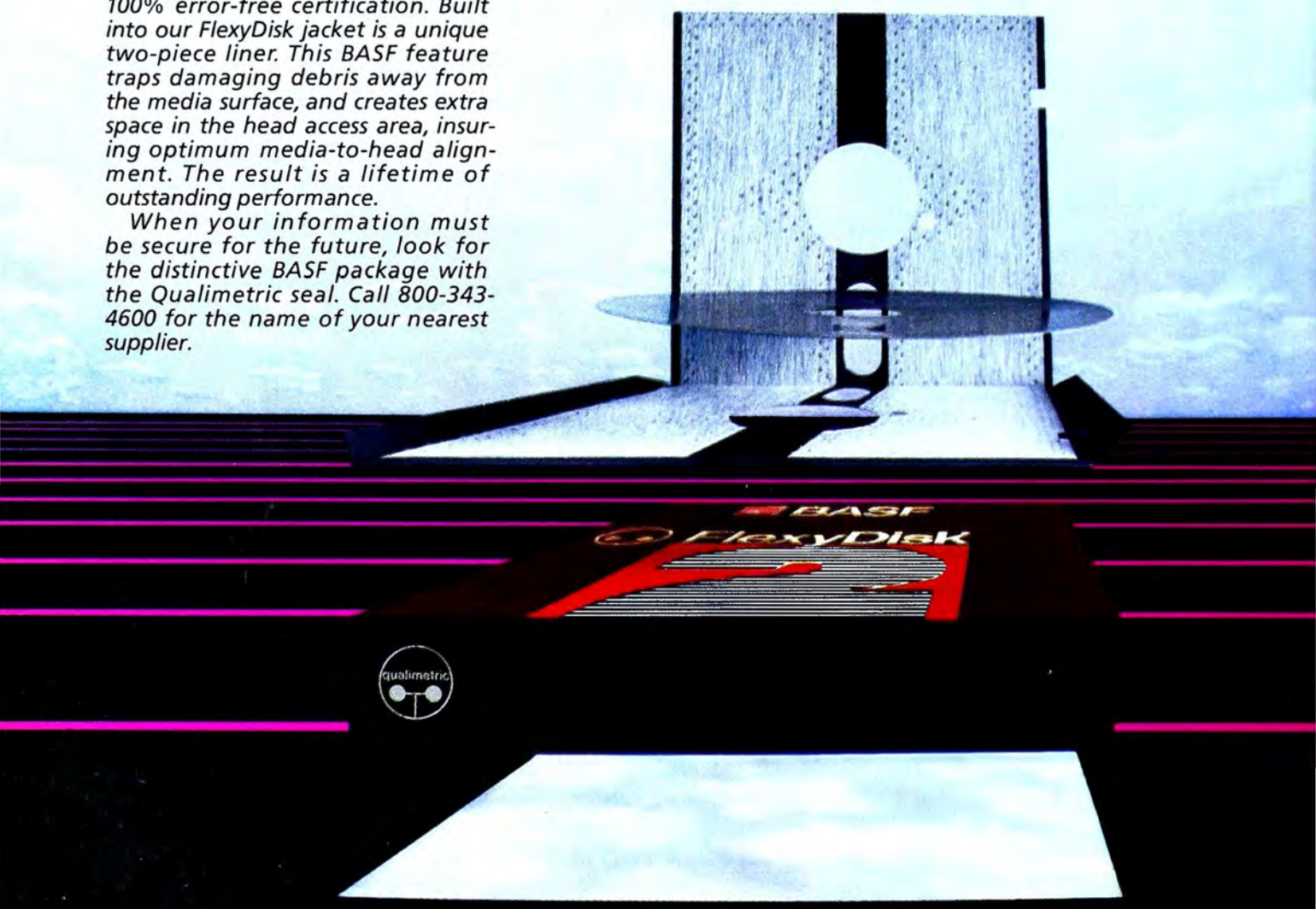

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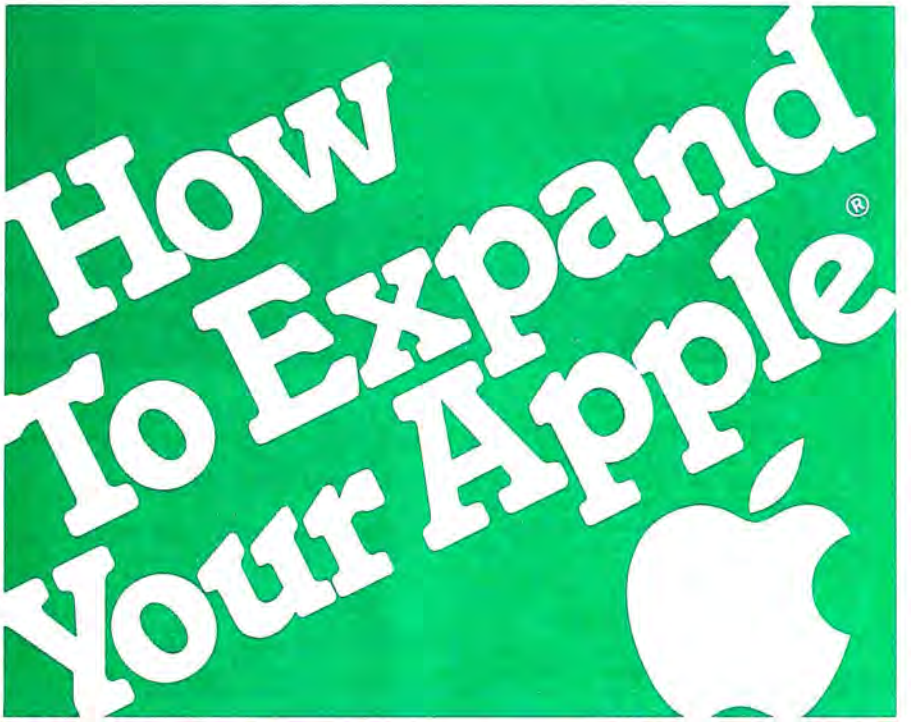
```
5550  FOR EN = 1 TO 16
5555  GOSUB 6100: GOSUB 7100
5557  IF A$(EN) = "" THEN 5570
5560  GOSUB 2800: GOSUB 2900
5570  NEXT
5580  RETURN
6000  REM  ***
6001  REM  * EDIT TITLES
6002  REM  ***
6010  EN = 1
6020  HOME : VTAB 20
6030  PRINT "EDIT TITLES": PRINT
6040  VTAB 22: PRINT EN;" - ";: HTAB 6:
      PRINT A$(EN)
6045  VTAB 22: HTAB 6: INPUT "";A$
6050  IF A$ < > "" THEN 6060
6055  IF A$(EN) < > "" THEN 6070
6057  NE = EN: HOME :B(NE) = 1: GOTO
      6200
6060  IF A$ = "." THEN 6057
6065  A$(EN) = A$: GOSUB 6100: GOSUB
      2800
6070  EN = EN + 1: IF EN < 17 THEN
      6020
6080  HOME : GOTO 6057
6100  FOR X = 1 TO 5
6105  HCOLOR= 0
6110  HPLOT 11,X + 9 + (EN * 8) TO 59,X
      + 9 + (EN * 8)
6120  NEXT
6130  RETURN
6200  IF NE = 17 THEN RETURN
6205  FOR EN = NE TO 16
6210  IF A$(EN) < > "" THEN A$(EN) =
      "": GOSUB 6100:D(EN) = 0: GOSUB
      7100
6230  NEXT
6240  RETURN
7000  REM  ***
7001  REM  * EDIT VALUES
7002  REM  ***
7005  FOR EN = 1 TO NE - 1
7020  HOME : VTAB 20
7030  PRINT "EDIT VALUES":PRINT
7040  VTAB 22: PRINT EN;" "; LEFT$
      (A$(EN) + "                ",11);" - ";:
      HTAB 18: PRINT D(EN) : REM  2
      SPACES AND 14 SPACES
7045  VTAB 22: HTAB 18: INPUT "";A$
7050  IF A$ = "" THEN 7080
7060  D(EN) = VAL (A$)
7070  GOSUB 7100: GOSUB 2900
7080  NEXT
7085  HOME
7090  RETURN
7100  FOR X = 1 TO 5
7110  HCOLOR= 0
7120  HPLOT 61,X + 9 + (EN * 8) TO 98,X
      + 9 + (EN * 8)
7130  NEXT
7140  RETURN
8000  REM  ***
8001  REM  * GRAPH DATA
8002  REM  ***
8010  IF NE < 3 THEN RETURN
8020  HOME : VTAB 21
8030  PRINT "1 - PIE CHART
      2 - BAR GRAPH";: GET A$
8035  HOME
8040  PRINT :X = VAL (A$): ON X GOTO
      2000,9000
8050  RETURN
9000  REM  ***
9001  REM  * BAR GRAPH
9002  REM  ***
9005  IF SF < > 0 THEN GOSUB 2700
9006  SF = 2: HCOLOR= CO
9010  M = 1
9020  FOR X = 1 TO NE - 1
9030  IF D(X) > M THEN M = D(X)
9040  NEXT
9060  SZ = INT (120 / (NE - 1))
9070  SP = INT (SZ * .3)
9080  SZ = INT (SZ * .7)
9090  HPLOT 140,20 TO 140,126
9100  HPLOT 140,126 TO 270,126
9110  XB = 150
9120  FOR X = 1 TO NE - 1
9130  H = INT ((D(X) / M) * 96)
9135  IF H < - 18 THEN H = - 18
9140  FOR Y = 1 TO SZ
9150  HPLOT XB,125 TO XB,125 - H
9160  XB = XB + 1
9170  NEXT
9180  XB = XB + SP
9190  NEXT
9200  REM  LABEL Y AXIS
9300  FOR X = 4 TO 1 STEP - 1
9310  Y = INT (M * (X / 4))
9320  O$ = RIGHT$ ("      " + STR$ (Y),3)
      : REM  8 SPACES
9330  VX = 26:VY = 4 + (12 - X * 3):
      GOSUB 1000
9350  NEXT
9360  Z = INT ((SZ + SP) / 4)
9362  T = 1
9365  IF Z < 4 THEN Z = Z + Z:T = 2
9370  VY = 17:Z = Z - 1
9380  FOR X = 1 TO NE - 1 STEP T
9390  Y = 150 + ((X - 1) * (SZ + SP))
9400  VX = INT (Y / 4) + 1
9405  IF Z < 3 THEN O$ = STR$ (X):
      GOTO 9415
9410  O$ = LEFT$ (A$(X) + "      ",Z):
      REM  5 SPACES
9415  IF D(X) > 0 THEN GOSUB 1000
9420  NEXT
9500  RETURN
```

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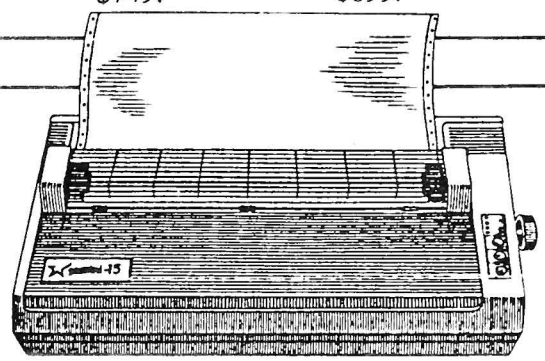

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Personal computers have an unlimited potential for saving us time. But they never do. This paradox has now been explained by an amazing scientific discovery, which you will read about first right here in DOStalk.

According to Dr. Kathleen O'Connell, a disorder called Computer Perseveration Syndrome is responsible for the problem. Dr. O'Connell says "perseveration" means the uncontrollable repetition of some activity or action.

Perfection seems like a real possibility to personal computer users, according to Dr. O'Connell. Before computers were widely available, people would devote as much time to a project as it deserved, she says.

Now they do a project in no time, but then spend hours repetitively refining it. Dr. O'Connell reports that her husband once ran twelve drafts of a ten-word letter through his word processor.

Manifestations of the syndrome are also seen in spreadsheet users who fine-tune a template for hours so it will be easy to use next time—and never use it again; in folks who spend days creating databases on those who sent them Christmas cards but who never have time to send Christmas cards themselves; and in programmers who write only programs that make it easier to write programs.

Some researchers think the Computer Perseveration Syndrome is a serious problem that must be given utmost consideration by the scientific community. Others think it is a sign of approaching nirvana.

We Join the Thundering Herd. Here at DOStalk the syndrome has us by the throats. This month we are using *Apple Writer IIe* for the first time. As those of you who already use this word processor know (the *thousands* of you, according to the *Softalk* bestseller list), it has a multitude of enticing features that could easily keep one from ever getting any real work done.

Even as this column is being written, more efficient methods of operation spring to the author's mind. Using *Apple Writer IIe*'s glossary function, for example, lets us give all the keys on the keyboard new, multikey meanings. We can set up the D key so that, when we push it while holding down the open-apple key, it will print "DOStalk." Just a minute here. . . .

DOStalk DOStalk DOStalk DOStalk. See how wonderful this is? This month's column may take months to write at the rate we're going so far.

What Kind of File Do Your Words Deserve? One very appealing feature of *Apple Writer IIe* is that it uses text files. Some other word processors, including earlier incarnations of *Apple Writer* itself, save data in binary files. Let's look at the difference.

Binary files have a B in front of them in DOS 3.3 catalog listings. They are nothing more than "snapshots" of your computer's memory. When you save a binary file, an exact image of the specified part of the computer's memory is stored on your disk.

In a similar vein, when you write a holiday love letter on a word processor, an image of your words warms the bits somewhere in your computer's memory. That image throbs as you type on your keyboard.

Most word processors work along the general pattern of determining what key you just pressed, changing the memory image of your document to reflect that keystroke, updating the screen display to reflect the new memory image, and returning for another keystroke.

Your word processor always keeps track of where the image of your passion is in memory and how big it is. From a programming standpoint, it is very simple to get DOS to save that image in a binary file. Thus, that's how many word processors do it.

Besides being easy on programmers, binary files have one other advantage. Uncle DOS can save them and reload them relatively quickly. If disk access speed is important to an application, consider word processors that use binary files for storage. (Use one of the speed-enhanced versions of DOS with it, if possible, to make the bits really fly.)

The problem with binary files is that they are not usually compatible with anything else. There are no standards for binary files. If you want to run your holiday letter through a spelling checker, for example, you have to find one that can read files created by your particular word processor.

The big advantage of word processors that use text files, on the other hand, is compatibility. There are certain standards for text files. If you have a word processor that saves your work in text files, you can use it for lots and lots of things besides writing love letters, as we shall see later in this column (and in even more detail next month).

Text files are the ones that appear in DOS 3.3 catalogs with a T in front of them. One problem with text files is that DOS will deal with them only one byte at a time. When your word processor wants to save a file, it has to hand the file to Uncle DOS character by character. As you can imagine, this is a relatively slow process.

(But by using direct calls to the file manager, such as those calls discussed here last month, a word processor can handle text files at binary file speeds. *Apple Writer IIe* uses direct calls for saving files but sticks with the slower, one-byte-at-a-time technique for loading them.)

Text File Fundamentals. There are two basic types of text files. One type is called *random-access* and the other is called *sequential*. There is no way to tell by looking at a DOS 3.3 catalog which of these two types a particular file might be.

Sequential text files are the kind word processors use. Sequential files are ideal for applications that start a session by reading a file from beginning to end (sequentially) into the computer's memory. Later in the session, a modified version of the entire file may be resaved. This is, of course, exactly how a word processor works.

Random-access files are used in applications where the user doesn't load the entire file into the computer at once, but only a small piece of it. Programs that help you keep records, such as an inventory of your computer magazines, usually use random-access files.

In a few months we'll talk about random-access files in more detail. In the meantime we'll take a close look at sequential files. This month we'll open a big investigation of text files by looking at a special kind of sequential file—the kind that holds keystrokes.

You've probably never heard of a *keystroke file* before. That's because we just made them up. (We make stuff up around here all the time.) Most discussions of text files, such as those in the DOS manuals, explain text files as if they were used only to store inventories and mailing lists. In fact, one of the most important uses for sequential text files is to store keystrokes.

A keystroke file is a text file that contains keystrokes needed to do some task on your computer. A standard image for explaining this concept is that of the player piano. If sitting at a computer and typing in commands is like playing a piano, then running a keystroke file through a computer is like running the tape through a player piano.

Exec Exec. You can thank our old friend Uncle DOS for giving your Apple the power to press its own keys. We've discussed in previous columns how DOS intercepts all messages between your programs and your keyboard and screen. Whenever a program tries to read the keyboard through the standard I/O link, Uncle DOS will know about it. You can get him to send the program something from a file rather than something from the keyboard by using the *exec* command.

The exec command is useful for easily entering frequently used command sequences. For example, we all know that the safest way to write programs is to keep two or more backup copies of your work. Having earlier versions of a program available is a good feeling when you realize that the last set of modifications you made did more harm than good. Backups also decrease the chances of pure disaster occurring when the power company's transformer blows. Few people consistently rotate earlier versions when saving their work, however, because the commands are so tedious.

But by using a simple keystroke file and the exec command, you can simplify things immensely. If you are working on a program called *Eggnog*, for instance, sit down at your word processor, create the following text file, and save it under the name Backup (if you don't yet have a word processor, or if your favorite uses binary files, goto "Apple II's Executive Editor," by Gary Kessler, IInd Grade Chats, in the August 1983 *Softalk*. The article describes and lists a free Basic program that allows you to create and edit text files):

```
DELETE EGGNOG.BKUP2
RENAME EGGNOG.BKUP1,EGGNOG.BKUP2
RENAME EGGNOG,EGGNOG.BKUP1
SAVE EGGNOG
```

Now, instead of entering *save Eggnog* when you want to save your program, enter *exec Backup*. The oldest copy of *Eggnog* will be deleted, newer copies will be rotated, and a copy of the current version of the program will be saved—all with a single command.

Notice that the commands in the Eggnog file look exactly as they would if you typed them on your keyboard. There is no need for a control-D or a print statement, as there would be inside a Basic program (although if you do use control-D the commands will still work, as we'll see later). Also notice that the commands must be in capital letters. They didn't teach small letters at Dr. Basic's grammar school.

If your word processor has an option to display the carriage returns in a file, use it when creating exec files. In particular, make sure you have a return after the last line in the file. If there is no carriage return there, the last line won't be executed until you press return on your keyboard. By then things are usually a mess.

The Executive Printer Ribbon. Exec files are also handy for little commands that you may not use frequently—but that are hard to remember for that very reason. Here is a file we use at DOStalk called Boldface.

```
PR#1
PRINT CHR$(27) + "!"
PR#0
```

This little file turns on the boldface feature of an Apple Dot Matrix Printer. It's very handy when you need a new printer ribbon but just can't break away from the keyboard long enough to buy one. Of course, you could write a Basic program that would do the same thing, but using an exec file instead has a simple advantage. Exec files don't disturb the program you already have in memory. If Boldface was a Basic program, it would destroy the program in memory whenever it was used.

Where Will It All End? Since exec files don't disturb what's in memory, you can use them as a sort of external subroutine from within programs, but this requires a special trick. This trick is not recommended for polished work, but it is handy for quidirware (quick and dirty software), particularly if you have a library of useful exec files already written.

Normally, when you try to exec a file from within a Basic program, nothing happens. This is because Dr. Basic is running your program rather than looking for commands entered on the keyboard. Uncle DOS can't pass keystrokes to Dr. Basic unless the good doctor asks for them.

Dr. Basic will ignore the commands in the exec file, just as he ignores commands you type on your keyboard, while a program is running. To get him to pay attention, put the command *end* right after the exec command. That may seem drastic at first, but follow along. Dr. Basic sees your end command, goes to the keyboard for input, finds your exec file, and executes it. To restart your program where it left off, put the virtually unknown Applesoft command *cont* at the end of your exec file.

Cont will cause execution to continue at the next instruction after the end statement. It works exactly like a return from a subroutine, with one exception—Basic can't continue if the exec file did something that caused an error message. The technique is also useless for modifying the program in memory itself: Adding, deleting, or editing a program line renders the continue command powerless.

Exec files can be linked together, but they can't be nested. This means one exec file can start a second one, but there is no command that can return to the first one and have it continue where it left off. (You can use the exec command with the R parameter to start execution of a file somewhere other than the beginning. However, it is quite difficult to envision situations in which people not under the influence of the Computer Perseveration Syndrome would want to do that.)

Speaking of Execution. . . . There are a few things that you can't do from within an exec file, even though it seems like you should be able to. For one thing, Integer Basic doesn't allow you to put several commands on one line, using the colon, in immediate mode (in deferred mode it works fine, of course). If you are writing exec files that you want to use from either version of Basic, you have to put each immediate mode command on a separate line.

Another thing you can't do with an exec file is change the number of DOS buffers using the maxfiles command. On second thought, that statement is inexact—you can put a maxfiles command in an exec file and it will execute correctly, but your exec file itself will be closed as part of the process. Thus an exec file that includes the maxfiles command is reminiscent of a trained kamikaze. Its death indicates a successful mission.

Belated Halloween Greetings. Maxfiles closes existing exec files for good reason. The exec command itself occupies a DOS buffer during its execution. When the number of DOS buffers is decreased, the buffer occupied by the exec file often disappears. The exec file becomes a ghost with all the power of a living, breathing, execing file. Just the idea of a phantom exec file terrifies Uncle DOS.

Those of you who take pleasure in practical jokes might want to take advantage of this. Set maxfiles to some number greater than the normal three, then exec a file that includes the fp or int commands. You may remember from previous columns that these commands reset maxfiles to the default value of three. However, they do not turn off an active exec file. Consequently, your exec file becomes a phantom and Uncle DOS either heads for the hills or sits and shudders. In either case you have to turn off your computer to calm the poor man down.

Another limitation you have when working with exec files is that several Basic commands don't work from immediate mode. The most important of these are *input* and *get*. (If they did work it would be useless anyhow, since they would just pick up the next string of characters in your exec file.) Like all computer problems, there is a long way around this one.

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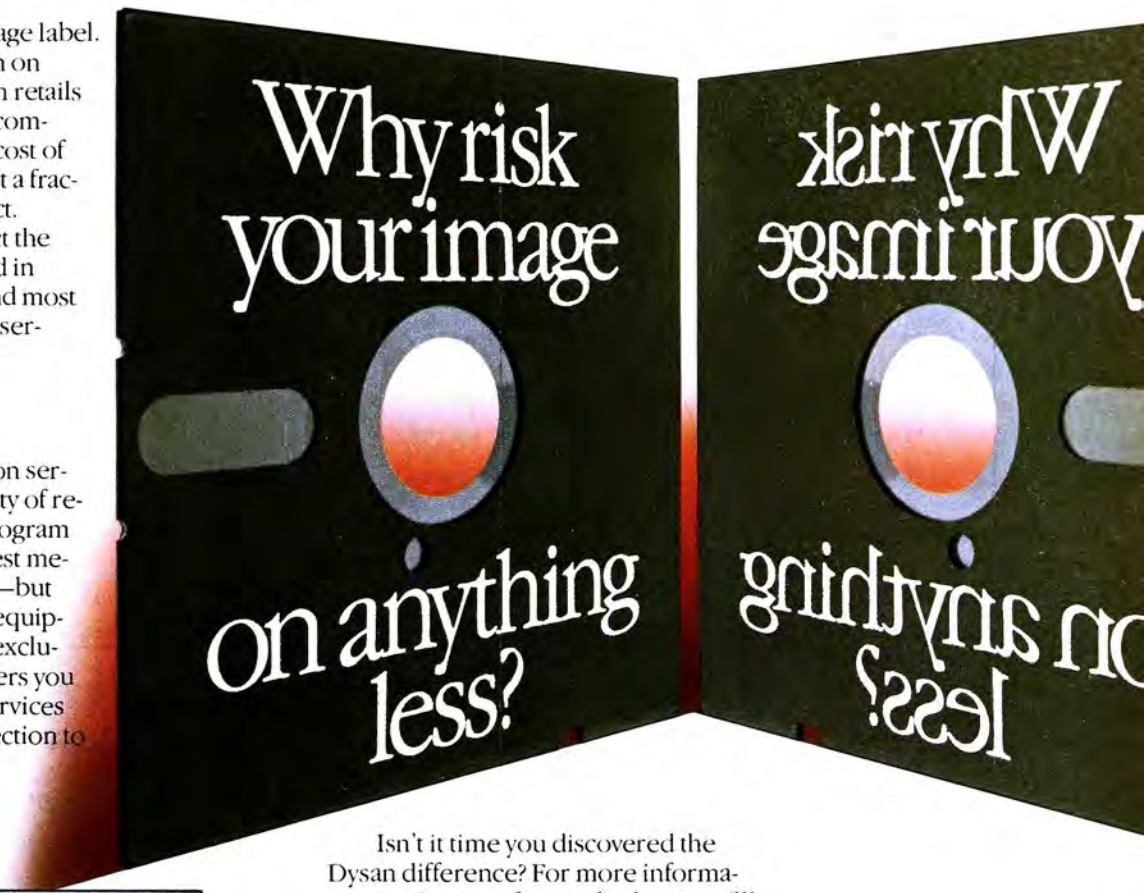



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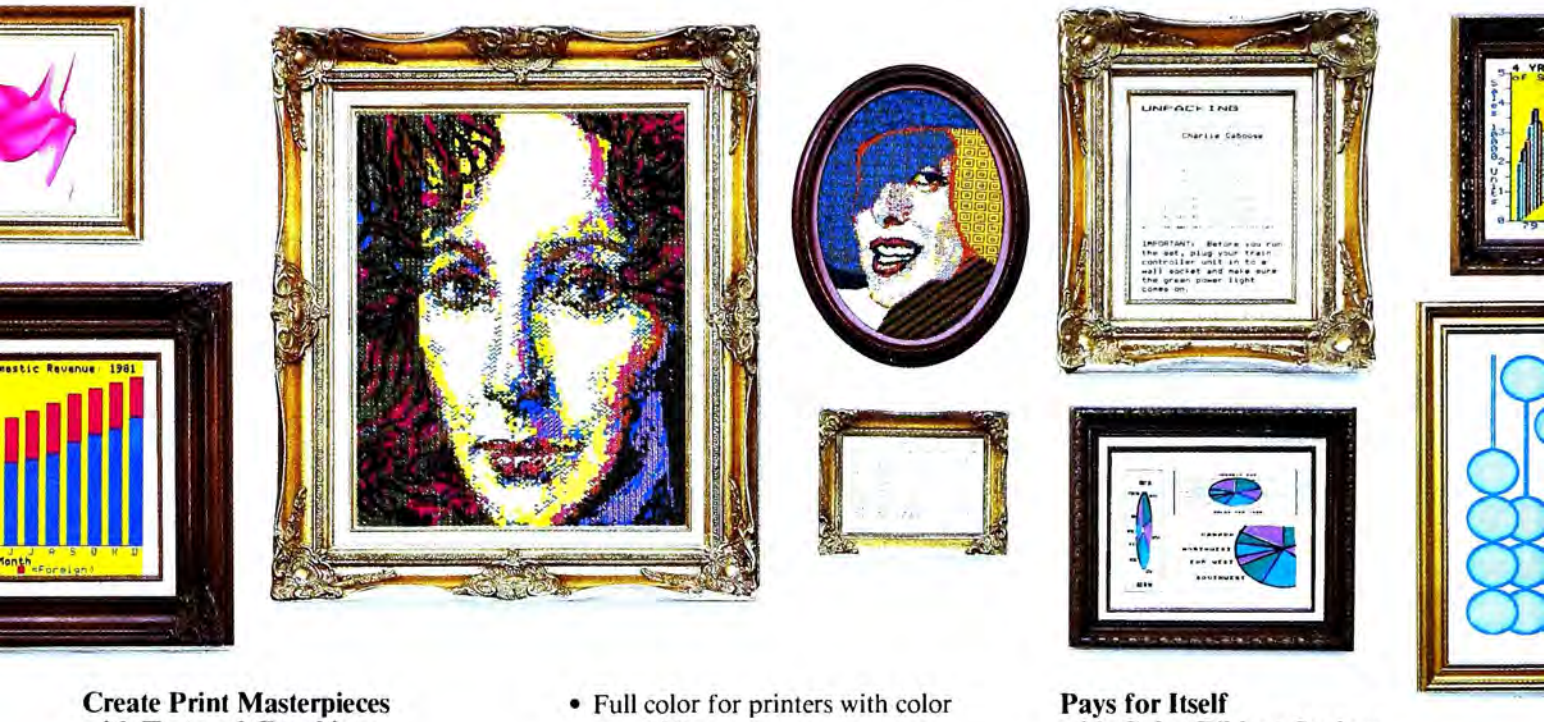

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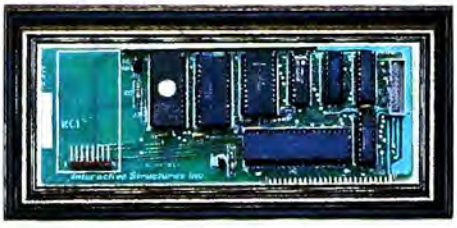

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How To Stay Execution. Let's begin with a simple case. Say you want an exec file to stop in the middle of execution and wait until you give it permission to continue. Maybe you want to put a new envelope in your printer or something. Try this:

```
PRINT "PRESS<ANY KEY>TO CONTINUE."
FOR I=1 TO 128 : I=PEEK(-16384) : NEXT : POKE -16368,0
```

I=peek (-16384) sets I to the value found in the keyboard soft switch (see the May DOStalk if you don't know what that means). Resetting a for-loop value inside the loop itself like this can get you ten years if the Pascal police catch you, so do it with discretion. Until you press a key, the value of I will always be less than 128. The for-loop will loop forever, or until you press a key. That will set I to something greater than 128 and break you out of the loop. The final poke resets the keyboard soft switch below 128 again.

Expand this technique a little and you have conditional execution:

```
PRINT "ACCEPT MESSAGE FROM ORK?<Y/N>"
FOR I =1 TO 128 : I=PEEK(-16384) : NEXT : POKE -16368,0
IF CHR$(I-1-128)="Y" THEN CALL 64246
```

In the third line we had to subtract 1 from I because the for-loop in the previous statement added 1 to it just before breakout. Then we subtracted another 128 because Applesoft doesn't recognize ASCII letter codes above 127.

One subtle effect exec files like these could have if you used them from inside a program is jumbling your variables. If your program had set I to a special value, for example, it would be scrambled when the exec file was done with it.

Program Processing. So far all our exec file samples have used immediate mode Basic statements. You can also fill a file up with statements that have line numbers. When you exec a file like this, the Basic statements are added to your program in memory (overwriting any statements with duplicate line numbers).

The implications of this are astounding. You can write programs on your word processor! Use all of your word processor's neat features for finding and replacing variable names, for scrolling up and down, and for moving things around.

Save your program into a text file and then exec it into memory. A long program will take a while to load using this method, but the power of a word processor's editor can make up for this drawback. If you have a program that's already half-written and you want to start using this technique tonight, here's a little exec file that will turn Basic programs into text files. It's a modified version of a program that appears in the *DOS Programmer's Manual* on page 97.

```
0 DIM F$(30) : D$=CHR$(13)+CHR$(4) : INPUT "FILE NAME?";
F$ : PRINT D$+"OPEN"+F$ : PRINT D$+"DELETE"+F$ : PRINT
D$+"OPEN"+F$ : PRINT D$+"WRITE"+F$ : LIST 1, :
PRINT D$+"CLOSE"+F$ : TEXT : END

RUN
```

After creating this file on your word processor, save it. Then load your Basic program. Exec the file shown above.

It will append a complete Basic program (as line 0) to your program in memory. Then it will run the little one-liner.

In response to the "file name?" question, give a name for the new text file that will hold your program lines. (If you have an extra return following the run command at the end of the exec file, that will be used as the file name and we'll die of syntax erroritis. . . . Just one return, please.)

Most readers will easily figure out how the program works. Line 0 simply opens a text file for writing and lists the program starting at line 1. With the file open, a listed program behaves just like any other printed text: It goes straight to disk.

Now you know how to convert a Basic program file into a text file so you can edit it in a word processor. And you know how to convert a text file back into a Basic program. It is also possible to have a Basic program that writes another Basic program and puts it in a text file. The program *Poker*, which comes on the DOS 3.3 Sample Programs disk, is a good

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example of this kind of program. *Poker* is used to capture machine language programs for use by Dr. Basic.

Executive Sophistication. The most sophisticated use of exec files is to provide input for programs. For example, the following exec file, named Copy Me, will execute the *Fid* program and copy itself onto another disk:

```
BRUN FID,D1
1
6
1
6
2
COPY ME
Q
9
```

You'll notice that this file contains nothing but the command that starts up *Fid* and the keystrokes needed to copy the file. An exec file like this one is useful for frequent copying tasks, such as moving files from a floppy to a fast RAM-based disk emulator and back.

This technique can be used with any program that uses the standard I/O links for receiving commands. Programs that read the keyboard directly can't use this technique.

Those of you whose eyes are sparkling with the possibilities for perseverating with the exec command deserve a small holiday gift.

The Holiday Exec-Killer. Once you start using exec files you will notice one small problem with them. Once you've started one, there is no way to stop it. Exec files carry charms that can be broken only with industrial-strength formulas. Even the usually all-powerful reset key is incapable of killing a runaway exec file.

The following exec file modifies DOS 3.3 in such a way that you can stop reading any text file—exec or normal—by pressing the escape key. It works by telling Uncle DOS that the end of the file has been reached.

When you are using this modification and reading a normal text file, pressing escape creates an end of data error (handy when you've just started to read a text file five miles long and suddenly realize it was the wrong one). When an exec file is working, on the other hand, pressing escape causes it to die of apparently natural causes.

The modification works by intercepting Uncle DOS as he is just getting the next character from a text file. We force him to take a look at the keyboard soft switch. If no key or any key other than escape has been pressed, we let him continue normally. If, however, somebody pressed escape, we'll put a zero in his bucket and send him back whence he came.

Whenever a zero byte is encountered in a text file, Uncle DOS takes that to mean there is no more data. Thus, when he gets back and finds a zero in his bucket, he thinks he has come to the end of the file and takes the appropriate action.

The point at which we want to intercept Uncle DOS is byte 42544 (in hexadecimal, that's $A630). Normally the machine language instruction here is JSR $A68C. We'll change that to JSR $BCEF and put our interception routine at that location. The space at $BCEF is empty in standard DOS 3.3.

Here is the assembly language code we will put at $BCEF:

```
BCEF - AD 00 C0  LDA  $C000   ;GET VALUE IN
                                KEYBOARD SOFT SWITCH
BCF2 - C9 9B     CMP  #$9B    ;COMPARE TO ESCAPE
BCF4 - F0 03     BEQ  $BCF9   ;IF ESCAPE, BRANCH
BCF6 - 4C 8C A6  JMP  $A68C   ;NOT ESCAPE, LET DOS
                                CONTINUE

BCF9 - 8D 10 C0  STA  $C010   ;CLEAR KEYBOARD SOFT
                                SWITCH
BCFC - A9 00     LDA  #0      ;PUT A ZERO IN
                                ACCUMULATOR
BCFE - 60        RTS          ;RETURN
```

And here is an exec file, which should be named Exec-Killer, that makes the modifications:

```
IF PEEK(978)<>157 THEN PRINT "CAN'T CONTINUE." : PRINT "DOS
NOT AT NORMAL 48K LOCATION." : PRINT CHR$(4);"CLOSE
EXEC-KILLER"
CALL - 151
BCEF:AD 00 C0 C9 9B F0 03 4C 8C A6 8D 10 C0 A9 00 60
A630:20 EF BC
3D0G
PRINT "EXEC-KILLER NOW IN PLACE"
```

This exec file could be written in many different ways—this particular way was chosen to demonstrate two things. In the first line, we test to see if DOS is at its normal 48K location. If it isn't, this file won't work. Rather than continuing, the file kills itself by sending DOS a close command. Notice that in this case it was necessary to send the command to DOS with a print statement and a control-D in the form of CHR$(4), since the command did not appear at the beginning of a line.

Also notice that it is necessary to kill the exec file by name. Using the close command without a file name will not close an active exec file. This is so that close can be used from within an exec file to close all other files.

The second thing the file demonstrates is the use of the Monitor from within an exec file. If you are not familiar with Monitor commands, the middle of the file will look like gibberish. But don't worry, it works. Those of you who are more familiar with the Monitor may be surprised that you can send commands to it from an exec file.

ProDOS Notes. As mentioned here last month, Apple will release a new disk operating system for the Apple II series of computers in January. It is called ProDOS. ProDOS includes its own exec command. In fact, all of the above exec files work with ProDOS except the last two. You can give commands to programs with ProDOS, but you can't give them to *Fid*, because ProDOS and *Fid* are incompatible. ProDOS has its own *Fid*-type program, called *Filer*. Exec-Killer was designed to modify DOS 3.3 and thus doesn't work with ProDOS.

That's about it for this month. There should be enough material here to keep any good perseverator busy the next thirty days. Isn't it too bad Dr. O'Connell didn't call her husband's disorder Computer Perseveration Mania? Then we could nickname it CPM. ■

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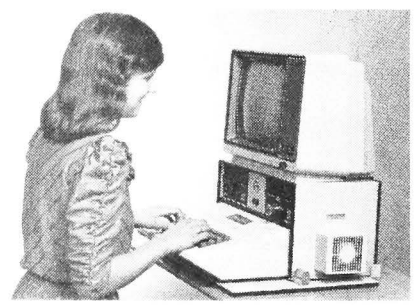

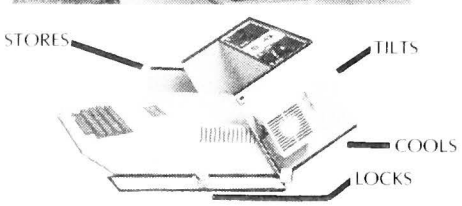

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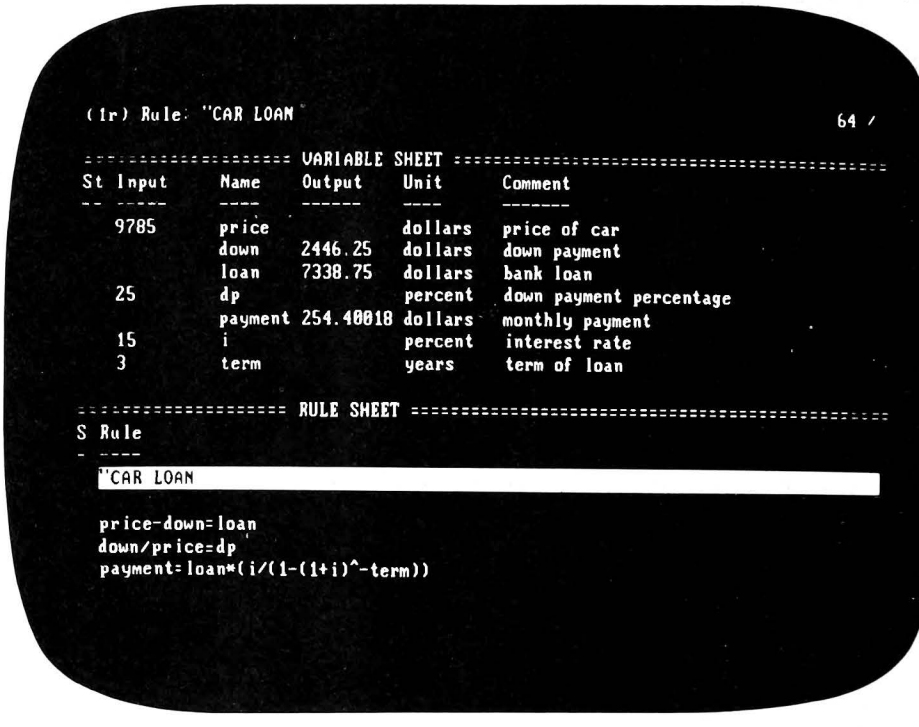

TK!Solver does for equations what word processing did for words. The first thing you should know about the TK!Solver™ program is that it is not a spreadsheet. Instead, it does something completely unheard of (until now)—it turns your personal computer into a voracious equation processor.

The next thing you should know is that if the TK!Solver program can't make life with your personal computer easier (and pay for itself), even if you use it only 15 minutes a week, you are a very rare person.

And finally, you should know exactly what equation processing is, and how it works. If you keep reading this, you will.

Equation processing with TK!Solver, or problem solving made easy. The best way to understand what the TK!Solver program *is*, is to understand what it *does*. The following simple example is designed to do just that. If you're still a little in the dark after reading it, stop in at your local computer store for a very enlightening hands-on demonstration.

Begin by setting up your problem. The TK!Solver program lets you do it quickly, easily, and naturally. For example, a car costs $9785. What would be the monthly payment on a three-year loan if the down payment is 25% and the interest rate is 15%?

STEP 1. Formulate the necessary equations to solve your problem and enter them on the "Rule Sheet" simply by typing them in (as in the screen photo). For example: "price−down = loan."

STEP 2. Enter your known values the same way on the "Variable Sheet." For example: "9785" for price. You may also enter units and comments, if you want.*

STEP 3. Type the action command ("!" on your keyboard) to solve the problem.

STEP 4. TK!Solver displays the answer: the monthly payment is $254.40.

Backsolving, the heart of TK!Solver. Now that you've defined the problem and solved it, TK!Solver's unique backsolving ability also lets you think "backwards" to solve for any variable, regardless of its position in the equation. For example, if you can only afford a monthly payment of $200, you can re-solve the problem in terms of that constraint. The TK!Solver program will solve the problem, displaying your choice of a higher down payment, a longer loan term, or a lesser interest rate. This unique backsolving capability forms the basis of TK!Solver's remarkably flexible problem-solving ability.

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Also, as you can see from the example on the screen, TK!Solver deals not only with single variables, but with entire equations and sets of simultaneous equations. It also deals with much more complicated problems than this one. How complicated? That's up to you. What kinds of problems? That's up to you, too, but popular applications include finance, engineering, science, design, and education.

Other extremely useful and interesting things TK!Solver does. Aside from its basic problem-solving abilities, the TK!Solver program performs a number of pretty fancy tricks. Like: *Iterative Solving;* in which TK!Solver performs successive approximations of an answer when confronted with equations that cannot be solved directly, (like $\exp(x) = 2 - x \cdot y$ and $\sin(x \cdot y) = 3 - x - y$). Like: *List Solving;* in which TK!Solver attacks complete lists of input values and solves them all, allowing you to examine numerous alternative solutions, and pick the one you like best. Like: *Tables and Graphs;* using the values you produced with the List Solver, the TK!Solver program will automatically produce tables and graphs of your data. You can look at your formatted output on the screen or send it to your printer with a single keystroke. And like: *Automatic Unit Conversion;* in which TK!Solver lets you formulate problems in one unit of measurement, and display answers in another. Very convenient what with all this talk about going metric.

The TK!Solver program also provides a wide variety of specialized business and mathematical functions like trig and log and net present value.

Then, there's TK!Solver's on-screen Help facility that provides information on commands and features any time you want it. Just type "?" and a topic name.

And of course the TK!Solver program combines all these features in one *integrated program.*

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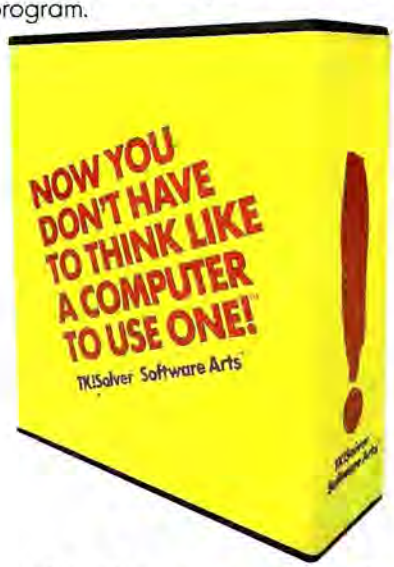
TK!SolverPack application packages available from Software Arts include Financial Management, Mechanical Engineering, Building Design and Construction, and Introductory Science. Additional TK!SolverPacks are on the way from Software Arts, McGraw-Hill,™ and others.

We know you're out there. No matter who you are, or what you do, if it involves using equations, the TK!Solver program is an indispensable* tool for you.

So, visit your local computer store today, and see TK!Solver in action. You'll be amazed at how much faster and more effectively you'll be able to work when you discover the power of equation processing with the TK!Solver program.



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The Christmas season is an exciting time because some really nice printers, add-on gadgets, interface cards, and other goodies may suddenly come tantalizingly within reach. Curiously enough, it seems that no matter how slick a new printer or add-on device is, it cannot overcome two chronic problems in this portion of the personal computer industry: poorly written user manuals and word processor programs that won't let you exploit the full potential of your printer.

Word processor developers, this Christmas wish list is aimed at you: *Don't give us a hard time about using our printers*. A classic example is the old version of *Super-Text*, which allows the user to enter only six control codes. This effectively cuts out at least ten other functions that most printers are capable of performing. The other weakness in *Super-Text* and many other word processors is that printer command codes take up space on a printed line. For example, if you try to print out a line that contains the escape-E and the escape-F to turn emphasis on and off, you will find that the line ends prematurely, with a gap of four blanks (one blank for each printer command character) at the right edge—rather lame when you consider that word processors are made to work with printers. Developers, if you spent as much time developing software that allowed easy entry of printer command codes as you do inventing editing commands, the world would beat a path to your door to buy your product.

One way for a user to avoid this difficulty with word processors is to get a demonstration of how easy (or hard) it is to use the program with a printer before purchasing it. Here are three key things to look for when examining a word processor:

1. Does the word processor allow only a limited number of preset (or user-definable) printer command codes? If so, you'd better think twice before purchasing it. You could be buying a lot of limitations.

2. Does the word processor's printed output have gaps in the right edge of justified text that contains printer command codes? Nice, if you like a shabby appearance.

3. Does the word processor refuse to allow you to enter certain necessary (and almost universal) printer command codes, such as escape and the control characters in the ASCII range 0 through 31?

If enough people refuse to buy the real dogs of the industry, upgrades will be right around the corner.

There are, of course, printer and printer-peripheral manufacturers who take pride in their work and make things easy on users. We'll be reviewing some of their products here and making recommendations. Hint: One hardware firm to keep your eye on is Micromax, which manufactures cards that are compatible with the popular industry standards, adding extra features and bringing the price down—a tough act to follow.

You won't believe what Micromax has done for a printer interface card. First, they made it Grappler-compatible, but they didn't stop there. Their card (the Graphmax) supports color printing, zoom magnification, picture cropping, and can capture text to be used for headings, footings, and page numbering (no software needed). Four dip switches allow it to be quickly configured for just about any printer. Oh yes, a full two-year parts and labor warranty is also included. A real bargain at $149.95 ($169.95 for color and zoom options).

The moral of the story is that if you manufacture printer-related devices or software for the Apple and have a class act, we'll be happy to review your product and evaluate it honestly for *Softalk*'s readers.



Printer Programs: Boxing the Bugaboos

When this column began in October, we mentioned that there were five main categories of common questions and problems with the Epson. As a review, here they are again.

1. *Printer hardware*. This includes the paper-out condition, tractor feeding, sheet feeding, care and feeding of the ribbon, maintenance tips, and switch settings.

2. *Printing from program control*. This covers using printer functions from Applesoft, Pascal, assembly language, CP/M, and so on.

3. *Printing from word processor control*. This includes commercial programs that reduce your ability to control the printer directly.

4. *Printer interface cards*. This covers the mysterious MSB (most significant bit, bit 7, also called the eighth bit or high bit) and the ins and outs of sending characters to the printer.

5. *Graphics*. This covers hi-res, lo-res, and text screen dumps, as well as more exotic things such as strip chart recording, artwork, and just plain doodling.

Last month, we touched on some of the basics of printing from program control. This time, we'll go into this topic in more depth, covering how to print from the three most used languages on the Apple: Applesoft, Pascal, and 6502 assembly language. Suppose we need to write the text shown in figure 1, which uses emphasis and italics. Let's begin with an Applesoft program that will print the sample text. See listing 1.

The program is pretty straightforward, except for two things that can really give you fits: control-I"80N" and pr#1. Such little things that can go wrong with printing will be set aside in a "bugaboo box" (figure 2).

Water Ouzel (oo'-zel). Any of several plump, thick-plumaged, aquatic birds of the family *Cinclid*ae, allied to the thrushes, esp. *Cinclus aquaticus* of Europe and *C. mexicanus* of western North America, having the habit of jerking the body or "dipping" as they perch, walk, etc.; a dipper.

Figure 1. Sample text.



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```
100  REM  *************************
110  REM  *  EPSON/APPLESFT DEMO  *
130  REM  *    "THE WATER OUZEL"  *
150  REM  *************************
160  :
170  REM  = = = = = = = = = = = = = =
180  REM          Variable Initialization
190  REM  = = = = = = = = = = = = = =
200  LET ESC$ = CHR$ (27):Q$ = CHR$ (34)
210  LET EE$ = ESC$ + "E":EF$ = ESC$ + "F": REM Emphasis
     on/off
220  LET E4$ = ESC$ + "4":E5$ = ESC$ + "5": REM Italics on/off
230  :
240  REM  = = = = = = = = = =
250  REM       Main Program
260  REM  = = = = = = = = = =
270  PR# 1
280  :
290  PRINT CHR$ (9)"N": REM Turn off video echo
300  PRINT EE$"WATER OUZEL"EF$;" (OO'-ZEL). ANY OF
     SEVERAL PLUMP, THICK-"
310  PRINT " PLUMAGED, AQUATIC BIRDS OF THE FAMILY
     "E4$"CINCLIDAE"E5$", ALLIED TO"
320  PRINT " THE THRUSHES, ESP. "E4$"CINCLUS
     AQUATICUS"E5$" OF EUROPE, AND "E4$"C."
330  PRINT " MEXICANUS"E5$" OF WESTERN NORTH AMERICA,
     HAVING THE HABIT"
340  PRINT " OF JERKING THE BODY OR "Q$"DIPPING"Q$" AS
     THEY PERCH, WALK,"
350  PRINT " ETC.; A DIPPER."
360  :
370  PR# 0
```

Listing 1. Applesoft program using the Epson printer.

As we fill up the box, you can refer to it to see why your printer program is not working—and how to fix it.

Listing 2 shows an example of how to generate the text with a 6502 assembly language program.

The algorithm used in the 6502 version is fairly simple: Reset the output hooks (CSW) to point toward slot 1 (where your printer interface card is assumed to be) and send each character to be printed through the standard Apple character output routine, COUT. Any special printer codes are blended right in with the rest of the text to be printed and sent to the printer. When the program is finished printing, it just resets the CSW character output hooks back to the normal setting of COUT1 (the video screen). Here we have two more things to add to our bugaboo box.

Finally, listing 3 shows how we would print out our "Water Ouzel" message from a Pascal program. Pascal tends to be a little fussy as to how you tell it to work with a printer; this is complicated by the fact that there are few books that really cover this topic well. Basically, there are three things you must do when you want to use Pascal to send text to a printer:

1. Declare a (global) printer identifier of type INTERACTIVE:

   VAR PRINTER: INTERACTIVE;

2. Assign the physical printer device to the identifier:

   REWRITE(PRINTER: 'PRINTER:');

3. Use the identifier as the first field in any Writeln statement that you want to use for printer output:

   WRITELN(PRINTER,'THIS WILL GO TO THE PRINTER AND NOT THE SCREEN');

The following sample programs are just that: samples. There are probably as many ways to print out text on a printer from those languages as there are programmers. There are also faster, more concise, and more elegant ways of doing the job. If you have such a method, send it in and share it with our readers.

1. Control-I "80N" is almost universally misused and misunderstood. It is intended to be used *only* for listing Applesoft programs. All sorts of inexplicable printing problems can pop up if you blindly use this command in your programs. To explain further, the control-I is a command to alert your printer interface card that a command is coming for it to interpret. This is similar to the way that control-D is used to alert DOS that a DOS command is coming.

   The "80" refers to a column width of eighty columns for an Applesoft program listing only. It is *not* intended to be used for any other type of printing. The "N" tells the printer interface card not to echo, or send to the video screen, characters sent to the printer. This is useful for preventing scrolling during a screen dump. The command does have a place, however; its proper use is for turning off the screen echo (which can clear up a host of seemingly unrelated problems) and should read, control-I "N" (no "80"). Control-I "I" will turn the screen echo back on. From Applesoft, control-I is printed as CHR$(9), as shown in line 290.

2. Pr#1 will temporarily disconnect DOS, preventing you from issuing DOS commands within your program such as PRINT CHR$(4) "OPEN FILE1." PRINT CHR$(4)"PR#1" will keep DOS connected but will disconnect any other program you may have had running (such as *GPLE* or *GALE*) before you ran yours. PR#1 : CALL 1002 does the same thing as PRINT CHR$(4)"PR#1" but does not generate a < CR > and will not spoil a screen dump. "You pays your money and you takes your chances."

3. When you're working from a machine code level and you need to send the Epson an escape via COUT, you must either make sure the high bit is on in the escape character (that is, send $9B and not $1B), or make sure that the screen echo is turned off. This will keep the Apple from recognizing and intercepting the escape character.

4. If you change either the input (KSW) or output (CSW) hooks from a higher-level language, DOS will change them right back again with the very next character input or output. You can force DOS to permanently accept the change with a call 1002 or a JSR $3EA. If you're working from the machine level and you're careful, it isn't necessary to do a JSR $3EA. This will leave a utility like *PLE* or *GALE* still connected when you exit your machine code routine.

Figure 2. Printer bugaboo box.

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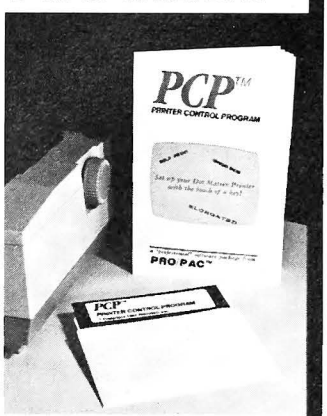

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Next month, we'll skip ahead to printer interface cards and talk about the mysterious eighth bit that gives everyone so many problems. In the meantime, if you have any questions, or if you have discovered any really nifty ways of overcoming limitations with your favorite word processor, send them in so that we can finally get them collected into one place for everyone to share.

Micromax, 6868 Nancy Ridge Drive, San Diego, CA 92121; (619) 457-3131.

Listing 2. Sample 6502 assembly language program using the Epson printer.

```
                     *******************************************
                     * Program name: EPSON/6502 DEMO           *
                     * Programmer: Bill Parker                 *
                     * Release date: 10/17/83                  *
                     * Assembler: Merlin                       *
                     *                                         *
                     * Purpose: This program prints out a "Water Ouzel"  *
                     * message on the Epson printer.           *
                     *******************************************

                     * Definitions
                     CR        =    13
                     Ctrll     =    9
                     ESC       =    $9B        Should always have
                                               hi bit set
                     PRTRSLOT  =    1          Put your prntr slot
                                               no. here

                     * Page 0 locations
                     CSWL      =    $36        Char output switch
                     CSWH      =    $37
                     TEXTPTR   =    $4E        Normally unused
                                               (RND holder)

                     *Monitor routines
                     COUT      =    $FDED      Output to any
                                               device routine
                     COUT1     =    $FDF0      Output to screen
                                               routine

                     * MAIN PROGRAM
                     *
8000: A9 00                    LDA  #<$C0+PRTRSLOT*256 Adjust for prntr
                                                       slot no.
8002: 85 36                    STA  CSWL               Temp send
                                                       output to card
8004: A9 C1                    LDA  #>$C0+PRTRSLOT*256
8006: 85 37                    STA  CSWH

8008: A9 2B                    LDA  #<TEXT        Point at chars to be
800A: 85 4E                    STA  TEXTPTR       printed
800C: A9 80                    LDA  #>TEXT
800E: 85 4F                    STA  TEXTPTR+1

8010: A0 00                    LDY  #0
8012: B1 4E          PRCHAR    LDA  (TEXTPTR),Y   Get char to be
                                                  printed
8014: F0 0C                    BEO  OUIT          Got end of msg
                                                  char?
8016: 20 ED FD                 JSR  COUT          No, print it
8019: E6 4E                    INC  TEXTPTR       Bump ptr to next
                                                  char
801B: D0 02                    BNE  *+4
801D: E6 4F                    INC  TEXTPTR+1
801F: 4C 12 80                 JMP  PRCHAR

8022: A9 F0          QUIT      LDA  #<COUT1       Done printing,
                                                  change
8024: 85 36                    STA  CSWL          output from card to
8026: A9 FD                    LDA  #>COUT1       screen
8028: 85 37                    STA  CSWH
802A: 60                       RTS

802B: 09 CE          TEXT      DFB  Ctrll,"N"     Turn off vid echo
                                                  (kills scroll)
802D: 0D                       DFB  CR            Space down 1 line
802E: 9B C5                    DFB  ESC,"E"       Emphasis on
8030: D7 E1 F4                 ASC  "Water Ouzel"
8033: E5 F2 A0 CF F5 FA E5 EC
803B: 9B C6                    DFB  ESC,"F"       Emphasis off
803D: A0 A8 EF                 ASC  " (oo'-zel), any of several plump, thick-"
8040: EF A7 AD FA E5 EC A9 AC
8048: A0 E1 EE F9 A0 EF E6 A0
8050: F3 E5 F6 E5 F2 E1 EC A0
8058: F0 EC F5 ED F0 AC A0 F4
8060: E8 E9 E3 EB AD
8065: 0D                       DFB  CR
8066: A0 F0 EC                 ASC  " plumaged, aquatic birds of the family "
8069: F5 ED E1 E7 E5 E4 AC A0
8071: E1 F1 F5 E1 F4 E9 E3 A0
8079: E2 E9 F2 E4 F3 A0 EF E6
8081: A0 F4 E8 E5 A0 E6 E1 ED
8089: E9 EC F9 A0
808D: 9B B4                    DFB  ESC,"4"       Italics on
808F: C3 E9 EE                 ASC  "Cinclidae"
8092: E3 EC E9 E4 E1 E5
8098: 9B B5                    DFB  ESC,"5"       Italics off
809A: AC A0 E1                 ASC  ", allied to"
809D: EC EC E9 E5 E4 A0 F4 EF
80A5: 0D                       DFB  CR
80A6: A0 F4 E8                 ASC  " the thrushes, esp. "
80A9: E5 A0 F4 E8 F2 F5 F3 E8
80B1: E5 F3 AC A0 E5 F3 F0 AE
80B9: A0
80BA: 9B B4                    DFB  ESC,"4"
80BC: A0 C3 E9                 ASC  " Cinclus aquaticus"
80BF: EE E3 EC F5 F3 A0 E1 F1
80C7: F5 E1 F4 E9 E3 F5 F3
80CE: 9B B5                    DFB  ESC,"5"
80D0: A0 EF E6                 ASC  " of Europe, and "
80D3: A0 C5 F5 F2 EF F0 E5 AC
80DB: A0 E1 EE E4 A0
80E0: 9B B4                    DFB  ESC,"4"
80E2: C3 AE                    ASC  "C."
80E4: 0D                       DFB  CR
80E5: A0 ED E5                 ASC  " mexicanus"
80E8: F8 E9 E3 E1 EE F5 F3
80EF: 9B B5                    DFB  ESC,"5"
80F1: A0 EF E6                 ASC  " of western North America, having
                                    the habit"
80F4: A0 F7 E5 F3 F4 E5 F2 EE
80FC: A0 CE EF F2 F4 E8 A0 C1
8104: ED E5 F2 E9 E3 E1 AC A0
810C: E8 E1 F6 E9 EE E7 A0 F4
8114: E8 E5 A0 E8 E1 E2 E9 F4
811C: 0D                       DFB  CR
811D: A0 EF E6                 ASC  ! of jerking the body or "dipping as they !
8120: A0 EA E5 F2 EB E9 EE E7
8128: A0 F4 E8 E5 A0 E2 EF E4
8130: F9 A0 EF F2 A0 A2 E4 E9
8138: F0 F0 E9 EE E7 A2 A0 E1
8140: F3 A0 F4 E8 E5 F9 A0
8147: F0 E5 F2                 ASC  "perch, walk,"
814A: E3 E8 AC A0 F7 E1 EC EB
8152: AC
8153: 0D                       DFB  CR
8154: A0 E5 F4                 ASC  " etc., a dipper."
8157: E3 AE BB A0 E1 A0 E4 E9
815F: F0 F0 E5 F2 AE
8164: 0D                       DFB  CR
8165: 00                       DFB  0             End of message
                                                  sentinel
```

Listing 3. Sample Pascal program to print a sample text.

```
(*****************************************************************)
(* Program name: Epson/Pascal Demo                               *)
(* Programmer: Bill Parker                                       *)
(* Date of release: 10/19/83                                     *)
(*                                                               *)
(* Purpose: This program shows how to use certain Epson          *)
(* printer functions from a Pascal program.                      *)
(*****************************************************************)

PROGRAM EpsonDemo;
  TYPE PrtrCmdType = (EmphOn, EmphOff, ItalOn, ItalOff);
  VAR  Printer: Interactive;

  PROCEDURE Select(Var Printer: Interactive; PrtrCmd: PrtrCmdType);
    VAR ESC: Char; (* Printer must be Var to be passed as param. *)
    BEGIN
      ESC := Chr(27);
      Case PrtrCmd of
        EmphOn  : Write(Printer,ESC,'E'); (* Epson command codes *)
        EmphOff : Write(Printer,ESC,'F');
        ItalOn  : Write(Printer,ESC,'4');
        ItalOff : Write(Printer,ESC,'5');
      End; (* Case *)
    END; (* Procedure *)

BEGIN (* Main Program *)
  Rewrite(Printer,'Printer:'); (* Assign phys device to identifier *)
  Writeln(Printer);            (* Print blank line *)
  Select  (Printer,EmphOn);
  Write   (Printer,'Water Ouzel');
  Select  (Printer,EmphOff);
  Writeln(Printer,' (oo''-zel), any of several plump, thick-');
  Write   (Printer,' plumaged aquatic birds of the family ');
  Select  (Printer,ItalOn);
  Write   (Printer,'Cinclidae');
  Select  (Printer,ItalOff);
  Writeln(Printer,', allied to');
  Write   (Printer,' the thrushes, esp. ');
  Select  (Printer,ItalOn);
  Write   (Printer,'Cinclus aquaticus');
  Select  (Printer,ItalOff);
  Write   (Printer,' of Europe, and ');
  Select  (Printer,ItalOn);
  Writeln(Printer,'C.');
  Write   (Printer,' mexicanus');
  Select  (Printer,ItalOff);
  Writeln(Printer,' of western North America, having the habit');
  Writeln(Printer,' of jerking the body or ''dipping'' as they perch,
    walk,');
  Writeln(Printer,' etc.; a dipper.');
END. (* Main Program *)
```

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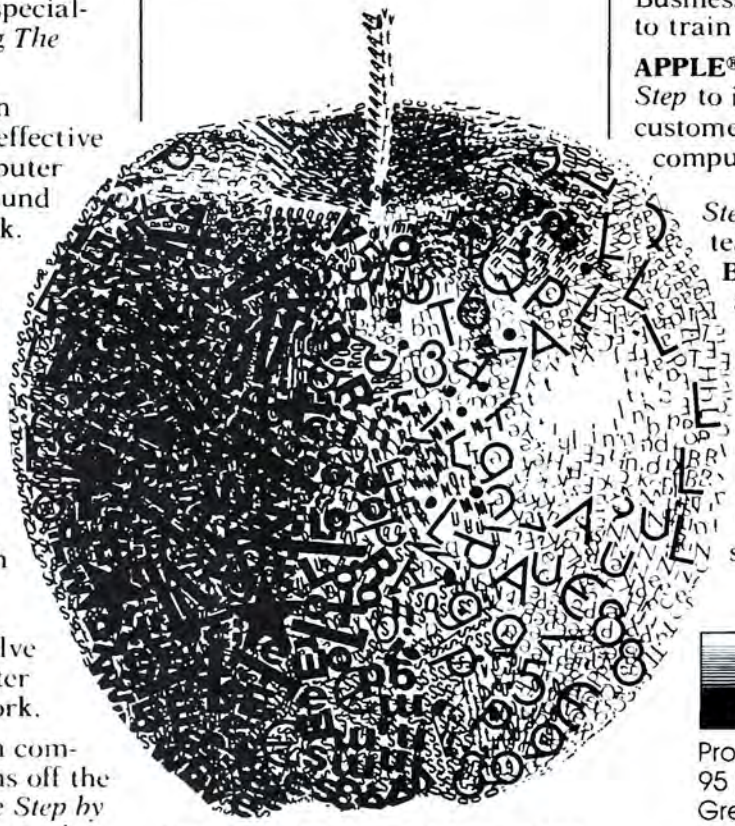

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BEGINNERS' CORNER

BY MATTHEW YUEN

One of the most powerful DOS commands is *init*. When used with a proper file name, it will rarely result in error. *Load* will make sure a Basic program's name follows it, *brun* will look for a binary program's name before proceeding, and *exec* won't do anything unless it's followed by the name of a text file. If any of the file name conditions aren't met, these commands will just result in an error message.

Init, however, doesn't care what follows; it barges ahead with the initialization procedure, destroying everything in its path to make way for new files. The Trans Am of DOS commands. If you accidentally type *init hllo*, *init text file*, or *init* followed by anything that passes as a file name, DOS will initialize the disk that is in the drive, regardless of what you meant to type. The only thing that can stand in the way of init is a write-protect tab on the disk.

When we initialized our first blank disk, we created a *slave* disk. It's called that because it is a slave to whatever system it was initialized on. Confused? Read on.

Booting the System Master disk loads DOS into the highest area of memory possible on the system you're using. Think of RAM as a very tall building. When you boot a master disk, DOS knows that it's supposed to go to the highest floor; it gets on the elevator, pushes the button for the top floor, and goes there. Once it's there, it makes a note of where it is (which floor).

For the sake of simplicity, let's say each floor in the building is the equivalent of 1K. If we're using a 16K Apple, a master disk will send DOS to the sixteenth floor to begin filling in the top ten floors (DOS takes just over 10K of memory).

Now let's say we want to initialize a disk on this 16K system. We put in the new disk, type *init hello*, and thirty seconds later we have a formatted disk. It looks and functions like the master disk in all but one respect. When you boot this new disk, DOS doesn't automatically load itself in the highest memory location available; it loads into where DOS was when it was initialized. In this case, the top 10.5K of 16K RAM.

That's why initialized disks are called slave disks; where DOS goes when the disk is booted depends entirely on the memory size of the computer it was initialized on. Because the master disk put DOS at the top of a 16K memory, the slave disk will put DOS there whenever it is booted, regardless of the size of memory. In other words, if you boot this slave disk on a 48K Apple, the disk will still tell DOS to go to the sixteenth floor and begin filling in from there. That leaves 32K above DOS unused.

In short, slave disks aren't too smart when it comes to loading DOS. Whatever size memory the Apple had when the slave disk was initialized is the size memory that it assumes the computer has when you boot the disk. A slave disk formatted on a 32K Apple will always assume it's being booted on a 32K system. On a 48K Apple, that means some memory will be wasted. A disk initialized on a 48K Apple won't boot on a 16K Apple. Not yet.

Emancipation Proclamation. Slave disks need not remain slaves for all eternity. A disk that is to be used for nothing but data storage will probably never be booted, so it doesn't matter where it wants to load DOS. But if you're storing programs on a disk that you plan to boot now and then, you might want it to behave like a master disk, loading DOS to the highest memory address possible.

On the System Master disk, there is a program called *Master Create*, which frees slave disks and allows them to become master disks. Running *Master Create* is simple. Just brun it and follow the directions as you go along.

Once *Master Create* is loaded, remove the System Master disk and insert the disk you wish to update. When you're asked for the greeting program name, type in the name of the slave disk's current greeting program. *Master Create* doesn't create or save a greeting program for you as init does; it just lets DOS know what name to look for when it boots. Now just hit return, and when the disk stops spinning you'll have a master disk.

Over the past few months we've been learning, talking about, and using DOS commands. Since there's no such thing as a perfect world, we'll very likely encounter errors now and then. How to deal with errors deserves just as much attention as how to do things right.

Tactless Apple. One of the great things about computers is that, if you're wrong, they'll let you know it. Unlike your work supervisor or



teacher at school, the computer tells you in no uncertain terms when you've made a mistake.

Mr. Kindheart at work might remark, "Say, Cromwell, do you think you could look over these figures once more. I know you probably have them correct, but they don't seem to match the financial reports we received last month. Maybe the reports are off. Well, check it out anyway. Thanks." Miss Bardlove, the English teacher, would similarly request that you reread the second act of *Macbeth*. "Your comparisons and contrasts between Lady Macbeth and Mr. T are close but still not quite correct."

The Apple, when it encounters something that doesn't quite match its expectations, will usually beep rudely and fling an error message your way. This would be comparable to Miss Bardlove's or Mr. Kindheart's finding a mistake and hurling your work back at you screaming, "Wrong!"

Indeed, it seems rude for the Apple just to beep loudly and tell you what you're doing wrong, but that's a lot better than having it tell you what it thinks of you, too. Thank goodness computers don't have emotions. Well, at least they don't exhibit them. Yet.

Sticks and Stones. Error messages are perhaps the most degrading thing a computer can spit at us, since they do little more than reinforce our beliefs that computers are infallible and that it was we who caused the error, not it. Computers are far from infallible, but when we consider that a computer performs thousands of operations a second, adding up to tens of millions of operations per hour, we realize that one error in a working day is close to one in a billion. Not too shabby.

Computer errors can result from power surges in the electricity, static inside the computer, moisture in the air, faulty chips, and everything in between. Problems like these are best handled by professionals. The errors we're going to look into are those created by us, the lowly humans.

The two main kinds of error messages we usually see are those relating to Basic and those relating to DOS. Since error messages from Basic are usually seen by programmers, we'll put those aside and concentrate on those seen more often by users of programs—DOS errors.

Broken down to their simplest elements, errors are usually the result of a communication problem between the person and the computer. If you type *catalogg*, it's obvious that you meant to type *catalog*, but the computer doesn't know that. It's as though a nightclub entertainer greeted the audience with, "Heaving heavy bodies!" and the audience thought he was talking about martial arts (not an appropriate greeting), when in truth the entertainer had nasal congestion and was trying to say, "Evening, everybody!"

Another example would be the always popular typo, *pr#65*. We know it means *pr#6* (oops!), but the Apple thinks you really meant to activate slot 65. As a result, it yells at you and gives you a range error.

Introducing the Cast. What follows is the Apple's inexhaustible stock of DOS error messages and what they mean. Only in a perfect world (never making a typo, never having a bad disk, and never having your favorite show preempted) could someone operate an Apple and never run into some of these. Here's what they mean and how to take care of them.

Language not available. The language you need to execute your command isn't in memory. The commands *fp*, *int*, *run*, and *load* look for a version of Basic. Typing *fp* from Integer or *int* from Applesoft is an attempt to switch to the version of Basic you're not using. Typing *load filename* or *run filename*, where *filename* is a program written in the version of Basic you don't have, also throws this error at you.

This error simply tells you that you have only one version of Basic in memory. If you have a 48K Apple with either Applesoft or Integer Basic built into it, you can get the alternate Basic (the one you don't have) by plugging in an Integer or Applesoft ROM card into slot 1 or by adding a language card (RAM card) to your system. The ROM card gives you the other Basic and nothing else; a RAM card will provide you with an additional 16K or more to do with as you please. Simply adding the RAM card to your system won't give you the alternate Basic; the alternate Basic must be loaded into the RAM card from a disk, usually the System Master.

Range error. A number you typed was too large. The Apple can handle numbers with as many as thirty-nine places in front of the decimal point (although numbers this large will be printed in scientific notation). However, it handles them in context. When it sees *load hello, d*, it expects to see either a 1 or a 2 after the *d*, indicating which drive you want to load the file from. In this case, any number higher than 2 will result in a range error because DOS doesn't recognize more than two disk drives on a one-disk controller card.

But if you typed *load hello, s*, it will accept numbers higher than 2 because when it sees *load hello, s* it knows that *s* refers to a slot number, which can be anywhere from 0 to 7. So, whenever you're slapped with a range error, check for typing mistakes and try again.

Write protected. Aha—caught by your own precautions! DOS tried to write, save, delete, or otherwise alter something on the disk but was unable to do so because the disk is protected against changes.

The cause of this is a write-protect tab (in layman's terms: a little sticker that covers the small notch on the side of the disk) on your disk. When you insert a disk into the drive, it depresses a small switch located just inside the drive; you can feel it and hear it click as you insert the disk. Once the disk is in position, the switch will pop up into the notch.

In this "up" position, the switch tells the drive that it's okay to change things on the disk presently in the drive. For that reason, the notch in the disk is called a write-enable notch. We can protect valuable information (data files, important programs) by placing a write-protect tab over that notch. Now, when the disk is in place, the switch won't be able to pop up into the gap. In this "down" position, it tells the drive not to mess around with data on the disk.

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to stay on disks. Hasty insertion or removal of disks tends to snag tabs on the disk drive, sometimes pulling them off. We have found that a better way to write-protect disks is to use Scotch tape instead of the conventional tabs that come with a box of disks.

Software publishers often package their programs with write-protect tabs on them or with no write-enable notch cut in the first place. It's best not to store files on a program master disk. Even if you use a separate disk for storing data created by the program, you can still init the disk accidentally. The tab prevents this. In any case, if a disk has a tab on it, it was probably put there for a good reason, so think twice before removing it.

File not found. DOS can't find the file you specified. Either the file isn't on disk, or you misspelled it. Remember, the computer takes everything in a literal way. Typing *run Geometric Function Programm* will cause DOS to look for a program spelled exactly that way, even if the file is actually spelled with one *m* in *Program*. Check your typing to make sure you spelled it right. If you did, then check the catalog to see how it's spelled there.

Volume mismatch. It's rare to run into this message; it just means that the volume number specified in the command doesn't match the volume number of the disk in the drive.

In the disk initialization process, it's optional to specify a volume number. Volume doesn't refer to the amount of information but rather to the volume number, as in a book volume, or a volume of an encyclopedia. In other words, giving a disk a volume number is almost like putting a label on it. Volume numbers are assigned in the init process; *init hello, v100*, for example, initializes a disk with 100 as the volume number. When you catalog this disk, it will say *disk volume 100* at the top of the catalog.

Disk volumes are assigned when you want to make sure that certain files go only on certain disks. Typing *save filename, v100* will result in a volume mismatch error if the disk's volume number is anything other than 100.

I/O error. The catchall of DOS error messages, I/O stands for input/output. When DOS is unable to read from or write to a disk for any reason, this is what it tells you. Most of the time, it means that the disk drive door is open or the disk's format doesn't match the current DOS you have in memory. An Apple running DOS 3.3 can't handle a disk that is formatted in CP/M, Pascal, DOS 3.2, or any operating system other than DOS 3.3.

Since this is perhaps the most aggravating and potentially disastrous error to encounter, we'll discuss how to handle it at the end of this column.

Disk full. Hmm . . . your eyes are bigger than the disk's stomach. The disk full message doesn't always mean the disk is full. We found out last month how the disk might think it's full when it still has room left. This message is telling you that DOS can't find any place on the disk to put data. There are several possible reasons.

The first is that all the disk's sectors are used. Fine. Get another disk.

The next is that DOS thinks all sectors are being used when they really aren't. This can happen when a file is edited to a smaller version and saved under the same name. Even though it's a smaller file, it occupies the same number of sectors, leaving some of them unused; these unused sectors are off limits to other files. All this was covered last month.

Another possibility for a disk full error is that there are no more places on the catalog for file names. The catalog can hold only 105 file names, so it's entirely possible that those slots can get taken before all sectors on a disk are occupied. In this case, you can delete some files that you don't need, each of which frees not only its sectors but its spot on the catalog as well.

File locked. 'Nuff said? The file you want to change has been locked; you can see this by the asterisk by its name on the catalog. The reverse command of *lock* is *unlock*; *unlock filename* works wonderfully.

Syntax error. Don't panic; though it sounds like DOS is telling you that you don't know what you're talking about, this message just means you probably made a typo. Don't confuse this with Applesoft's *?syntax error* or Integer's ****syntax error*; the DOS version of this popular message has no question mark or asterisks in front of it.

Once DOS recognizes one of its commands, it will attempt to carry it out. But if it encounters something that doesn't go with the command, the result will be this error. Typing *catalogg*, for instance, will get you a syntax error; DOS recognizes the first seven letters of *catalogg*, but the extra *g* fouls things up.

In short, check your spelling and try again.

No buffers available. Simple: You're out of buffers. A buffer is an area of memory that is set aside to hold things (data, keyboard input) until the Apple or DOS is ready to transfer them elsewhere. To illustrate, the save command takes the contents of memory and feeds them into a buffer. When the buffer is full, all of its contents are then sent to disk; the save command stores things on disk a bufferful at a time.

Now that we understand what a buffer is, let's get back to the error message. DOS commands require that there be at least one empty buffer in order for them to be executed. If a program you just finished running has opened and was using all the buffers for text files, then the no buffers error will result when you try to issue a DOS command.

The same thing happens if a program you're writing tries to open another text file when all the buffers are being used. Those familiar with Basic can use the close command to free a buffer or the *maxfiles* command to increase the number of buffers available; sixteen is the maximum number of buffers for maxfiles.

Unless otherwise specified, the Apple sets maxfiles to three. So if you ever break out of a program and all your DOS commands are met with no buffers available, increasing maxfiles can usually get DOS commands through. Simply typing *maxfiles 4* (or any number up to sixteen) will free some buffer space for DOS commands to use.

Clearing the Apple's memory also frees buffers; *fp* or *int* is a lot faster, but whatever Basic program is in memory will be deleted.

File type mismatch. This means the command doesn't go with the type of file (Applesoft, Integer, binary, or text) that was specified. For example, you can't *bload* a Basic file and you can't *run* a text file. All this message says is that the verb (DOS command) doesn't match the noun (file name). It's like saying, "Pour me a car" or "Drive the beer." Catalog the disk to make sure of the file type if you're not sure.

Program too large. The DOS command tried to load a file from disk, but there's not enough space in memory for the entire file. Issuing either an fp or int command will clear memory, making way for your disk file. You can also use the maxfiles command to decrease the number of buffers that are available; this opens more memory space for Basic's use.

Sometimes a program that was previously in memory has set himem or lomem values that prevent you from loading your file. Himem and lomem are Basic statements that set barriers marking the highest and lowest memory addresses available to you. Street barricades would be a good way to think of himem and lomem; they're temporary markers that tell you where you can or cannot go, depending on what's happening on the other side.

For instance, himem is usually set right below DOS, making sure you don't put information where DOS is, thus damaging or altering it. This is like marking off streets with wooden barricades to prevent cars from accidentally driving through a parade route or a marathon race.

It's best to let programmers reset himem or lomem by typing at the keyboard. For begin-

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ners, it's easier just to reboot the system.

Not direct command. Trying to execute an *append*, *open*, *position*, *read*, or *write* command from the keyboard will result in this error message. These commands can be executed only from within a program, so let's not worry too much about them.

Do Your Part. We have seen that most of these errors can be easily corrected. However, one DOS error that creates a lot of confusion and general hysteria among beginners is the I/O error message. It seems that when DOS can't figure out what's going wrong, it will tell you that an I/O (input/output) error has occurred.

As we said earlier, I/O error just means that for various reasons DOS is unable to read or write on the disk. DOS is no lazy creature. When you issue a save command, for example, DOS does its best to save the information you have in memory; if it's unable to do so the first time, it tries again. And again. And again. In fact, it attempts to carry out your command ninety-six times before it gives up. When was the last time you tried to do something ninety-six times with no success? As a wise man once said, "If at first you don't succeed, try again. If you still don't succeed, give up. No sense in making a damn fool of yourself over it."*

DOS isn't like that. Ninety-six tries is a lot of times to try something, just to conclude that it's impossible. Here's where we have to work together with DOS—it needs our help.

* Quote by W.C. Fields

One reason for DOS's problems in reading from disk might be that some sectors on the disk are damaged. We learned last month some of the ways disks become injured: magnetic fields, extreme heat or cold, fingerprints, dust particles, spilled orange soda, or being set on fire. Bad sectors are the most aggravating causes of I/O errors because they require delicate disk surgery, which usually can be performed only by computer experts armed with disk utility programs (computer versions of brain scan and X-ray machines).

A popular tool for fixing up disks that seem beyond hope is *Bag of Tricks*, from Quality Software. This little wonder lets you look at disks sector by sector and repair damage that seems impossible to repair, thus restoring one's faith in an almighty being.

I/O errors received when you try to write to disk usually occur because DOS is trying to write on a part of the disk that is damaged; it's sort of like trying to write on wet paper. The best thing to do in this case is to remove the disk, pop in another initialized disk, and save your file on it. Once you've done this, it would be a good idea to salvage whatever other files you had on the bad disk by using *Fid* to copy them to another disk.

Most of the time, a few bad sectors won't spoil a whole disk. That is, you can usually reinitialize the disk and use it over again. If the damaged sectors are the result of some unobservable villain like magnets or heat (they usually are), reinitializing the disk will set everything right. But if the damage was caused by excessive disk wear (a rare occurrence), then it's best to write the disk off as having lived a good and useful life.

Damaged disk sectors don't always give you I/O error messages. If the damage has occurred where DOS lives (tracks 0 through 2), the results will vary. Sometimes the disk will refuse to boot; sometimes it will boot but behave in an odd manner when you issue DOS commands. When this happens, the best thing to do is rescue the files from the disk by copying them to another disk via *Fid*.

Copying one file at a time can be pretty time-consuming. Another way to save the disk is to brun the *Master Create* program to put a new DOS image on the damaged disk. After that, you can copy the entire disk with *CopyA*.

Pleasant Dreams. It should now be easier to sleep at night, knowing how to handle DOS when it spits error messages at you. Computers aren't so frightening when we realize that what we often interpret as hostility and aloofness from the computer is nothing more than its own infantile way of communicating.

Infantile? You bet. Though microcomputers are sophisticated pieces of machinery, they are still barely in the developmental stages, far from where we'd like them to be. When it comes to communication between people and computers, the computer is very much like a young child. It knows only what it has been taught and has no consideration for other people's feelings; when it doesn't understand something, it lets us know in a direct, uncompromising way.

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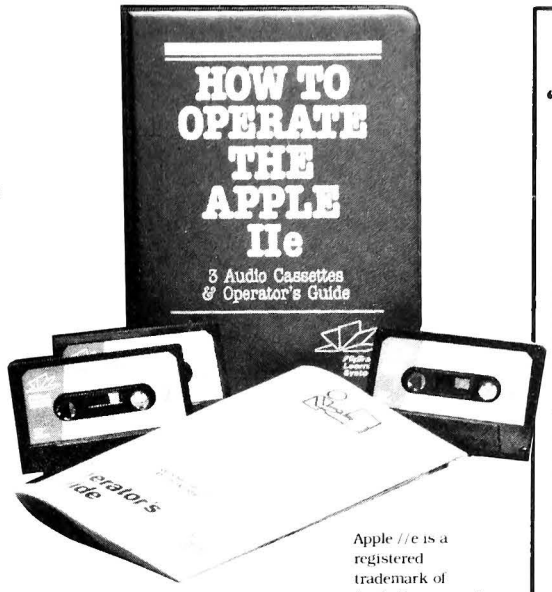

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Dear Mike:

Congratulations! Your financial portfolio jumped another 1/4 in value last month.

I don't know what your secret is, but you've developed an uncanny sense for what to buy and sell and when to do it.

Again, my sincere congratulations. It's always a pleasure to be the bearer of such good news.

Sincerely,

MG

Frank—
Who said playing computer games is a waste of time? I suggest you check out the one from Blue Chip.
Mike

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Buttonwood Apples

BY KEN LANDIS



Last month we looked at some of the statistics that technical investors can obtain from *Barron's* Market Laboratory. This month we'll examine a few more. But before we do, a reminder: No matter how good the investment technique, the stock, the bond, or the company, investing is still a game of chance. Some investors succeed at this game, but there are many who don't. Therefore, whatever money you've invested or are thinking of investing should be money you can afford to lose.

Perhaps an example will illustrate this point. Two months ago, we stated in this column that a company's growth signifies its health. That's a fine rule of thumb, but when you consider the recent bankruptcy of Osborne Computer, a company that was growing at a fantastic rate, it doesn't always seem to apply. For our purposes, how the company wound up in such a state is not the issue; the lesson to be learned is that everything can be right and still go wrong. Remember that, and you'll probably do well with your investments.

More Market Laboratory. The various market diaries in *Barron's* Market Laboratory are important sources of volume statistics for the technician. Figure 1 shows the NYSE common stock diary and the NYSE composite diary. The difference between these two tables is that the composite diary contains preferred stocks, while the stock diary does not.

NYSE Common Stock Diary

	Sept. 19	20	21	22	23
Total	1,479	1,480	1,489	1,482	1,483
Advances	909	775	507	741	569
Declines	349	449	701	449	642
Unchanged	221	256	281	292	272

NYSE Composite Diary

Total	1,949	1,985	1,975	1,977	1,996
Advances	1,116	1,016	707	956	785
Declines	482	591	858	620	809
Unchanged	351	385	410	401	402
New Highs	76	76	67	75	79
New Lows	8	8	8	12	9
Sales ths shs	99,175	120,422	106,594	113,638	112,357

Figure 1.

Why does *Barron's* break out the preferred stocks? Because preferred stocks are interest-rate sensitive, behaving just like bonds in many cases. As discussed last month, the bond market's behavior is normally a harbinger of how the equity, or stock market, will behave or react. For example, if bonds and preferreds are falling, the composite diary will be pulled down by the preferreds, but the common stock diary won't. Watching the movements of both can give us a feeling as to where the up or down pressures in the market may be coming from.

In the common stock diary, the total of issues traded represents the number of stocks traded—not the number of shares, but the number of stocks. Advances tells the number of issues traded that advanced, and declines shows the number that fell. Unchanged displays the unchanged number of issues.

For dyed-in-the-wool technicians, advances and declines are two of the most important technical indicators. The difference between the two statistics is usually plotted against a market index, such as the Dow Jones 30 industrials. This chart shows whether the market is sending contrary signals. If the advance/decline line is going up and the Dow is going down, a technician interprets this to mean that the market may be ready to fall. This interpretation is not always correct (what is?), but advance/decline information is nonetheless a widely used point of reference.

The composite diary also shows the number of stocks that have attained new highs or lows for the previous twelve-month period. Technicians often use the difference between the highs and lows to get an idea of how the top and bottom ends of the market are doing, especially those stocks used in the Dow Jones 30 industrials. For example, if the Dow Jones 30 industrials average is going down and the number of stocks hitting new market lows is getting smaller, a technician may interpret this situation as a sign that the market will likely rally in the future. If the number of new highs is getting smaller and the Dow is rising, the technical interpretation is that the market may have false hopes and will probably go bearish. Many technicians refer to this form of analysis as divergence analysis. Market Laboratory also lists this kind of information for the American, over-the-counter, and New York bond exchanges.

Many technicians rely much more heavily on volume changes than they do on price changes, but they don't necessarily have to chart these changes in order to use them.

Figure 2 shows the twenty stocks that were most active on the New York exchange during the previous week. This table is often used in checking the "mind set" of the market.

As you know, the largest corporations in the United States, if not the world, trade on the New York exchange; these include such companies as AT&T, Exxon, and IBM. Many technicians consider the presence of these firms in the "twenty most active stocks" table a good sign—a sign that the market's expectations are high and that investors have their heads screwed on straight. If the table is dominated by more speculative issues, many technicians believe that investors are scrambling to make some money before the market begins to fall. Although this analysis is

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qualitative rather than quantitative, it's still part of a technician's toolbox. The same sort of analysis can be done for the American and over-the-counter exchanges using information contained in similar tables.

The elements of Market Laboratory that we've covered this month and last are enough to get you started as a technician, but we have only scratched the surface of technical analysis. The purpose of these last two tutorials has not been to teach you technical analysis, but to teach you about it—to familiarize you a bit with the lingo technicians use and to give you some idea where to look for technical information. If you're interested in learning more about technical analysis, getting a book on the subject from your local library or bookstore is a good beginning. You should be able to find a variety of materials written for investors at various levels of experience.

NYSE Most Active Stocks

52 Weeks High	52 Weeks Low			Sales	High	Low	Last	Chg
70¼	54½	ATT		8,563,800	67⅞	65⅝	67¼	+ ⅛
127	73¼	IBM		5,135,900	126⅝	122⅝	126⅝	+ 3½
56½	17¼	MerLy	s	4,755,500	39⅞	36¾	38¼	+ 1⅜
35⅝	8	Chryslr		4,394,300	30¾	28½	30¾	+ 1⅛
33½	19¾	RCA		4,323,800	33½	27⅞	33¼	+ 4⅝
26⅝	18⅝	DiamS		4,318,100	25⅞	24⅞	25¾	
77½	46¼	GMot		3,667,900	74⅞	71¼	74⅞	+ 3½
36⅞	22⅝	Avon		3,629,800	28⅜	23⅜	23½	— 3⅞
8⅞	2½	PanAm		3,618,200	7⅞	7¼	7¾	+ ½
64⅞	25½	FordM		3,427,800	64⅞	61⅝	64⅞	+ 3⅞
26¼	17⅜	BnkAm		3,284,100	22⅛	20¾	20⅞	— ¾
45⅛	27⅜	GulfOil		3,147,500	45⅛	41½	44½	+ 3
38⅜	20½	K mart		3,143,000	38⅜	36⅛	37¾	+ 1⅝
39⅜	27⅛	Exxon		3,062,800	38½	37	37⅝	— ⅜
46⅛	25⅝	Citicrp		3,030,100	38¾	36¾	37¾	+ ⅝
30¼	13⅞	PrimC	s	2,976,700	18⅞	15⅝	18¾	+ 3⅜
57¾	37⅛	GenEl	s	2,862,100	52½	49⅞	52⅛	+ 2⅛
44¾	32⅞	Pfizer	s	2,660,100	41⅝	38⅛	41	+ 3
41	17⅜	PhibS	s	2,638,900	30⅞	28¼	30⅛	+ 1¾
38¾	14⅛	NwstEn		2,541,800	38¾	38⅜	38½	+ 1⅝

Figure 2.

Keeping Up—This Month's Review. No matter what your analytical orientation is or what you invest in, you need a way to keep track of your investment dealings. With that in mind, we'll look this month at the *Dow Jones Market Manager*, a software system designed to help investors stay on top of their portfolios.

Dow Jones Market Manager, Dow Jones & Company (Box 300, Princeton, NJ 08540; 800-257-5114). $299.

Backup policy: One backup supplied; additional copies $30 each.

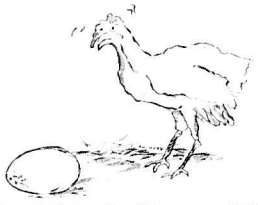
System requirements: 48K Apple II, II Plus, or IIe; one disk drive, printer.

Optional: Hayes Micromodem II.

The *Dow Jones Market Manager* is a portfolio reporting and accounting system that can track up to twenty-six different portfolios. The program is designed to handle stocks, bonds, options, mutual funds, and treasury issues. Let's explore its capabilities by going through the processes involved in establishing a portfolio, updating it, and printing out reports.

Market Manager requires that the printer interface be in slot 1 and the Micromodem II be in slot 2. Unfortunately, because the program is written in Pascal, these specifications cannot be altered, so if your peripherals are arranged any other way, you'll have to swap them around each time you run this program.

Since *Market Manager* can handle twenty-six portfolios, an investor can choose from among twenty-six possible names—the twenty-six letters of the alphabet. Though it may sound clever, this naming convention is actually a severe drawback. Most people give their portfolios names



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that signify the kinds of securities that are contained in them, such as bonds, high-tech, or blue chips. A single letter tells the investor nothing, and it increases the off-system bookkeeping and tracking that must be done.

When you input the letter of an existing portfolio, all transactions you enter are automatically posted to that portfolio. When a new name (letter) is given, the program establishes a new portfolio file and prompts the investor for the transactional information.

If a transaction is the first one being entered into the program during a session, pressing return displays the default date (entered when the program is booted). If a transaction occurred on a different date, that date can be entered. After the first entry, the default date will always be the last date entered into the system, making it possible for the investor to enter streams of prior transactions with ease. However, the date error-checking does not look for the validity of a date. It's possible, for instance, to enter a log-on date of 10/5/83 and a buy transaction dated 10/05/89 without the program being the wiser. A program of this nature should really do a better job of alerting the investor to dates that may not be appropriate.

The next prompt asks the investor if the transaction is a buy (B) or a sell (S). *Market Manager* then requests the number of securities involved in the transaction, the symbol for the security, its type (S for stock, B for bond, O for option, M for mutual fund, T for treasury issue), and the dollar amount.

It is at the inputs for the amount and type of security that two major flaws in *Market Manager* become evident. No matter what we tried, we could not seem to get the program to accept a bond or treasury bill transaction. Every time the B or T key was hit, the system gave a rather rude audio response and rejected the entry. And, believe it or not, *Market Manager* does not accept cents, only dollars. So if you have a common stock transaction for $1,200.76, you can enter the $1,200 but not the seventy-six cents. This virtually negates the program's value for income tax purposes. Next time you file your tax return, try rounding off all the numbers. The aggregate effect might not be more than a few dollars over the course of a year, but that could still push you into another tax bracket, which would mean a larger tax liability.

Once an entire transaction has been entered, the investor is asked to check to make sure that all the information is correct. If it's not, correction is done through the entry screen by answering "yes" to the prompt, "Any changes?" and specifying the information to be changed. If the information is correct, answering "no" to the prompt moves the program along to the next transaction.

When the investor closes out a position (by entering both a buy and a sell transaction on the same security), *Market Manager* displays the projected profit/loss on the position and asks whether the investor does indeed want to close out the position. If so, the program transfers the details of the realized gain/loss to the reports. For example, if you were to enter a buy transaction for one hundred shares of Apple Computer at $30 per share and then enter a sell transaction for all one hundred shares at a selling price of $50, *Market Manager* would tell you that your projected profit on the closed position is $2,000 ($50 selling price − $30 buy price *100 shares).

Market Manager can also account for cash. If securities are purchased, the program automatically deducts the total cost of the transaction from the cash balance. If a security is sold, the total proceeds from the sale are added to the cash balance.

Remarkably, that's all there is to entering stock information in this program. It's one of the simplest procedures in any program of its kind. Unfortunately, the inability to accept full prices (prices that include cents) and the problem concerning bonds and treasury issues almost negate the program's intended value.

The updating of current prices in the portfolio can be done automatically by logging on to the Dow Jones News/Retrieval Service and collecting the prices of any stocks, bonds, options, mutual funds, or treasury issues listed there (some six thousand issues are included). It's also possible to update the prices by hand using figures from a local newspaper, the *Wall Street Journal*, or any other financial publication or section.

The end-of-year closing-out of the present year's detailed information is done by means of close-out utilities that are part of the program. These utilities also carry forward any information the investor will need for the coming year.

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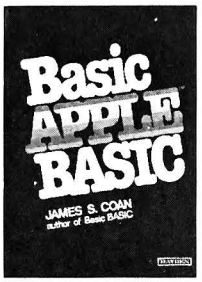

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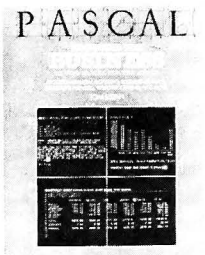

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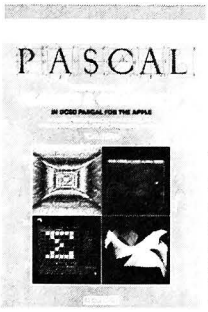

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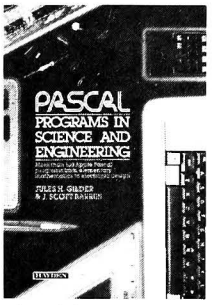

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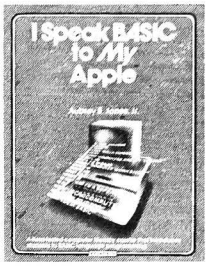

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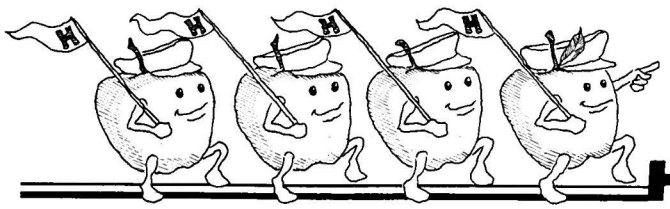

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Based on the securities bought and sold, positions closed, and cash balance, *Market Manager* generates four reports on a portfolio. They cover holdings by portfolio, holdings by symbol, realized gains/losses, and year-to-date transactions.

The holdings-by-portfolio report (see figure 3) shows all the current open positions within each portfolio. For each security in the portfolio, the report displays transaction date, the symbol of the security being traded, the nature of the trade (buy, sell, short sale, or buy/trade to cover a short sale), the quantity traded, the original cost of the security, the average price per share (which is simply the total price divided by the quantity purchased), the current value of the securities, the present price per unit, the unrealized gain or loss, and whether the transaction is a short-term capital gain or has aged sufficiently (one year) to be a long-term capital gain.

The lower left portion of the report shows the column totals for both securities held (valued securities long) and securities sold short (valued securities short). The cash balance for the portfolio is also computed and displayed.

The holdings-by-symbol report is shown in figure 4. When this report is chosen, the program asks which symbol (security) the investor is interested in. It then scans through each portfolio on the disk and records the information given in the holdings-by-portfolio report for that particular security.

The realized gains/losses report (figure 5) consists of all transactions that have been closed by the investor. This report shows both purchase and sale information, plus realized gain and loss and the capital gain treatment that ought to be given the transaction. Although the program assigns a short- or long-term capital gain indicator to the transaction, it doesn't total up the gains by that classification. This would have been a simple thing for the program to do and would greatly enhance the program's value as a tax tool.

The year-to-date transactions report (figure 6) lists all the transac-

HOLDINGS BY PORTFOLIO

TODAY'S DATE 12/08/82

CODE	SYMBOL	TYP E	S/S	DATE	TRANSACTION QUANT	TRANSACTION $COST	TRANSACTION PRICE	12/08/82 $VALUE	12/08/82 PRICE	UNREALIZD GAIN/LOSS	L/S
A	AAPL	S	8	3/15/82	100	1,528	15.28	3,312	33⅛	1,784	S
A	AAPL	S	8	3/15/82	200	3,080	15.40	6,625	33⅛	3,545	S
A	AAPL	S	8	3/17/82	200	2,853	14.26	6,625	33⅛	3,772	S
*TOTAL AAPL					500	7,461		16,562		9,101	
A	DEC	S	8	1/15/82	50	4,128	82.56	5,450	109	1,322	S
A	DEC	S	8	1/27/82	25	2,159	86.36	2,725	109	566	S
*TOTAL DEC					75	6,287		8,175		1,888	
A	DJ	S	8	11/20/81	100	5,118	51.18	6,975	69¾	1,857	L
A	DJ	S	8	11/23/81	200	10,201	51.00	31,950	69¾	3,749	L
A	DJ	S	8	11/24/81	100	5,025	50.25	6,975	69¾	1,950	L
*TOTAL DJ					400	20,344		27,900		7,556	
A	IBM	S	B	5/20/82	100	6,313	63.13	9,450	94½	3,137	S
A	IBM	S	B	5/20/82	50	3,182	63.64	4,725	94½	1,543	S
A	IBM	S	B	6/01/82	50	3,108	62.16	4,725	94½	1,617	S
*TOTAL IBM					200	12,603		18,900		6,297	
VALUED SECURITIES LONG					1,175	46,695		71,537		24,842	
VALUED SECURITIES SHORT					0	0		0		0	
CASH BALANCE = 3305											

Figure 3.

HOLDINGS BY SYMBOL

TODAY'S DATE 12/08/82

CODE	SYMBOL	TYP E	S/S	DATE	TRANSACTION QUANT	TRANSACTION $COST	TRANSACTION PRICE	12/08/82 $VALUE	12/08/82 PRICE	UNREALIZD GAIN/LOSS	L/S
A	IBM	S	B	5/20/82	100	6,313	63.13	9,450	94½	3,137	S
O	IBM	S	B	6/01/82	50	3,182	63.64	4,725	94½	1,543	S
O	IBM	S	B	6/01/82	50	3,108	62.16	4,725	94½	1,617	S
O	IBM	S	B	6/01/82	100	6,313	63.13	9,450	94½	3,137	S
X	IBM	S	B	6/01/82	50	3,108	62.16	4,725	94½	1,617	S
X	IBM	S	8	5/20/82	100	6,313	63.13	9,450	94½	3,137	S
X	IBM	S	8	5/20/82	50	3,182	63.64	4,725	94½	1,543	S
VALUED SECURITIES LONG					500	31,519		47,250		15,731	
VALUED SECURITIES SHORT					0	0		0		0	

Figure 4.

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CODE	SYMBOL	PURCHASE QTY	PURCHASE DATE	PURCHASE PRICE	PURCHASE $COST	SALE DATE	SALE PRICE	SALE PROCEEDS	GAIN/LOSS	L/S
A	DJ	100	11/23/81	51.01	5101	12/07/82	70.23	7023	1922	L
A	AAPL	100	3/15/82	15.40	1540	12/07/82	33.45	3345	1805	S
A	DEC	50	1/15/82	82.56	4128	12/07/82	111.36	5568	1440	S
A	DEC	25	1/27/82	86.36	2159	12/07/82	111.36	2784	625	S
A	IBM	50	5/20/82	63.64	3182	12/07/82	94.56	4728	1548	S
A	IBM	50	6/01/82	62.16	3108	12/07/82	94.56	4728	1620	S
TOTALS:		375			19218			28176	8958	

Figure 5.

YEAR-TO-DATE TRANSACTIONS

TODAYS DATE 12/08/82

DATE	CODE	TRANSACTION		DESCRIPTION			AMOUNT
11/20/81	A	BUY	100	DJ	@	51.18	5118
11/23/81	A	BUY	200	DJ	@	51.00	10201
11/24/82	A	BUY	100	DJ	@	50.25	5025
1/15/82	A	BUY	50	DEC	@	82.56	4128
1/27/82	A	BUY	25	DEC	@	86.36	2159
3/15/82	A	BUY	100	AAPL	@	15.28	1528
3/15/82	A	BUY	200	AAPL	@	15.40	3080
3/17/82	A	BUY	200	AAPL	@	14.26	2853
5/20/82	A	BUY	100	IBM	@	63.13	6313
5/20/82	A	BUY	50	IBM	@	63.64	3182
6/01/82	A	BUY	50	IBM	@	62.16	3108
12/08/82	A	CHANGE	100	DJ	@	50.25	5025
11/01/81	A	CASH	INITIAL	ENTRY			50000
12/07/82	A	SELL	100	DJ	@	70.23	7023
12/07/82	A	SELL	100	AAPL	@	33.45	3345
12/07/82	A	SELL	50	DEC	@	111.36	5568
12/07/82	A	SELL	25	DEC	@	111.36	2784
12/07/82	A	SELL	50	IBM	@	94.56	4728
12/07/82	A	SELL	50	IBM	@	94.56	4728

Figure 6.

tions that have occurred in a given portfolio during the year. This report gives the investor an excellent audit trail against which to check the year's portfolio entries to be sure that nothing was forgotten and that no wrong information was entered.

When its reports are run, *Market Manager* prompts the investor to set the top-of-form on the printer. Then, after each report finishes printing, the program is supposed to send an eject signal to the printer so that a new, clean sheet will be brought up for the next report. This top-of-form/eject feature worked on only one of the reports we ran, so that the end result of a printing session was a series of reports that were not easy to separate or to read. Such a lack of attention to detail is inexcusable, especially from Dow Jones.

In addition to automatic log-on and fetch of securities prices, *Market Manager* offers the ability to retrieve financial news from the Dow Jones News/Retrieval Service. The news program is quite nicely done and, in contrast to some of the other modules of the program, very well designed and planned.

Market Manager can retrieve up to sixty-six of the headlines for a symbol or company that the investor specifies. After these headlines have been received, the investor can scroll through them and retrieve the news stories they accompany. As many as five stories can be saved on one data disk, and these stories can either be printed or reloaded from disk at a later date. The program can also print stories directly from the Apple's memory.

All other information on Dow Jones is accessed by means of the *Market Manager* terminal program. The information retrieved with this module is stored in an 8,800-character memory buffer. Retrieved information can be printed out, but it cannot be saved to disk. This is a real surprise. When you're using an information service, and especially when you're switching from one database to another, you receive many instructions. Once the information you're seeking has been transmitted successfully, these instructions are of no use to you; they only take up space on a report. In light of this, many investors read communications files that were saved on disk into a word processor and edit out the instructions. But since the program doesn't allow you to save the data to disk, you can't do this with *Market Manager*.

To Invest or Not To Invest? Dow Jones is a name that commands and deserves respect in the financial community. It is a company rich in tradition and history that has become known for its quest for excellence. Unfortunately, *Market Manager* does not live up to Dow Jones's reputation. Until significant modifications have been made, this program is not a wise investment. ◨



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Scrolling for Everyone. Scrolling is something you take for granted on the text screen. When you reach the bottom of the screen, everything automatically moves up one line and you continue typing as if nothing had happened. But as you begin to experiment with fonts that write on the hi-res screen, you come face to face with the scrolling problem.

The Monitor routine that scrolls the text screen won't help you on the hi-res screen. Most hi-res writing routines use the output vector at memory locations 54 and 55 ($36 and $37 hex) to intercept normal output. If your font uses the same size characters as the standard Apple character set, you can plot your character at the current cursor position and then call COUT, the Monitor character output routine. COUT keeps track of assorted details like cursor position and automatic return when the right edge of the screen is reached, so your routine doesn't have to.

However, when COUT decides it's time for a scroll, it accomplishes this task by moving the memory that comprises the text screen. This doesn't help you on the hi-res screen. So, it seems you must handle the scrolling yourself. Memory location 37 ($25 hex) contains the current vertical cursor position (0–23), and you can use this to decide when to scroll. We'll look at how this is done later on.

The first problem to solve is how to scroll. Obviously, we have to move all the hi-res memory to new locations that correspond to screen positions above the present ones.

Presented here are several different ways of accomplishing this. Each method has its advantages and disadvantages.

The Long, Hard Scroll. Since the amount of memory that has to be moved is quite large, it would be unreasonable to write a routine in Basic to do the scrolling—that is, unless you wanted to have time to go out for a sandwich every time it scrolled. Clearly we need the speed of machine language.

The problem that must be dealt with, as in all hi-res routines, is the bizarre organization of the Apple hi-res memory. As shown on the maps of the hi-res screen on page 21 of the old *Apple II Reference Manual* and page 34 of the *Apple IIe Reference Manual*, the order of the addresses doesn't appear to have an order. But it does, and the screen address of the leftmost byte of each line (the *base address*) can be calculated from the Y coordinate. That byte and the thirty-nine bytes immediately following it comprise one hi-res screen line. Fortunately, we don't need to know how to do these calculations, since there is a routine called HPOSN at memory location $F411 in the Applesoft ROM that, among other things, calculates the memory address corresponding to a particular set of X and Y coordinates.

The base address, as we said, is just the address of the leftmost byte of the screen line. Once we know the base address of the line we are interested in, we can use simple indexed addressing based on the X coordinate to address any byte on that line.

Listing 1 shows a basic scrolling routine using this technique. The algorithm goes something like this: Move "text" line 2 to "text" line 1. Then move line 3 to line 2, line 4 to line 3, and so on. Each hi-res text line, however, is composed of eight hi-res screen lines. So, to move one line of text up one line, we actually have to move eight hi-res screen lines up eight lines each. In terms of hi-res lines, then, we move line 8 to line 0, line 9 to line 1, line 10 to line 2, and so on.

Each line of the hi-res screen is composed of forty bytes. We're moving twenty-three text lines (the top line scrolls off the screen, so it doesn't need to be moved anyplace), which at eight hi-res lines per text line is 184 lines. One hundred eighty-four lines times forty bytes per line equals 7,360 bytes, the number to be moved in order to scroll the whole screen. Now is it clear why we can't do this in Basic?

One thing does make sense about the way the hi-res screen is laid out: Each screen line is composed of forty consecutive bytes. This means



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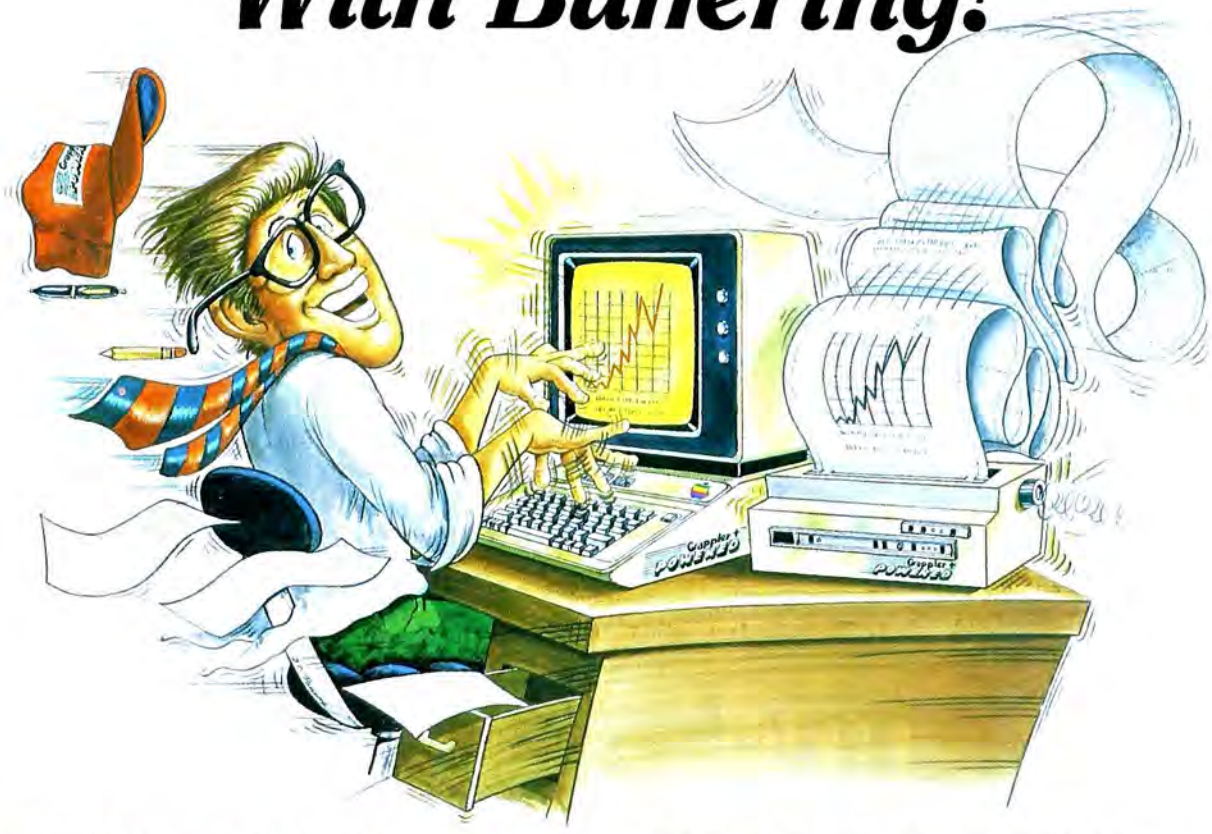

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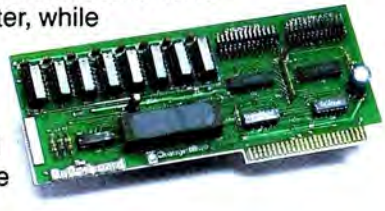

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that, in order to move a screen line up eight lines, only the base addresses for the source line (the location we're moving from) and the destination line (the location we're moving to) need to be calculated. We can simply index those addresses to get the addresses for the whole "from" and "to" lines.

The routine calculates the base address using the HPOSN routine. Before this routine is called, the Y coordinate is placed in the accumulator and the X coordinate goes in the X and Y registers. The Y coordinate the first time through will be 8 and the X coordinate will be 0. The eighth screen line, remember, will be our first "from" address, with the X coordinate of 0 used to get the base address of the line. These values are set in lines 8 through 10, and HPOSN is called in line 11. The base address is returned in locations $26 and $27 and subsequently moved to $06 and $07 by lines 12 through 15.

The Y coordinate is retrieved from $E6, where it was left by HPOSN. Line 18 subtracts 8 from the Y coordinate's value to get the Y coordinate for the "to" line, and HPOSN is called again.

At this point we have the base address for the "from" line in $06 and $07 and the base address for the "to" line in $26 and $27. A simple loop in lines 23 through 27 moves one line. Then the Y coordinate is recalculated and a check is made to see if the last line has been reached. If it hasn't, the process is repeated.

Listing 2 is a more useful implementation of this technique. It behaves just like the scroll on the text screen. In particular, it scrolls only within the defined text window, so you can poke locations 32 through 35 to control the window just as you would on the text screen. Also, the new program erases the bottom line of text after executing the scroll. It has the added benefit of being completely relocatable; so although it is shown at location $300, you can bload it anywhere in memory where you have room. Just call the starting address to scroll.

As written, the program in listing 2 scrolls hi-res screen 1. To change it to scroll screen 2, just change the $20 in line 11 to $40.

All of this assumes that you already have a routine to print text on the hi-res screen. If you don't, check out the April 1983 *Softalk*. No kidding, there are two different character generators in there, one in Roger Wagner's Assembly Lines column and one in Doug Carlston's All About Applesoft column. Take your pick. The routine also works on any hi-res picture, so you can try it out right away even if you don't have hi-res text routines.

```
                          1  ****************************
                          2  *                          *
                          3  *       SIMPLE SCROLL      *
                          4  *                          *
                          5  ****************************
                          6           ORG    $0300
                          7  HPOSN    EQU    $F411
0300: A9 08               8           LDA    #$08
0302: A2 00               9  BASE     LDX    #$00
0304: A0 00              10           LDY    #$00
0306: 20 11 F4           11           JSR    HPOSN
0309: A5 26              12           LDA    $26
030B: 85 06              13           STA    $06
030D: A5 27              14           LDA    $27
030F: 85 07              15           STA    $07
0311: 38                 16           SEC
0312: A5 E2              17           LDA    $E2
0314: E9 08              18           SBC    #$08
0316: A2 00              19           LDX    #$00
0318: A0 00              20           LDY    #$00
031A: 20 11 F4           21           JSR    HPOSN
031D: A0 00              22           LDY    #$00
031F: B1 06              23  MOVE     LDA    ($06),Y
0321: 91 26              24           STA    ($26),Y
0323: C8                 25           INY
0324: C0 28              26           CPY    #$28
0326: D0 F7              27           BNE    MOVE
0328: E6 E2              28           INC    $E2
032A: A5 E2              29           LDA    $E2
032C: 18                 30           CLC
032D: 69 08              31           ADC    #$08
032F: C9 C0              32           CMP    #$C0
0331: 90 CF              33           BCC    BASE
0333: 60                 34           RTS
```

Listing 1.

```
                          1  ****************************
                          2  *                          *
                          3  * MORE ELABORATE SCROLL    *
                          4  *                          *
                          5  *  FOLLOWS TEXT WINDOW     *
                          6  *   BLANKS BOTTOM LINE     *
                          7  *                          *
                          8  ****************************
                          9           ORG    $0300
                         10  HPOSN    EQU    $F411
0300: A9 20              11           LDA    #$20
0302: 85 E6              12           STA    $E6
0304: A5 23              13           LDA    $23
0306: 38                 14           SEC
0307: E9 01              15           SBC    #$01
0309: 0A                 16           ASL
030A: 0A                 17           ASL
030B: 0A                 18           ASL
030C: 85 08              19           STA    $08
030E: A5 22              20           LDA    $22
0310: 0A                 21           ASL
0311: 0A                 22           ASL
0312: 0A                 23           ASL
0313: 18                 24  BASE     CLC
0314: 69 08              25           ADC    #$08
0316: A2 00              26           LDX    #$00
0318: A0 00              27           LDY    #$00
031A: 20 11 F4           28           JSR    HPOSN
031D: A5 26              29           LDA    $26
031F: 18                 30           CLC
0320: 65 20              31           ADC    $20
0322: 85 06              32           STA    $06
0324: A5 27              33           LDA    $27
0326: 85 07              34           STA    $07
0328: 38                 35           SEC
0329: A5 E2              36           LDA    $E2
032B: E9 08              37           SBC    #$08
032D: A2 00              38           LDX    #$00
032F: A0 00              39           LDY    #$00
0331: 20 11 F4           40           JSR    HPOSN
0334: A5 26              41           LDA    $26
0336: 18                 42           CLC
0337: 65 20              43           ADC    $20
0339: 85 26              44           STA    $26
033B: A0 00              45           LDY    #$00
033D: B1 06              46  MOVE     LDA    ($06),Y
033F: 91 26              47           STA    ($26),Y
0341: C8                 48           INY
0342: C4 21              49           CPY    $21
0344: D0 F7              50           BNE    MOVE
0346: E6 E2              51           INC    $E2
0348: A5 E2              52           LDA    $E2
034A: C5 08              53           CMP    $08
034C: 90 C5              54           BCC    BASE
034E: 18                 55           CLC
034F: 69 07              56           ADC    #$07
0351: A2 00              57  ERASE    LDX    #$00
0353: A0 00              58           LDY    #$00
0355: 20 11 F4           59           JSR    HPOSN
0358: A5 26              60           LDA    $26
035A: 18                 61           CLC
035B: 65 20              62           ADC    $20
035D: 85 26              63           STA    $26
035F: A0 00              64           LDY    #$00
0361: A9 00              65           LDA    #$00
0363: 91 26              66  ZERO     STA    ($26),Y
0365: C8                 67           INY
0366: C4 21              68           CPY    $21
0368: D0 F9              69           BNE    ZERO
036A: C6 E2              70           DEC    $E2
036C: A5 E2              71           LDA    $E2
036E: C5 08              72           CMP    $08
0370: B0 DF              73           BCS    ERASE
0372: 60                 74           RTS
```

Listing 2.

Now let's look at how you can use a scroll routine with your character generator so that the hi-res screen automatically behaves just like the text screen. There are two conditions that will cause COUT to initiate a scroll. The first is the printing of a return character when the cursor is on the bottom line. The second is when the right edge of the screen is reached on the bottom line. As a side note, COUT does not actually make two tests. When the right edge of the screen is reached, COUT forces a return, and so it is always the return that forces the scroll.

Listing 3 is a short routine that sits in the output path before the character generator. It performs the necessary tests and jumps to the scroll routine if necessary. Lines 12 and 13 should be changed so that SCROLL points to the scroll routine and CHRGEN points to your character generator. If you don't have an assembler, make these changes in the hex code corresponding to lines 28 and 33. This code is relocatable and may be put wherever you like in memory. Finally, to use the scroll hook, you must change the output vector so that this routine sees each character first. To do this, place the starting address of the routine (low byte, high byte) in locations $36 and $37 (54 and 55 decimal) and then call the DOS hookup routine at $3EA (1002 decimal). In Basic it would look like this:

```
10  POKE 54, ADR - INT(ADR/256)*256: POKE 55,
    INT(ADR/256) : CALL 1002
```

All subsequent output (until a reset or pr#0) will be intercepted by this routine before being passed on to your hi-res character generator.

Hi-Speed Scrolling for Fun and Profit. The problem with the scroll routine in listing 2 is that it's just too slow. This isn't a problem if you're printing only a few lines at a time, but if you try to list a long Basic program, the scrolling produces a wavy motion that can make you seasick (the same motion occurs on the text screen, but it is too fast to notice). What we need is a way to speed up the scrolling routine so that the waviness is undetectable.

The reason the scroll routine is so slow is that it has to calculate (via HPOSN) the base address for each line. Since this calculation is done almost four hundred times, it really bogs things down.

If you have dabbled in graphics, you are probably familiar with the concept of a Y-lookup table. This is simply a table of all the base addresses on the hi-res screen, and it is stored in memory so that your programs can just look up the addresses instead of calculating them. This speeds things up considerably, but you pay the price in memory. Listing 2 could be modified to use a lookup table instead of HPOSN to get the addresses, but there is an even faster way to scroll.

Hyperscroll, the program shown partially in listing 4, does not waste

```
                          1  ************************
                          2  *                      *
                          3  *      SCROLL HOOK     *
                          4  *                      *
                          5  *    SET "SCROLL" TO   *
                          6  *  SCROLL ROUTINE AND  *
                          7  * "CHRGEN" TO CHARACTER *
                          8  *      GENERATOR       *
                          9  *                      *
                         10  ************************
                         11          ORG    $0300
                         12  SCROLL  EQU    $6000
                         13  CHRGEN  EQU    $9000
0300: 84 35              14          STY    $35
0302: C9 8D              15          CMP    #$8D
0304: F0 07              16          BEQ    RETURN
0306: A4 24              17          LDY    $24
0308: C8                 18          INY
0309: C4 21              19          CPY    $21
030B: 90 10              20          BCC    WRITE
030D: A4 25              21  RETURN  LDY    $25
030F: C8                 22          INY
0310: C4 23              23          CPY    $23
0312: 90 09              24          BCC    WRITE
0314: 48                 25          PHA
0315: 8A                 26          TXA
0316: 48                 27          PHA
0317: 20 00 60           28          JSR    SCROLL
031A: 68                 29          PLA
031B: AA                 30          TAX
031C: 68                 31          PLA
031D: A4 35              32  WRITE   LDY    $35
031F: 4C 00 90           33          JMP    CHRGEN
```

Listing 3.

```
6000- A0 00        LDY  #$00
6002- B9 80 20     LDA  $2080,Y
6005- 99 00 20     STA  $2000,Y
6008- B9 80 24     LDA  $2480,Y
600B- 99 00 24     STA  $2400,Y
600E- B9 80 28     LDA  $2880,Y
6011- 99 00 28     STA  $2800,Y
6014- B9 80 2C     LDA  $2C80,Y
6017- 99 00 2C     STA  $2C00,Y
601A-              30   $3080,Y
601D- B9 D0        30   00,Y
60-   99 50        STA  $33
640-  B9 D0 37     LDA  $37D0,
6443- 99 50 37     STA  $3750,Y
6446- B9 D0 3B     LDA  $3BD0,Y
6449- 99 50 3B     STA  $3B50,Y
644C- B9 D0 3F     LDA  $3FD0,Y
644F- 99 50 3F     STA  $3F50,Y
6452- A9 00        LDA  #$00
6454- 99 D0 23     STA  $23D0,Y
6457- 99 D0 27     STA  $27D0,Y
645A- 99 D0 2B     STA  $2BD0,Y
645D- 99 D0 2F     STA  $2FD0,Y
6460- 99 D0 33     STA  $33D0,Y
6463- 99 D0 37     STA  $37D0,Y
6466- 99 D0 3B     STA  $3BD0,Y
6469- 99 D0 3F     STA  $3FD0,Y
646C- C8           INY
646D- C0 28        CPY  #$28
646F- F0 03        BEQ  $6474
6471- 4C 02 60     JMP  $6002
6474- 60           RTS
```

Listing 4.

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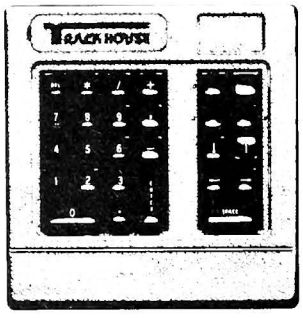
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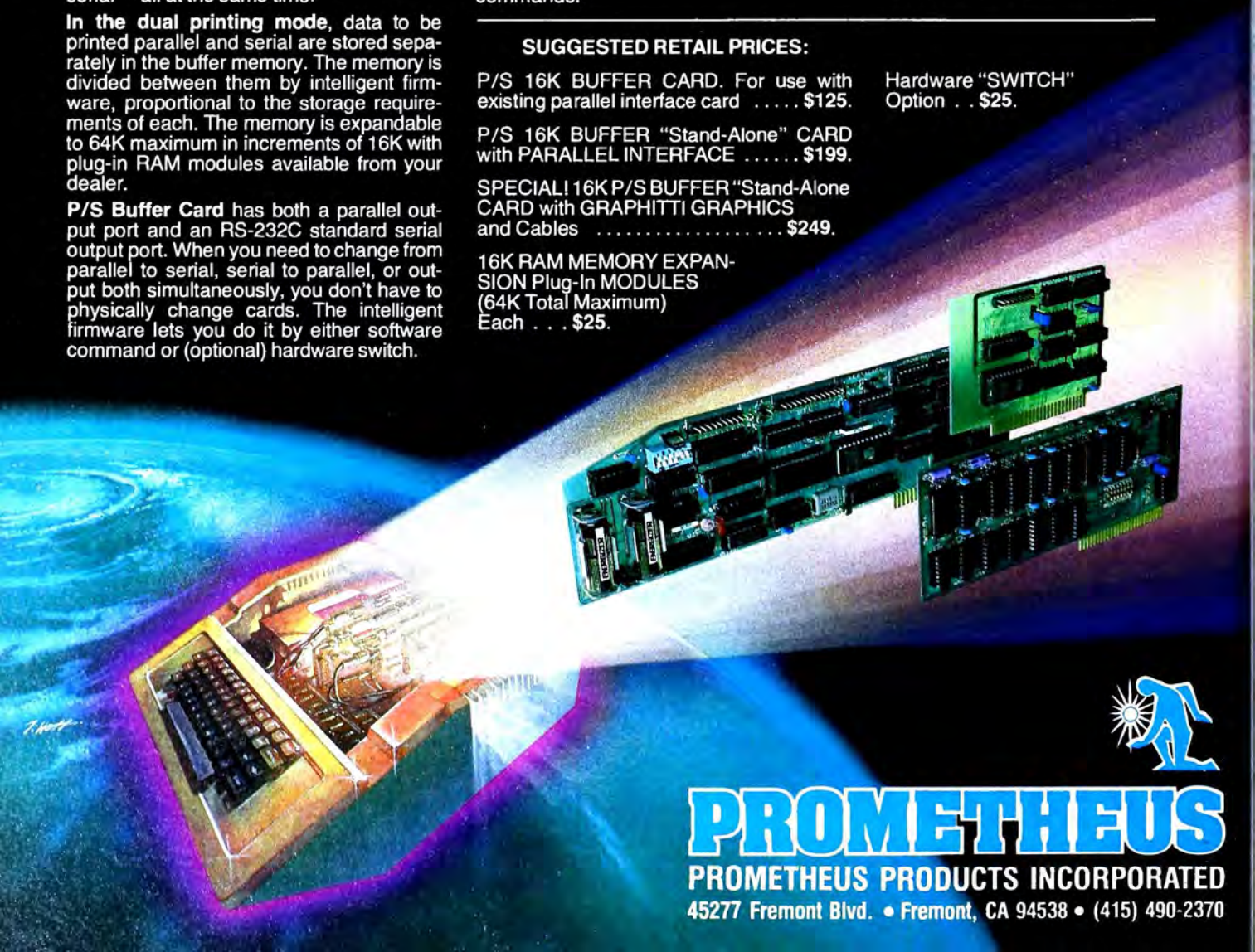

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any time calculating the addresses or looking them up in a table. For each screen line moved, there is one line in *Hyperscroll* for the "from" line and one line for the "to" line. All of the LDA and STA commands use indexed addressing, so the whole thing is executed once for each column to be scrolled, with the Y register set each time to the value of the scrolling column. It is long, but only about twice the length of a program plus a lookup table. It makes up for the length difference in speed.

Nevertheless, nobody relishes the idea of typing all that code. This is where the Basic program in listing 5, *Scroll Maker*, comes to the rescue. True, you still have to type in the Basic program, but once you've done that you'll have a utility that can be used to generate many different scrolling routines. *Scroll Maker* generates the entire machine language scrolling program, which can be executed through the scroll hook routine the same way the old routine was or called directly by another program. By making simple changes in the Basic program, you can generate superfast scrolling routines for both text and graphics applications.

The variable L in line 160 holds the address where the scrolling routine will start. Since the code produced by this program is *not* relocatable, you should make sure this is where you want the code before running the program. Of course, if you ever need to move your scroll routine to a different location, you can just change line 160 and run it again to generate new machine code at the desired location.

When you run this program, it will ask you how many lines to scroll. We have been scrolling up eight lines at a time for standard text format, but you can put anything you like in there. For example, if you want a continuously scrolling background for a hi-res game, you will find that scrolling only two or three lines at a time produces a much smoother (although slower) effect.

When the program finishes, it will tell you the starting address and length of the machine code, which you will need to bsave it. It will then give you a small demonstration of your new scrolling routine. It draws a few lines and then executes a scroll every time you press a key. Use the repeat key to see the continuous scrolling effect. When you've had enough, press E to exit the program.

Variations. As written, the routine created by this program will do a standard scroll—that is, everything on the screen will be moved up, and the bottom lines will be erased. The scrolling routine is written by the loop in lines 230 through 310. Lines 330 through 390 take care of the code to erase the lines left behind.

The subroutines at lines 900 and 1000 allow the option to wrap-around—instead of erasing the bottom lines, they can be replaced with the lines going off the top. This has some interesting possibilities as a moving background for a game or as a special effect in a program title picture. To implement this option, just add these lines:

```
220  GOSUB 900
320  GOSUB 1000 : GOTO 380
```

The variable I in line 170 controls the scroll direction. If you want the screen to scroll down instead of up, just change the value of I to −1 before running.

In line 190 you have the option of scrolling hi-res page 1 or page 2. Just change the value of PG to the page you want.

To try it out on one of your favorite hi-res pictures, just bload the picture before running *Scroll Maker*, and change line 1110 to:

```
1110  POKE -16304,0:POKE -16302,0:POKE -16297,0
```

The scrolls produced by this program are so fast that there is almost no detectable flicker. *Scroll Maker* and *Hyperscroll* can be used for smooth text scrolling or for interesting graphics.

```
10  :
20  REM  *** SCROLL MAKER ***
30  :
40  :
50  REM  PRODUCES HI-SPEED
60  REM  MACHINE LANGUAGE
70  REM  SCROLLING ROUTINE
80  REM  FOR HI-RES SCREEN
90  :
100  FOR I = 768 TO 776
110  READ X: POKE I,X
120  NEXT
130  DATA  169,0,162,0,160,0,76,17,244
140  TEXT : HOME : INPUT "# OF LINES TO SCROLL: ";N
150  PRINT : PRINT : PRINT "Y = ";
160  L = 24576: REM  STARTING ADDRESS
170  I = 1: REM  SCROLL DIRECTION (1 OR -1)
180  L1 = L
190  PG = 1: REM  PAGE TO SCROLL (1 OR 2)
200  POKE 230,PG * 32
210  X = 160: GOSUB 600:X = 0: GOSUB 600
220  :
230  FOR Y = 191 * (I = -1) + N * I TO 191 * (I = 1) STEP I
240  X = 185: GOSUB 600
250  GOSUB 800
260  X = 153: GOSUB 600
270  Y = Y - N * I
280  GOSUB 800
290  HTAB 5: PRINT Y"   ";
300  Y = Y + N * I
310  NEXT
320  :
330  X = 169: GOSUB 600:X = 0: GOSUB 600
340  FOR Y = (192 - N) * (I = 1) TO 191 * (I = 1) + (N - 1) *
     (I = -1)
350  X = 153: GOSUB 600
360  GOSUB 800
370  NEXT
380  FOR I = 1 TO 6: READ X: GOSUB 600
390  NEXT
400  Y = L1 + 2: POKE L,Y - INT (Y / 256) * 256:L = L + 1
410  POKE L, INT (Y / 256):L = L + 1
420  X = 96: GOSUB 600
430  HTAB 1: PRINT "SCROLL ROUTINE INSTALLED AT "L1
440  PRINT "LENGTH = "L - L1
450  PRINT : PRINT "PRESS A KEY FOR DEMONSTRATION"
460  PRINT "PRESS ANY KEY TO SCROLL, 'E' TO QUIT"
470  GET A$: GOTO 1100
480  END
490  DATA 200,192,40, 240,3,76
599  :
600  REM  POKER
610  POKE L,X:L = L + 1: RETURN
799  :
800  REM  FIND BASE ADDRESS
810  POKE 769,Y: CALL 768
820  REM  POKE ADDRESS
830  POKE L, PEEK (38):L = L + 1
840  POKE L, PEEK (39):L = L + 1
850  RETURN
899  :
900  REM  WRAPAROUND PART 1
910  FOR Y = (192 - N) * (I = -1) TO N * (I = 1) + 191 * (I =
     -1)
920  X = 185: GOSUB 600
930  GOSUB 800
940  X = 141: GOSUB 600
950  X = Y - (192 - N) * (I = -1): GOSUB 600
960  X = 2: GOSUB 600
970  NEXT
980  RETURN
999  :
1000 REM  WRAPAROUND PART 2
1010 FOR Y = (192 - N) * (I = 1) TO (N - 1) * (I = -1) +
     191 * (I = 1)
1020  X = 173: GOSUB 600
1030  X = Y - (192 - N) * (I = 1): GOSUB 600
1040  X = 2: GOSUB 600
1050  X = 153: GOSUB 600
1060  GOSUB 800
1070  NEXT
1080  RETURN
1099  :
1100  REM  DEMONSTRATION
1110  HGR : POKE -16302,0: HCOLOR= 3: HPLOT 0,0 TO
      279,191 TO 0,191 TO 279,0
1120  GET A$: CALL L1: IF A$ <> "E" THEN 1120
1130  TEXT : END
```

Listing 5.

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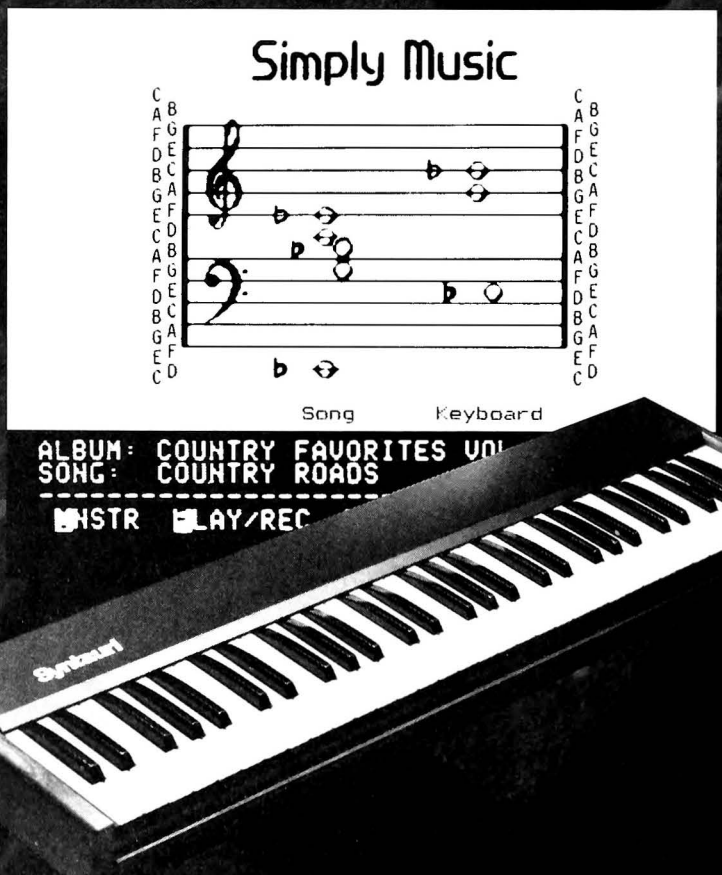

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TRADETALK

☐ **John Couch**, who has been on a leave of absence from **Apple Computer** (Cupertino, CA) recently, announced that he has left the company to join the board of directors of **Software Ventures** (Mountain View, CA). Couch, who was formerly vice president and general manager of Apple, directed the development of the Lisa. In other Apple news, the company has won a small victory in what may prove to be a protracted legal battle against **Franklin Computer** (Cherry Hill, NJ). The Third Circuit Court of Appeals ruled that Apple II programs—especially those stored in ROM components and operating systems—are subject to copyright protection. A lower court had ruled earlier that the copyright law was unclear in its application toward a computer's operating system. Now, Franklin has the option to appeal the case or return to the lower court, which will rule on whether Franklin violated the copyright law.



Reporter Richard Sypher of the *Tacoma News Tribune* practices one of the eye relaxation techniques he learned at a Dataspan seminar for VDT users

☐ **Dataspan** (New York, NY), a professional training company, introduced its training programs for the automated office in the New York area this past October. The skills courses were geared toward increasing the productivity and accuracy of VDT users while increasing users' comfort on the job. Those who attended the courses were counseled on methods to improve ergonomic factors such as lighting, chair adjustment, and terminal placement, and were taught to utilize their short-term memory to avoid constant shifting back and forth between the users' source material and the VDT screen. The first company to try the Dataspan programs was Boeing Aircraft. A study conducted six months after twenty-four Boeing employees took the courses revealed an 86 percent reduction in error rate and a 91.5 percent increase in speed. "We come in where the computer salesmen leave off, showing workers how to deal with the machine, not simply how to make it work. That's what ergonomics is all about: the science of adjusting machines to people and vice versa. The workers win because they feel better and the company wins because the work is better," said **Gerald L. Soloff**, president of Dataspan.

☐ **Sirius Software** (Sacramento, CA) has filed a $20 million suit against **Fox Video Games** (Santa Clara, CA), a division of Twentieth Century-Fox, alleging breach of contract, fraud, and breach of covenant of good faith. The complex suit, which contains forty counts against Fox, asserts that Fox failed to live up to a contract between the companies that gave Sirius the option to translate Fox's coin-operated arcade games to personal computers and Fox the option to translate Sirius's personal computer games to the arcades. The suit seeks to dissolve prior agreements between the companies, including a contract that would give Fox one-third of Sirius's common stock. **Jerry Jewell**, president of Sirius and one of the plaintiffs named in the suit, said that Fox made a string of promises it didn't live up to. He declined to make further comment.

☐ **Andrew Greenberg**, coauthor of *Wizardry*, has agreed to produce three war games for **Origin Systems** (Houston, TX). The programs, which will be released early next year, are based on board games designed by **Steve Jackson**—someone whom Greenberg says he has admired for years. **Robert Del Favaro**, who designed part of the scenario for *Legacy of Llylgamyn*, will collaborate on the venture. Greenberg said his new interest will not interfere with his work at Sir-tech.

☐ Apple has announced that it plans to rescue hundreds of would-be computer buyers who got burned when **CompuPlus** (Van Nuys, CA), one of the largest Apple dealers, declared bankruptcy last March. In the aftermath of its sudden collapse, CompuPlus left hundreds of consumers shocked and angry by not delivering merchandise that was already paid for. A total of $4 million in claims from consumers, as well as Apple and other large firms, was leveled against the store. Apple has agreed to provide CompuPlus customers with their computers—at last—if they agree to pay the difference between the full list price of the equipment and the discounted price they paid CompuPlus. In return, buyers must sign over to Apple their claims against CompuPlus, thus giving Apple a priority over other corporate creditors. Under federal bankruptcy laws, the first $900 of an individual's claim goes into a category with higher priority than claims of business creditors. Apple agreed that if the company ever collects on its claims for the undelivered discounted Apples, it will split the proceeds evenly with individual consumers.

☐ **Broderbund** has moved. Its new address is 17 Paul Drive, San Rafael, CA 94903. The company's phone number is (415) 479-1170.

☐ **Synergistic Software** (Renton, WA) has sold the rights to several of its programs as part of the transition toward becoming a software author house, said Synergistic president **Robert Clardy**. Synergistic has sold *Bolo* to **Sir-tech Software** (Ogdensburg, NY) and *The Linguist* to **Gessler Publishing** (New York, NY). Clardy also said that negotiations are under way to sell *Microbe* to **Atarisoft** (Sunnyvale, CA), the new multicomputer software division of Atari.

☐ **William Millard**, president of **ComputerLand** (Hayward, CA), was named one of the 400 richest people in the country in a recent issue of *Forbes*. Millard, a college dropout who made his fortune through the success of ComputerLand, opened his first store in 1976. ComputerLand now has 550 franchises worldwide and $1 billion in yearly revenues. Millard owns



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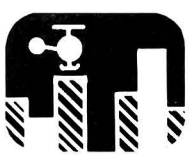

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97 percent of the company, as well as other assets. His personal fortune is estimated at more than $500 million.

☐ **Michael McConnell**, president of **ComputerLand International**, has announced the appointment of **William Hossack** as general manager of ComputerLand Canada. Hossack, who previously worked for IBM, will oversee the planned expansion of ComputerLand in Canada from the present thirty-one franchises to forty-two.

☐ **SSM Microcomputer Products** (San Jose, CA) has changed its name to **Transend Corporation** in response to the success of its *Transend* communications products. The name was changed to emphasize the line's success, as well as the company's new commitment to using resources once allotted for other product lines in electronic communications, said Transend president **Fred Krefetz**.

☐ **Counterpoint Software** has moved. Its new address is 4005 West Sixty-fifth Street, Minneapolis, MN 55435. Counterpoint's phone number is (800) 328-1223.



Jack Koch, new director of corporate marketing at Verbatim.

☐ **Verbatim** (Sunnyvale, CA) has appointed **Jack Koch** director of corporate marketing. Koch formerly worked at IBM. **Rod Crisp**, the previous director of marketing, is now director of a new line of Verbatim microdisks.

☐ **Winton Churchill** and **Donald Hydrick** have formed **Resource 1** (San Diego, CA), a software design group. Productivity software designed by the firm will teach management skills and will familiarize executives with personal computers. The company's first project is a time-management system for professionals.

☐ **United Stationers** (Chicago, IL), a large wholesaler of office products, has signed a letter of intent to acquire **High Technology Distribution** (Saint Louis, MO). High Technology, a wholesale distributor of microcomputer systems, will retain its present officers and staff under the leadership of president **Joseph Dahlem**, said **Howard Wolf**, chairman of United Stationers. ■

GET TRIPLE THE FUN WITH SAMS NEW APPLE® GAMES.



Sams three new Apple® games are so fun, you won't know which one to play first.

The games themselves are relatively simple. The challenge is in winning. So whether you're an experienced player or beginner, Sams new games give you a lot of entertainment for a little money—only $29.95 each.

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BERMUDA RACE is the ultimate test for sailing enthusiasts of all levels. Unlike REGATTA, you have time to think out every move. To play, you respond to the conditions indicated on the screen by changing your sail capacity, centerboard depth and compass direction. Then by pressing a key, you can check your progress on a vivid, hi-res graphics map. Sail alone or against a competitor. But watch out! A few compass degrees can make the winning difference or leave you stranded in the Bermuda Triangle. No. 26129.

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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!

The game's finished. And maybe, so is your Apple. Oh, but don't worry.

Cavern Creatures is just a game. Full of action. Fun. Suspense. Just like our other games. Whether they're blowing up your Apple. Or totally blowing your mind.

How Much More Can One Joystick Jockey Take?

We've exceeded our past reputation for bringing you some of the most super snazzy, ultra-intense, graphically involving games around.

We've gone totally out of our minds with every game from shoot 'em up, blast 'em out of the sky strategies to mind game graphics guaranteed to provoke a mental meltdown.

Are you ready?



Cavern Creatures™

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?



your Apple.*



Space Ark™

Skin-hunters, poachers and mechanicals—enemy robots who aren't exactly the warm and friendly types—await you. Obliterate the bad guys. Save the good guys. You might survive this.



Ardy The Aardvark™

Here's a tongue that's as long and skilled as you are. Think you can lick stinging ants and tarantulas? Use Ardy's tongue as you make it through this maze!



Roundabout™

Sharpens your target skills with 24, count 'em, 24 different series of targets. How's your hand to eye coordination, pal?



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.



Super Bunny™

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!



Conquering Worlds™

So you fancy yourself a die-hard strategist? Try conquering this. Maybe you'll rule the universe if mom will let you off restriction.



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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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.

☐ **Associated Technology** (Route 2, Box 448, Estill Springs, TN 37330; 615-967-9159) has announced *Personal-Message*, a program that can add a novel touch to birthdays, anniversaries, and other special occasions. *Personal-Message* prints your message in characters seven inches high onto standard fan-fold paper. From a menu of options, you can select a variety of special-occasion wishes, which can be mixed with your own message. $19.95.

☐ **Avant-Garde Creations** (Box 30160, Eugene, OR 97403; 503-345-3043) has repackaged its *Word Scrambler* and *Super Speller* game and is now selling it under the name of *Word Scrambler and Spelling Tutor*. $19.95. *Amperfinesse* is a programmer's utility that enhances Applesoft with additional high-level commands, provides a powerful set of line-editing commands, and includes powerful sound and graphics commands. $79.95. *Electronic Flash Card* lets teachers and parents drill and quiz students of all ages. The program stores files of up to five hundred question-and-answer sets supporting various symbols and foreign letters. Files can be run in order or randomly. Answers can be displayed and questions input when appropriate. $29.95.

☐ **Doublestuff Software** (2053 West Eleventh Street, Brooklyn, NY 11223; 212-449-6300) lives up to its name by releasing *doublestuff*, a graphics program that doubles the Apple IIe's graphics capabilities. Using Applesoft commands, you can program double resolution lo-res and double resolution hi-res graphics; you get sixteen colors for each mode. You must have a revision B Apple IIe and an auxiliary memory eighty-column card for double lo-res; an extended eighty-column card is required for double hi-res. Along with *doublestuff*, the disk includes a self-paced series of demo programs. $39.95.

☐ A computer games album (LP)? **Funtastic** (5-12 Wilde Avenue, Drexel Hill, PA 19026; 215-622-5716) has released *Snack Attack & Friends*. The package consists of *Snack Attack*, *County Fair*, and *Space Cadette*, all on a single disk for one price. $29.95.

☐ **Precision Software** (6514 North Fresno Street, Milwaukee, WI 53224; 414-353-1666) has announced a new version of its disk emulation software for Apple systems with 64K and 128K extended eighty-column cards. The product, *Ramdrive IIe*, is compatible with Apple Pascal 1.1, DOS 3.3, eighty columns, and double hi-res graphics. $29.95.

☐ It's going to be an action-packed year, and **Workman** (1 West Thirty-ninth Street, New York, NY 10018; 212-398-9160) is marketing the *1984 Computer Desk Diary*, a daily note pad with the look of a green and white computer printout. Illustrations and text are scattered throughout the year, marking and explaining significant dates in computer lore. The calendar also includes quick-reference guides to *VisiCalc*, CP/M, and *WordStar*, and an ASCII code table. $8.95.

☐ **Strategic Simulations** (883 Stierlin Road, Building A-200, Mountain View, CA 94043; 415-964-1353) has entered the arcade field with *Queen of Hearts*, a video pinball game. A sequential scoring system adds to realism; you must knock down the right targets in the right order to



In mid-October, during an Apple special interest user group meeting via telecommunications on CompuServe, Apple II inventor Steve Wozniak spoke of sixteen-megabyte Apple IIs with twenty-four-bit addressing and Lisa-like mice.

The atmosphere at the time was that of a gathering of friends, but the transcript reads like a presidential press conference. Unlike most presidents, Woz's goal is to communicate, not hedge; the strictures of business held him back only a little. Hard questions flew like racquetballs, but Wozniak never missed unless he wanted to.

After fielding questions on Apple's corporate health with, "Well, I'm not a finance man, but I have Apple stock on margin well above what I own," and after dismissing the upcoming IBM Peanut as "like the Edsel," a home computer with not enough dealer margin and too little software backing, Wozniak got down to the subject he knows best, the Apple II, in all its manifestations—past, present, and future.

Of primary importance to II and II Plus owners, Woz spoke of a plug-in board for which he's campaigning that will upgrade the earlier IIs to IIe's. But the IIe is also headed for upgrading. Commenting on the soft-switching approach to using the extra 64K in the IIe extended video card, Wozniak said, "I promise an alternative solution soon"—defined as "six months?"—"for direct access to twenty-four-bit addresses." At another point, he spoke of the "enhanced IIe family . . . headed toward sixteen megabytes in a short time with a revolutionary 6502-based processor."

It may have seemed off the wall for a user to ask about the IIe running in Lisa-emulation mode. If so, Woz embraced the wall and part of the ceiling too: "I believe strongly in the advantages of the Lisa/Mac user interface and see it as a reasonable goal for II software in the future, based on double hi-res graphics and possibly clever software or a faster processor." Later, in talking about the differences in the revisions A and B IIe motherboards and the revision B's capacity for double hi-res, Woz commented, "This may become more important with future mouse software and Mac-like user interface."

What-like interface?

"Just go to your local store and look at Lisa. Then imagine

receive bonus points. Five flippers keep the ball in play and a tilt feature keeps the playing fair. A scoreboard keeps track of the points for up to four players and lets you know the all-time high score. $39.95.

☐ *Diversi-DOS*, from **Diversified Software Research** (5848 Crampton Court, Rockford, IL 61111; 815-877-1343), is now available in an enhanced version. The new version includes a feature that allows you to list a file on a disk without destroying the program in memory. You can then copy lines from the disk file on the screen into the program in memory. You can also display control characters as inverse characters. *Diversi-DOS* also has an insert mode and macros that emulate some *GPLE* functions. $30.

☐ The UDS 103 O/A LP modem from **Universal Data Systems** (5000 Bradford Drive, Huntsville, AL 35805; 205-837-8100) has been reduced in cost by $50 to its current price of $145.

☐ **Howard W. Sams** (4300 West Sixty-second Street, Indianapolis, IN 46268; 317-298-5400) offers a handbook on the practical problems that confront a new microcomputer user entitled *What Do You Do after You Plug It In?* The book presents a tutorial covering use of microcomputer hardware, software, languages, operating systems, and data communications, followed by a second tutorial on workable solutions to problems occurring during computer use. $10.95. *Word Processing for Small Businesses* describes word processing systems, discusses the decisions that need to be made in choosing one, explains the options, and offers advice. Detailed descriptions cover more than fifty hardware and software products. $11.95.

☐ **National Datec** (4055 Cy Avenue, Casper, WY 82604; 307-265-8888) has released an integrated accounting package for hard-disk-based systems running under CP/M. *Bytesmith Software* is designed to offer real-time processing capabilities to small and medium-sized business organizations. Modules include general ledger, $495; accounts receivable, $595; accounts payable, $595; payroll, $595; inventory, $595. The packages run on CP/M systems with a five-megabyte hard disk; also runs on a 5¼-inch double-sided floppy, double-density, 600K drive, or an 8-inch double-sided, double-density, 1.2-megabyte drive.

☐ **Excalibur Technologies** (800 Rio Grande Boulevard N.W., 21 Mercado, Albuquerque, NM 87104; 505-242-3333) has two new versions of *Savvy* for the Apple. *Savvy One* consists of the Savvy programming language, a database management system, a text editor, and a coprocessor printed circuit card containing a Z-80A processor. Being easier to use than Basic, *Savvy One* can be used for teaching computer novices basic computer procedures and elementary programming techniques. $349. *Savvy Pro*, for multiple and hard disk systems, includes an automated database builder, Savvy programming language, a database management system, and coprocessor. *Savvy Pro* helps professionals and experienced users to develop a wide range of business and personal applications. $495.

☐ *Understanding Personal Computers* is a video program series that provides general information about personal computers that can be applied in various situations. The series stresses the development of general skills and knowledge, rather than training for specific programs and machines. The eight programs currently available include introductions to personal computing, hardware, software, printers, word processing, and financial analysis. Available from **Understanding Personal Computers** (Box 5849, Stanford, CA 94305; 415-494-3737). Each program is $99.

☐ Daily market research data on key commodities has been added to AgriStar, an agricultural videotex service from **AgriData Resources** (205 West Highland Avenue, Milwaukee, WI 53203; 414-278-7676). The data, by Merrill Lynch Futures, provides information on wheat, corn, soybeans, cotton, cattle, hogs, T-bills, gold, and heating oil. It covers trends, trading parameters, moving averages, and overbought/oversold oscillators.

☐ *Microbase*, a database program, has been released by **Phantom Software** (Box 39, Sugar Run, PA 18846; 717-746-1919). It operates inside of *Apple Writer*, allowing you to create blank forms, standard documents, and data files. All files are standard text files and can be handled by *Apple Writer* and other programs written in Basic and Pascal. *Microbase* can be used on the Apple III or IIe and requires an eighty-column card and ProDOS. $39.95.

☐ *Signal* is a free newsletter with useful information and hints for users of Apple's Lisa. To sign up for a subscription, send your name, address, and Lisa serial number to the publisher, **Semaphore** (207 Granada Drive,

slightly less hardware and memory but an advantage taken to make it faster and better with fewer resources (sound familiar, IIe world?). Mouse, no color, no slots, but the finest software. Basic and Pascal [for the Mac] are the finest ever done as well. . . . It's rare for a successful company like Apple to do something so revolutionary and great as Mac.

"Mac will use its own operating system, which was developed to handle the user interface of Lisa more directly with better performance. Such good software has been written for Mac that it will be transferred to Lisa soon!"

The Mac, whatever it might be, will have 128K ROM, a black-and-white monitor, and use a small floppy disk, according to Wozniak—"around average personal computer price with normal peripherals."

"Initially Mac won't displace the [IBM] pc as a small business machine due to memory, mass storage, and slot capability limits. But Mac is intended to be a more finished product for the bulk of the personal market—[with Apple] assuming which peripherals and features the users would want and supplying them at lower cost than if they had slots to make their own choices. Interesting."

Earlier, Wozniak had commented on the similar closed-machine policy as it applied to the Apple III: "One of the downfalls was that we were *too smart*. We knew the proper ways to do all sorts of things and we didn't allow hackers to do things their own random ways. I feel we were wrong to believe in our 'religion.' Users should only use a good product (like SOS) if it's better for their application, not because the company feels only one way is right. It's a good lesson to learn." Apparently, corporate Apple still hasn't learned it. If you have strong feelings about this, Woz suggests, "please let them [Apple Computer] know."

But it was the mysterious Scotsman that had captured the group's imagination, despite its suspected tightness. And Wozniak tried to comply by contrasting the birth of the new child with that of his own II.

"I believe that Mac is the most revolutionary computer of all time. Not that what it does hasn't been done before, but that it hasn't been done at a price that will allow millions of users to wind up experiencing it.

"I developed the original Apple strictly from a hacker mentality, trying impressive tricks to satisfy a market of one—myself—which made it possible to include a lot of the accessible features. For example, I didn't assign a team to design the hardware and a team to design the software, but did them both. The lack of task partitioning allowed the software to interact very closely with the hardware and make personal computers inexpensive.

"The designers of the Mac worked closely enough to achieve this, and many (Bill Atkinson, Andy Hertzfeld, Burrell Smith) are hackers at heart. The Mac unfortunately is so perfect that we [Apple] didn't leave much room for hackers to do hardware 'for themselves' or 'their own way'—we feel there are no alternatives. . . .

"You [Mac owners] won't have the interesting world we [II people] enjoy of programming to handle each of five eighty-column cards, six printer interface cards, four dot-matrix printers and a letter-quality printer, four modem cards, et cetera.

"The world of ones and zeros, registers and adders, instruction sets and video modes . . . this world is dear to many of us. We were forced to learn it to be Apple pioneers."

Pioneers. Remember the survey that showed IBM pc owners to prefer pepperoni-only pizza overwhelmingly, while Apple owners opted for every combination—mostly the works? Silly, maybe; maybe not. But aren't we, Apple II, II Plus, IIe owners, all pioneers? You betcha.

So, come next spring, when you meet someone who says, "I'm glad I have a Mac!" you can respond, "I'm glad I have an Apple, II." He'll think you mean "also," and you won't spoil his fun. ■

Aptos, CA 95003; 408-688-9200).

☐ For Apple III users requiring more than one serial communication device, **Apple Computer** (20525 Mariani Avenue, Cupertino, CA 95014; 408-996-1010) has announced Apple Serial Card III. By inserting the card into one of the III's slots, you can communicate with modems, plotters, printers, and other serial communication devices without disconnecting or reattaching any of the system's cables. Up to four cards can be used at once. With appropriate software, the card lets you perform multiple tasks, such as printing documents while communicating with another computer via modem. $225.

☐ **Intelligent Software** (9609 Cypress, Munster, IN 46321; 219-923-2340) has released its first educational software packages entitled the Intelligent Tutor series. Five titles comprise the series: *Algebra I, Geometry, Algebra II, Trigonometry and Advanced Topics*, and *SAT Math*. Each package in the series helps students identify their areas of strength and weakness and allows them to practice a wide variety of problems from all topics covered in each specific subject. Diagnostic and practice modes let students test themselves or work on areas that need help. *SAT Math* sells for $69.95; the other four are $49.95 each. The entire series is available for $199.95.

☐ *Lordlings of Yore—The Game of Knights, Knaves, and Necromancers* is being introduced by **Softlore** (8714 Wellesley Manor, San Antonio, TX 78240; 512-691-2800). Designed for one to four players, the game is centered on four mythical kingdoms that are attempting to conquer each other through military, diplomatic, and mystical means. The game requires a combination of strategic planning, resourcefulness, cunning, and skill. $39.95.

☐ New software from **State of the Art** (3183-A Airway Avenue, Costa Mesa, CA 92626; 714-850-0111). *Word Processing* integrates with the company's accounting software. Without need of codes or complicated instructions, the system can extract information from other programs and insert the data directly into form letters, reports, and other documents. It includes a help command, password security, and printer command capabilities. $395. *Professional Time and Billing* may be used by itself as a timekeeping system or combined with other State of the Art business modules to form an integrated accounting system. This module was designed for organizations that bill service by time. The software includes a comprehensive timesheet entry system that records billable and nonbillable time, a billing system that turns time and expense records into detailed bills for clients, an accounts-receivable system that tracks client billings, an aged open bill report and month-end summary, and extensive reporting abilities. $795.

☐ **Counterpoint Software** (4005 West Sixty-fifth Street, Minneapolis, MN 55435; 612-926-7888, 800-328-1223) has released *Early Games Fraction Factory*. Designed to teach fraction concepts at the elementary and junior high levels, the game makes fractions understandable. Numerators and denominators are described, and children learn to perform math functions with fractions. $29.95. The first adult and family game from Counterpoint is *Quizagon*. Knowledge, strategy, and luck are all part of the game. More than six thousand questions explore and expand the limits of what you know in the categories of science, geography, sports, entertainment, the arts, history, words, and more. $39.95. *Early Games Matchmaker* is a reading program for preschoolers. *Matchmaker* playfully guides children through a series of six matching games involving colors, shapes, sizes, lines and directions, facial expressions, and reversible letters. Games are easy to play and require no adult supervision. $29.95.

☐ *Astrocalc* is astronomical software for the amateur, the professional, the teacher of astronomy, or anyone interested in the sky and its observation. Date, time, and location are input and *Astrocalc* calculates and displays all basic data for the sun, moon, and planets. Output includes rising and setting times, ascension and declination, angular size, and more. From **Zephyr Services** (306 South Homewood Avenue, Pittsburgh, PA 15208; 412-247-5915). $29.95.

☐ A new what-if question: What if data falls into the wrong hands? *My Secret* is an encryption/decryption program that protects any kind of DOS 3.3 file and many others. It completely scrambles entire disks or selected files so they can't be read without the correct password. In their scrambled form, files can be copied and transferred, but only someone with the password of your choice can unscramble the files. Multiple

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passwords can be used for added protection. From **Anthro-Digital** (Box 1385, Pittsfield, MA 01202; 413-448-8278). $19.95.

☐ If you can remember what an article was about but not what magazine it was in, **Syncom** (1000 Syncom Drive, Box 130, Mitchell, SD 57301; 800-843-9862) can help. A free monthly guide called *Infoscan* indexes more than four hundred articles from more than one hundred thirty-five computer magazines each month. *Infoscan* is free through retail computer stores, notices to computer user groups, and by direct mail to subscribers.

☐ The newest release from **Learning Well** (200 South Service Road, Roslyn Heights, NY 11577; 516-621-1540, 800-645-6564), *Space Math*, provides an almost unlimited number of math problems for children in grades one through six. Players try to stop evil aliens from conquering Earth. Answering questions correctly allows players to shoot at alien spacecraft and provides fun with math practice. $49.95. *That's My Story* is a creative writing program for one or more student authors. Students can enter their own what-if questions that create writing challenges for themselves or for the next writer. They can then make corrections or change stories by following simple directions. $59.95.

☐ **BP Publications** (Box 617 Stiles Road, Southbury, CT 06488; 203-264-2143) publishes a series of indexes to computer magazines, *The Computer Information Index Series*. Published bimonthly with an annual cumulation, each index is cross-referenced by subject, application, name of hardware, software, and manufacturer. Full citations are given for page, issue, and magazine titles with an indication of illustrations, charts, screen displays, schematics, program listings, and bibliographies. A brief description of each article is given. The index for Apple covers twelve magazines. Subscription for 1983, $22 for three issues and cumulation. Subscription for 1984, $22 for six issues and cumulation.

☐ **Transend** (2190 Paragon Drive, San Jose, CA 95131; 408-946-7400), formerly SSM Microcomputer Products, has released upgraded versions of *Transend 1*, *2*, and *3*. The new versions include several enhancements. By entering your particular terminal and peripheral options, *Transend* automatically configures itself. For various remote systems, you enter I.D., password, or any of eleven items, only once; *Transend* remembers the information and logs you on automatically. Keyboard macros combine several functions under one keystroke. "Skip-through" menus let you enter a sequence of menu selections from within the program and page ahead automatically. *Transend 1*, $89; *2*, $149; *3*, $275. *Transends* under warranty can be upgraded at no charge; those out of warranty can upgrade for $20.

☐ Engineers, researchers, programmers, and anyone wanting to program and learn the 68000 microprocessor might be interested in Qpak-68, a board and software package that turns the Apple into a 68000 assembly language development system. The board plugs into the Apple and uses the 68008, an eight-bit version of the 68000. The complete system includes the plug-in board, an editor/assembler to create 68000 source code, a debugger, and documentation and reference material. From **Qwerty** (9252 Chesapeake Drive, Suite 600, San Diego, CA 92123; 619-569-5283). $695.

☐ *Create-A-Test* is a test-writing program that lets teachers select questions from question disks and print them out to produce tests in as few as ten minutes. The program creates true/false, multiple-choice, fill-in, matching, and problem-solving questions. Teachers can write their own questions with the built-in text editor or purchase question disks. The *Create-A-Test* question library currently has twenty-one disks containing four hundred fifty questions each. Topics include chemistry, biology, physical science, physics, botany, and geography. $89.95. Question disks are $49.95 each. Program disk with four question disks, $200.

☐ *Gumball* is a sticky new game from **Broderbund Software** (17 Paul Drive, San Rafael, CA 94903; 415-479-1170). Sorting all the gumballs would be a simple job, were it not for all the overzealous dental assistants who try to blow up the factory with explosive-laced gumballs. Brush after playing. $29.95. *Drol* launches gamesters on an amusing outer-space rescue mission. There's plenty to cope with here—airborne turkeys, scorpions, lizards, and a magnet-tossing witch doctor. Players pursue a little girl and her propeller-beanied brother who have wandered away from their mother. A rocket backpack, laser gun, and radar help you try to rescue them and reunite the family. $34.95.

☐ *Plotpro* is a set of three Microsoft Basic programs that make scientific graphs on any 80- or 132-column printer. *Plotpro* creates linear, semi-



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For Apple II Plus and IIe computers. $49.95 at better software dealers, or direct from Software Masters, 3330 Hillcroft Suite BB, Houston, Texas 77057. (713) 266-5771. Bank cards accepted. Please include $3.00 shipping.



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and full-logarithmic plots and will plot multiple functions on the same graph. One module creates templates of the physical appearance of any graph; templates can be saved to disk. Another module controls plotting and printing of graphs limited only by paper length. From **BV Engineering** (Box 3351, Riverside, CA 92519; 714-781-0252). Requires CP/M. $49.95.

☐ **IDEA Industries** (1580 Woodvale Avenue, Box 86, Deerfield, IL 60015; 312-940-1010) publishes *dNotes*, the international journal for microcomputer *dBase II* users. The twenty-eight-page bimonthly journal is available by subscription and through selected computer dealers and newsstands. *dNotes* covers database management, applications and forms design, data entry programs, and information on new programs, applications packages, and hardware. $44 for twelve issues.

☐ *dBase II for the Programmer* is a book that helps professional programmers develop application systems with *dBase II*. Included is advice on how to create database files, construct indexes, interpret error messages, and debug the finished program. A primer on terms and commands gives a brief introduction to *dBase II* language. Detailed examples show how to develop large and small systems. The book is published by **Scott, Foresman Publishing** (1900 East Lake Avenue, Glenview, IL 60025; 312-729-3000). $19.95.

☐ **Black Sands Software** (15-2686 Palani Street, Pahoa, HI 96778; 808-965-9161) has written *Fastax 83* for the Apple III to support the needs of the professional federal tax preparer. Available within the program are extensive help files for the nonprofessional. The program is set up to be used while interviewing the taxpayer or to verify information already collected. It prepares the 1040 form and fifteen other schedules. $195.

☐ *The Personal Computer Glossary*, published by **Alfred Publishing** (15335 Morrison Street, Sherman Oaks, CA 91413; 213-995-8811), is a sixty-four-page handbook of computer terms translated into simple English. Part of the book explains commonly used generic computer terms, and another part covers the meanings of frequently heard computer slang words. Both sections list terminology in alphabetical order. $2.95.

☐ **Ziyad** (100 Ford Road, Denville, NJ 07834; 201-627-7600) has introduced a new paper feeder for printers. The Personalfeeder works in an unattended mode to insert, remove, and collate sheets of paper for many letter-quality and dot-matrix printers. Personalfeeder's paper bin holds up to two hundred sheets of paper, feeds paper of lengths from six to fourteen inches, and permits the printing of superscripts, subscripts, and reverse line printing. $495.

☐ **Magnetic Harvest** (Box 255, Hopkins, SC 29061; 803-783-3151) has released *Gnosis VII*, which it refers to as a computer gaming experience. It's a board game, role-playing text adventure, psycho-social testing tool, and puzzle generator. $19.95.

☐ *Pinball Magic* is a collection of four pinball games written with the *Pinball Construction Set*. It's available from **Rebel Software** (1440 Quince, Denver, CO 80220). $21.95.

☐ **Rhino Robots** (Box 4010, Champaign, IL 61820; 217-352-8485) has released its Rhino-Com language card, which permits owners of the Rhino XR robot to program it in an extended version of Applesoft. The card contains an RS-232C interface so it can be used to operate other peripherals such as a printer. $300.

☐ **CMA Micro Computer** (5722 Santa Fe Trail, Yucca Valley, CA 92284; 619-365-9718) has a new version of its *Construction Accounting System* available. The system offers a general ledger and payroll system with job cost analysis. The new general ledger handles five hundred accounts and automatically posts approved transactions from the payables journal. The payroll system can manage up to one hundred fifty employees with up to eleven deduction fields. The job cost system lets you enter up to three hundred active jobs, each with up to one hundred accounts. $795.95.

☐ The Flashcard disk emulator from **Synetix** (15050 Ninety-fifth N.E., Redmond, WA 98052; 800-426-7412, 206-881-7110) is now being offered with Artsci's *Magicalc* spreadsheet program for a package price of $595.

☐ You can protect your printer from dust and other dirty air conditions with a printer cover from **Discovery Design Center** (Box 72289, Roselle, IL 60172; 312-893-5468; 312-529-9014). Covers come in several colors: tan duck with navy blue trim, blue denim with white trim, or chestnut suedecloth trimmed in chocolate brown. Designed to fit Epson, NEC, Apple, and Smith-Corona printers, the all-cloth covers don't



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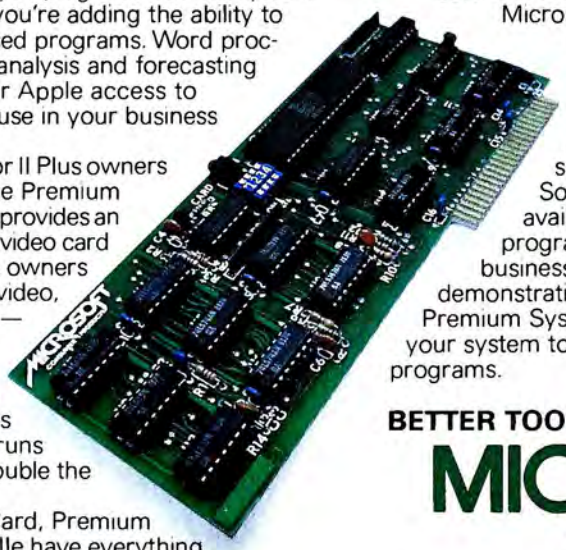

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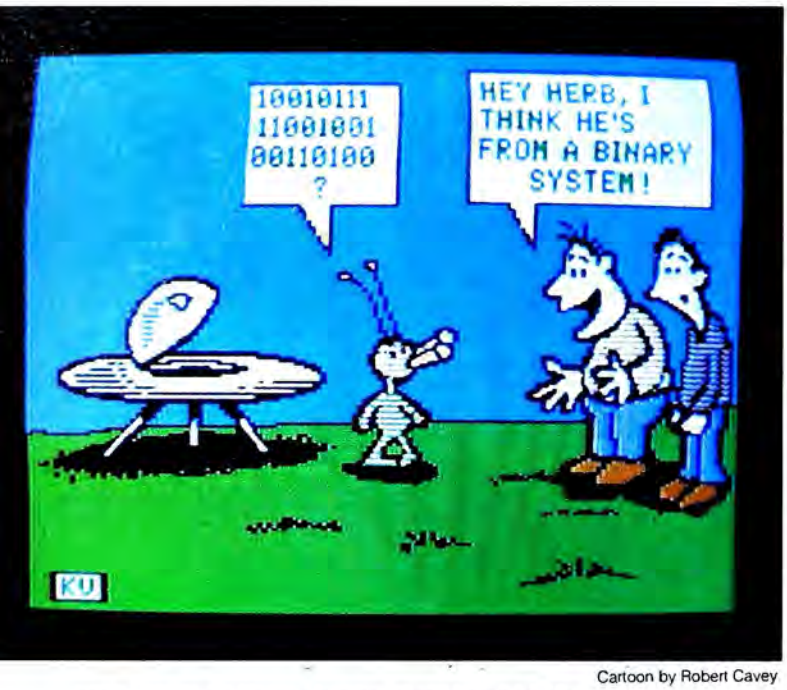

Cartoon by Robert Cavey

contribute to problems of static electricity. $12.50.

☐ **Tumac Industries** (650 Ford Street, Colorado Springs, CO 80915; 303-596-4400) manufactures a wall-mounted workstation. Three components provide a sturdy support for a monitor, keyboard, or printer. The unit mounts into the wall and a pivot arm supports a rotating table surface. Components are available with a variety of built-in functions such as adjustable keyboards, extensions, and security devices. $59.95.

☐ Holiday shoppers: **Tie-One-On** (Box 40225, Philadelphia, PA 19106; 215-625-2855) thinks it's not a cop-out to give a tie as a gift. The Computer Tie features the words *bit*, *byte*, *floppy*, *hard*, *RAM*, *ROM*, *micro*, and *mini* woven into a navy silk-polyester blend necktie. Interface wardrobe with computer. $15.95.

☐ The Guild Computer Rack comes in a choice of finished mahogany or ash. No assembly is required. The rack fits over the Apple II, holds one or two disk drives, and supports a monitor on top. From **Guild Computer Rack** (225 West Grand Street, Elizabeth, NJ 07202; 201-351-3002). Mahogany, $69.95; ash, $54.95.

☐ Winebuys is an electronic wine catalog published on the Source by **D'Vine Adventures** (860 Piner Road, Unit 21, Santa Rosa, CA 95401; 707-526-9434; Source Mail, STW127). It lists fine California wines from Sonoma County, giving wine lovers access to almost sixty Sonoma wineries. D'Vine Adventures offers discounts on wines ordered.

☐ **Computer Science Press** (11 Taft Court, Rockville, MD 20850; 301-251-9050) publishes *Apple Assembly Language*, containing more than three hundred exercises. The book assumes the reader has some knowledge of a programming language but requires no knowledge of hardware. $17.95. For those who wish to gain more general knowledge of computer hardware, *Understanding Computer Systems* might be the book. $12.95.

☐ The Riverside Computer Fair will be held at Loma Linda University in La Sierra Campus Alumni Pavilion on December 4. The fair will feature educational, business, personal, and home computing applications. Hardware and software manufacturers, suppliers, and local computer vendors will be showing their wares. Tutorial seminars and workshops will cover basic computer usage, word processing, spreadsheets, and software demonstrations. **Riverside Computing Fair** (Box 8236, Riverside, CA 92515; 714-687-3333).

☐ **Microcomputer Workshops** (225 Westchester Avenue, Port Chester, NY 10573; 914-937-5440) has added four programs to its *Algebra* series. The programs are interactive, using the screen as a worksheet; each contains a tutorial and explanatory error messages. *Binomial Multiplication*, $24.95; *Factoring Algebraic Expressions*, $29.95; *Simultaneous Linear Equations*, $29.95; *Graphing Linear Functions*, $29.95. These four programs may be purchased with Microcom-

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puter Workshops's *Equations* and *Quadratic Equations* as a six-disk set for $150.

☐ *Participative Management Skills* from **Duosoft** (1803 Woodfield Drive, Savoy, IL 61874; 217-356-3111) is a set of interactive lessons designed to help improve employee-management communications and to reverse trends of declining productivity in business and industry. Specific subjects cover benefits of participative decision making, positive ways to use power, how to facilitate team communication, understanding motivation dynamics, and achieving a consensus. $249.90.

☐ **Micro Program Designs** (5440 Crestline Road, Wilmington, DE 19808; 302-738-3798) has introduced *Edu-Cave*. The player descends into a multichambered cavern, encountering hazardous queries posed by the Wizard of Lore. *Edu-Cave* challenges players in arithmetic, geography, and spelling. A quiz maker lets kids, parents, or teachers design their own questions in history, languages, science, or any topic. $29.50.

☐ *Calcu-Plot*, a package of math utilities that transforms complex equations into easy-to-read graphics, is available from **Human Systems Dynamics** (9010 Reseda Boulevard, Suite 222, Northridge, CA 91324; 213-993-8536). With this software, users can solve equations quickly and accurately. Data can be input from the keyboard, disk files, and *VisiCalc* files. Equations can be plotted one at a time or in sets on the same graph. *Calcu-Plot* creates sequential disk files that can be used with all the company's other products. $150.

☐ *Computing Guide* is a quarterly directory of more than five hundred personal computer classes offered in the San Francisco Bay Area. Published by **Lester-Song** (10601 South De Anza Boulevard, Suite 301, Cupertino, CA 95014; 408-973-0582), the guide lists classes covering computer literacy, word processing, financial planning, database usage, programming, graphics, and educational use. Classes are listed geographically and by subject. $3.

☐ **Custom Data Systems** (209 Acadia Drive, Madison, WI 53717; 608-833-6936) produces *Shuttle*, a program that loads an entire disk to a Saturn Systems 128K RAM board in about twenty seconds, using normal DOS. *Shuttle* also saves the contents of the RAM board to disk. $39.95.

☐ Trying to find a particular file by shuffling through piles of disks no longer need be a problem. *Master Cat*, from **Fountain Computer Products** (1901 Kipling, Lakewood, CO 80215; 303-232-8346), makes one combined catalog of all the files on all your disks, organized alphabetically. Once this catalog has been created, it can be printed on paper. $39.95.

☐ Computer Care is a maintenance package to help keep systems clean. It includes a head-cleaning kit, air blower, keyboard cleaner, screen cleaner, disk library system, color-coded index cards, cable ties and mounts, and other unusual products. Available from **Basic Quality Computer Products** (1281 Westwood Boulevard, Suite 202-204, Los Angeles, CA 90024; 213-473-1549), Computer Care is $29.95.

☐ *Academy on Computers* is a twelve-week course that will provide nationwide audience participative computer training via public television. **WNET/Thirteen** (356 West Fifty-eighth Street, New York, NY 10019; 212-664-7120) will introduce the series, entitled *Bits and Bytes*, on January 22, 1984. Designed for people wanting to become computer-literate, the course will cover basic computer terms, the kinds of programs in use, ways to evaluate and select software, the operation of a microcomputer, and simple computer programming.

☐ *InfoMail* is a program allowing small business and other microcomputer owners to use the postal service's electronic mail system, a system that is used almost exclusively by major corporations with large computer systems. It's from **Info Designs** (6905 Telegraph Road, Birmingham, MI 48010; 313-540-4010). Requires CP/M. $199.

☐ **Unik Associates** (12545 West Burleigh, Brookfield, WI 53005; 414-782-5030) has developed *Form Generator*, a program that prints finished forms for medical, real estate, engineering, and other purposes. For applications such as invoicing, *Form Generator* performs arithmetic functions. $95; $29 until February 1984.

☐ The SpeeDemon makes *DB Master*, *VisiCalc*, Pascal, Fortran, word processing, and game programs run up to three and a half times faster. Plugs into any slot. Available from **Micro Computer Technologies** (1745 Twenty-first Street, Santa Monica, CA 90404; 213-829-3643). $295.

☐ **Matrix Software** (315 Marion Avenue, Big Rapids, MI 49307; 616-796-2484) has released *Astro*Talk*, an astrology program that generates horoscopes. For those new to astrology the program contains an introduction to the concepts involved. Experienced astrologers can rely on the program's accuracy. $39.95.

☐ A directory called *1984 Programmer's Market* lists more than five hundred software publishers, arcade game publishers, and magazines with information on who to contact and how to get software published. The directory is published by **Writer's Digest Books** (9933 Alliance Road, Cincinnati, OH 45242; 513-984-0717). $16.95.

☐ **Borg-Warner Educational Systems** (600 West University Drive, Arlington Heights, IL 60004; 312-394-1010) has made available its Ufonic voice system, consisting of an interface card and an amplifier/speaker unit. Initial software for the system includes a program that will allow users to include voice programs they write or to add voice to existing unprotected courseware. $495.

☐ *The Exchange* is a hi-res graphics stock market game from **Kelcom Management** (30 Southampton Drive S.W., Calgary, Alberta, Canada T2W 0T5; 403-253-5397). Players enter the world of blue-chip and speculative stocks, precious metals, bonds, and futures. The game's exchange news service provides the latest in business tips and helps players analyze the market. $59.95.

☐ **Cyclone Software** (3305 Macomb Street N.W., Washington, DC 20008; 202-362-8740) traces roots with *Patriarch I*, a genealogy system that combines easy data entry and editing with database features. It keeps track of up to thirty generations per disk, prints family trees, and generates reports with up to sixty print formats sorted on any five fields; fifty fields per record are possible. $195.

☐ **Dow Jones** (22 Cortlandt Street, New York, NY 10007; 212-285-5466) has made available MCI Mail, an electronic message delivery service, to subscribers of the Dow Jones News/Retrieval Service. Messages can be delivered in four ways: next-day mail, guaranteed overnight, four-hour same-day (in metropolitan areas), or electronically. Billing is on a usage basis.

☐ *Grade Master*, a grade management package, has been released by **Micro-Vision** (Box 5311, Kingwood, TX 77325; 713-358-6687). Data

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☐ *Write Away*, a word processor from **Midwest Software Associates** (Box 301, Saint Louis, MO 63074; 314-997-6470, 800-835-2246, ext. 467), has been enhanced to take advantage of electronic mail. *Terminal*, a communications program, has been integrated into the *Write Away* system. It offers the following features: auto answer, file transfer, half and full duplex, automatic dialing and answering, and capture. $175.

☐ In an effort to cut the high price of educational software, **Bertamax** (3647 Stone Way North, Seattle, WA 98103; 206-547-4056) has introduced the Educational Software Licensing Plan for public and private schools. It's designed for schools that have more than one brand of microcomputer and can't afford to purchase a version of a program for each machine. Schools with just one kind of computer can also take part in the plan. One school is named a host and receives a set of two hundred fifty program disks with teachers' manuals. The host is licensed to reproduce copies of the disks and manuals for its member schools. Schools wishing to participate should contact Bertamax. Annual membership fee, $250. First-year license fee, $500. For grades one through eight, Bertamax has introduced its Punctuation and Capitalization series. The first program in the series is for grades one through three; the remaining five programs are for grades four through eight. Sentences without capital letters or punctuation marks are given on-screen; the student presses the arrow keys to move the cursor under the letter to be capitalized or to place a necessary punctuation mark. The series covers the skills included in most standardized tests for various grades. $45.50 each. *Parts of Speech 1* consists of ten lessons for grades three through six. This series covers, in order, noun and verb identification, parts of speech in sentence context, adjectives, and adverbs. Programs are presented in color with optional sound. $45.50 each. The *Parts of Speech 2* series is also for grades three through six and provides practice in identifying parts of speech as they occur in the context of a paragraph. Self-scoring for the student is included. $45.50 each.

☐ **J & S Software** (140 Reid Avenue, Port Washington, NY 11050; 516-944-9304) has two programs for teachers. *Biology Test Maker* creates quizzes and tests of any size from a bank of nine hundred multiple-choice questions on four disks. Tests can be saved on disk. Teachers can add questions of their own to the test bank. The test question bank includes the following categories: living things, genetics, biochemistry, diversity, animals and plants, ecology, reproduction, and physiology. $75. *Chemistry Test Maker* chooses its questions from a bank of about seven hundred fifty multiple-choice questions. Teachers can add their own. Categories include matter and energy, stoichiometry, kinetics, equilibrium, atomic structure, acids and bases, bonding, the periodic table of elements, oxidation/reduction, and organic chemistry. $75.

☐ **Design Trends** (644 Danbury Road, Box G, Wilton, CT 06897; 203-834-1560) has updated *SofTax* for the 1983 tax season. The following new features have been added: batch printing, end-of-year mailings showing clients' prior years' figures, a print parameter file to set options such as whether to round amounts to whole dollars or to include cents, and preparer information for printing at the bottom of signature forms. Individual version, $199; tax preparer's version for preparers of 1040 forms, $499; professional version, which contains individual, trust, partnership, and corporate returns, $850. Demonstration system, $25.

☐ **Courseware** (10075 Carroll Canyon Road, San Diego, CA 92131; 619-578-1700) has unveiled the first in a series of program-writing packages that allow teachers and business educators to create interactive, self-paced lessons without the need for programming skills. The *Apple Authoring System* is composed of four components: training, building screens, creating graphics, and building lessons. Requires 64K; completed lessons can run on a 48K system. $255.

☐ **Associated Technology** (Route 2, Box 448, Estill Springs, TN 37330; 615-967-9159) has released a four-volume reference set designed to serve as a software management tool for establishing a company's internal programming and documentation practices. Three of the volumes cover standard methods for programming in Cobol, Fortran, and Basic;



the fourth covers software documentation practices. The complete set sells for $45.

☐ *Computer Publishers and Publications: An International Directory and Yearbook* lists more than seven hundred computer periodicals. The book includes recommendations of books and periodicals for libraries, a title index, a geographical index, and an author index. Published by **Communications Trends** (710 Webster Avenue, New Rochelle, NY 10801; 914-576-7175), the book is updated every six months. $115.

☐ Two programs from **Gessler Educational Software** (900 Broadway, New York, NY 10003; 212-673-3113): *La Guillotine*, based on the hangman word game, challenges students of French to save an endangered aristocrat from the blade of the guillotine by figuring out and filling in letters of a mystery word. The Spanish version is *La Corrida de Toros*, in which players help a bullfighter stop the charge of an enraged bull. In both games, players may choose lists of words from five categories relating to days of the week, months, seasons, the weather, restaurants, schools, household items, and various professions. Completing the word brings on a victory fanfare; missing the word causes the aristocrat's or the bullfighter's demise. $27.95 each.

☐ Purchasers of the Networker modem from **Zoom Telephonics** (207 South Street, Boston, MA 02111; 617-423-1072) may also obtain a free sign-up to the Source; members must still pay for hourly costs. $129.

☐ **American Educational Computer** (2450 Embarcadero Way, Palo Alto, CA 94303; 415-494-2021) has developed a line of educational software for home use. One series is Easy Reader, covering phonics, words, and reading comprehension. $39.95 each. Another is Matchmaker, covering vocabulary skills, grammar, United States and world geography, and beginning Spanish. The Matchmaker series lets parents create tailored drills and includes a built-in reward system for students. $39.95 each.

☐ **Chesell-Robocom** (125 Pheasant Run, Suite 2B, Newtown, PA 18940; 215-968-4422) has released Robographics CAD-1, a computer-aided design system. The package helps designers, illustrators, educators, and other professionals produce scaled technical drawings and custom graphics for building plans, mechanical drawings, schematics, flow charts, and business graphics. CAD-1 uses a high-precision hand-held controller to draw lines, circles, arcs, and tangents to exact dimensions. $1,095. Two Robographics drafting plotters are available to produce drawings. Model 1 plotter for A/B size drawings, $1,495; model 2 plotter for C/D size drawings, $3,495.

☐ Here are three booklets from the **International Council for Computers in Education** (1787 Agate Street, Eugene, OR 97403; 503-686-4414). *Computer Literacy Activities for Elementary and Middle School Students* is a collection of twelve introductory computer activities. *Logo in the Classroom* takes Logo a step beyond the turtle by sharing classroom experiences and solutions. *Computer Metaphors: Approaches to Computer Literacy* introduces a new way of thinking. The approach relates the computer to familiar concepts in a nonthreatening development of computer literacy. Booklets are $6 each.

☐ **The Learning Seed** (21250 North Andover Road, Kildeer, IL 60047; 312-438-3251) publishes the following nutrition programs. *Fast Foods* lets you select from the largest national fast food franchises to display each one's menu. You then select a typical meal from the menu, and the computer gives an analysis of the meal, showing calories; the percentage of calories that come from fat; protein analysis; vitamin A, B, and C content; and amounts of other nutrients. Students can learn nutritional decision making. $36. *What Did You Eat Yesterday?* helps you balance your diet. The program keeps track of the amount of calories you consume and provides a nutritional breakdown of each day's intake. Hundreds of foods' values are stored in the program's data file. $39. In *Snackmaster*, the player with the lowest calorie count wins. Players take the role of the snackmaster, whose task is to select between-meal treats for Snackman. Tempting snacks are presented, but the snackmaster must make selections that lead to the lowest possible calorie count. $36. In the language area, *101 Misused Words* explains fifty pairs of confusing homonyms, sound-alikes, and other words that cause confusion. Users select only those that they find confusing. Proper usage is explained, and practice sentences are provided to test understanding. $37.

☐ **Syntauri** (4962 El Camino Real, Suite 112, Los Altos, CA 94022; 415-966-1273) has come out with *Dolphin Dialogue*, a program that creates dolphinlike sounds. With it, music professionals and novices can experiment with unusual sounds and sound effects. The program was

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REVOLUTIONARY READING

originally developed for a human-dolphin communication project. A sound design feature lets you create and save sounds. To hear them, you just play the Apple's keyboard; a sequence of letters triggers a sequence of dolphinlike sounds. Requires the MusicSystem from Mountain Computer. $39. With *Simply Music*, beginners and advanced music students can play, compose, and orchestrate music and see the music they're playing on the video screen. The product consists of a *Simply Music* disk and a series of courseware disks accompanied by books that teach music with the alphaSyntauri computer music system. The program disk includes prerecorded songs and sheet music in a variety of styles. All songs can be played back using multipart orchestration, or individual parts may be turned off, allowing players to fill in or record their own parts while playing the Syntauri keyboard. With five-octave keyboard, $1,295; with four-octave keyboard, $995; *Simply Music* software only, $179.95.

☐ *Handicapper* is a golf handicap management system from **GolfSoft** (10333 Balsam Lane, Eden Prairie, MN 55344; 612-941-2172). Golfers have the option of updating their handicaps more than every two weeks, the prescribed interval, and they can set handicap maximums at any value from one through fifty-four. *Handicapper* can also manage handicaps for nine-hole scores, common in corporate golf leagues. Four hundred handicaps can be maintained on a single disk. The program is available in Microsoft Basic and CP/M. This is in addition to the Applesoft DOS 3.3 version introduced earlier this year. $175.

☐ The 1984 edition of *The Book of Apple Software* is now available from **The Book Company** (11223 South Hindry Avenue, Los Angeles, CA 90045; 213-410-9466). $19.95.

☐ **Telos Software Products** (3420 Ocean Park Boulevard, Santa Monica, CA 90405; 213-450-2424) has released *TeloSchool*, a student record-keeping and report-writing system designed for elementary schools. Up to forty-eight items of student data (thirty-five of which are user-defined) are tracked, and up to four hundred student records can be stored on a single disk. *TeloSchool* sorts up to five fields simultaneously and prints reports on as many as thirteen data items. Requires two disk drives. $549.

☐ **Omnium** (201 North Second Street, Stillwater, MN 55082; 800-328-0223) markets TouchBase 2, a static control wrist rest. It slides under the front edge of the Apple, offering wrist support, and dissipates static electricity safely to the ground via a grounding cord. $49.

☐ **SubLogic** (713 Edgebrook Drive, Champaign, IL 61820; 800-637-4983) puts you in control of a Piper 181 Cherokee Archer with full flight instrumentation and a colorful panoramic view. *Flight Simulator II* lets you practice takeoffs, landings, and complicated aerobatics. The program features more than eighty airports in the New York, Chicago, Seattle, and Los Angeles areas. Complete navigation facilities are included; additional scenery areas are available. $49.95.

☐ The DiscMaster II board allows you to connect two eight-inch or two three-and-a-half-inch double density disk drives to the Apple. The board comes with software drivers to run under DOS 3.3, Pascal 1.1, and Microsoft CP/M. DiscMaster II contains ROM and RAM that can be used to store the drivers, leaving the Apple's main memory free to be used by programs. Available from **Data-Cue** (5696 Highway 431 South, Brownsboro, AL 35741; 205-883-2933). $265.

☐ Subscribers to the **Source** (1616 Anderson Road, McLean, VA 22102; 703-734-7500) now have access to the Associated Press stock and videotex news services. The videotex service provides two hundred fifty daily dispatches of international, national, sports, business, and weather news. The stock service provides regularly updated stock and bond reports, Dow Jones averages, closing tables of mutual funds, options, and various other stock and commodities information.

☐ An automated fund development system has been developed for the Apple III by **Healthcare Information Sciences** (1231 Wood Creek Drive, Greenwood, IN 46142; 317-888-3780) to aid the fund-raising office in planning, organizing, controlling, and evaluating the functions of its office. The system handles storage, retrieval, and report generation of donor profiles, pledge information, mail campaign information, memorial files, and fund files. The program enables the staff to increase its productivity, thus increasing the funds available for future hospital research, expansion, and operations. $4,995.



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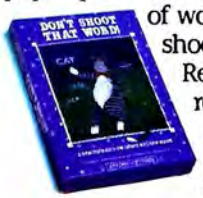

Reading skills are required to determine which words match the object. The goal is to shoot all the wrong words, then for extra points, get the letters as they fall away. For ages 6 and up.

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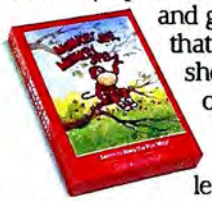

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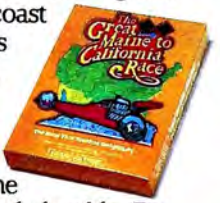

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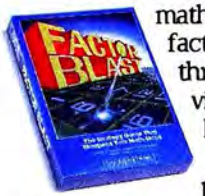

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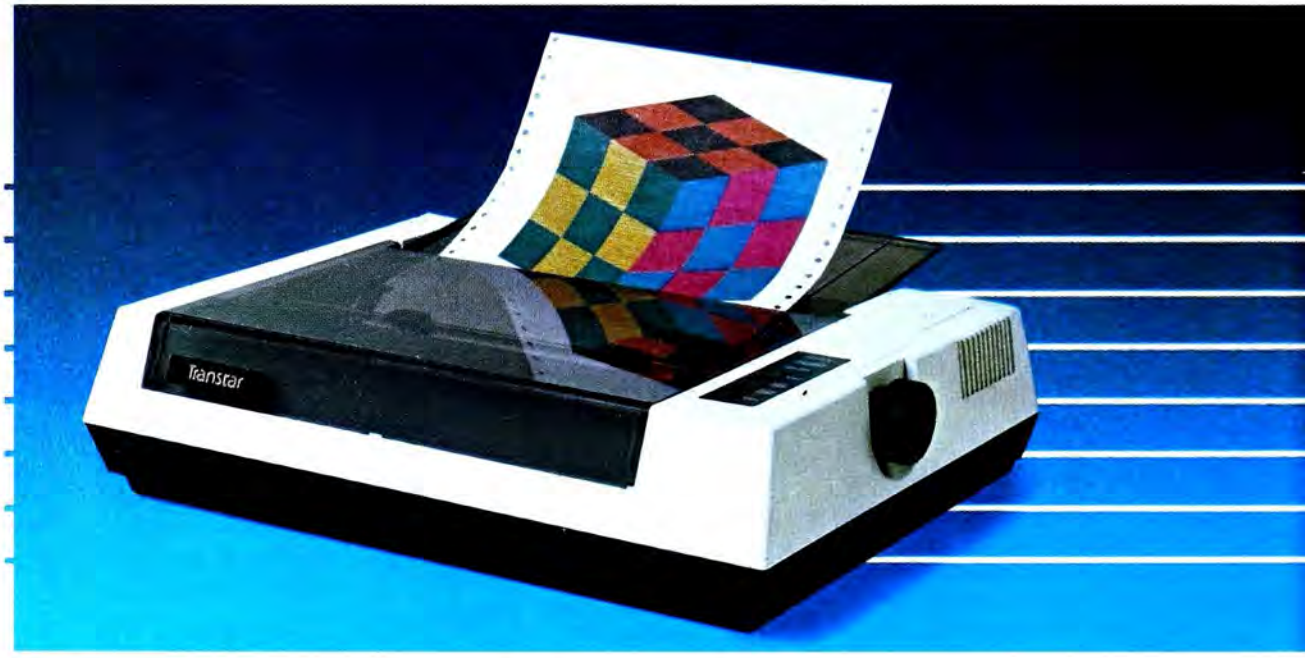

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EVERYONE'S GUIDE TO ASSEMBLY LANGUAGE



BY JOCK ROOT

Part 6: Game Paddles and Fast Loops

You have probably heard that one of the main advantages of assembly language is its speed, but you may not know exactly what that means. After all, how fast is "fast"? We used to say, "fast as an express train"—but the Apple can do a major change in personality, from business system to arcade game, in less time than it takes an express train to travel one mile.

Computer events are usually measured in *microseconds*—millionths of a second. The express train we mentioned takes about a thousand microseconds to travel one inch. Most assembly language instructions are executed in three or four microseconds.

Normally, we humans aren't interested in microseconds: Our reaction time is measured in tenths of seconds. At a movie, we get a new picture every forty-two milliseconds (thousandths of a second), and it looks like one continuous picture. In real time (that is, time as we humans perceive it), anything from a microsecond to a few dozen milliseconds counts as zero time.

But programmers, as you know, do a lot of things that would seem strange to a normal human, and that goes double for assembly language programmers (sorry about that). This month, you are going to learn how, and when, to count microseconds.

Game Paddle Timing. Let's talk about reading the game controller inputs. These are the only Apple inputs that can perceive an *analog* signal—a signal that is continuously variable over a certain range (for comparison, a *digital* signal must be in one of two states, 0 or 1; anything else, like ½, is an error).

As you might expect, reading these inputs is more complicated than the usual, "Is it on or off?" There is a time factor involved. Each game paddle input is connected to a timer, and the position of the paddle (or knob, or joystick) determines the time delay for that input. In order to read one of these ports, a program has to start the timer and measure how long it takes to time out: The result is the position of the paddle.

Let's take that a step at a time. The problem is that the microprocessor chip (the "brain," or central processing unit, of the Apple) doesn't understand analog inputs at all. That means that the analog information must be converted into some form of digital signal before the microprocessor can recognize it. This is done by special circuits on the motherboard near the game connector: The aforementioned timers convert the analog input into a time-variant digital signal.

When a timer is triggered, its output goes from 0 to 1 (digital); then, after a certain time (determined by the position of the knob or joystick), the output falls to 0 again. The signal is now purely digital, and the analog information has been converted to a time interval.

In order to recover the analog information (the position of the knob) from this signal, the microprocessor simply measures the incoming signal against a timer of its own and reports the resulting value.

Parallel Time. The timing circuit is so simple that the Apple designers chose to give each paddle input line its own timer: There are four of them. Each one consists of a capacitor on the board, the variable resistor, or rheostat, in the hand control, and an integrated circuit that manages all four timers. Each timer puts out a perfectly good signal when triggered, and they all trigger at once.

This seemed a little odd, since the Applesoft PDL (X) command reads only one paddle at a time and it can't be used twice in a row, since it needs "settling time" between uses. Most games nowadays (and many word processors, graphics processors, and educational programs) use joystick control, which requires the reading of two paddle inputs, preferably at the same time. It would be nice to be able to read two timers at once, since they're all running anyway.

Let's take a look at such a routine, which will also serve to demonstrate the use of the X and Y indexes in nested loops. Later, if you want to write a game or other program and you need to read a joystick, you can use this routine instead of two PDL commands with a delay between.

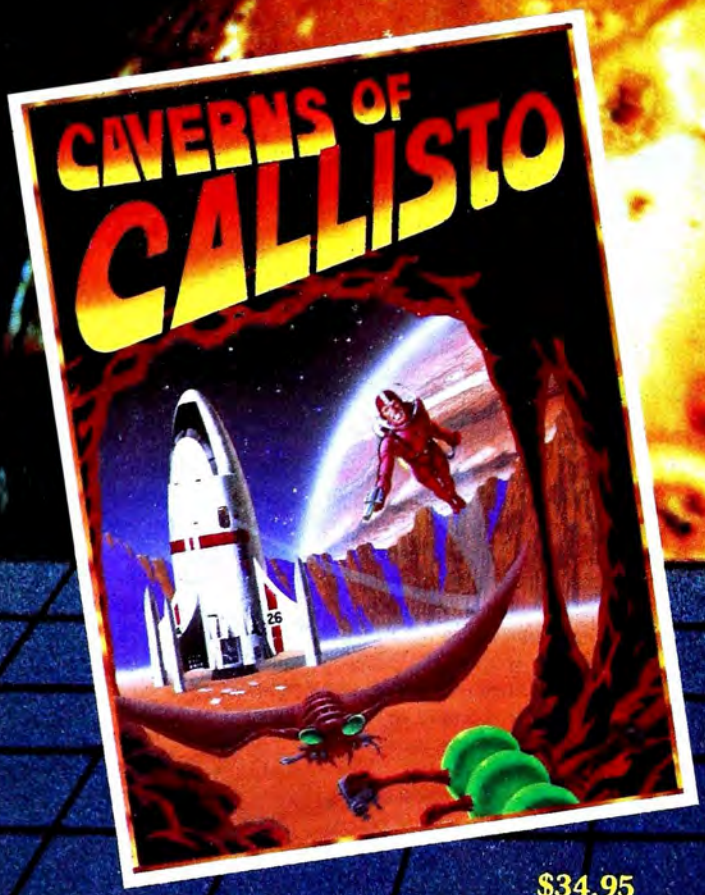
Unfortunately, it isn't as easy as modifying the existing routines; the Apple people were too fast for us. They made the time constants of the digitizing timers very short so as not to delay the calling program. There's no way you can cram more instructions into their timing loop without losing something—they didn't leave any room.

But we don't give up that easy. Our double paddle read can be done if you're willing to sacrifice some resolution (that is, fineness of detail): The routine returns a range of 0 to 100, instead of 0 to 255. This program will read both joystick axes (GC0 and GC1, in the *Apple II Reference Manual*) on call 768. The values will be stored in locations 800 and 801 for later peeking.

Even that much required considerable thought and considerable rewriting of the routine. When you use the microprocessor itself to measure time delays, you have to be careful about instruction execution times; when you can't afford to waste any time at all, it gets even trickier. And that is why our secondary topic this month is counting microseconds.

Execution Time. Some instructions take less time to execute than others (note: These instructions are being executed not because they did anything wrong, but simply because, in the Great Program, their Time has come). Execution time depends on the complexity of the instruction. Some of the simplest ones, like LDA (immediate) or INX, take only two machine cycles; the more complex ones, like LDA (indirect) or JSR, take up to six or seven cycles. A "machine cycle" is the set of micro-

Two Great Games From Out of This World



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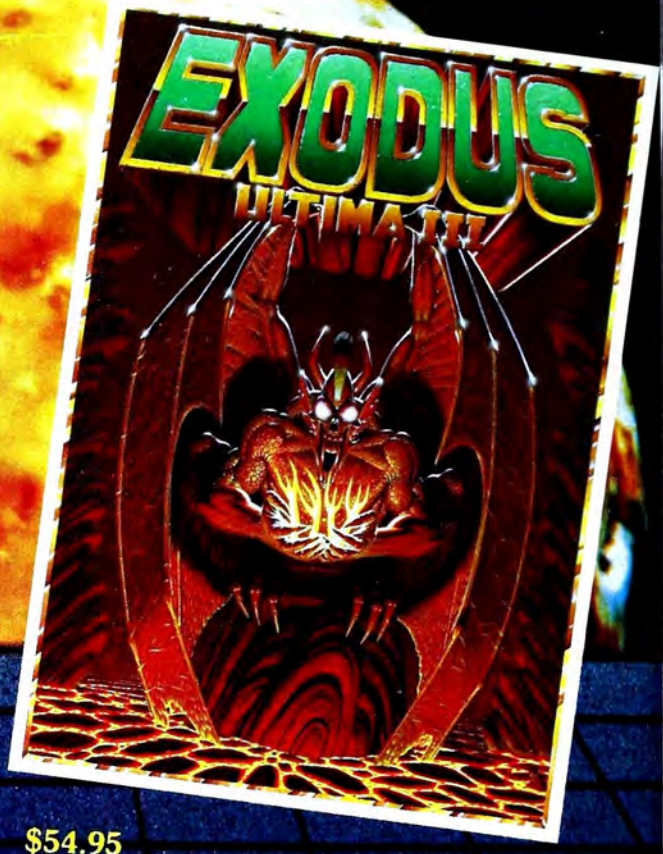

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processor activities that go with moving a byte from one place to another, or modifying a byte. In the Apple, with its 1.023 MHz system clock (that's megahertz, or million cycles per second), a machine cycle takes about one microsecond: 1/1.023, or .9775 μsec, to be exact.

You may have trouble finding a list of assembly language commands specifying the number of cycles taken by each instruction. Some books on 6502 assembly language include such a list, but many do not. Even the Apple reference books, good as they are in most respects, fail to include this information. Your best source for timing data is one of the manufacturers of the 6502 chip itself—Synertek or Rockwell. See if your computer store has any of their manuals, or write to them directly.

In most programming applications, you don't need to know the execution speeds of the various commands—it's enough to know that they execute "very quickly." However, if you're doing process control in real time—for example, a tone generator, or a phase-controlled light dimmer, or an event timer—you may find an understanding of command cycle-times very useful.

From Time to Place. What we want to make is an event timer. With that, we can measure the delay generated by one of the timers on the game control port; that measurement will give us the position of the paddle connected to that timer.

In order to read a game port, you must first send a signal to start the timers (they all start together, even if you're using only one of them). The timers' outputs all go to one, and the time interval begins. After a certain time, the output of each timer will fall to zero again; and the length of time it takes will indicate the resistance of the rheostat connected to that timer. If that resistance is the variable resistor in a game control or joystick, then the time interval indicates the position of the knob or shaft.

You can measure this time interval with a simple loop. The algorithm (a fancy word for "logical procedure," or "sequence of steps," or "What you do is . . .") for the loop consists of three steps: (1) advancing the loop counter, (2) testing the timer output, and (3) repeating the loop if it's still timing (output =1) or exiting if it's timed out (output = 0). On exit, the value of the loop counter will indicate the resistance in the timer circuit (and therefore the position of the knob or joystick): It says, "The delay was long enough for the loop to go around X times."

What we've described so far would look like this in assembly language:

```
LOOP    INX
        LDA TIMER
        BNE LOOP
EXIT    RTS
```

But that's not enough by itself. We have to put a frame around it, to take care of some housekeeping. To start with, we have to zero the loop counter and trigger the timers: That's LDX #0 and STA TSTART. By the way, it makes no difference what's in the accumulator when STA TSTART is executed—this is not a normal "store" operation. All that's needed is to send a signal to the "start timers" address. Even a read command, such as LDA TSTART, would work. TSTART is, of course, the label for the address of the start timer soft switch.

After the loop has finished, we need to do one more thing: save the loop count somewhere. Right now it's in the X register, but it won't be safe there very long. We'll use a byte of RAM out past the end of our routine; $320 will be a good one, and its decimal address, 800, is easy to remember; so STX $320 will take care of that. That gives us:

```
START   LDX #0
        STA TSTART

LOOP    INX
        LDA TIMER
        BNE LOOP

EXIT    STX $320
        RTS
```

Refinements. Even that isn't quite enough. First, we're going to need what you might call a Murphy trap. Consider these two points: The time delay produced by each game control port timer depends on the resistance connected to that port (that is, the higher the resistance, the longer the delay); and our timer, the way it is now, will stay in its loop until the port timer times out (output goes to 0). Got that? Okay, quick now, answer this: What if the joystick isn't plugged in?

Right, you got it. The program will hang up indefinitely, waiting for the port timer to time out. If nothing is connected to the game port, the resistance in the timer circuit will be infinite, as will the delay.

No problem; that's an easy one, if you think of it in time. We simply add a step after INX, as follows: BEQ EXIT. When the counter "rolls over" (that is, when the value in the X register is incremented from 255 to 0), the BEQ reacts and gets us out of the loop. And we should add a DEX to the exit routine, to adjust the limits of the final reading: What we have so far will give us 1 for zero resistance and 0 for the rollover case, and what we want is 0 and 255 respectively (if you want some exercise, try working out the logic for both cases, with and without DEX).

That would work, but there's still one more change we should probably make. We've been cheating a little bit on the explanation, and this would be a good place to clear things up. We have been talking about the signal called TIMER—the output of any of the game port timers—as if it were a one-bit signal, and it isn't. It's an eight-bit byte, like most inputs to the microprocessor, but it's not a normal byte: Only the high bit (most significant bit, sometimes called bit 7) changes. The other bits of that byte (bits 0 through 6) are always zero.

It happens that bit position 7 serves a special purpose in 6502 systems—it's used to indicate negative numbers. Bit 7 is often called the sign bit or the negative bit. In fact, two assembly language commands are dedicated to bit 7: They test it and branch accordingly. BMI (branch if minus) branches on bit 7 = 1, or set: This is the convention for a negative number. BPL (branch if plus) branches on bit 7 = 0, or clear.

In the *Apple II Reference Manual* (page 24), they refer to this change in bit 7 in yet another way. In binary numbers, bit 7 represents the value 128 (decimal); so the Apple book says that "the value becomes greater than 128" when they mean "the high bit is set" (negative, or, for our purposes, still timing), and "the value drops below 128" to mean "the high bit is cleared" (positive, timed out).

We will acknowledge this confusion by changing the label from TIMER to PORT to show that we're dealing with an eight-bit byte, and we'll use BMI LOOP instead of BNE to focus our attention on the bit that is changing. That will give us:

```
START   LDX #0
        STA TSTART

LOOP    INX
        BEQ EXIT
        LDA PORT
        BMI LOOP

EXIT    DEX
        STX $320
        RTS
```

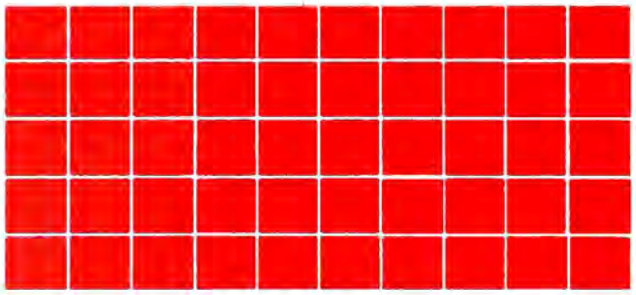
This is probably about the way the Apple does it with the PDL command in Basic. At least, this produces the same results: If you use it with a normal joystick or game control (total resistance 150K ohms), it gives the expected range of 0 to 255.

A Slight Improvement. But we wanted to do better than that. We wanted to read two timers with one command. After all, all four of the timers are running; couldn't we read two of them in each pass through the loop? Well, yes, we could, but. . . .

The obvious way, as we mentioned earlier, is with a pair of nested loops. We're already using one loop, since we're doing the same thing over and over again: testing the timer. All we have to do is put in an inner loop to test one timer and then the other.

Well, not quite. In the original version, when the timer timed out, we stopped the loop. We can't do that here, or we'll lose the count for the second timer. The loop has to keep rolling, with no change in speed, until both timers have timed out.

Right, then, how about this? We reserve two bytes of RAM for scratchpad locations, one for each timer: $320 and $321, decimal 800 and 801. Then, on each pass through the timing loop, we test each timer; if it's still timing, we write the current loop counter value into the scratchpad location for that timer. If it's timed out, we skip the writing step. That way, the value in the scratchpad location (after the loop is finished) will be the value of the loop counter that was written on the pass just before the timer timed out.



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Well, that's almost right. There's only one problem—that business about skipping a step if the timer has timed out. That's a no-no. If you start skipping a step, you change the number of steps in the timing loop, and that changes the length of time it takes. That, in turn, will mess up the value we get for the second timer, which is still going.

What we have to do, instead, is put in one or more dummy program steps—commands that don't actually do anything—to take up the same amount of cycle time as the step that was skipped. This is where a knowledge of instruction execution times becomes important.

Both Legs Equally Long. The program has to branch into two parallel paths—either of which will take the same number of machine cycles—and then it has to rejoin itself, like a river flowing around a long, narrow island. If the two pathways take the same number of cycles, they will take the same time. That way, the timing loop will take the same time no matter which pathway is used; we can update the scratchpad for a timer if it is still timing, or roll on by if it has timed out, without affecting the reading for the other timer at all.

The problem looks very difficult at first. We've been using a simple STX (store X register) instruction, because we were storing X in only one place; but now we are going to use two loops, one for timing (as before) and one to select which port timer we're dealing with. We will have to use a form of STX instruction that is indexed by Y so we can update the right scratchpad for each timer, from within the inner loop.

The only STX instruction, indexed by Y, is a zero-page instruction—it doesn't work out there in main memory (if you don't know what zero page is, just think of it as an important place in memory. We'll deal with it another time).

Okay, so we can't use 800 and 801 for our scratchpad. We'll use 28 and 29 ($1C and $1D); they're available. And we'll use the Y indexed STX instruction, $96 (store the X register in the zero page address that follows, plus Y). The execution time for this instruction is four cycles, so now we know the length of one component of one leg of our two pathways.

With a little thought, you can figure out the length of the rest of that leg, too—if you know about cycle times. Well, you have to know a *lot* about cycle times. It turns out that a branch instruction (any branch instruction, BMI, BPL, BNE, and company) has two different cycle times. The choice depends on whether the program takes the branch or continues straight ahead.

Every branch is based on a test of some condition: zero, negative, overflow, or whatever. If the condition is not met, the program continues to the next step, in sequence. This is a very simple process and takes only two machine cycles. On the other hand, if the condition is met, the program must branch to another address, which means the address in the program counter must be changed. This takes longer: When the program takes the branch, it uses three machine cycles instead of two.

We discovered, a while back, that one component of one branch of our parallel pathways had to be a Y-indexed STX operation, which took four cycles. We are trying to make these pathways as short as possible, you remember; so we would like to combine the shorter leg of the branch with the irreducible four cycles of STX. That will give us: branch on plus (timed out: do not update, but waste time), otherwise update scratchpad (still timing). The "update" path is six cycles long (two for the branch-not-taken and four for the STX), so the "waste time" path must also be six cycles long; and we already have three cycles of it, the branch-taken.

Well, that makes it easy—we got lucky this time! A branch-taken uses three cycles, and we have three more cycles to use up: We'll simply use another branch-taken. We can reserve a memory address out beyond our routine—call it WAIT. Then, when the timer we're testing has timed out, BPL takes us to WAIT; once there, another BPL takes us to SELECT, which is where the other pathway will reach in the same length of time.

But now we are going to need another Murphy trap. If the resistance in one of the time circuits is very near zero, that timer will time out before the microprocessor's timing loop even gets started; and thus, on every pass through the loop, the program will bypass the update step for that timer. The trouble with that is, it leaves the value in the scratchpad location unchanged—and that value, which was left over from the last use of this routine, is no longer correct.

Suppose you're trying to make a fast move in a program and you ram the joystick as far over as it will go. Let's say also that you went toward the zero end of the scale, causing the situation described above. Finally, we'll assume that the joystick is being read over and over again by some

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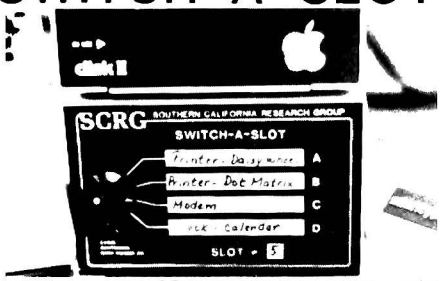

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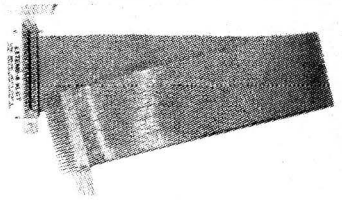

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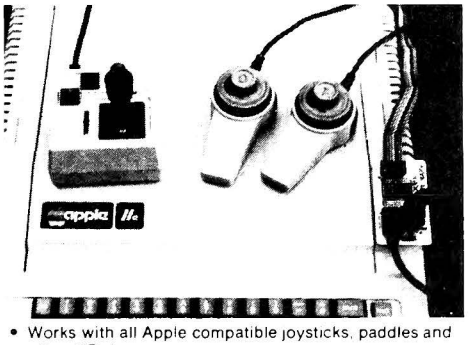

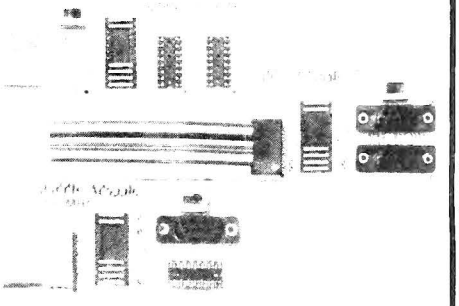

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calling program. Got that? Right. On the timer read cycle just before the joystick hit the end of its travel, it was passing (let's say) 25—so 25 was written into the scratchpad location and used by the program.

See what's going to happen? Now that you've hit the stop, the resistance is nearly zero, and the scratchpad isn't being updated any more—so it still reads 25 when the correct value is zero!

The answer to this one is easy, too—once you figure out what is going on. You simply have to set the two scratchpad locations to zero before you start the timing loop; then, if the timing resistance is zero and no update takes place, the value in the scratchpad will be correct anyway!

A Good First Attempt. Listing 1 gives the program we have described. We are using the X register to count passes through the loop and the Y register to select which timer is being dealt with.

The first steps in the timing process (lines 15 through 18) zero the loop counter and the output locations and send off a start signal to the timers (this can be done by either a write or a read operation—that is, either a load or a store instruction). Then the first timing loop begins.

The timing loop is the outer loop: It begins first and ends last. In fact, the first step in the outer loop is to initialize the inner loop by setting the timer selector (the Y index) to 1, which will select game control port 1 (line 20).

Then the inner loop begins. Line 22 reads the timer selected by Y, and you should be able to take it from there. The path advances to line 24 if the timer is still running or branches to line 34 if it's timed out. Either way, the two paths rejoin at line 26.

Now it's loop time again. Line 26 advances the port selector, the Y index, or, more precisely, retreats it (since we're counting backward in this loop). Then line 27 tests whether we've finished the inner loop yet, and if not sends us around once more (the reason we're counting backward is so that we can use this BPL for a loop exit when Y goes negative).

Lines 29 and 30 take care of the outer loop. Note that in this version, the INX instruction is the last thing in the loop (instead of the first thing, as it was before). That's why we don't need a DEX step here, as we did last time.

Improving on It. The program in listing 1 looks smooth and elegant on paper, but it has one fatal flaw: It's *slow*. As we mentioned earlier, the Apple designers made the program for the PDL command as simple and as fast as possible so that the calling program wouldn't have to wait around for a slow timer to run out; and then they chose component values that would produce a maximum reading of 255 with their fast program.

Our program of nested loops, running under those same component values, produces a maximum of seventy with a standard joystick. That gives you a range of paddle positions from 0 to 70; this isn't as good as we wanted, and besides, seventy is an awkward number to work with. Can we make our loops run any faster?

Well, yes, we can, but we'll have to sacrifice the nested loop structure to do it. Our inner loop has an LDA instruction and an STY instruction, both using indexed addressing: If we used absolute addressing instead, we could save one cycle on each instruction. That adds up to four cycles on each pass through the timing loop—two instructions, used twice each.

Worse than that, the BPL in line 27 (the branch that closes the inner loop) costs us three cycles every time we take the branch and two cycles when we don't. That adds up to ten cycles on each pass through the timing loop.

The answer is to turn the inner loop into a straight stretch of program, without any branches (except of course the update/waste time branch, which we have to have anyway). This means repeating some sections of code, which makes our routine a few bytes longer, but even so it actually runs in less time. The new version is in listing 2.

Note that this version uses page three addresses for scratchpad bytes again instead of the zero page bytes. That's because of the STX instruction, which is part of one of our matched parallel pathways. STX (abso-

```
                         1  * ************************
                         2  *                        *
                         3  *      PADDLE TIMER      *
                         4  *                        *
                         5  *         <10>           *
                         6  *                        *
                         7  * ************************
                         8
                         9          ORG  $300
                        10
                        11  KEEP    EQU  $1C        DECIMAL 28 (PDL 0)
                                                      AND 29 (PDL 1)
                        12  TSTART  EQU  $C070      READ HERE TO
                                                      RESET
                        13  PORT    EQU  $C064      PADDLE #0
                        14
0300: A2 00             15          LDX  #0         SET COUNTER
                                                      TO ZERO
0302: 86 1C             16          STX  KEEP
0304: 86 1D             17          STX  KEEP+1
0306: AD 70 C0          18          LDA  TSTART     START THE TIMERS
                        19
0309: A0 01             20  OUTLOOP LDY  #1         SET THE SELECTOR
                        21
030B: B9 64 C0          22  INLOOP  LDA  PORT,Y     READ THE
                                                      SELECTED
                                                      PADDLE TIMER
030E: 10 09             23          BPL  WAIT       IF TIMED OUT, GO
                                                      WASTE SOME
                                                      TIME
0310: 96 1C             24          STX  KEEP,Y     STORE COUNTER
                                                      VALUE FOR THIS
                                                      TIMER
                        25
0312: 88                26  SELECT  DEY  .          FLIP THE SELECTOR
0313: 10 F6             27          BPL  INLOOP     IF NOT DONE, DO
                                                      OTHER PORT
                        28
0315: E8                29          INX  .          ADVANCE THE
                                                      COUNTER
0316: D0 F1             30          BNE  OUTLOOP    IF NOT FINISHED,
                                                      DO NEXT CYCLE
                        31
0318: 60                32          RTS  .          OTHERWISE
                                                      FINISHED-
                                                      RETURN
                        33
0319: 10 F7             34  WAIT    BPL  SELECT
```

Listing 1.

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lute, zero page) takes only three cycles, instead of the four for STX (Y indexed, zero page), and that would have upset our timing; so we went to STX (absolute, not zero page), which takes four cycles again (lines 24 and 28). The bytes used are $323 and $324 (803 and 804 decimal) because the new routine extends to address $322, overwriting the old scratchpad location.

Otherwise the program in listing 2 is pretty much the same as the one in listing 1. However, it runs almost one-third faster: With a standard joystick, it gives a range of 0 to 98. That should be near enough to 100 for most purposes.

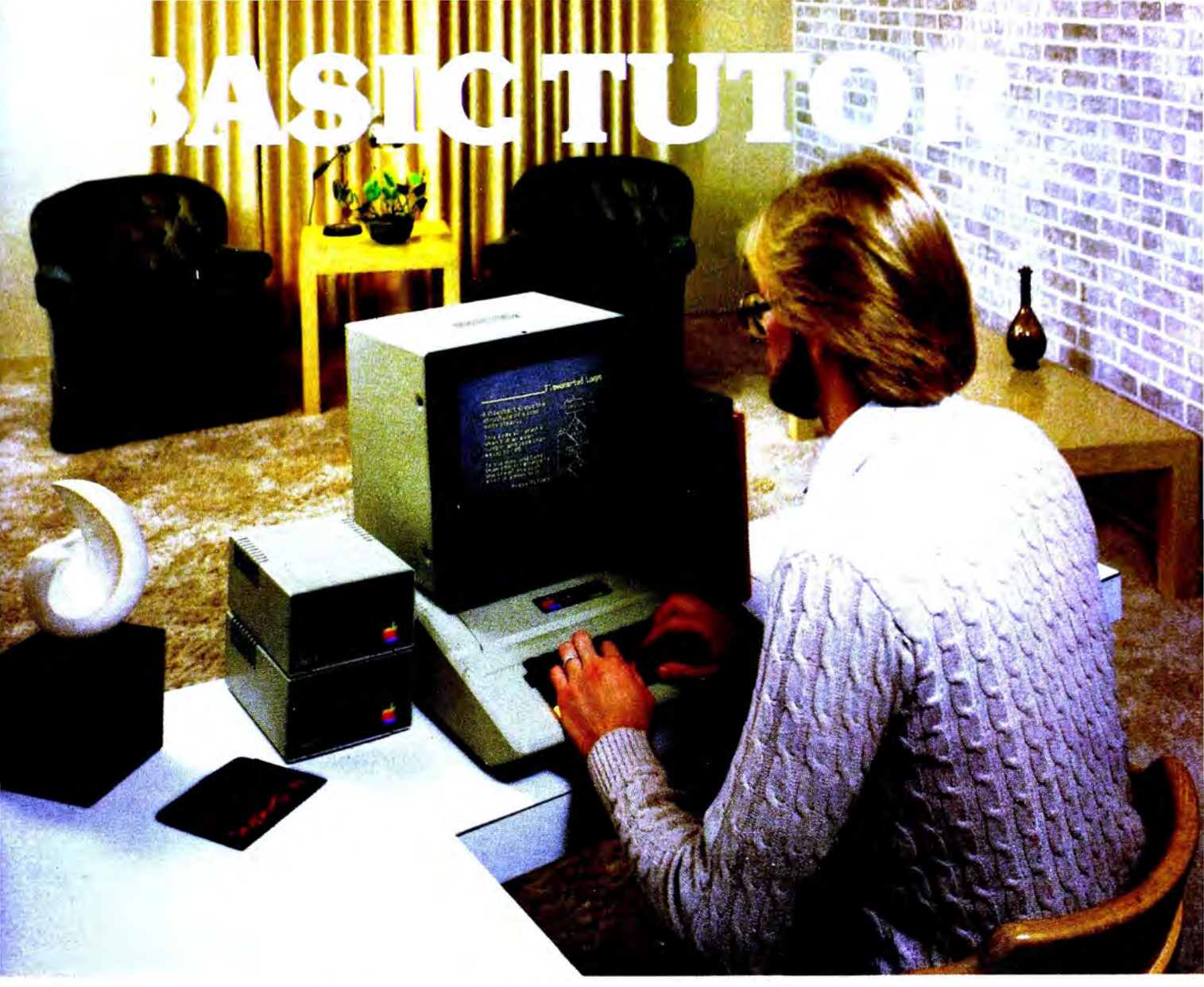
If you want to use this routine in one of your own programs, remember that using it is a two-step process. First you have to read the timers with a call 768; that will store the current values in locations 803 and 804. Then, when you need the information, you can peek those locations.

It would probably be a good idea to calibrate your joystick (or other type of control) against the program before using it. Take a reading with the control at each end of its range, and another in the middle: Adjust the control carefully in each position, call 768, and peek the readings. With that information, you can fine-tune your program for more sensitive joystick control.

Synertek Lit., Mail Stop 34, 3001 Stender Way, Santa Clara, CA 95054; (408) 748-7047.

```
                        1  * ************************ *
                        2  *                          *
                        3  *       PADDLE TIMER       *
                        4  *                          *
                        5  *         < 14 >           *
                        6  *                          *
                        7  * ************************ *
                        8
                        9          ORG  $300
                       10
                       11 KEEP0    EQU  $323      DECIMAL 800
                       12 KEEP1    EQU  $324      DECIMAL 801
                       13 TSTART   EQU  $C070
                       14 PORT0    EQU  $C064
                       15 PORT1    EQU  $C065
                       16
0300: A2 00            17          LDX  #0        SET COUNTER TO
                                                    ZERO
0302: 8E 23 03         18          STX  KEEP0
0305: 8E 24 03         19          STX  KEEP1
0308: AD 70 C0         20          LDA  TSTART    START THE TIMERS
                       21
030B: AD 64 C0         22 LOOP     LDA  PORT0     READ THE FIRST
                                                    PADDLE TIMER
030E: 10 0F            23          BPL  WAIT0     IF TIMED OUT, GO
                                                    WASTE SOME TIME
0310: 8E 23 03         24          STX  KEEP0     STORE THE
                                                    CURRENT
                                                    COUNTER VALUE
                       25
0313: AD 65 C0         26 PDL:1    LDA  PORT1     READ THE OTHER
                                                    PADDLE TIMER
0316: 10 09            27          BPL  WAIT1     IF TIMED OUT,
                                                    WASTE TIME
0318: 8E 24 03         28          STX  KEEP1     STORE THE
                                                    COUNTER HERE,
                                                    TOO
                       29
031B: E8               30 CYCLE    INX  .         ADVANCE THE
                                                    COUNTER
031C: D0 ED            31          BNE  LOOP      IF NOT FINISHED,
                                                    REPEAT
                       32
031E: 60               33          RTS  .         OTHERWISE
                                                    FINISHED -
                                                    RETURN
                       34
031F: 10 F2            35 WAIT0    BPL  PDL:1     REJOIN THE FLOW
0321: 10 F8            36 WAIT1    BPL  CYCLE     REJOIN THE FLOW,
                                                    LATER
```

Listing 2.



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STOCKING STUFFERS



A Holiday Gift Guide

Thank the stars that Christmas comes only once a year. While you all have been out there fretting over what gifts to buy, we here at *Softalk* have been laboring like Hercules to compile the fourth annual Stocking Stuffers Holiday Gift Guide.

What follows, arranged by category, is the most comprehensive listing of Apple hardware and software since last year's Holiday Gift Guide. The individual entries are manufacturers' descriptions of their wares. We haven't tried all of them; we'll leave it to you to determine relative gift value.

Here's what you can assume in terms of basic requirements: 48K memory (64K for IIe programs), Applesoft, an eighty-column printer (if printer there need be), DOS 3.3, and one disk drive, unless specified otherwise. A ROM Applesoft requirement can be satisfied with RAM Applesoft in a language card.

At the end of the listings you'll find the complete addresses of all the firms and most phone numbers. If you can't find the product in your neighborhood computer store, you can call or write the company for the location of its nearest retailer.

Good luck, and remember: 'Tis the season to be jolly!



Actioncraft

Pick-A-Dilly Pair, by Norm Gray. As the room clerk at the Pick-A-Dilly Hotel, the player must locate the matching Dillies. Dilly movements are coordinated with a familiar melody. Eight variations of play. $34.95.

Speedway Classic, by Norm Gray. Driving skills are exercised by powering Indy-style cars around the oval speedway. Position, elapsed time, speed, and laps-to-go are monitored on the instrument panel. Top scores are recorded for recall. $39.95.



Adventure International

Saigon: The Final Days, by Jyym and Robyn Pearson and Norman Sailer. Vietnam, 1975. The order has come down to get out now, but a stray missile blows your helicopter to oblivion, leaving you to face a savage environment gone mad. Find a way out. Gritty realism and historic fact in machine language epic. $24.95.

The Curse of Crowley Manor, by Jyym Pearson and Norman Sailer. The scene is London in 1913. Scotland Yard is buzzing with the news that there's been a murder at the Crowley Estate. What starts out as a simple homicide investigation becomes a trip into the depths of the occult. Program uses many unique plot twists and strange devices to guide you to victory, or to the gates of hell. $34.95.

Escape from Traam, by Jyym Pearson and Norman Sailer. Your small space cruiser is in trouble—and even though you survived the initial crash on a bizaare, distant world, you may soon wish that you hadn't. The alien environment of Traam is replete with incredible wonders and sights the like of which no human eyes have ever beheld. You must escape this dangerous world. $34.95.

Earthquake—San Francisco 1906, by Jyym Pearson and Norman Sailer. On April 19, 1906, at 5:18 a.m., one of the most violent earthquakes of modern times decimated metropolitan San Francisco. The city's remains are awash with flame; buildings burn and crumble, and death's dark sentry holds watch over all. It is through this madness that you plunge, your chances of survival directly related to your ability to reason logically in an effort to escape from fallen San Francisco with your life. $34.95.

Labyrinth of Crete, by Cliff Johnson and Allen Pinero. You control the actions of two powerful warriors, the stalwart Jason and the mighty Hercules. Straight from the mythology of ancient Greece they come, and their quest is a most dangerous one: the recovery of the mythical Golden Fleece from the heart of the horrific Labyrinth! Many have tried, and many have failed, to penetrate and exit the Labyrinth. Will you be able to direct Jason and Hercules to success? $29.95.

Commbat, by Bob Schilling. A battle game that allows players on different computer systems to participate. You and your opponent are located somewhere within a 4,096-square-kilometer combat zone. As soon as communications are established (via 110 to 9600 baud modem or direct cable connection), the battle begins. Decide which weapons to carry, then load them onto up to eight remote-controlled tanks. Computer displays all relevant data. Requires two computer systems with RS-232 port and 300-baud full-duplex modem. $49.95

War, by Stan Erwin. A detailed war game for one or two players. Your army consists of armored units, infantry units, engineer units (which can either build or destroy all-important bridges), and aircraft. Set against a backdrop of forests, cities, and rivers. Move your units into battle and eventually destroy your opponent. $24.95.

Rear Guard, by Wayne Westmoreland and Terry Gilman. You are there—charged with protecting your mothership from the deadly waves

of inhuman Cyborgs that are approaching from behind. You must maneuver around their ships as they pass and destroy them before they move off-screen and into contact with the mothership. Advanced play levels, running high score, sharp graphics, horizontal scrolling, and mind-boggling sounds. $29.95.

Tunnel Terror, by Eric Popejoy. Space and time go berserk in *Tunnel Terror*. The scenario: while your ship moves around the circles on the edge of a dimensional funnel, enemy forces move up the sides until they either reach the top or are destroyed by your ship's fission torpedoes. The enemy is varied as well as deadly. Can be played by one to four players and features sounds, high score save, and sixty-one levels of difficulty. $29.95.

The Eliminator, by Wayne Westmoreland and Terry Gilman. Your mission unfolds at a breakneck pace as you pilot your *Eliminator* craft over alien terrain and square off against hordes of marauding enemy ships. But the action doesn't stop there. The *Eliminator* pulverizes the competition with realistic sounds and superlative graphics. Running high score and joystick compatibility. $29.95.

The Stone of Sisyphus. Carries you to a "thinking person's" dungeon wherein you must apply your skills to effect survival and to realize your goals. This is an unfriendly, subterranean world populated by hideous monsters and dripping with fabulous treasures—the latter enticing you to face the former. Your survival hinges on hard intellect. $29.95.

Morton's Fork. The third entry in the Maces and Magic series transports you into a world bereft of natural laws—a realm populated by magical beings and strange creatures. The scenario is set within the confines of an ancient wizard's fortress. Through keyboard input, you equip your warrior with armor, weapons, and gold, as well as desirable personal attributes. Only then will you be able to face the dangers of *Morton's Fork*. $29.95.

Missile Attack, by The Cornsoft Group, edited by Eric Popejoy. This real-time action game pits your twin silos of ABMs against a barrage of enemy missiles raining down on your cities. As your skill increases, so does the difficulty. $29.95.

Pirate Adventure. The lost treasures of Long John Silver lie hidden somewhere. Will you be able to recover them? Only by exploring this strange island will you be able to uncover the clues necessary to lead you to your elusive goal. $39.95.

Strange Odyssey. At the galaxy's rim, there are rewards aplenty to be harvested from a long-dead alien civilization, including fabulous treasures and advanced technologies far beyond human ken. Will you be able to recover them and return home? $39.95.

Voodoo Castle. The count has fallen victim to a fiendish curse placed on him by his enemies. There he lies, with you as his only possible hope. Will you pull off a rescue, or is he down for the "Count" for good? $39.95.

Adventure #3. You race the clock to complete your mission in time, or else the world's first automated nuclear reactor is doomed. Tread lightly and don't forget your bomb detector. $39.95.

The Count. You awake in a large brass bed in a castle somewhere in Transylvania. Who are you, what are you doing here, and why did the postman deliver a bottle of blood? Who can say...but somewhere a centuries-old evil lies in wait. $39.95.

Adventureland. Wander through an enchanted realm and try to recover the thirteen lost treasures. There are wild animals and magical beings to reckon with, as well as many other perils and mysteries. Can you rescue the Blue Ox from the quicksand? $39.95.

Arex, by William Muk. Enter and neutralize at least 90 percent of the enemy's territory while avoiding alien ships. The battle grid teems with perils, and only the quick survive. *Arex* features Arcade Action Graphics, joystick compatibility, and a host of extras, including high-score retention, one or two-player option, and multiple skill levels. $34.95.

Sea Dragon. A slick, arcade-ish simulation that puts you in command of a nuclear sub that's armed to the hilt with deadly missiles and torpedoes. *Sea Dragon* boasts a scrolling seabottom that extends the equivalent of more than two dozen screens laid end-to-end. Two-player option, sounds and high-score save feature. $34.95.

ARS Publications

Wizmaker 3.0, by Ron Richards. Use to modify characters for *Wizardry*. Reserve or make a superhero. Resurrect the dead. Modify attributes, level, status, age, gold, spells, experience, and hit points. Supports line printer and includes maps of Scenario #1. $20.

Artificial Intelligence Research Group

Eliza. Created at MIT in 1966, *Eliza* is actually a nondirective psychotherapist who analyzes each statement as you type it in and then responds with a comment or question. Designed to run on a large mainframe, *Eliza* has never been available to personal computer users except in greatly stripped-down versions. This version has the same power and range of expression as the original. A complete source program is available for a small additional charge. $45.

Artworx Software

Strip Poker, by Roger Harnish. Settle in for a sizzling evening of *Strip Poker*. This program features opponents Suzi and Melissa, each with her own style of play. The more chips you win, the more they take off. Additional disks available. $34.95.

Data Disk #1. Provides two additional female opponents for Strip Poker. $24.95.

Data Disk #2. Introduces two male opponents to Strip Poker. $24.95.

Bridge 4.0, by Arthur Walsh. *Bridge 3.0* has now been upgraded to *Bridge 4.0*. Features include scoring, Blackwood convention, ability to replay and switch hands and other convenience features. Allows you to both bid the contract and play out the hand. You and your computer partner play against two computer opponents. $23.95.

Poker Tourney, by Edward Grau and Roger Harnish. You are entered in a high-stakes draw poker tournament facing six opponents. Each has his own style of play and of bluffing. *Poker Tourney* utilizes the Joker, has true table stakes play, and each hand is played based on pot odds. $23.95.

The Vaults of Zurich, by Roger Harnish and Felix and Greg Herlihy. Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impregnable vaults. But you, as a master thief, have dared to undertake the boldest heist of the century. You will journey down a maze of corridors and vaults to reach the chairman's chamber and steal the most treasured possession of all—the OPEC oil deeds. $25.95.

Avalon Hill

Fortress of the Witch King. Enter the fortress, realm of a dark and mysterious lord, whose slightest whim gives you great treasures or plunges you into deadly combat with the vicious hacker. Your quest is to find the arch ruler and slay him. But beware, for there are conditions to be met and battles to be fought. $25.

Tactical Armor Command. You control individual tanks, anti-tank guns, and infantry squads. For one or two players featuring hi-res graphics. Five different scenarios. $40.

Legionnaire. Takes the war-gamer back to the ancient times of Julius Caesar. You command your legions (as Caesar) against as many as ten barbarian hordes in this real-time full-color strategy game. The action is animated on a huge scrolling map. $40.

Avant-Garde

Federation. As commander of a Federation starship, you must protect your planet from the Drorn drones. Using your laser cannon, you destroy their flying ships while your neutrostatic bombs eliminate surface emplacements. To get to their mothership, you must first destroy their remote fighters, but beware of their tracking bombs. $29.95.

Hi-Res Computer Golf II. Play golf on your computer during those blustery days. The fairways, lakes, trees, sand traps, and roughs are true-to-scale, and the greens are contoured. Includes a variable wind factor. You select your clubs and control your own swing, or auto-swing selection can be used. $34.95.

JumpJet. JumpJet makes you the pilot of a JumpJet. Your job is to fly sorties against cruisers, submarines, and kamikaze fighter-bombers while avoiding anti-aircraft fire, protecting your fleet, and watching your fuel supply. Successful missions will result in the surrender of the Outsider general. $29.95.

Trompers. Arnold Strump's shortwave broadcasts have prompted the invasion of hundreds of zany little critters called Trompers. Your job is to help Arnold catch these bouncing creatures in his net. It's easy at first,

but by the time you reach the higher levels, the Trompers have removed the streethole covers. $29.95.

Lazermaze. In the twenty-fourth century, conflicts are settled in the Hall of Mirrors. Shoot a lazer beam into the hall and guess where the lazer will exit. A correct guess results in the conflict being settled in your favor. Begin with thirty mirrors and work your way to seventy. $29.95.

Air Traffic Controller. You are an air traffic controller at a major metropolitan airport. Your monitor serves as a radar screen, and your job is to use the radar readout to direct the flight paths and landings of helicopters, passenger jets, military jets, and private prop planes. $19.95.

Triple Arcade Insanity. This program puts three different arcade-type games on one disk: *Alien Onslaught*, *Galactic Conquerors*, and Andromeda Blitz. Each is more difficult than its predecessor. $29.95.

Beagle Bros

Beagle Bag, by Bert Kersey. Twelve listable games—*TextTrain*, *Buzzword*, *Magic Pack*, and more—on one jam-packed, copyable disk. *BeagleMenu* greeting program displays a catalog of only the programs (on your disks) you want displayed, such as only Applesoft or only locked files, for one-key selection. $29.50.

BitCards

BitCard. Customized software gift. The current BitCard release can be ordered fully customized. The recipient will be called upon to help solve the adventure and find many other references to himself throughout the program. A personal holiday greeting message from the sender can also be included. $18.50.

Blue Chip Software

Millionaire. A stock market simulation game that doubles as an educational vehicle for learning about investment finance. *Millionaire* allows a player using a microcomputer to compress seventy-seven weeks of stock trading into a two-hour exercise. A player begins with a hypothetical $10,000 and, in simulated "weeks," makes purchase decisions based on a steady stream of business and news information. As profits increase, the player progresses through a series of levels that allow increasingly sophisticated trading, borrowing, and other investment alternatives. $59.95.

Tycoon. A commodity market simulation game that doubles as an educational vehicle for learning about investment finance. A player begins with a hypothetical $10,000 and, in simulated "weeks," makes purchase decisions based on a steady stream of business and news information. As profits increase, the player progresses through a series of levels that allow increasingly sophisticated trading and other investment alternatives. $59.95.

Broderbund Software

Spare Change. You're the owner of an arcade, but zikes, the characters of your favorite game, the comical Zerks (Zeke and Ozzie), have broken out and are trying to steal your tokens for their piggy bank. You'll have to resort to trickery to stop them by playing the jukebox, ringing the pay phones, and popping popcorn. $34.95.

Drol. A young girl and her brother have been lured away from their mother by a witch doctor and made to wander aimlessly through the ruins of a lost civilization. Your mission is to guide the rocket-propelled hero through legions of cartoon scorpions, monsters, flying turkeys, swords, magnets, and vacuum cleaners to reunite the family. $34.95.

Labyrinth. Descend into the labyrinthian depths of Prince Julian's long-abandoned diamond mines in search of treasure. You'll encounter terrifying creatures guarding dark corridors with walls that move constantly to expose entryways and seal off exits. $29.95.

Serpentine. Giant serpents set forth to slay their slithery cousins. To add to the fun, the snakes lay eggs and fight ferociously to protect their young. $34.95.

The Arcade Machine. Create your own arcade games. No programming knowledge needed. Comes with a selection of full-color monsters (or design your own), dramatic explosions and sound effects, and automatic high scoring features. $59.95.

David's Midnight Magic. Hi-res pinball with dual flipper controls, upper and lower playing levels, tilt mechanism, rollovers, multiple ball play, electromagnetic deflectors, and many special effects. $34.95.

Apple Panic. The apples will get you if you don't watch out. Forced to flee from pursuing apples in a multilevel mansion, you set traps for your pursuers along the way. $29.95.

Sky Blazer. Test your ability to attack and evade supersonic tanks, heat-seeking missiles, explosive balloons, enemy jets, and fuel-guzzling bluebirds in your maneuverable fighter as you battle to clear away the Flatlanders' radar, ICBM installations, and headquarters. $31.95.

Choplifter! With realistic throttle action, you maneuver a daredevil rescue chopper. You fight off enemy jet fighters and air mines above, and tank fire and air-to-ground missiles below, to rescue hostages held behind the lines and bring them out alive. $34.95.

Seafox. In a lone submarine you take on a convoy of enemy ships and its escort while dodging exploding depth charges, mines, and torpedoes. You will need superior maneuvering ability, courage, and a welcome aquatic ally to survive. $29.95.

A.E. The A.E. are coming. Squadrons of menacing stingrays are streaking down from the sky to attack you. Wave upon wave elude the firepower of your trigger-action missiles. You're doomed to be pestered forever unless you drive these waves of A.E. "rays" out of the solar system. $34.95.

Gumball. You're an apprentice gumball sorter. You'll have to keep up with your sorting duties and zap the flashing, dynamite-spiked gumballs before they go off. Watch out for your supervisor. He'll make life even tougher. $29.95.

Lode Runner. As a Galactic commando out to recover gold from the Bungeling Empire, you'll have to maneuver through 150 levels of play by running, jumping, and drilling new passageways with your laser pistol. Using the game generator, you can design your own playing fields. No programming knowledge needed. $34.95.

Cheapsuit Software

Star Ferry. See if you can run a passenger service to the stars! Build starships (six types), borrow money at outrageous interest, give detailed flight orders to each ship, print detailed status reports. No two games alike. Save-game option. Avoid black holes, pirates. Stay one jump ahead of your merciless creditors! $20.

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Counterpoint Software

Quizagon. A family game, or a party game, that challenges players with over 6,000 questions in the categories of sciences, sports, entertainment and arts, and potpourri. Two disks, four sides to this game of knowledge, strategy, and luck. $39.95.

Cross Educational Software

Dinosaurs. Contains four games, a graphics demo, and a paddle graphics program. Games include *Fire Fight*, an arcade-type dinosaur battle, and *Dinosaur Hangman*, where a Zeuglodon will get you if you don't watch out! $15.

DataKnight

Grand Slam Trivia. A question and answer game for everyone who is crazy for baseball. Quality block graphics, offensive and defensive strategies, and six difficulty levels make the game realistic and loads of fun for one or two players. Original questions by baseball experts. $34.95.

World Series Questions. An additional data disk of more than 650 questions for DataKnight's *Grand Slam Trivia* game. These questions, as on the original, are written lovingly by baseball fanatics with hints, six difficulty levels, and optional multiple-choice answers. Additional data disks will be released each month to support the game. $19.95.

Datamost

Ardy the Aardvark, by Chris Oberth. Tired of shoot-'em-ups? Want something more than spaceships and missiles? Come down to Earth and get caught in the tongue-twisting world of our hero, Ardy the Aardvark. The object is to help Ardy eat his dinner; avoid stinging ants, worms, and spiders; clean out the anthill; and move on to more food. $29.95.

Argos, by Ron Lowrance. From space to planet to city street—a fight all the way. An action-packed arcade-quality game where you fight off waves of alien invaders in three different scenarios. Has missiles, bombs, lasers and jet fighters. The enemy even tries to parachute onto the streets. $34.95.

The Bilestoad, by Mangrove Earthshoe. The amazing world of *The Bilestoad* was designed to let mankind survive a technological future gone wild. Within the thirty-nine levels and forty-four combat areas, you may work out your aggressions man-to-man or man-to-robot in stunning and barbaric battle, or use some clever strategy and see if you can outsmart the enemy. $39.95.

Cavern Creatures, by Paul Lowrance. You've probably heard the rumors around Command Central about the Underground City. Does it exist? And if you do find it, what lies beyond? You'll discover the truth for yourself as you fly through the caverns, shooting enemies and gathering fuel. A special surprise is in store if you reach the end, but to do so requires concentration and split-second timing! $29.95.

Conquering Worlds, by Walter Hochbrueckner. A strategy game with high action. Contains months of continuous challenge. Scan the galaxy by checking your star system map. Decide on strategy and what kind of warp power to use, but be ready to switch tactics. The enemy is intelligent and will fight with guile and force. $29.95.

Roundabout, by Gumby Bitworks. Fascinating shapes zoom, rotate, and zig-zag about the screen while you try to shoot them before they trap you. The foes travel in packs, and after you successfully fight one swarm of attackers, another pack will challenge you. $29.95.

Space Ark, by Art Huff and Bob Flanagan. Designed by an artist, *Space Ark* challenges you to find, capture, and protect representative samples of all friendly life throughout the universe. To do so requires skill, for you must fight off the skin hunters, poachers, and mechanicals at the same time. $39.95.

Super Bunny, by Vic Leone. A flash of white...a cloud of carrots...and a mighty bunny roar. Hopping out of the midwestern sands comes—*Super Bunny!* In this video comic, you guide Reggie Rabbit to his magic carrots—avoiding wolves, snakes, owls, traps, and cages. When Reggie eats his carrots, he takes on supernatural powers—becomes Super Bunny—and beats up on the enemies of Rabbitville. $29.95.

Davka

The Lion's Share. Bible adventure game based on the Book of Daniel. You're a military spy trying to make your way into ancient Babylon and signal the Persians when to attack. For both experienced and novice adventure players. No prior knowledge of the Bible required. Features animation, sound, hi-res graphics, and original music. $34.95.

I.Q. Baseball. Quiz game for baseball buffs. Animated ballpark, scoreboard with sound and music. Computer pitches questions on baseball fact and lore; correct answers score runs. Both easy and difficult question sets. Play against computer or another player. Supplementary disks cover all major league teams and World Series. $24.95.

Purimaze. Two games on the Jewish holiday of Purim. In *Purimaze,* player is Biblical character Mordecai moving through a tricky labyrinth to find Queen Esther. The Wheel of Fortune affects his fate. In *Hang Haman*, player guesses Purim words in hangman game. Brochure summarizes history and observances of Purim. $25.

The Philistine Ploy. Bible adventure game based on the Book of Judges. You seek the Treasure of the Seven Nations, pursued by a Philistine warrior who is trying to kill you. For both experienced and novice players. No prior knowledge of the Bible required. Features animation, sound, hi-res graphics, and original music. $34.95.

Dynacomp

Space Tilt. A test of both skill and patience as you use your game paddles to roll a ball through a hole in your television screen. Uses hi-res graphics to represent a plane with a randomly placed hole in it. The game paddles tilt the plane around the X and Y axes. The ball then rolls according to the plane's orientation. Each time you succeed in this task, the hole is replaced with an even smaller hole. $18.95.

Bridge Master. A comprehensive bridge program designed to provide hours of challenging competition. Bidding features include the Blackwood convention, Stayman convention, preemptive openings, and recognition of demand bids and jump-shift responses. $29.95.

Space Lanes. A simple but exciting simulation of the economics of the space transportation industry. The object is to establish and expand space transportation companies in a competitive environment. Hal, the computer, is one of the players. Up to three additional players are allowed. $14.95.

Valdez. Simulation of supertanker navigation in the Prince William Sound area of Alaska. Contains a detailed analysis of ship response characteristics, as well as a model of tidal patterns in the Sound. $23.95.

Backgammon 2.0, by Giga. Tests your backgammon skills and improves your game. A human can compete against the computer or against another human. The computer can even play itself! Played in accordance with the official rules of backgammon. $23.95.

Starbase 3.2. A new and exciting program related to the classic space simulation many have played on large computers. This version is a significantly enhanced program that is more complex and more challenging. It was written by a visiting Croylin who decided to give his side a chance. The Empire gets even! $17.95.

Space Evacuation. How many people can you evacuate from Earth before the sun explodes? The goal is to save everyone. However, the highest recorded score is 97 percent. Can you do better? $19.95.

Games Pack I and Games Pack II. Each package contains a cross-section of traditional computer games. The packages are set up as one large program; after completing one game, another game can be run without having to reload. *Games Pack I* includes simple physical models, such as *Catapult* and *Lunar Lander*; a mathematical brain teaser, *Switch*; and entertaining gambling games, *Blackjack*, *Horse Race*, *Craps*, and *Slot Machine*. *Games Pack II* contains the popular word puzzle, *Jotto*; two entertaining card games, *Acey Deucey* and *Crazy Eights*; the game of *Life*, plus *Wumpus*, *Number Guess*, and *Calendar*. $18.95 each.

Moonprobe. Navigate your Lunar Lander to a precise (and presumably safe) landing on the surface of the moon. The program starts you out in a stable orbit above the moon's surface. By varying the Lander's attitude and amount of thrust, you direct the probe to drop slowly from orbit. You must land at the predetermined probe site. $16.95.

Blackjack Coach. Learn and practice your blackjack skills with the *Coach* giving advice and consent. Test various playing and betting strategies. *Blackjack Coach* includes a thirty-page tutorial manual. $33.95.

Mensa Master. The first computer version of the card game that is


WASHINGTON (UPI) — The U.S. Air Force/NASA have developed an experimental spacecraft given the title XTM. Due to the vague description as to the design or purpose of the XTM, the press is still in the dark about many aspects of the craft or its intended mission. It has been discovered, however, that at least three pilots have been lost in the current flight testing program of the mysterious
TIME MACHINE I
Starfire Games offers you the ultimate challenge in adventure games: Time Machine I. First in a series of time travel episodes, Time Machine I catapults you into mind bending mystery where the extraordinary is commonplace and dangers are as real as any human experience.
You are the fourth test pilot to fly the joint Air Force/NASA XTM series experimental "craft", a vehicle which transverses through time, the true last frontier. Provided with the newly modified but still untested version of the craft, XTM-3, your mission is to rescue the three previous test pilots who are lost somewhere in the infinity of time itself.
Not far into the mission, you discover this task is more than you could have imagined. Never knowing what you will encounter next, you manuever your ship from one adventure to another. You draw upon every resource to survive events ranging from battles with Vikings in the past to outwitting aliens in the future for your ship, the lost pilots, even your very life. But prepare, your final challenge is to return to your own time era safely, a feat which has not been accomplished by any pilot before you.
Time Machine I is available for your IBM PC or XT (64K, disk drive), Apple II + or IIe (48K, disk drive, DOS 3.3), Commodore 64 (cassette or disk drive), Atari 400 and 800 (48K, disk drive). TRS-80 version to be released soon.
Ask for Time Machine: $34.95 at your local dealer or order direct. Visa, Mastercard, Money Orders, Checks accepted (Calif. residents please add 6½% sales tax). Dealer inquires invited.
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favored by members of Mensa, the "high IQ club." While easy to learn, the game demands a different approach and strategy with each new hand. Two levels of play. $19.95.

The Olde Gin Parlour (Gin Rummy). It allows knocking, laying off, and all standard game conventions. The game is easy to learn, and the documentation includes some fascinating history on the game of gin rummy, as well as a complete set of rules. Program is for one player against the computer. $22.95.

Go Fish. Classic children's card game, adapted for one player against the computer. Uses graphics that make the game suitable for play with small children. $18.95.

Poker Party. If you enjoy draw poker, then this is the software package for you. *Poker Party* is better classified as a simulation than a game. An inexpensive tool for learning the subtleties of draw poker. Not just a two-handed game, but seven-handed. Usual rules of draw poker are followed. $23.95.

Management Simulator. Based on similar games played at graduate business schools by teams of managers. The game realistically models the economic marketplace of the business world. Comes with a nine-page instruction manual that includes a sample playing form. $29.95.

Monarch. Elected the ultimate ruler of your own country, it is your job to decide the country's budget. Your country's income comes from farm produce and tourism. Half your land is farmland, but it also has excellent mineral content. It is up to you to decide how to manage the country's economy and redistribute the wealth to your countrymen. Can you keep your countrymen happy (and yourself in office) for eight years? $18.95.

Lem Lander. A hi-res graphics real-time simulation of lunar excursion module maneuvering. Several interesting terrains are saved on disk as data files. The amount of thrust is controlled by the paddle knob, and the direction by the paddle button. $16.95.

Starship Landing Party Adventure. While on patrol, your starship suddenly encounters a severe cosmic storm that burns out all the ship's power crystals. There is just enough power left to beam down one person to an abandoned mining planet, armed only with a hand laser, and then beam that person back up again with a supply of power crystals. Your job is to get those crystals! $19.95.

Handicapper. A handicapping scheme for thoroughbred races on track lengths of six, six and one-half, or seven furlongs. Designed by a mathematician and tested by professional bettors and handicappers. Produces the winning horse about forty percent of the time. However, in certain instances it can be much more accurate. You feed race data to computer. $33.95.

Optimac. A work-day simulation designed to maximize the overall output of interrelated production equipment. Based on four different machine relations commonly found in agriculture, construction, transportation, and industry. Once the relations, machine types, and other data has been entered, *Optimac* will simulate an eight-hour work day (at two-minute time increment intervals) for those conditions and quantities. The resulting simulated workday is displayed graphically and numerically. $43.95.

Genesis—The Adventure Creator. *Genesis* has two parts. The *Creator* allows you to create and edit your adventures. The *Player* allows you, or anyone else, to play any adventure you have created. After you get a feel for the system, you will probably be able to create a moderate-sized game of about thirty-five locations in one to two hours. $49.95.

Poker Machine. Simulates the card-playing slot machines found in Las Vegas and Atlantic City casinos. The preset odds employed in the simulation follow those used in actual casino machines, thereby presenting a realistic representation. While *Poker Machine* offers the opportunity to have harmless fun, you may also try out betting strategies on it before risking money in those other machines. $19.95.

Super Sub Chase. Take over the controls of a destroyer in search of a submerged enemy submarine. The only clues you will receive are from your sonar, and you will need a good memory and powers of deduction to find the sub in your territory. Hi-res graphics simulation. $23.95.

Earthware Computer Services

Zoo Master, by Kevin Ryan. A fast-paced, multilevel arcade game. To keep you moving, the upper levels permit your adversary to disappear. Can you catch the animals and the mad scientist without being captured? $20.

Edu-Ware Services

Prisoner 2. Enter The Island, and play a game of delusion and paradox. A science fiction adventure. $39.95.

Electronic Arts

Pinball Construction Set. A computerized erector set. It allows the user to design and play his own pinball game from a library of pinball machine parts such as bumpers, balls, and paddles using only a joystick. Three ready-to-play pinball games are included as examples. $40.

The Standing Stones, by Peter Schmuckal et al. Dungeon role-playing adventure with over 200 monsters, fifteen levels, several games within a game, humor, and a three-dimensional perspective. The quest is to find the Holy Grail and escape with it. $40.

Hard Hat Mack. All you have to do is finish the building. Sound easy? Then you're forgetting about OSHA inspectors, the neighborhood punks, and the fact that falling bodies (including your own) accelerate at a rate of thirty-two feet per second. $35.

Axis Assassin. The Master Arachnid spins webs and sends alien shapes to eliminate the player. The player, an Axis Assassin, maneuvers in four directions and shoots in two. To get extra men, the player blasts into the Master Arachnid's nest to steal them. One hundred levels. $35.

Julius Erving and Larry Bird Go One-on-One. Arcade simulation basketball contest in which the player assumes the style and moves of basketball greats Larry Bird and "Dr. J." Special features include hot and cold shooting spells, fouls, backboard shattering, instant replays, and player fatigue. $40.

Electronic Courseware Systems

Ear Challenger. An aural-visual game designed to increase tonal memory using a series of pitches that are played by the computer. The game includes several levels of difficulty based on the number of pitches presented. Each pitch is reinforced visually with a color presentation on the display screen. $39.95.

First Flight Data Systems

Bull Run. A stock and option simulation game for one or two players. By investing in stocks, options (calls and puts), and interest-bearing T-Bills, each player tries to beat the market or his opponent. The program features routines that generate news, dividend changes, interest rates, stock dividends, and market research. $29.95.

Funtastic

Space Cadette. An arcade-style game. Space cadettes in the Space Military Academy test their skills on the Academy's simulator to determine if they're tough enough to defend the galaxy. It has both a one-player mode and a two-player mode. In the two-player mode, both cadettes maneuver their ships simultaneously in head-on combat. $34.95.

H.A.L. Labs

Vindicator. A paranoid's nightmare come true. Robots appear all around you, dragons streak toward you, and mutants, centipods, pod hatchlings, and more fill the screen. Kill everything while saving your eggs from the birds! $25.

Super Taxman II. Four mazes; smooth, clean control; music; monsters; challenging ranks; and cartoons. You've never seen fast until you've played level twenty-four. $25.

Sheila. The arcade game with a fantasy twist. Sheila's locked in the tower of the Kriel's castle—can you rescue her? Wield spears, bombs, and magic against the vast array of monsters in your path. Those who can, do graphics; those who can't, make slogans. Help Sheila. $25.

Hayden Software

Wargle. A maze game featuring seven playing fields. Score points by hitting the Wargles with a light beam that can be fired frontward or backward. Six levels of play. Keyboard input with player assignment of key controls. $34.95.

Shuttle Intercept. Hi-res arcade game with sound effects. Player controls a space shuttle; score points by retrieving friendly satellites and by destroying enemy satellites, flying saucers, and meteors. Four playing levels with "hyperspace transitions" in which the shuttle can act only defensively. Pause mode. $34.95.

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Sargon II. Preeminent chess program featuring seven levels of play. Kibbitz mode offers hints to player via audible signals. Hi-res display of chess board and pieces. $34.95.

Reversal. Computer adaptation of the strategy game Othello, the objective of which is to capture your opponent's pieces. Play against another person or the computer. Hi-res graphics display features smiling faces on winning side's pieces and frowning faces on loser's pieces. $34.95.

Microscopic Journey. An educational adventure game. Player steers a vessel through the bloodstream, heart valves, connective tissue, and lungs in order to reach a tumor and cut it away with a laser. Along the way there are obstacles to overcome. Option is provided to save game in progress. $34.95.

Go. Computer adaptation of the ancient Oriental strategy game, the objective of which is to capture opposing pieces and stake out as much of the board as possible. Handicap option provides different levels of play. $34.95.

Championship Golf. With an aerial and side view of each hole, the player selects one of twenty clubs and the strength and direction of each stroke. Handicaps of one to eighteen affect the reliability of strokes. Special putting routine; penalties for out of bounds. One to four players. $24.95.

Laser Bounce. An arcade game with hi-res graphics, animation, and sound. Shoot laser beams at satellites passing overhead, deflecting them toward the enemy's energy modules; score points for each module destroyed. Defend against enemy lasers by activating a defense shield that bounces enemy beams back to their territory. Paddles required. $34.95.

Tetrad. A three-dimensional tic-tac-toe game with sixteen squares each on each of four tiers. Audible cues. $24.95.

Bellhop. An animated climbing game with the task of delivering luggage from the lobby to each of seven suites on the top floor. Player works against time, with the tip diminishing as time ticks by. Four rounds of play, sound effects mark time. $34.95.

King Cribbage. Classic card game. Hi-res graphic representation of playing cards and cribbage board. Plays regular cribbage and "muggins." $34.95.

Kamikaze. Hi-res arcade game with animation and sound effects. Player scores points by shooting down enemy aircraft while defending against enemy bombs, floating mines, and kamikaze attacks. Pause mode. $34.95.

Final Conflict. Objective is to destroy the enemy's central controller by programming robots to penetrate their base, avoiding obstacles along the way. Player can customize the battlefield and choose either a fast-paced tactical game or a strategic game in which all orders are programmed at the outset. Color, sound effects. Can be played against the computer or a human opponent. Paddles required. $34.95.

Crystal Caverns. Text adventure in which the player searches for treasures buried in an old mansion. Save and restore commands. Accepts many full sentences and strings of commands. $34.95.

Crime Stopper. A text adventure in which the player assumes the role of Al Clubs, private eye, and tries to rescue a kidnap victim by the midnight deadline. Save-game option stores sequence of commands entered; restore command recalls play. Accepts many full sentences and strings of commands. Occasional sound effects. $34.95.

Homeware

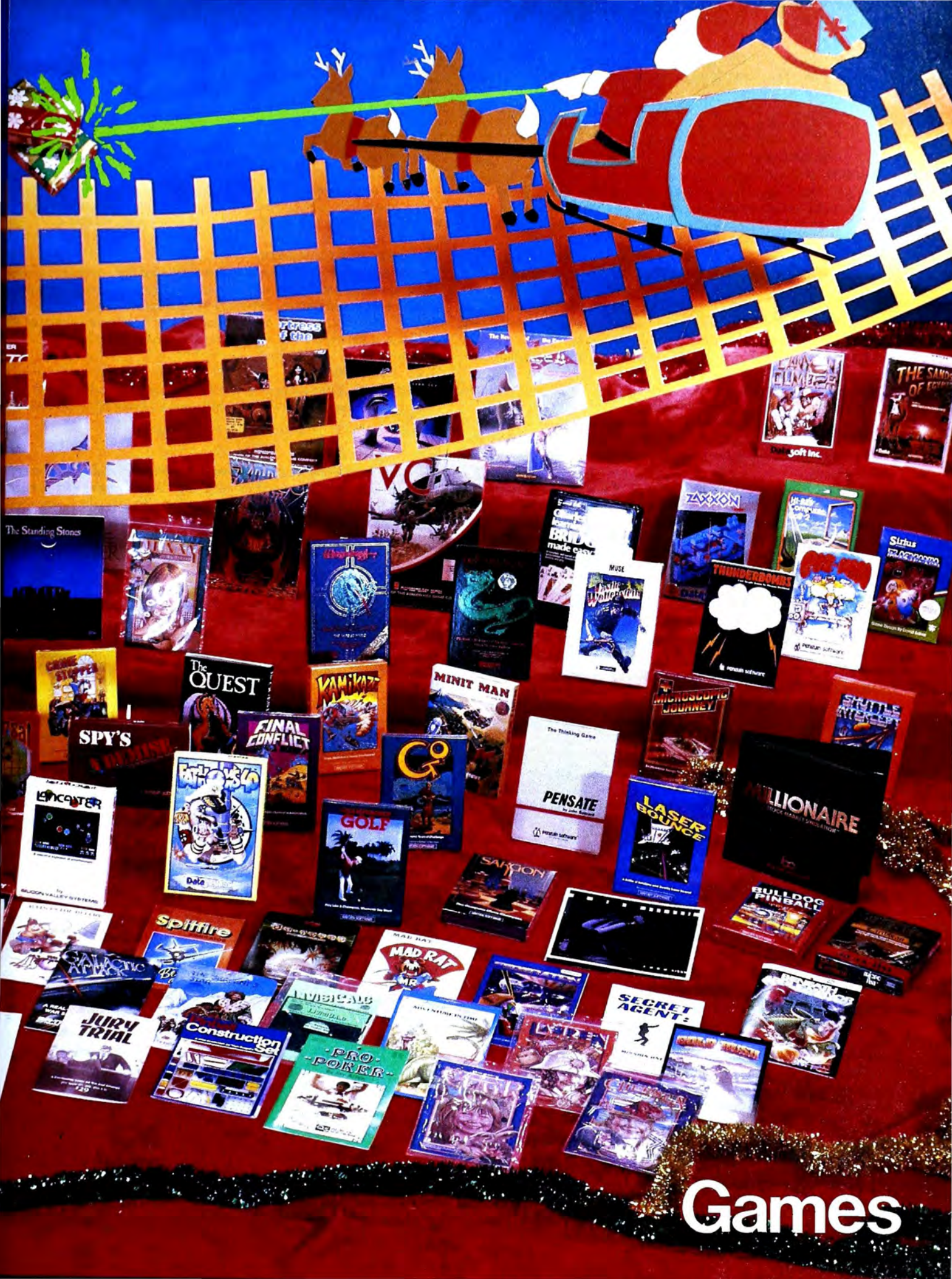
Apple Downs. Enjoy a day at the track. Select your horse from the racing form displayed on the screen, place your bets, and watch as the horses race around the oval track. $20.

Mystic Oracle. Got a question? Consult the Oracle. Gaze into the crystal ball and see your answer appear. The *Mystic Oracle* knows all and answers all, but be respectful. The Oracle gets upset and does strange things if you start insulting it and using language that is "not so nice." $10.

Hy-Tek

Profit Motive. A realistic big business simulation in which you can produce, market, and sell any one of several different products. It is not a flashy arcade style game, but a fun, mind-teasing challenge. One to ten players may compete in two levels of play. Institutional version also available. $39.95.

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Socket Wilderness: Don Juan in RAM. Ada's notorious progenitor accesses the fateful loop of his own poetical character, Don Juan. The hardware seems to come to life and Juan crashes in epic verse. But what a way to go. Tasteful graphics. $45.50.

Infocom

Infidel. The first in the new *Tales of Adventure* series. Challenges you to find the buried entrance to the last great Egyptian pyramid. Once inside, it is up to you to seize the priceless treasures that have remained there for thousands of years. $49.95.

Enchanter. Takes you into a realm of magical powers and perilous world. First entry in a new Zork-like trilogy with magic spells abounding. $49.95.

The Witness. *Deadline*'s worthy successor breaks another barrier of time and space—this time, into the past. A hard-boiled whodunit of the Thirties, *The Witness* masterfully reconstructs the great detective era. Working from a police file and battling a twelve-hour limit, you'll take on your most intriguing case to date. $49.95.

Suspended. You're in cryonic suspension miles beneath a distant planet's surface, with responsibility for the entire civilization above. You must act through your robot crew, six robots that carry out your orders simultaneously and each of whom offers a distinctly different view. The success of your strategies will determine your fate and that of your world. $49.95.

Deadline. A mystery with a difference: You are the detective. Working from an actual dossier, you face a challenge so sophisticated that your suspects possess flesh-and-blood personalities. And some of those personalities are so treacherous that, should you make the wrong move, one of them may do you in. $49.95.

Planetfall. A humorous science fiction adventure set in the far future. You are the lowliest ensign aboard the stellar patrol ship *Feinstein*. When your ship explodes, you are jettisoned onto a mysterious and deserted world plagued by floods, pestilence, and a mutant Wild Kingdom. You'll meet Floyd, a mischievous, multipurpose robot with the mentality of an encyclopedia and the maturity of a nine-year-old. Together, you and Floyd will unravel the mysteries of *Planetfall*. $49.95.

Starcross. Mindbending science fiction launches you headlong into the year 2186 and the depths of space. You are destined to rendezvous with a gargantuan starship from the outer fringes of our galaxy conveying a challenge that was issued eons ago, from light-years away—and only you can meet it. $39.95.

Zork I: The Great Underground Empire. Confronts you with perils and predicaments ranging from the mystical to the macabre, as you strive to discover the twenty treasures of Zork and escape with them and your life. $39.95.

Zork II: The Wizard of Frobozz. Takes you into new depths of the subterranean realm. There you'll meet the wizard, who will attempt to confound your quest with his capricious powers. $39.95.

Zork III: The Dungeon Master. The final test of your courage and wisdom. Your odyssey culminates in an encounter with the dungeon master himself, and your destiny hangs in the balance. $39.95.

Insoft

Zargs. As captain of the top-secret Zarg spaceships, you must arm yourself in order to be protected against bright objects from the region of Crab Nebula, who are launching a full attack on Earth. To avoid deadly x-rays, you must work against time to rotate and dock your spacecraft into one of the ports before beaming yourself back to Earth. $19.95.

Grapple. Takes place on the remote planetoid of Squelchem, where the galaxy's worst mutations are sent to a maximum security prison. You are the warden and your guards are androids, equipped with only stun guns. There is a prison break and your guards must try to stop it, but with each successive wave of attack, the job becomes more difficult. Can it be done? Play and find out. $19.95.

Spider Raid. Writen in GraForth. You are Hero Maximus, leader of one of the few remaining spider packs on Earth. You and your two loyal warriors must seek out the only food supply left, the common fly. Beware of deadly acid rain and your fiercest enemy, Toxicus beetle. Only speed and cunning can save you from certain death. $19.95.

Gary Irwin & Associates

Source Code. The source code to four games, written in Basic, for pleasure as well as education. Each game presents a different approach to computer gaming techniques. They are well documented, with remarks to make them easy to understand and modify. Color graphics required. $39.95.

Jor-And

Secret Agent—Mission One. A thrilling adventure with over 100 intricate hi-res drawings created with the Gibson light pen. Contains exciting puzzles. The fate of the world is in your hands. $32.95.

Kelcom Management

The Exchange. Hi-res stock market simulation for one to six players. Generate game variations of blue chip and growth stocks, precious metals, bonds, and futures. Experience taxes, splits, rises, declines, dividends, stock tips, special news bulletins, and become a tycoon or go bankrupt. Challenging and instructive. Two disks. $59.95.

Key Enterprises

Fun Facts. This unique program will print your daily biorhythm plus two pages of many interesting personal statistics based on your birthday. $19.95.

Krell Software

Super Star Baseball and All Time Super Star Baseball. Based on interaction of actual batting and pitching data. Select rosters and lineups; exercise strategic choices, including hit and run, base stealing, pinch hitting, intentional walking, and so on. Highly realistic. Each game includes about fifty players. $39.95.

Magnetic Harvest

Gnosis VII, by Gary Cuba. Do you really know who you are? Find out in this esoteric challenge that combines the best features of a fantasy-based text adventure, a dynamic board game, and a complex, ever-renewable logic puzzle. A unique mental landscape for true adepts and alchemists, savants and saints. Twenty-page guidebook and blank logic charting forms included. $19.95.

Mattel Electronics

Burgertime. As the burger chef, you're out to build delicious hamburgers. As you run through the colorful maze assembling the ingredients, nothing can stop you—except menacing hot dogs and pickles that are out to ruin the meal. Bury them under beef patties, lettuce, and buns, or knock them out with pepper. The game gets more difficult as you get better. One or two players. $17.50.

Lock 'N' Chase. A fast-action chase game in which you maneuver your thief through the maze, picking up coins and other treasures. Billy-club-swinging cops are in hot pursuit, but you can temporarily escape them by locking gates behind you. The longer you survive, the more valuable the treasures become. One or two players. $17.50.

Nightstalker. The relentless robots have you on the run. Destroy one, and it's replaced by an even faster and smarter one! There's a bunker to hide in, but be careful! The spiders and bats can give a stunning sting to slow you down and make you easy prey for the alien robots. One or two players. $17.50.

MicroLab

Crisis Mountain. Strategy/action arcade game that can blow up at any moment. Nine levels with hi-res color graphics. $35.

Dino Eggs. Save the dinosaurs from extinction. Multiscreen arcade game with hi-res graphics. $40.

Miner 2049er. Multilevel arcade game with hi-res graphics. You and Bounty Bob go deep into an abandoned uranium mine. $40.

Death in the Caribbean. Death-defying island treasure hunt with hi-res color graphics. An adventure strategy game. $35.

Micro Magic

Boa. To recover the king's stolen jewel, you must ride your giant boa through mazelike caves. But there are mice and rats who like to nibble at the boa's tail. If the boa can eat them first, he grows long enough to wrap around the jewel. Surprise ending. $29.95.

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Then there's *The Lion's Share* based on the Book of Daniel. Crack your way into Babylon, an eerie city of dreams, stargazers, wizards and savage lions. Find Daniel, then signal your Persian forces to attack the city at the right psychological moment. Don't miss this!

The Bible Adventure Game Series is for Apple II+/IIe computer with 48K and one disk drive. **Games are $34.95 each.**

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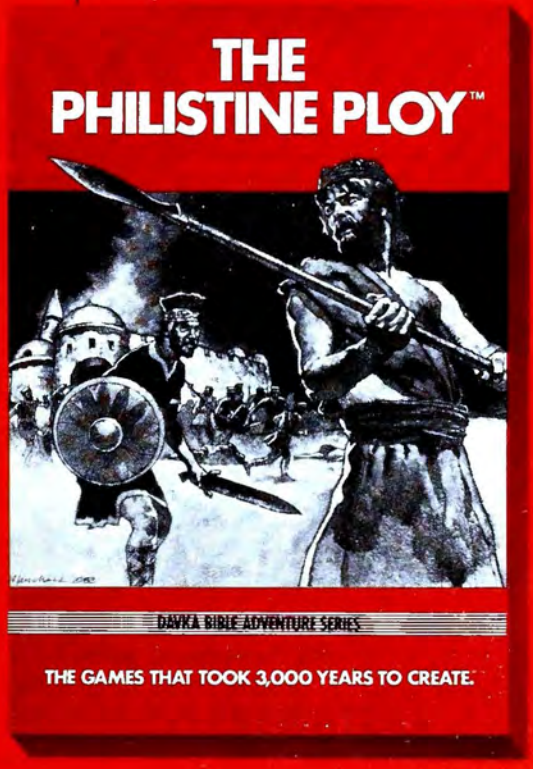

DAVKA ADVENTURE GAMES...WE TOOK OUR TIME.

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Micromax Systems

Cubit. A strategic arcade game with a three-dimensional pyramid as the playing field. Your task is to jump from block to block changing the pyramid's color. Against you are bouncing balls, disguised snakes, and vicious gremlins. But with a set of transport disks and a magic star to help you, you can outwit your opponents. $39.95.

Microsoft

Microsoft Decathlon. Enjoy the excitement of Olympic competition any day, using your personal computer. *Decathlon*'s exceptional graphics will make you feel like you are right there. Ten different events keep it exciting; you will not learn one trick for a perfect score. Lets you compete against up to five other players, or you can play by yourself. $29.95.

Mind Games

The Desecration. A game that incorporates the action of three arcade games and a full-blown hi-res adventure in 196 colors. Each of the four games can either be played separately or as one complete action story. $37.95.

Mind Systems

Spitfire Simulator, by Ted Kurtz. Pursue three-dimensional moving targets in a 360 mph Spitfire fighter plane. Eight target types. Scores for targets destroyed. Aerobatic flight simulator (loops, rolls, and so on) with two landing fields. Many convenient control options. Can access *Airsim-1* scenery to fly a Spitfire around New England. Paddles or joystick. $40.

Airsim-1, by Ted Kurtz. Flight simulator with scenery along New England coast from Boston to New York City, with five landing fields. Aerobatic flight simulator (loops, rolls, stalls, and so on). Cruising speed approximately 120 knots. Equipped for instrument flying (artificial horizon, HSI) with an instrument flying mode (500-foot ceiling) to practice instrument approaches. $24.95.

Airsim-3 Airplane Simulator, by Ted Kurtz. Aerobatic flight simulator with standard instrumentation plus all instruments required for IFR practice (ADF, VOR, HSI/VOR, DME, OM, MM). Scenery along California coast with ILS runway approaches at six airports. User mode for setting up customized ILS approaches, including runway scenery. $44.95.

Muse Software

Castle Wolfenstein, by Silas Warner. An all-time favorite arcade/adventure game. Classic. $29.95.

A.B.M., by Silas Warner. Enjoy missle madness with *A.B.M.* Can you save the East Coast from enemy attack? $24.95.

Firefly, by Silas Warner. Fire up your Apple with *Firefly*, the challenging maze game. $24.95.

Frazzle, by James Nolan. Outer space game where alien beasties surround and attack your *Frazzle* ship. Save yourself from total destruction. $24.95.

The Cube Solution, by Leonard Biggerstaff. Master the cube. Here is the enjoyable way to deal with the common cube headache that any cube owner will appreciate. $24.95.

The Best of Muse. Ten Muse games on one disk. Provides any Apple owner with a super selection of enjoyable games. $24.95.

International Gran Prix, by Richard Orban. Arcade-quality three-dimensional Formula One car race. Five courses, eight levels of difficulty, five-speed manual transmission, one-button shifting, and full instrument panel. $29.95.

Caverns of Freitag, by David Shapiro. As a Thechu Warrior, you must seek out and slay the evil dragon, Freitag, thus ending his reign of terror over your homeland. Fast-paced action for the hardiest of warriors! $29.95.

Titan Empire, by Ed Zaron. Defend the universe from the evil Titans as you travel a realistic solar system in your starship. The dark outposts of deep space will be your battlefield as you encounter the Titan Empire. There is no turning back. $34.95.

Navic Software

Jury Trial. An adult multiplayer game simulates courtroom proceedings. Players assume the roles of attorneys and witnesses, while the

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A fast moving arcade game in which you try to capture the animals and the mad scientist. Be watchful for the higher you go, the more there are . . . and they may disappear only to reappear and zap you when you least expect it. Stimulating, non-violent fast-action! Supports Sweet Micro Systems' Mockingboard, sound and speech synthesizer. **$20.00**

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computer is the judge and jury. Cases are randomly selected from the database, and players must be observant and clever in selecting favorable jurors and convincing them with persuasive testimony. $29.

Odesta

Odin (Othello). Join the growing number of strategists exploring the subtleties of a game that may change the way you think. Offers a full range of features to help you master the secret of Odin. $49.95.

Checkers 2.1. Learn the complexities of this strategy game by interacting with its twenty-four user features. Included are fifteen levels of play, advice, take back, and replay of games. $49.95.

Chess 7.0. A new microcomputer standard for what many consider to be the ultimate game of the intellect. Introduces a new generation of interactive intelligence with twenty-seven cursor-controlled features. $69.95.

Omega Microware

Nightfalls. A full-color, hi-res, arcade-style game that tests your ability to survive the invasion of enemy aliens. Fight off the aliens each night and rebuild your city during the day. $29.95.

Origin Systems

Exodus: Ultima III, by Lord British. Features new animated graphic techniques, full sound effects, and multicharacter interplay. Step into a new fantasy world and use your skill and wit to find and destroy the insidious Exodus! $54.95.

Caverns of Callisto, by Chuckles. Combines real-time vertical and horizontal scrolling with expert color graphics. Five levels of caverns are filled with treacherous monsters, boiling volcanoes, and secret passages that will challenge even the most experienced player. $34.95.

Penguin Software

Ring Quest. Hi-res graphic adventure. The sorceress Lisa has come into possession of a magical ring that corrupts its owner. As the ring's influence grows, she is beginning to wreak havoc on the inhabitants of your native land. You must travel to another dimension, track down Lisa, and reclaim the ring before she destroys everything in sight. Of course, she will try to stop you. $19.95.

Expedition Amazon. Fantasy role-playing game. You must lead an expedition deep into the Amazon rain forest to find the ruins of a fabled Inca citadel, which is rumored to hold a great secret in its underground tunnels. You command a party of four specialists. Watch them grow in skill and stamina, if they survive. $19.95.

The Coveted Mirror. Animated graphic adventure with arcade-style games included. The once-tranquil medieval kingdom of Starbury has fallen under the evil rule of the black-hearted King Voar. All that stands between him and absolute power is a single shard of a magical mirror. You must get to it first. $19.95.

Tactic 9. A colorfully animated thinking/strategy game that you play on nine fields simultaneously. It is amazingly simple yet startlingly complex. $19.95.

Bouncing Kamungas. You are a melon farmer, trying to plant and harvest your crop in the midst of a lightning storm while the kamungas bounce out of the sky and smash your melons. Your only defense is a pitchfork, which unfortunately also attracts the lightning. As if that weren't hazardous enough, when you harvest enough melons, you must try driving a truckload to town for delivery. $19.95.

Crime Wave. Arcade action chase game. Every felon in town is trying to knock off a bank in order to raise the money to buy the latest in anti-peace officer technology: the dreaded Robot Rammer! Hop into your trusty blue cruiser and see if you can round up the robbers. Mockingboard Speech and Sound board option. $19.95.

Thunderbombs. Arcade shoot-'em-up. Out for a cruise in your interstellar cloudship, you find yourself suddenly in the midst of a swarm of alien dronebombs. Trapped in deadly crossfire, your only recourse is to dodge and fire back as fast as you can to destroy the waves of attacking aliens. Mockingboard Speech and Sound board option. $19.95.

Pie Man. Nonviolent arcade fun. When the pies come out of the oven, put whipped cream and a cherry on each one and put them in the pie bin. Watch out for grease spots, flour sacks, and the slightly tipsy wedding cake baker. If you let seven pies fall to the floor, you are fired. $19.95.

The Quest. Graphic adventure. As King Galt's newest advisor, you must accompany his champion, Gorn, on a quest to rid the kingdom of a vengeful dragon. There are many ways to arrive at the game's solution. With over 200 locations and a parser that accepts full and multiple sentence instructions, *The Quest* fills two sides of a disk. $19.95.

Transylvania. In this hi-res graphic adventure, you search all of Transylvania in order to find and rescue the Princess Sabrina. You encounter vampires, werewolves, and many other sorts of creatures as you explore the forest and castle. Put the clues together in time, and the Princess is saved. If you fail, she dies at dawn. *Transylvania* uses over 100 colors and superb graphics to provide hours of enjoyment for all adventurers. $19.95.

Minit Man. Two arcade games in one. Your silos are empty, awaiting three interceptor missiles that are loaded on trains on the other side of the gorge. You have to stop the enemy's robots that not only have shattered the bridge across the gorge, but also have penetrated the building complex to sabotage your missile launch computer. $19.95.

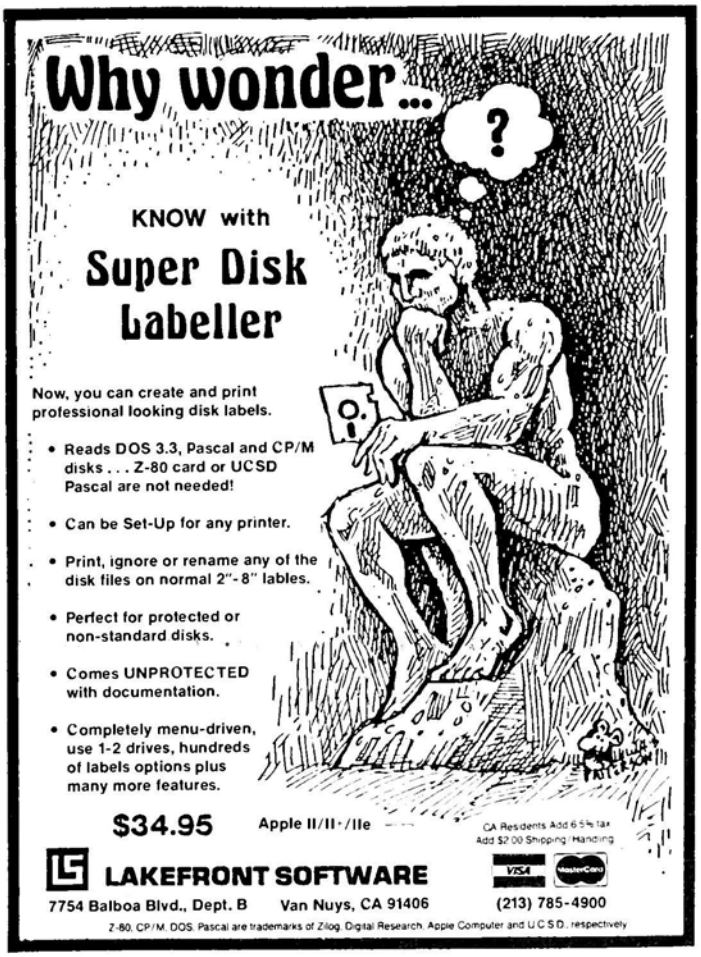
Pensate—The Thinking Game. An original thinking game of evasion. The object is to get to the top of an eight-by-eight grid while avoiding all other playing pieces. The computer has ten types of pieces, each of which moves in a distinct pattern relative to the player's move. Multiple play options. One and two-player modes. $19.95.

Spy's Demise. Fast-action arcade game. Gather dossiers, tapes, and microfilms from each floor of a Soviet diplomatic mission. You must avoid the embassy guards, who make frequent rounds in elevators at unscheduled intervals. A prize is yours if you crack the secret code in time. $19.95.

The Spy Strikes Back. Fast, real-time action arcade/strategy game. The spy is back to thwart an international terrorist's threat. Can you help him evade the electronic guards while searching the 120 sections of a five-story castle? A prize is yours if you put the clues together in time. $19.95.

Phoenix Software

Mad Rat, by Logan Zintsmaster. Three blind mice are trapped in Zacks Sixth Avenue department store. Danger lurks everywhere. Their



captor takes a perverse pleasure in throwing cheese at them for food, then makes it downright dangerous for them to get to the cheese. However, the mice have one hope: you. Your deft maneuvering can save these poor little souls. $24.95.

Masquerade, by Dale Johnson. Solving this graphic adventure could make you $1,000 richer. Anyone solving this adventure is asked to submit his or her final score to Phoenix Software. From the correct entries, Phoenix will award one lucky adventurer with $1,000. So, sharpen up your skills. Multiple solutions to tough puzzles will keep you working for many hours. Full color. $34.95.

Gemini, by John O'Fallon. The fate of the universe rests on your shoulders. An evil space lord and his legion of fighting robots have annihilated the last outpost of the rebel forces. You alone are left to defend the galaxy. You will be terribly outnumbered. $19.95.

Queen of Phobos, by Bill Crawford and Paul Berker. Set in deep space aboard a derelict starliner, this graphic adventure pits you against four computer-generated opponents. Your mission is to get the famed Mask of Kuh-Thu-Lu and get out alive. Only the strong will survive. $34.95.

Bats in the Belfry, by Samuel Moore. It's rough work being a novice netter with the Swat and Squash Exterminators. Your first job takes you to an old schoolhouse infested with bats. You must catch and dispose of them before they reach the belfry. See if you can make the exclusive club of Bat Masters. $29.95.

Adventure in Time, by Paul Berker. Using all their wits, experienced players will race through time in an effort to save the world and capture a master criminal. Exciting text adventures. $29.95.

Birth of the Phoenix, by Paul Berker. An adventure tutorial designed for the novice. Learn the tricks of solving the more complex adventure games: mapping, dealing with locked doors, light sources, and so on. $22.

Sherwood Forest. You have a chance to save Robin Hood. He does not remember that he has vowed to tie the knot with fair Maid Marion on this very day. You must lead Robin out of his amnesia and into wedlock, all without getting our hero killed. This graphic adventure features full-color animation. $34.95.

Quality Software

Ali Baba and the Forty Thieves. Encounter sultans, thieves, fierce and friendly creatures as you guide your alter ego, Ali Baba, through the thieves' mountain den in an attempt to rescue the beautiful princess. Treasure, magic, and great danger await you. $32.95.

Beneath Apple Manor. Special edition of the first Apple fantasy game. Includes hi-res graphics, faster moves at lightning speed, sound effects, more monster types, more magic items, a deeper dungeon, and a save-game feature. $32.95.

Pro Poker. Now you can play eight-handed poker any time you want. An excellent way to improve your poker skills. Fun, but it's much more than a game. An extremely interactive program and a complete poker tutorial that will improve your poker-playing skills. $39.95.

Space Vikings, by Mitch Robbins. An adventure in deep space. The galaxy is in rebellion, you command a Federation Starship, and your Viking troops are ready for battle. The fate of every star system is in your hands. Will you reunite the Federation or become the terror of twenty worlds? $49.95.

Escape, by Ed Eaglehouse. A challenging game of skill and strategy. You've just broken out of your cell in a maximum-security prison of the future. The electronic guards have been alerted and are closing in fast. Your stolen laser has eight shots left. Can you escape? $29.95.

Roadblock, by Terry Eagan. An arcade-strategy original with fast action and hi-res graphics. As county sheriff, you must dispatch your patrol cars to surround and capture a fleeing bank robber. Since his getaway car is faster than your own pursuit vehicles, you'll have to think ahead and develop a workable envelopment strategy if you want to keep your job (and improve your score). $29.95.

Zendar, by Terry Eagan. An economic-defense simulation for strategy game enthusiasts. You have been given absolute ruling power over one country on the continent of Zendar for a period of ten years. You must allocate aid and resources, annex other countries, make trade agreements, and defend your borders from enemy attack. Many variables make for an infinite variety of strategic possibilities. $29.95.

Frontline, by Terry Eagan. A fast-paced battle of wits and strategy for one or two players. Enemy forces are trying to break through one of your frontline sectors; you respond with the troops, tanks, and planes at your command. Then press your attack and attempt to penetrate the enemy line. Requires quick offensive and defensive tactical maneuvering. $29.95.

Rainbow Computing

Stellar Defense, by Tom Burlew. The peace treaty with the Machiavellian Cartel has failed as the Confederation of Planets comes under attack. Also, the treacherous Sadic Empire pursues a covert campaign of hostility. You, the captain of the only operative spaceship, are charged with the defense of the Confederation. $49.95.

Pot O' Gold Plus. Forty-six games. Variety of games in lo-res, hi-res, or text. Paddles required. With an Echo II, text will be spoken; otherwise, text is displayed on-screen. Includes *Othello*, *Eliza*, *Sink the Ship*, *Pinball*, *Color Math*, *Space War*, and more. $39.95.

Reston Publishing

Multiploy, by Paul Coletta. Combines features of an arcade game with mathematical operations. Offers four different operations at three different difficulty levels. Arithmetic problems in the form of invading spaceships come streaming down the CRT. Players must answer them quickly, or the Answer Base will be destroyed. The computer automatically ranks players at every skill level. $24.95.

Word Worx, by Intentional Educations. Consists of two word games on separate disks: *Myspellery* and *Sentence Maker*. Play competitively or solo. In *Myspellery*, the player must decode a mystery word using as few clues as possible. *Sentence Maker* challenges you to turn five initial letters into as many grammatically correct sentences as you can. $34.95.

Apple Graphics Games, by Paul Coletta. A book/disk combination with ten completely documented games using Applesoft, sound, and hi-res graphics. Games include *Spider* (control a fly whose goal is to eat the spider's eggs); *Piano* (using Apple II as a concert piano); *Pairs* (match wits with the computer) and *Poker* (play a game of five-card stud with an opponent). Book/disk, $30.

Rhiannon Computer Games for Girls

Jenny of the Prairie. A spunky pioneer girl becomes separated from her covered wagon train and must face the advancing winter alone. Jenny's job is to gather nature's provisions from a hazardous environment. Engaging, hi-res graphics accompany many hours of fun and interactive discovery, for children of ages seven through twelve. $34.95.

Chelsea of the South Sea Islands. A nineteenth-century British girl becomes stranded on a small Pacific island while traveling to boarding school in England. With her pet kiwi, she explores for native treasures and confronts tropical dangers. For children of ages seven through twelve. $34.95.

Cave Girl Claire. Claire loves to wade through the tall grasses to watch the Woolly Mammoth. Her skillful fire-tending can ward off wild animals, but her extended existence depends on seasonal foraging for food and medicinal plants. For children of ages seven through twelve. $34.95.

Lauren of the 25th Century. Lauren takes over responsibility for maintaining a tenuous reclamation project at a sun-baked desert outpost. The blazing sun provides plentiful solar energy, but also threatens the fragile life forms she has pledged to protect. An interactive adventure with surprises and imaginative, hi-res graphics, for children seven through twelve. $34.95.

Rocklan

Diamond Mine. Ready to begin an exciting quest for fabulous diamonds far below the earth's surface? Then hop into your subterranean mining vehicle and get ready for a fast-paced arcade game that puts your reaction time and strategic thinking to the test! $34.95.

Howard W. Sams

Bermuda Race, by John Biddle and Gordon Mattox. If you'd rather be sailing, try this ultimate test for any sailing enthusiast, novice or expert. Simulates the blue-water sailboat race from Newport, Rhode Island, to the island of Bermuda with vivid hi-res displays that let you chart your progress and find out how good a sailor you are. On-line tutorials teach you sailing terms, and a clear, concise instruction manual

helps improve your race against time, your opponent, or yourself. $29.95.

Caves of Olympus, by Thomas and Patrick Noone. In this adventure, you are the only good-guy robot left on the planet Olympus, which is under siege by hostile invaders. Hi-res color, with many special effects. $29.95.

Regatta, by Joseph DeMuth and Eric Peterson. Here's another chance to sharpen your sailboating skills! Allows complete control of tiller and sails as you race a friend or the clock around your choice of four different courses. On-line instructions let you review your controls and the rules of the game instantly, while colorful hi-res screen displays bring you the true flavor of sailing! $29.95.

Voyage of the Valkyrie, by Leo Christopherson. Bursts of music from three different Wagnerian operas cheer you onward as you battle giant Scandinavian war birds in your quest to conquer the island of Fugloy and claim its gold. Pick your level of difficulty from ten possible choices. Animated graphics; includes blank island maps. $29.95.

Sansoft Plus

Strip Blackjack. An adult computer card game. Play strip blackjack with Chyrl. A picture disk with four additional women and two men is available. $29.95.

Lucky Slot. Simulates a colorful slot machine. Allows different amounts to be bet; even allows you to buy odds. Winners' names saved to disk to challenge future players. $14.95.

S-C Software

S-C Games Disk. Pit your wits against the Apple. Includes *Cubic* (three-dimensional tic-tac-toe), *Tone Concentration* (like Simon), *Lo-Res Space War*, *Numeric Mastermind*, *Lo-Res Jig-Saw Puzzle*, and several more. Both Integer Basic and compiled versions included on disk. $15.

Sensible Software

Quadrant 6112. Maintain your position against swarms of alien starships as they attack your lone fighter ship. You must save the quadrant from the aliens, and you must do it alone. $29.95.

Cyclotron. Destroy the evil Mangan devices before they damage your cyber crystals—the heart of the Cyclotron. If the Cyclotron is destroyed, Mangan forces will take over the empire. How long will you be able to hold out? $29.95.

Sentient Software

Cyborg. A science fiction adventure written by a science fiction author. *Cyborg* allows full sentence input from the player. This text adventure contains character development and animals to whom you can talk. $34.95.

Oo-Topos. Adventure written by a science fiction author. Complete a dangerous outer space mission for the Galactic Council. $32.95.

Gold Rush. Avoid renegade Indians, ferocious grizzly bears, and unscrupulous claim jumpers in this fast action, hi-res graphics game. Survive the hazards and stake your claim in the gold-rich mountains of Colorado. $34.95.

Congo. Rescue suvivors of a lost expedition as you float down from the headwaters of the raging Congo river. Avoid wild animals, natives in their war canoes, and dangerous rapids on your quest for the missing survivors. $34.95.

Sierra On-Line

Crossfire. Aliens attack from all sides. An ever-dwindling supply of ammunition keeps you on your toes. $29.95.

Frogger. Hippity-hop across crowded highways and alligator-infested streams to your riverbank home. If the gators don't get you, the clock will. $34.95.

Sammy Lightfoot. More than just another climbing game, Sammy climbs, bounces, swings, and jumps his way through multiple levels of circus fun. $34.95.

Apple Cider Spider. As a little spider, you can have lots of fun on your way through a cider factory. Be careful, though; rolling apples, moving blades, conveyor belts, and apple mashers can smash you like a bug. Also stay away from those frogs and birds. $34.95.

Ultima II. Create your own personality and venture through dungeons and castles, land and sea, space and time to overcome Minax's evil reign. $59.95.

Dark Crystal. Become Jen, last of the Gelfling race, and return the shard to the dark crystal before the next great conjunction. Fail and the reins of power will remain in the clutches of the evil Skeksis. $39.95.

Sirius

Capture the Flag. A unique action game with color graphics and music. The player competes against the computer using keyboard, joystick, or game paddles. Each player begins in a different section of the playing field and has his own three-dimensional view of the maze. The invader tries to find the exit that leads to the flag while the defender tries to capture the invader, resulting in a hilarious chase. $39.95.

Escape from Rungistan. An adventure game featuring music, animation, and arcade sequences. The player finds himself in a jail cell in Rungistan, due to be shot at sunrise. His task is to escape the jail and then the country. Needless to say, there are plenty of obstacles to prevent him from doing so. $29.95.

Flip Out. The first marble-type game to appear in video format. Playing against the computer or a human opponent, each player tries to prevent the other's marbles from dropping through one of nine different playing courses by trapping them in gates. The gates flip to release or trap marbles in a chain reaction as each marble is dropped. $29.95.

Fly Wars. Features a Spider-Fighter, the sole survivor of an alliance of spiders who dared to challenge the tyranny and oppression of the Raygunites. Ensnaring flies in the web he spins, the player finds them regenerated into caterpillars armed with Rayguns. If he can trap them as well, while dodging their fire, they turn into explosive cocoons. Beetles and bug spray are among the other weapons of the heartless Raygunites. $29.95.

Free Fall. A humorous game that has the player falling through space collecting treasures and avoiding deadly showers of needles, bombs, and guns on his way to safety holes in the ground. The game features colorful graphics, three levels of difficulty (each with three playing screens), and a choice of keyboard, game paddles, or joystick. $29.95.

Gorgon. A computer version of the well-known arcade game licensed

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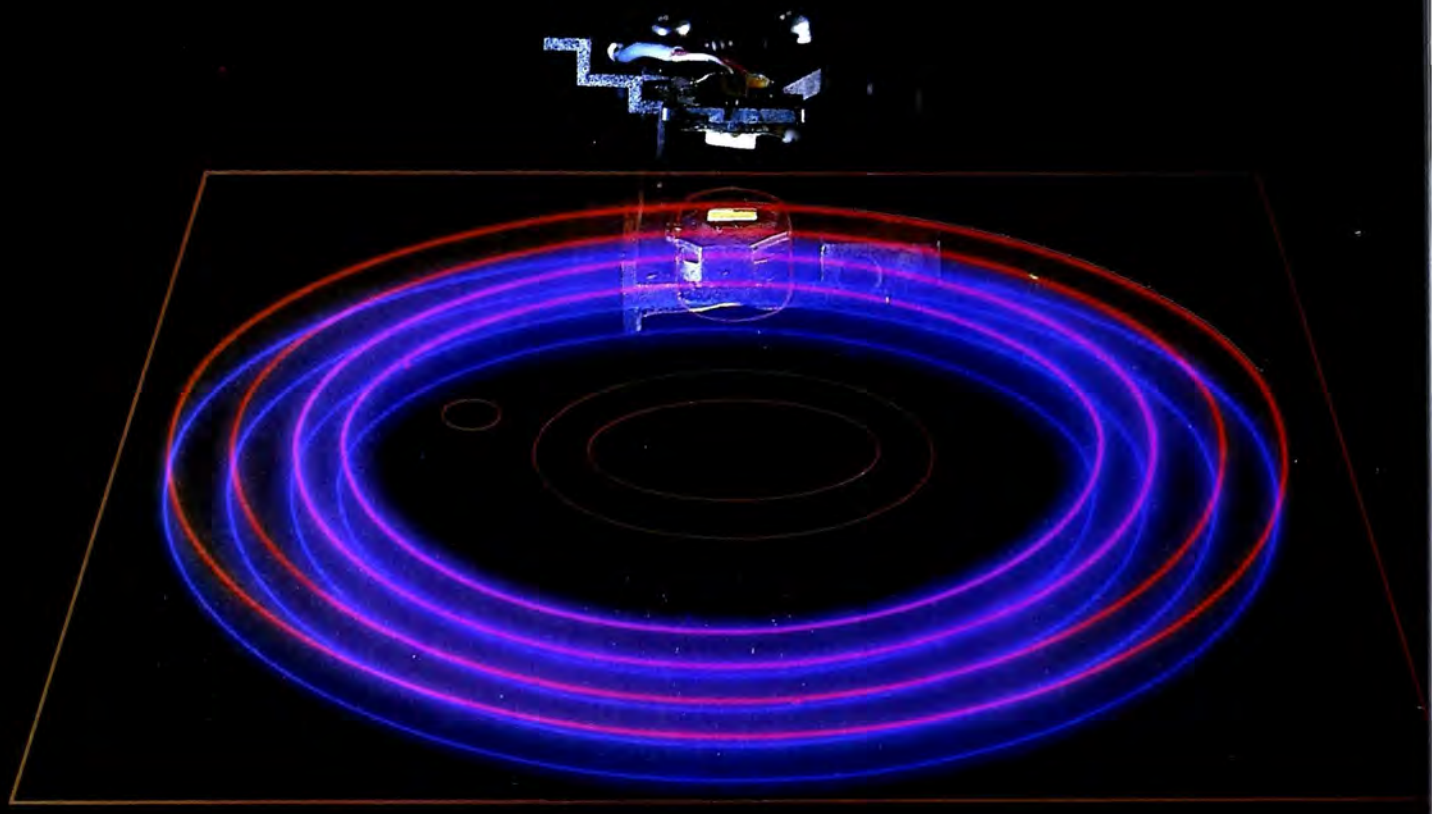

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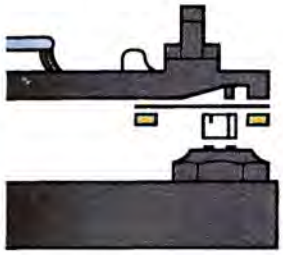

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It takes 4½ Apples to equal the capacity of our superior Elite Three



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.

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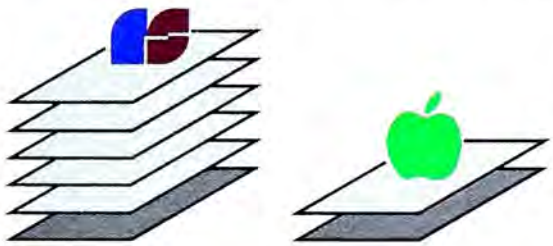

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from Williams Electronics. Gorgons are ripping through the atmosphere, snatching up helpless humans in their talons. The player in his fighter plane must attack and destroy the Gorgons, cut speed, dive, and rescue the now-falling people, returning them safely to earth. Radar and hyperwarp control assist him in his mission. $39.95.

Kabul Spy. An adventure game set in Central Asia. The player crosses the Afghan border with the help of a guide and then sets out alone to rescue and secure the secrets of the imprisoned Professor Eisenstadt. The in-depth plot, extensive vocabulary, and colorful graphics make *Kabul Spy* an intriguing adventure game. $34.95.

Plasmania. An arcade-style game simulating a voyage through the veins of a critically ill patient in order to find and destroy a life-threatening blood clot near the patient's brain. In a race against time, the player must maneuver carefully, avoiding and/or destroying the defense cells, bacteria, antibodies, and enzymes that threaten his mission. $34.95.

Repton. A complex arcade-style game requiring both strategy and skill; duo-directional scrolling, option keys, and unlimited levels of play. The player must stop Quarriors, Spyes, Draynes, and others from stealing Repton's energy and building an enemy base. *Repton* T-shirt transfer included. $39.95.

Snake Byte. Lets the player control a snake as it eats apples on its way through a series of twenty obstacle courses. The snake's length and speed increase with each apple he eats, making it more and more difficult not to bump into obstacles, himself, or the optional Perilous Purple Plums. In addition, penalties are exacted if the snake eats his apples too slowly. $29.95.

Sneakers. A multiphase arcade game in which the player must battle a variety of colorful animated creatures, including Sneakers, Cyclops, Saucers, Fangs, H-Wings, Meteors, Scrambles, and Scrubs. Eight separate attack scenarios are featured on each of five levels of difficulty. The player also gets bonus ships for completing each level. $29.95.

Space Eggs. An arcade-style game in which the player cracks open flying orbs with his ship's phasers and then has to deal with what he's hatched. Spiders, Wolves, Lips, and Fuzzballs must be destroyed before they attack. Each package includes a multicolored T-shirt transfer proclaiming, "I Fried the Space Eggs!" $29.95.

Wavy Navy. A battle on the high seas featuring amusing graphics, maritime music, and three levels of skill, each including a number of progressively more challenging rounds. Kamikaze fighters, helicopters, and Exocet missiles assail the player from the air as he tries to cope with huge rolling waves that continually change his position and expose him to mines in the water. One to four players. $34.95.

Twerps. Combines a number of arcade genres into a multilevel space scenario. The player controls Captain Twerp, on a rescue mission to save fellow Twerps from various perils, not the least of which is his own limited supply of fuel. Players must develop strategies to deal with Orbitors, Glingas, and Gleepnoks. Modulated sound effects give the sense of distance. Eight levels of play. $29.95.

Type Attack. Teaches typing skills in a fast-action arcade-style game. Giant groups of words and letters falling from the sky can only be repelled by typing the same words or letters on the computer keyboard. The game includes thirty-nine preprogrammed lessons, a Lesson Creator, with which users can design their own lessons, and a real-time words-per-minute bar with player-selected speeds from one to ninety-nine. $39.95.

Wayout. A three-dimensional action game featuring twenty-six different mazes, each with its own set of interesting quirks that challenge the player searching for a way out. Drifting fireflies give clues as to the direction of the exit, and the player must always be on guard against the mischievous Cleptangle, which is continually trying to steal the player's compass and mapmaker. $39.95.

Beer Run. A whimsical game featuring hi-res color graphics and several levels of play. The player climbs to the top of the Sirius building via ladders and elevators. Once on the roof, a blimp transports him to the Olympia building, which he must climb down. He must avoid the guzzlers and bouncers who try to stop him along the way and catch falling cans of beer dropped by Artesians. $29.95.

Blade of Blackpoole. An advanced adventure game with numerous puzzles to baffle and challenge the player as he tries to find the magical sword Myraglym. The program has provisions for storing and returning to up to ten stages of play, permits the player to string multiple actions into single commands, and has a large vocabulary. $39.95.

Buzzard Bait. Pits the player against man-eating birds who prey on humans in order to feed their young. The player is on a rescue mission to save the people from their fate. A bonus round for the successful player offers a second play segment. $34.95.

Sir-tech Software

Wizardry. A ten-level fantasy role-playing program that will hold you spellbound. Breathless adventuring awaits you at every turn. $49.95.

Knight of Diamonds. The second scenario in the *Wizardry* universe. Requires thirteenth-level characters created in the first scenario. All six levels will keep you on your guard. You can never be sure of who or what you will meet at your next encounter. $34.95.

Legacy of Llylgamyn. The third scenario in the *Wizardry* saga features new window graphics, as seen in the Apple Lisa computer, that enhance the challenges awaiting you at every turn. Characters from either scenario one or two are needed to play this game. $39.95.

Wiziprint. A must for *Wizardry* fans. This character printout utility records information such as known spells, attributes, and gold pieces of your characters quickly, neatly, and in an easy-to-read format. Compatible with all *Wizardry* scenarios. $24.95.

Police Artist. A fun way to help develop memory and recognition skills in children and to sharpen these skills in older players. In the game, the player is an eyewitness to a crime and must remember the culprit's face in order to identify him in a police lineup or to construct a likeness from a catalog of face parts. $34.95.

Star Maze. A hi-res arcade game. Player must venture through a maze while trying to pick up power crystals. Also must eliminate enemy ships and keep an eye on a limited power supply. $34.95.

Galactic Attack. Real-time simulation of space wars. To complete your mission, you must travel to planets, hold off enemy armies, and transport human armies to gain control of the planets. Meanwhile, you must conserve your resources in order to be able to fight off the Kzanta Star marauders that try to destroy you. $29.95.

Softdisk

Chiang Chest. A two-sided, unprotected disk filled with games, utilities, and adventures. *Man-Eng, Master of Evil* is a hi-res adventure that occupies an entire side of the disk. Also get *Space Gorn*, *Hi-Res Movie*, *Volume Name Changer*, and more. $9.95.

Super Trivia and the Best of Larry Selzer. A two-sided, unprotected disk packed with programs, quizzes, games, utilities, and tutorials. Get a fast-paced trivia game with over 300 questions, a physics demo, a space game, and a page-flipping tutorial. $9.95.

Warp and the Best of Dan Tobias. A two-sided unprotected disk with fifteen programs. In *Warp*, explore the many worlds of space and time to escape the clutches of an evil scientist. *Planet of the Robots*, *Musician*, and more. $9.95.

Carrier Lander, by Roger Wick. Simulate landing your jet fighter on an aircraft carrier. As an added bonus, there are four pinball games on the back of the disk, which is two-sided and unprotected. $9.95.

Softsmith

The Island Prison. Do you have keen intelligence, sharp memory, and a passion for mystery? If you can answer yes to any of these questions, you may be able to escape from the island and gain freedom. Or you may be the ideal prisoner, a perfect candidate for brainwashing. $32.95.

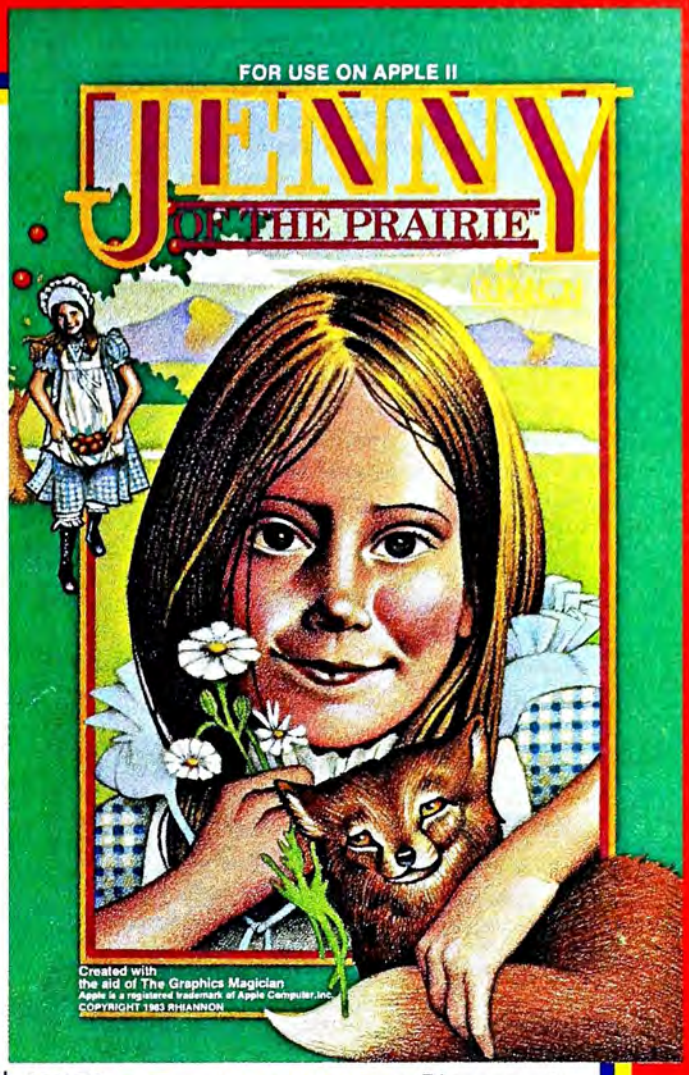
Southwestern Data Systems

Bezare. First hi-res arcade game written by an alien. Part of the rules are to discover the rules. Plenty of action with succeeding levels offering new challenges. $34.95.

Norad. A hi-res, high-speed "wargame" that challenges you to defend the entire continent against a nuclear onslaught. The advantages of using a little strategy in your playing and the unique game design make this more than the usual "shoot-'em-up" game. $34.95.

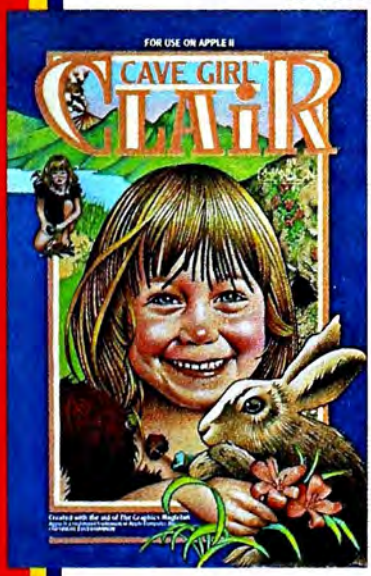
Starfire Games

Casino Master. Gambling can be a very expensive pastime, especially if you don't know how to win. *Casino Master* provides the op-



Rhiannon brings girls and computers together.

When your little girl sits down to play with Jenny, Chelsea, Lauren or Clair, she is learning how much fun a computer can be. Our heroes capture her imagination and our graphics make her smile. We give her time to explore, to experiment, to be enchanted. We did not design these games to be fast, we designed them to be endlessly fascinating.





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portunity for you to develop winning skills for seven different casino games. Each game is accurately simulated in full-color graphics with exciting animation and realistic sound effects. $34.95.

Global Thermonuclear War. Match your wits against the computer and prevent WW III. Be prepared to fight with a full arsenal of state-of-the-art tactical and strategic weaponry. Game features Hal speech synthesis, exciting color graphics with animation, realistic sound and special effects, and skill levels (joystick play optional). $34.95.

Time Machine I. The first in a series of challenging time-travel adventure games. Catapults you into mind-bending mystery where the extraordinary is commonplace and dangers are as real as any human experience. Features exciting graphics, animation, and realistic sound and special effects. $34.95.

SubLogic

Flight Simulator, by Bruce Artwick. Combines superior flight simulation with state-of-the-art animated three-dimensional graphics. Practice takeoffs and landings, steep turns, rolls, and other aerial maneuvers. If you feel in control of your plane, declare war and head into enemy territory where your mission is to destroy the enemy's fuel depot. $25.

Night Mission Pinball, by Bruce Artwick. Arcade simulation program with five bumpers, seven standup targets, nine rollovers, two spinners, and much more. Comes with ten preset modes of play. Forty user-adjustable program parameters let you create and save up to 100 custom modes of your own design. Paddles are recommended but not required. $34.95.

Saturn Navigator, by Wes Huntress. Challenge your intellect with this beautiful hi-res simulated space flight from Earth to Saturn. Maneuver your spacecraft into an optimal approach trajectory, place the ship in orbit, and rendezvous with the orbiting Saturn space station. Sophisticated three-dimensional graphics provide an out-the-window view of the ringed planet during your approach. $34.95.

Superior Software

The Quest for the Holy Grail. Search through forests and monaseries of Merrye Olde England for the Grail and encounter dragons, killer rabbits, black knights, wanton wenches, man-eating trees, fair maidens, and many others. $24.95.

Doom Valley. Classic adventure game with features such as game-save and music. Search for and save plane crash survivors. Copyable, listable, and modifiable. $19.95.

Asteroid Belt. Fast-action arcade game. Written in assembly language, with source code included for advanced programmers. $24.95.

Telephone Software Connection

Computer Concentration, by John Price. A computer version of the Concentration game. Locate matching pattern pairs in as few turns as you can. Has both color and black-and-white versions for either one or two players. $25.

Three Sigma

Space Spikes. Ground-to-air, air-to-air, and air-to-ground action awaits you. Defend yourself against falling projectiles, kamikaze pilots, and the deadly laser batteries. In the finest tradition of space shoot-'em-ups. Requires joystick. $20.

Vega$ Video. Before venturing to Lost Wages, Nevada, or to the new casinos in Frantic City, New Jersey, sharpen your skills with *Vega$ Video*. Enjoy fast hi-res action as you bet against the house in five-card stud, red dog, and draw poker. $20.

Top-Notch Productions

Pollywog, by Alan Wootton. Player controls a school of pollywogs. Eat the algae (but beware the creepies and killer fish) and watch yourself metamorphose into a frog. Lay your own eggs and bring more pollywogs into the world. Reach the highest stage of the pollywog life cycle and you're a prince! Sixty-four levels. $29.95.

Turning Point Software

Pentapus. Your journey begins deep in outer space in a vast and uncharted region of another universe. To return home, you must control the stargates between universes. *Pentapus* is one of the few games a human can win and includes all those features you've come to know and love. $29.95.

Ultrasoft

The Mask of the Sun. The premiere release of a series of challenging and truly enjoyable animated adventures. The graphics and animation are created by a professional artist and Ultravision, Ultrasoft's exclusive graphics language. You see and feel your movements; traps have more realism; puzzles are more involving. Sound, upper/lower case text, and acceptance of English sentences as commands. $39.95.

The Serpent's Star. In the second of a series of animated adventures, the search for the Serpent's Star takes Mac Steel into the hostile Himalayas of Tibet. Ultravision makes possible fabulous hi-res graphics and animation. Enhanced text handling and vocabulary, sound effects, and state-of-the-art graphics. $39.95.

United Software of America

Survival Adventure. A helicopter drops you deep in the midst of a dense jungle. You have only twenty days to complete your mission and rendezvous with the helicopter. $24.95.

Robot Battle. You have been deposited onto the surface of the planet Gamma Hydra IV to repel robot invaders that have taken over control of the planet and are subjecting the colonists to Robotization (a painful process whereby the human body is transmuted into a robot). Your mission (whether you decide to accept it or not) is to destroy as many robots as you can and to save the colonists. $29.95.

Bug Battle. Armed only with your trusty can of bug spray you must defend your garden from giant caterpillars, spiders, and the weed-planting next-door neighbor. $22.50.

Star Dance. Do you have the skill to balance a nova star or capture a blazing sun? You'll find out when you take the master control with *Star Dance*! $24.95.

Space Raiders. Take command of your star fighter for the ride of your life! Blast off through hyper-space to different sectors of the galaxy to save the federation star bases from alien invasion! $24.95.

Versa Computing

Battlesight. A real-time tank warfare simulation on a hi-res, three-dimensional battlefield. Player has five M60A3 tanks dug in on high ground overlooking the enemy's avenue of approach. This is not an arcade game against relatively defenseless Klingons, but a realistic simulation involving well-equipped and trained adversaries. $39.95.

Wolffware

Sports Complex. A set of three sports simulations—baseball (Applesoft), football (Integer), and golf (Applesoft). Baseball uses real player stats; disk includes fourteen teams and utility to add more. Football pits player versus player or computer. Twenty-eight offensive plays, thirteen defensive formations. Golf consists of eighteen-hole course in graphics. $30.

Xerox Education Publications

Fat City. Get in a wrecker and see how many buildings you can flatten before flying garbage cans flatten you. Nine towns. Disk, poster, stickers, instructions, vinyl binder. For ages eight to ninety-nine. $39.95.

Chivalry. A fantasy board game/computer game. Play twenty arcade-style games in your quest to rescue the king. Disk, gameboard, playing pieces, poster, user's guide. One to four players. Ages eight to ninety-nine. $49.95.

Stickybear Basketbounce. Win points by catching objects—before running out of baskets, getting clunked on the head, or being tripped. Sixteen rounds. Disk, poster, desktop mobile, stickers, instructions. Ages three to ninety-nine. $39.95.

Old Ironsides. Maneuver your ship and outwit your opponent in this two-player game. Use powder magazines, compasses, cannons. Graphics re-create real sailing experiences. Disk, poster, log book, binder. Ages eight to ninety-nine. $39.95.

Stickybear Bop. Animated shooting galleries of juggling Stickybears, ducks, planets, balloons, and more to knock off the screen while ducking falling sandbags. Disk, game, poster, stickers, instructions. Ages three to ninety-nine. $39.95.

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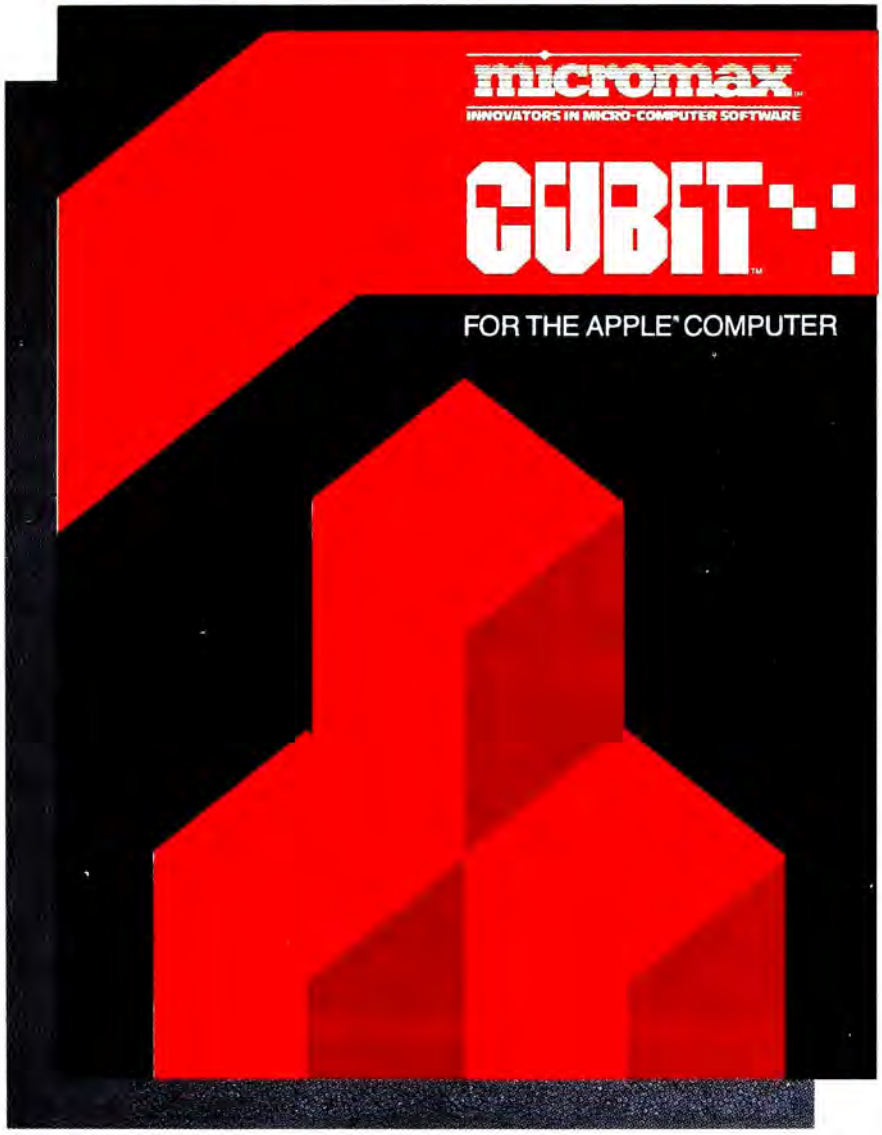

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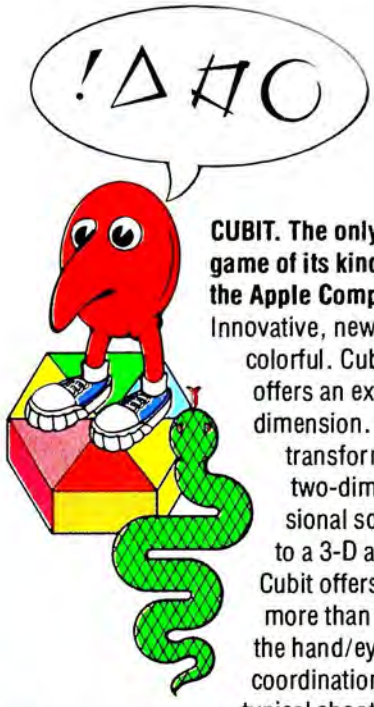

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Bursar Student Activity Fund Accounting System. Keeps track of funds generated by such extracurricular activities as athletic teams, marching bands, newspapers, yearbooks, scholarships, and student councils. A comprehensive system, providing everything from receipts to printed reports. No accounting background needed. $195.

Energy Monitor. Energy-use monitoring system tracks energy use within a single building or for as many as ninety buildings. Accounts for energy units, energy expenditures, and energy use relative to climatic variables. Produces a set of six reports that contain information on how much of each fuel type is used in each facility on a month-by-month basis, as well as comparing this year's consumption to last year's. $245.

Equip School Equipment Inventory System. An equipment inventory program designed specifically for schools. It enables education managers to allocate, locate, and account for all the physical assets of a department, school, or school system. $195.

Micro-DSS/Analysis. Provides the materials executives need to make the best possible decisions. Designed for ad hoc analysis, it does not impose a fixed approach to analysis. *DSS/A* lets you explore relationships between different kinds of data in minutes. It is explicitly designed to provide flexibility by combining the tools needed for effective decision making. $495.

Micro-DSS/Finance. Microcomputer modeling with mainframe power gives financial planners and managers the full power of a comprehensive planning, analysis, reporting, and graphics system on a desktop computer, combining the ease of built-in standard functions with sophistication that enables you to manipulate, cross-reference, and rearrange information as though you were using a large computer system. $795.

Purchase. Annual school purchasing system. Makes a school's annual ordering process a cost-effective system. *Purchase* compiles specifications, computes quantities and prices, and prints all necessary forms. Use in a single department, school, or an entire school system. $195.

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Printer Sharing Units and Port Expanders. For business computers. Allows sharing of printers by multiple work stations, as well as expansion of computer ports. Manual and intelligent data switches available for RS-232C or parallel interfaces peripheral networks. Twenty-four-hour ASCI Express Service for business needs. $60 to $200 per port.

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Budget Analysis. Extension module to farm accounting permits budgeting based on the previous year's data. Percentage increases or decreases can be made across the board. Actual versus projected performances can be presented as a graph on the screen or printed. Compare current budget with previous year's budget. $150.

Cash Flow Analysis. Extension module to farm accounting or standalone product. Cash flows can be generated for one year in the future or up to five years. Provides condensed listing or detailed listing. Four graphs are provided. Period comparison, expense percentage graph, operating loan analysis, net cash comparison. $150.

Corn/Soybean Management. Contains five different programs: *Grain Storage Decisions*, *Harvest Loss Calculations*, *Crop Yield Calculator*, *Field Population Calculator*, and *Planter Calibration*. You can adjust variables to determine how much crop to store and when to sell. Also determine combined efficiency, estimate yields, and establish the right plant population. $140.

Crop/Livestock Profit Projector. Use on any type of farm enterprise. Designed to answer two important questions: What should I produce and how much should I produce? It projects profits for specific enterprises based on expected production costs and market conditions. Built-in "what if" allows in-depth analysis. Bar graphs are generated to illustrate expenses as percentage of income. $95.



Crop Record Keeping. Crop and field information can be kept on an unlimited number of topics. Subject areas such as plowing, disking, planting, and harvesting. Plant population, row spacing, fertilizer applications and costs, weather information, and special comment section for your own input are provided. Graph comparisons can also be generated. $600.

Enterprise Analysis. Extension module to *Farm Accounting*. Generate specific profit and loss reports for each of your farm enterprises. Generate this information on the enterprise as a whole or account by account for the enterprise and on a "per" basis defined by you (per CWT, per acre, per pound, and so on). $150.

Farm Accounting. You have double-entry accuracy with single-entry ease. Cash or accrual basis; 250 account capacity. Select your chart of accounts from six predesigned farm charts of accounts, then change and update them as you wish. Control the length of accounting period and sequence of report printouts. $600.

Business



Financial Management. Contains five programs, each dealing with a different area of money management. The *Land Purchase Analysis* program lets you make an in-depth cash flow analysis before any purchase is made. Accurately calculate cash flow per acre, ratio of borrowed money versus market value, loan balance, and many other parameters. Also on the disk are *Depreciation Schedules*, *Farm Profit Analysis*, *Loan Cost Calculator*, and *Interest Income Calculator*. $140.

Machinery Management. Contains four programs for operation cost estimation that help you calculate total fixed and variable costs of any piece of machinery. Also programs that let you determine the benefits of leasing versus buying machinery, and ownership versus custom hiring. $140.

Market Charting. Helps you make commodity buying and selling decisions based on thorough market information. Up to thirty-two commodities can be charted. Bar charts, point and figure charts, basis charts, and spread charts can be generated. Complete with zoom and forward and backward tracking of each commodity. Trend lines can also be generated. $450.

Swine Management. Contains four programs: *Swine Ration Analysis*, which also graphs your adequacy of ration, *Feeder Pit Analysis*, *Hog Selling Decision*, and *Sow Productivity Calculator*. $140.

Swine Record Keeping. Record information for swine producers. Breed types, management practices, gestation actions, death causes, culling flags vital to decision making, production targets to meet user specifications. Weekly worksheets printed for open and available swine. Data entry can be made by groups or by individual animal. Breeding inventory, sow productivity, sow history, pig death, boar conception rate, and production target reports can be generated. $600.

VisiCalc Templates. Work with the popular *VisiCalc* program. Business management, cow-calf herd management, crop management, feed-lot cattle management, machinery management, swine farrowing management, swine finishing management. Set-up files to speed up

manipulation of the template, as well as example data files, are included. $95 per volume.

Aguila

E-Setup. A printer control utility that allows the user to preset print options before using existing software. Can specify print style, line spacing, and paper control from a simple "plain English" menu without programming control codes or installing additional hardware. Printers supported include Epson, Okidata, Gemini, NEC, and Prowriter. $34.95.

Alf Products

CP/M-86. For the Alf 8088 processor card. Provides Apple users with access to a wide variety of software written to run under CP/M-86. $100.

Alpha Logic Business Systems

VC Expand. Allows you to use *VisiCalc* with Saturn memory boards to provide up to 176K of usable workspace in an Apple. *VC Expand/80* provides additional workspace and the added ability to work with eighty columns using many of the popular eighty-column boards. $69 and $89 respectively.

Alternative Software

Micropayroll. Source-listed, menu-driven, permits fifteen deductions per employee, up to 145 employees, multistate and local taxes, fixed salary, hourly, piecework, and commissions, multiple overtime rates. User-changeable tax rates. NEBS standard checks. All reports. $199.95.

Anthro-Digital

F.A.R.M. Accounting package that does accounting the way farmers do it. This is not a *VisiCalc* screen or an adapted general ledger, but a cash basis system that allows complete reporting covering crop and livestock enterprises, and so on. Produces *VisiCalc*-compatible Schedule F. Multiple checking accounts too. $395.

F.A.R.M. Aids. A set of seven *VisiCalc* templates for farmers, including *Cash Flow Summary*, *Inventory Summary and Net Worth*, *Best Crop*, *Finishing Hogs Planner*, *Feeder Pig Production Planner*, *Beef Feeder Planner*, and *Dairy Cow Production Planner*. $60.

My Secret. An effective data encryption/decryption program for any Apple II files, including graphics, text, *VisiCalc*, program, and many word processor files, even entire disks. The single password may include any keyboard character. $19.95.

Performance Manager. Runs automatically within *VisiCalc* to track performance of a project against goals or budget and give results in absolute and percentage values in comparison to previous month and same month a year ago. $35.

Rental Manager. An integrated accounting package for the apartment rental property manager. Includes A/R, A/P, GL, and tenant records, all connected for automatic posting and double-entry accounting. Fixed asset management is also included. $695.

Versacalc. A unique enhancement of *VisiCalc* that sorts *VisiCalc* screens, automates processing with menu-selectable modules, and includes an extensive tutorial on those parts of *VisiCalc* not well documented in its own manual. Easel binder. $100.

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BPI Business Accounting System. A practical, no-nonsense program. It was designed by business and accounting professionals for use in many kinds of business. It operates quickly and easily so you have rapid access to your accounting records. The result for you is a decrease in clerical/operator time and faster, more profitable response to everyday business questions. Five individual systems: general ledger, accounts receivable, inventory control, payroll, and job cost. These systems function independently and are available separately or they can interface with one another as one comprehensive accounting system. Gives you immediate capabilities in specific areas and provides for the addition of other systems when you need them. Two disk drives. $395 per module except job cost: $595.

Apple II Business Graphics. Gives you the advantage of seeing the big picture. Allows you to convert sales and stock activities, production schedules, manpower projections, quality and control data into easy-to-read, comprehensive charts and graphs. Viewing numerical information graphically gives you a sharp perspective on the figures affecting your organization. Language card. $175.

Senior Analyst II. Allows professionals to put away their pencil, paper, and calculator when tackling corporate planning and financial modeling projects. Powerful planning tool that will save time and reduce errors by making it easy to create and display different budget and planning models, profit and loss reports, cash flow projections, and forecasts. Two disk drives. Language card. $225.

Quick File IIe. Easy-to-use personal database filing system that generates reports, sorts. Fifteen fields; files as long as disk allows. $100.

Applied Software Technology

Invoicing Template. Used in conjunction with *VersaForm*, provides a powerful but easy-to-use invoicing application package. Predefined entry screen, including data entry checking and automatic calculations, format for output to preprinted invoice forms, control instructions for several management reports including sales analysis and accounts receivable, and a start-up set of forms. $49.95.

Purchase Order Template. Used in conjunction with *VersaForm*, provides a powerful but easy-to-use purchasing application package. Includes predesigned entry screen, including data entry checking and automatic calculations, format for using preprinted purchasing forms, several sets of management report instructions, and a start-up set of forms. $49.95.

Legal Office Manager. Used in conjunction with *VersaForm* to automate recordkeeping, billing, scheduling, and database management functions of a small to medium-sized law practice. Includes a system for month-end close/billing that brings balances forward. Includes *VersaForm*'s comprehensive error checking and flexible reporting. $249.

Qbase Personal Database/Reporting System. Provides greater accuracy by allowing extensive data entry checking to be built into entry screen design. Report definition has rich selection options and easy formatting of any data filed. Report instructions are saveable, with variable title or selection values available. $189.

VersaForm Business Database. Provides free-form screen design of files based on familiar business forms, with headings and column areas. Includes extensive data entry checking and automatic filing built in by the user. Flexible report function contains powerful data selection options. Easy formatting for output to preprinted forms in batch or singly. $389.

Artsci

Magicalc. A spreadsheet program that supports multiple RAM cards in any combination up to 512K. Capable of forty or seventy-column software display and eighty-column hardware display. Column widths are adjustable. Cells and columns may be made invisible to hide sensitive data. Compatible with DIF and *VisiCalc* formats. $149.95.

Magic Mailer. An automatic form letter package that will insert names and any other information into a document and print personalized letters. Automatically rejustifies the letter each time. Allows the user to enter one name at a time or accepts hundreds of names stored on disk. Capable of selected mailings. $69.95.

Magic Memory. A database designed to simplify the storage of valuable information. Simulating an address book, the database has two sets of index tabs (A-Z and twenty-four tabs you label yourself). Each tab can hold 250 nine-line records. You can add, delete, edit, sort, and transfer information with a single keystroke. $99.95.

Magic Words. An automatic spelling dictionary for checking letters and documents written with the family of Artsci word processors. The system will perform a variety of tasks, from printing a list of errors to checking and rewriting a correct document back to disk. Contains 14,000 words and has provisions for hundreds of custom user dictionaries. $69.95.

Artworx

Mail List 3.0, by Arthur Walsh. Stressing ease of use along with powerful features, this is a versatile data manager. Addresses are created, edited, added to, or deleted from your files. Entries retrieved by name, keywords, or zip code. Can be written to a printer or to another disk file for complete file management. Program will produce address labels (one, two, or three-up) and will sort alphabetically or by zip code (five or nine digits). More than 1,000 addresses can be stored on a

typical single-density disk. With minor changes to the program code, virtually any size address label can be used. $39.95.

Ask Micro

Accounting Plus II. A comprehensive accounting system that consists of the four modules needed to automate a small business's accounting process: *General Ledger*, *Accounts Payable*, *Accounts Receivable*, and *Inventory*. Other modules available include standalone *Inventory*, *Payroll Plus*, *Labels Plus*, *Invoices Plus*, *Data Plus*, and *GL Plus*. $400 to $1,250.

Accounting Plus Super IIe. Easy-to-use, cost-effective way of organizing and processing financial data into useful management information. Interactive modules supply *General Ledger*, *Accounts Payable*, *Accounts Receivable*, *Inventory Control*, and *Payroll*. $395 per module.

Chuck Atkinson Programs

Pro-Bookkeeper. Single-entry bookkeeping that gives you income and expense, pay, and tax reports. Prints checks. $199.

Quick Register. Point-of-sale inventory tracking. Print sales slips, automatic purchase orders, and price identification tags. No sorting. $250.

Avant-Garde

Ultra Plot. A menu-driven, flexible business graphics package. The user can design and print pie charts, scatter charts, bar charts, stacked bar charts, line graphs, high-low graphs, and a unique United States map chart. $70.

Ultra Plot/DIF/Datagraph. Package has all the features of *Ultra Plot* business graphics package plus a DIF interface. Interface allows the user to search, select, sort, total, or average data from *VisiCalc* or other DIF files and use the data to create business graphics. $99.

BPI Systems

Business Analyst. A cash flow manager. Accepts financial information from *BPI General Accounting*, or operates independently. Maintains budget spreadsheets, tracks P & L, and provides for business forecasting. Statements: Income, Changes in Financial Position, Changes in Net Working Capital. Reports: Ratio/Variance Analyses. $395 to $595.

Payroll. Multistate payroll program automatically calculates gross pay, tax withholdings, deductions or allowances to pay, and net pay for all employees. System can handle regular, overtime, and double-time hours; varying pay scales per employee; and integration with the CYMA *General Ledger* for complete job cost capabilities. $1,095.

Small Business. Includes complete integration of general ledger, accounts receivable, accounts payable, and payroll functions, as well as alphanumeric customer, vendor, and employee numbers. Audit files store original entry information resulting from corrections or changes to date. Twenty-six user-defined journals can be set up in the general ledger. Budgeting by account and subaccount; date sensitivity throughout the system. $1,095.

Church Management. Provides churches with computerized member recordkeeping, accounting, text editing. Features member access by name, number or group, budget projections, income accounting. Prints income statements, mailing labels, letters, newsletters, directories, geographical visitation lists, and groupings such as Sunday school and choirs. $495.

Broadway Software

Diskinvoice System. Reliable, low-cost accounts receivable package for the small business, free lancer, or professional. Written in Applesoft Basic. Generates invoices, file copies, and statements quickly and easily. Unprotected and guaranteed. Full documentation included. $55.

Broderbund Software

Accounts Receivable. Four hundred customers and 1,725 transactions per data disk—unlimited number of disks. Prints invoices, statements, aging report, customer list, mailing labels, past due notices, payment report, bank deposit slip, salesperson and department analysis. $395.

General Ledger with Payables. Two thousand ledger accounts, three levels, 255 second and 255 third locations, 200 open payable accounts, 1,000 checks per disk. Up to 1,600 open invoices. Prints trial balance report, profit and loss statements, balance sheet, checks, check register, and many other reports. It also has a user-defined report generator. $495.

Payroll. Three hundred employees per data disk, up to fifteen divisions or states, five taxable types of pay, thirty additional deduction types. Computes all necessary taxes. Prints check detail, check register, checks, W-2s, summary reports, and all necessary quarterly and annual reports for 941 reporting. $395.

BusinessMaster

BusinessMaster Plus. A fully integrated, menu-controlled general business accounting and bookkeeping software package including general ledger, accounts receivable with order entry, accounts payable with vouchers and purchase orders, payroll, inventory, fixed asset accounting, and mailing list. Requires 64K (CP/M 2.2), two disk drives, and a 132-column printer. $495.

Business Solutions

The Incredible Jack of All Trades. An integrated software package that combines word processing, file management, calculation analysis, and the ability to sort and print mailing labels all in one easy-to-use program. $179.

Cache Data Systems

Ledger, by Bruce Scott. A menu-driven double-entry general ledger, supporting forty accounts and 12,000 journal entries. Built-in reports include trial balance, journal and ledger listings. Financial report formats are user-defined and flexible. Also supports automatic posting of the journal, closing of accounts, nine special journals, and journal consolidation. For the CP/M Apple. $105.

Calcshop

OpVal. A stock option analysis program that takes just eighteen seconds to evaluate ninety-six options. Features include newspaperlike tabular displays for forecasted and quoted prices, expected profit, and more. Black-Sholes calculations; recall of all security information; market



quotes from Dow Jones or keyboard; auto-calendar to the year 2060; strategy and position graphs. $250.

Century Software

Tax Byte '83. A tax planning program that provides the means to plan income strategy. The menu options offer a quick, easy, and efficient tool to analyze tax liability through "what if" simulation before making an irreversible decision. $69.95.

CET Research Group

SEQS (Simultaneous Equation Solver). Determines a real root from one equation or solves a family of as many as twenty equations, which may be a combination of linear, nonlinear, and transcendental. Applications range from compound interest calculations to solution of engineering problems. Specific models may be formulated and stored on disk for recall and use with recurring problems. $100.

Commercial Software Systems

Real Estate Models for the Eighties. Set of sixteen *VisiCalc*-compatible templates for "creative financing" analysis. The models help analyze wraparound, buydown, ARM, GEM, SAM, and many other mortgage plans. The templates are completely up-to-date with current real estate practices and tax laws. $65.

Compu-Law

Client Management System 2.0. Law office A/R and billing program, written in Pascal and entirely menu-driven and self-prompting. The program enables a small law office to keep track of its time, expenses, and payments, and to produce customized statements and a variety of management and financial reports. $2,495.

Compumax

Bill of Materials. Software package written specifically for the small manufacturer. Designed to handle inventory control and materials requirement planning. Will also "explode" your bill of materials. $350.

Compu-Tations

Mail/Phone List. A versatile utility program for school, home, or work. User enters and stores name, address, and phone data for friends or businesses. The information may be changed, deleted, sorted, and printed on the screen or on mailing labels. $14.95.

Computer Systems Design

Restaurant Profit Analysis. Tracks sales and performs inventory control. Allows for entry of ingredient base and for definition of menu items. Enter sales keyed by waiter/waitress or in batch quantities. Tracks loss, pilferage. $495.

Computer Tax Service

Money Street. Checkbook financial system that cuts taxes, controls expenses, and saves accounting time. One hundred user-defined accounts, 2,400 entries, unlimited checking accounts, credit card accounting. $99.95.

CompuTrac

CompuTrac. A consolidated program that allows the stock or commodities trader to generate studies in technical analysis and associated bar graphs to anticipate market trends. Maintains a strong support system to help with any problems. Members receive frequent program updates. $1,800.

Maxiledger. Enhanced general ledger package offering user-definable detail and subtotal accounts as well as divisional reporting capabilities. $350.

Microbase. Data management system with the ability to locate, sort, and select needed information from a larger base of information. Fast, flexible report generator. $149.

Microinv. A series of programs that carry out the inventory control functions of a small business. The master file maintains detailed information on your inventory stock, while the transaction file monitors data on items received into your inventory or issued to job locations. $140.

Microledger. Performs the essential duties of double-entry bookkeeping. The programs will interact with other Compumax accounting programs using two files. $140.

Micropay. Handles the necessary operations of accounts payable required by most small businesses. Two files are used to monitor activity during a user-defined period and to keep a permanent record of all due and paid A/P. $140.

Micropers. A complete payroll system and a personnel management system. The payroll system handles both hourly employees paid on a weekly basis and salaried employees paid biweekly. $140.

Microrec. Manages and documents the accounts receivable functions of your business accounting system. Using a transaction file you can monitor transactions and then accumulate them into a master file. $140.

Order Entry. Handles documentation and control of both purchase orders and sales orders. It generates and prints orders and statements in mailable format. Manages changes in description, price, and quantity when orders are shipped or delivered. Computes tax and monitors back orders. $140.

Concept Group

Architect's Business Manager. Complete financial management package for architectural firms. Fully interactive job cost system with payroll, general ledger, accounts payable, and receivables. For small and medium-sized firms (250 employees, 134 active jobs). Compatible with AIA accounting system. $2,200 with $150 annual update fee.

Engineer's Business Manager. Complete financial management package for engineering firms. Fully interactive job cost system with payroll, general ledger, accounts payable, and receivables. For small and medium-sized firms (250 employees, 134 active jobs). Compatible with AIA accounting system. $2,200 with $150 annual update fee.

Prompter. Helps you keep your project on time, coordinate and report on all the tasks that must be done to complete your projects, and allocate resources to the tasks as they have to be done. Allows on-screen entry and editing for schedule modification. Requires CP/M. $89.

Consumers Software

Spreadsheet Auditor. *VisiCalc* users—your spreadsheets can look perfect and still be wrong. The *Spreadsheet Auditor* lets you print the formulas behind your spreadsheets in an easy-to-read grid. Large formulas can be wrapped around. Ideal for documentation, training, as well as error finding. $99.

Continental Software

F.C.M. A filing, cataloguing, and mailing program to keep any type of record on your personal computer. With *F.C.M.*'s form letter, the program ties into a variety of word processors, allowing the user to have standard form letters and mailing lists. $99.95.

The Home Accountant. Personal and small business financial management program tracks all your finances automatically. The program budgets, forecasts, keeps track of checkbooks, reconciles bank statements, and even prints checks. It also flags and recalls any tax deductions. $74.95.

Property Management. Accounting program for owners and managers of residential, industrial, and commercial properties or developments of up to 1,000 units. This program calculates and displays standard accounting reports for the overall property along with tracking individual accounting records of each tenant, such as date of last rent/lease. $495.

The Tax Advantage. A tax assistance and year-round tax planning program. Takes you through standard federal 1040 tax forms and related schedules. With its one-key commands, the user can tell at any point in the 1040 how much tax is owed. Performs complex operations such as income averaging and describes any item of the federal United States tax form. $59.95.

Craftsbury Software

Mail Manager. Professional mailing list program that creates mail merger files for all versions of *Apple Writer II, Screen Writer II, Executive Secretary, Magic Window II,* and for its own built-in word processor. Features 9,999-record capacity, instant search over any combination of fields, sort by name, zip code, or any other field, labels in up to four columns, and user-defined file structure. $89.95.

Cyber-Tech

The Wall Street Analyst. Program works in conjunction with *Value Line Investment Survey* and features two levels of analysis. It is menu-driven, and analyzed stocks can easily be graphed, printed, stored, ranked, and updated. Program and manual, $74.95.

CYMA

Accounts Payable. A cash management tool that optimizes a small or medium-sized business's use of its cash. To fit the needs of different businesses, cash basis or accrual accounting methods may be used. Any changes to data in the system that affect financial position are recorded as a complete entry in the audit files. $1,095.

Accounts Receivable. Provides small to medium-sized businesses with up-to-the-minute account ledgers and aging detail on receivables. Easy to use, functions transparently, and adheres to sound accounting principles. $1,095.

Client Accounting. Based on the CYMA *General Ledger*. Performs job costing, budgeting, and graphing of activity within accounts. Goes beyond *General Ledger* by performing after-the-fact payroll, loan amortization, and ratio analysis. $1,695.

Construction. One to thirteen budget periods, with the option to roll each total into a separate budget for complete tracking of income and expense accounts; complete job costing capabilities; automatic generation of recurring and/or reversing entries; check registers showing broken check sequence and voided checks; trial balance and funds flow worksheets; complete audit files that automatically record changes affecting the financial position of the company. $2,795.

General Ledger. Stores general journal transactions and job cost entries with complete audit trails. Provides up to twenty-six different user-defined financial statement formats and produces a comprehensive range of financial reports for screen display or printing. The system has superior password protection and extensive data file integrity-check and backup/restore facilities. $1,095.

Inventory. A complete inventory management and order entry system that includes multilevel bills of materials, sales and purchase order entry, back-order tracking, subassemblies, and finished goods in multiple locations. It is designed for small to medium-size wholesale or retail operations and can be integrated with other CYMA accounting packages. $1,095.

Medical, Orthodontic, Dental, Chiropractic. These medical programs provide patient billing, third-party billing, practice analysis, and patient recall. Allows the practice to use any combination of balance forward, open-item, and contract receivables with payment-book capabilities. Single or multiple-doctor practices can be managed with this system. Automatically generated insurance forms for chosen patients. $1,695.

Data Security Concepts

VisiCalc Formatting Aids 4.5. Gives Apple II+/IIe or Apple III owners formatting features while retaining the speed, power, and memory of standard *VisiCalc*. Now printed reports can look their best with variable width columns, selective rows and columns, comma insertion, centered headers, and many other local and global enhancements. One or two drives. $54.95.

Decision Support Software

The Business Accountant. A general ledger that does not require accounting knowledge. Instantaneous balance sheet as well as profit and loss. Back-date entries with automatic end of month's balances adjustment. Define 200 accounts and sixty-three codes (for project management). Optional interface to *VisiCalc* and *Multiplan*. $225.

Digisoft Computers

Mailcom. Send over 2,000 letters per hour, delivered in less than forty-eight hours at twenty-six cents a piece, from your computer, using the U.S. Postal Service's E-Com system. Menu-driven software, including a text editor, mailing list manager, set-up and format programs, and communications. $195.

Digital Marketing

Bibliography. Compares citations in a manuscript with entries in a card catalog and constructs a bibliography of all entries cited. Entries are added to the catalog using a text editor. Each catalog entry has a key-name followed by bibliographic information. Entries may be of any length and format. Will work with most word processors including *WordStar*, *Spellbinder*, *PeachText*, and *SuperWriter*. $125.

Datebook II. Schedule appointments for up to twenty-seven different doctors or lawyers. Three appointment schedules are displayed on the screen at a time. Searches for openings that fit time of day, day of week, and/or year constraints. Appointments are made, modified, or canceled easily. Copies of day's appointments can be printed quickly. $295.

Dental Practice Management. A versatile A/R and practice-analysis system for single or multiple doctor practices. The system is programmed to print statements on "speed-mailer" or preprinted forms; insurance statements are set for ADA-approved forms, or the system will print any form desired by the user. It produces a range of management reports, mailing and recall labels, and a file-word processing interface. $995.

Footnote. Automatically numbers and formats footnote calls, footnotes and text, placing footnotes on the bottom of the correct page. At user's option, the footnotes can also be removed from the text file to a separate note file. Footnotes can be entered singly or in groups, in the middle or at the end of paragraphs. Includes *Pair*, a companion program that checks on the termination of underline and boldface commands. $125.

Milestone. A project management and time scheduling program that uses a critical path network analysis process to schedule manpower, dollars, and time. It can be used by executives, engineers, managers, or business people to produce a Pert chart or to investigate tradeoffs between manpower, dollars, and time. Requires 56K RAM and CP/M or UCSD p-System. $295.

Plan 80. A financial modeling system that's easy to use and powerful enough to replace most timesharing applications. You write a *Plan 80* model just the way you would write a letter using any editor or word processing program. You'll remember how you created the model, because calculations are defined using English, not matrix coordinates. $295.

The Specialist. A medical billing/accounts receivable package specifically designed with the specialist in mind. This easy-to-use but comprehensive package is available in five different specialties: anesthesiology, family practice, internal medicine, radiology, and surgery. For a single- or multiple-doctor practice. $995 to $1,495.

Hyper Typer. A personal typing teacher for beginning typists. Prompts the user for all commands, familiarizes him with the typewriter keyboard, and guides him through speed drills. $29.95.

Disk Depot

Golf League Statistics. Fully automated system to manage, analyze, and print records for an industrial or school league of up to twenty teams and fifty players, with minimal effort. Automatic team scheduling, tee-off order, player standings, USGA handicap system, course records by player and course, equitable stroke adjustment, and computed match play points. $139.95.

DJR Associates

FMS-80. Database management simplified for new users. *Screen Writer* program automatically defines a file and data entry screen from the format that has been established on the word processing screen. Menu-driven, generates custom-made reports without programming. Special development language accesses up to nineteen open files at the same time, performs random and sequential keyed reads and writes, and supports full string handling operations for complex business, financial, and scientific applications. $395.

Dow Jones

Market Analyzer. A technical analysis product that allows automatic collection, storage, and updating of historical and daily stock market quotes and construction of technical analysis charts. Accesses information from Dow Jones News/Retrieval. $349.

Market Manager. A portfolio management product that allows private and professional investors to access pricing and financial information, and provides an accounting and control system for portfolio of se-

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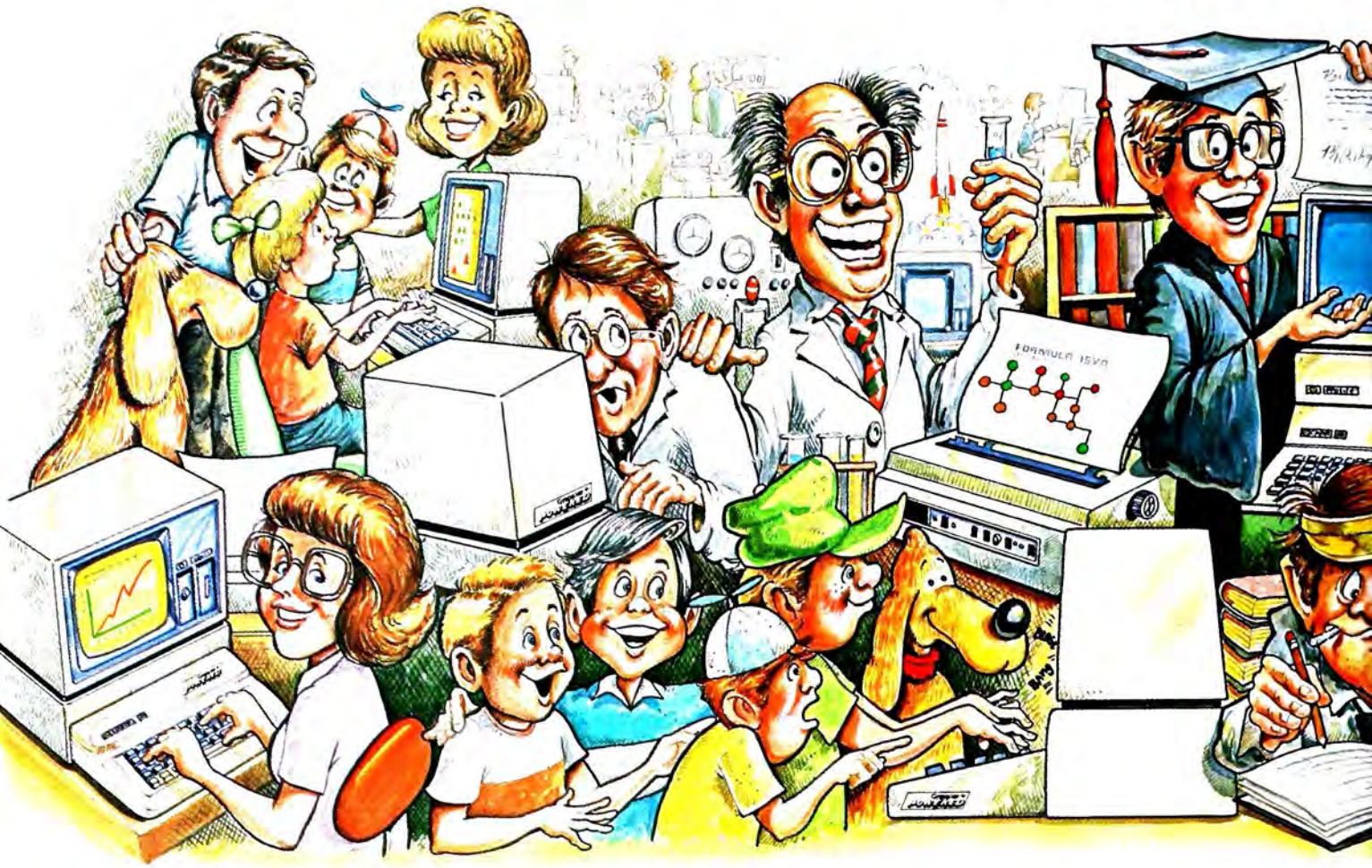

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The Original Apple® graphics printer interface. Since its introduction three years ago, the Grappler has been imitated by many, but never matched. Now with exclusive features for the Apple IIe and full support of new Epson® graphics, the Grappler + remains the most intelligent interface available. Over twenty-seven commands give Apple users full control over any graphics or text on the Apple screen, including a new 80 column text dump. Performance, reliability and support have made the Grappler + the #1 selling intelligent Apple interface.



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The innovator in "dock-on" printer buffering. The Bufferboard easily adds memory to your current Apple interface system, freeing your computer for additional input. Easily upgradable from 16K, the Bufferboard can store up to 20 pages of text. It fits neatly inside your Apple, "docking" onto your existing printer interface.* No clumsy boxes or cables, no external power supplies…just convenience and economy. With the Bufferboard, you might never wait for your printer again.



*Versions for standard Grappler + , Epson APL and Apple Parallel Interfaces.

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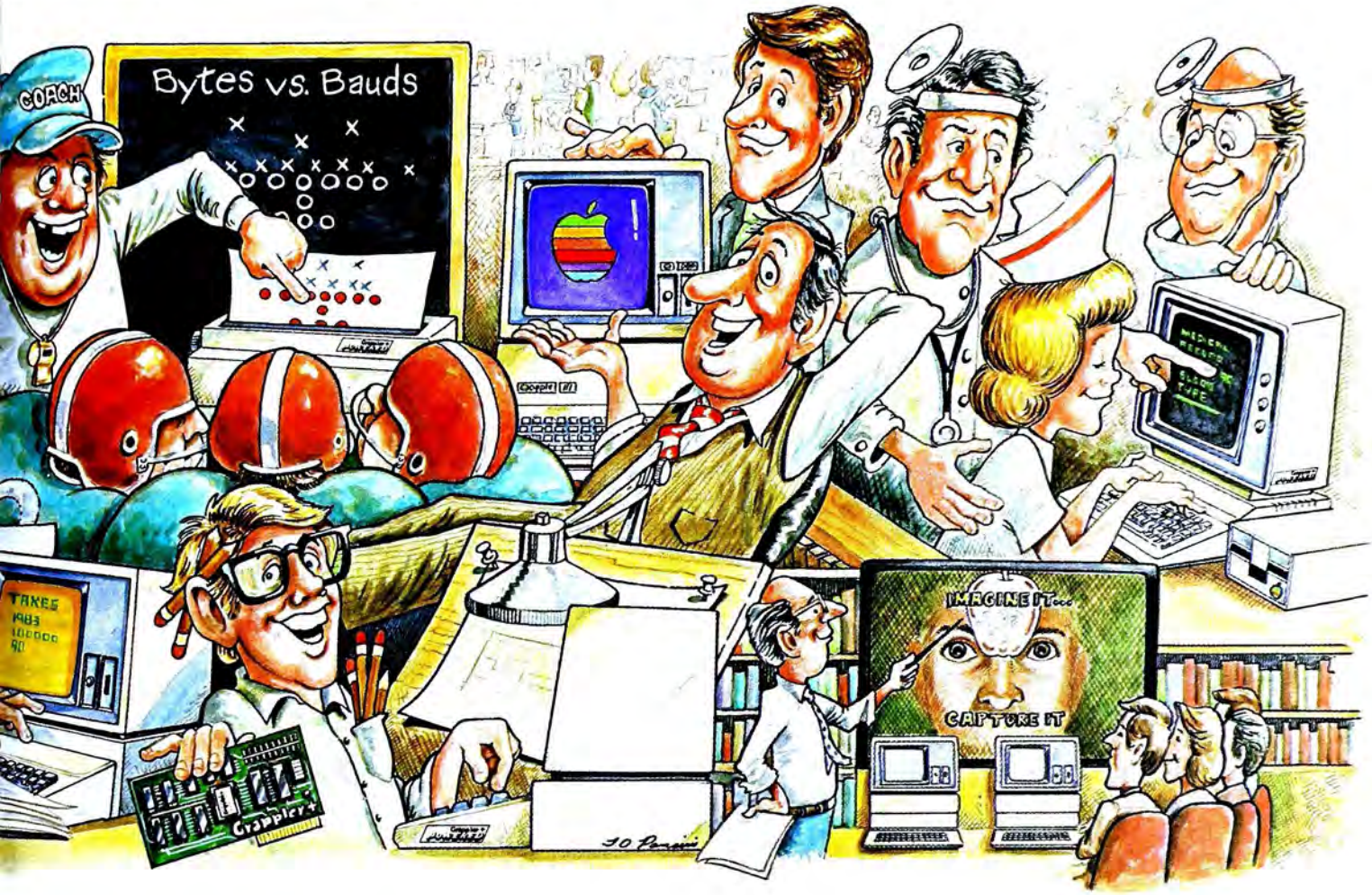

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curities. Accesses information from Dow Jones News/Retrieval. $299.

Market Microscope. A fundamental analysis product that allows users to choose and follow indicators for extensive lists of stocks and industry groups and to sort, rank, screen, and get critical points for buying and selling. Accesses information from Dow Jones News/Retrieval. $699.

Dynacomp

Life Cycle Analysis and Depreciation. Creates a data file of business expenses for equipment which can later be used to calculate and display a variety of reports. You may project annual costs, find the present worth, create depreciation schedules, and justify tax deductions. $39.95.

Payfive. Flexible payroll accounting package with special capabilities that will allow your accountant to do your records from the check stubs. $149.95.

Portfolio Management. Written by a stock broker to help manage portfolios for individual customers. A variety of reports, attractively and professionally laid out, can be generated for clients. $69.95.

Text Master. A general-purpose text editor that features English-oriented textual information. Interfaces with any printer connected to your Apple. Can process any length file segment by segment; thus it is possible to process files as large as a disk. $49.95.

Stock Master/Stock Plot. Companion programs designed to help the investor record fiscal data on companies of interest, record stock transactions, and track price action on these same companies. $59.95.

Data Smoother. Provides the user with a fast and easy means to least-squares smooth equally spaced data and plot the results. Any size data set may be treated within the memory limits of your machine. Very useful for smoothing out day-to-day stock market fluctuations in order to determine underlying trends. Also beneficial in planning inventory based on varying sales volume. $23.95.

Fourier Analyzer. A scientific program that can be used to examine the frequency spectrum characteristics of defined duration signals, such as groups of pulses. The user inputs a data set, which is Fourier transformed into the frequency space descriptors of amplitude and phase. The results are then displayed in tabular form. A powerful tool for the engineer, scientist, student, or anyone involved in cyclic phenomena (music, stocks, and so on). $23.95.

Microcomputer Bond Program. Designed to help you evaluate bonds. Provides a quick and easy way to estimate prices and yields of fixed income securities under a broad range of assumptions and estimates about the future. $59.95.

Microcomputer Stock Program. Designed to help you analyze stock prices. Provides timing signals for stock purchases and sales. Buy and sell indicators are generated by means of a unique auto-regressive price trend analysis. Requires only weekly high, low, and close prices and the volume of shares to aid you in your investment decisions. Completely menu-driven and easy to use. $59.95.

Tax Optimizer. Designed to evaluate various tax alternatives and to select the most advantageous method for the preparation of individual federal income tax returns. You can easily determine the advantages or disadvantages of your projected financial decisions and actions. $59.95.

Transfer Function Analyzer. Frequency spectrum analysis package designed with the engineer in mind. It applies the concept of the Fourier integral transform to an input data set to provide a frequency domain representation of the function approximated by that input data. Based on Dynacomp's *Fourier Analyzer*, but includes special data handling features. A key tool for the electronics and acoustics engineer involved in the analysis of limited-duration signals. $29.95.

Active Circuit Analysis Program (ACAP). An active and passive circuit analysis program. Can be used to solve for the node voltages of a network. The circuit elements that can be analyzed by *ACAP* are resistors, capacitors, inductors, voltage sources, current sources, and a voltage-controlled current source. $43.95.

Analysis of Variance. Four programs in one. Each program performs a specific task matched to the designed experiment under analysis. $43.95.

Basic Scientific Subroutines, Volume 1, by F. Ruckdeschel. The first in a series of books designed to provide microcomputer users with scientific subroutines written in Basic. These subroutines have been designed to facilitate the application of microcomputers to scientific tasks that have previously been largely in the domain of the large timeshare mainframe computers. $20.95.

Basic Statistical Subroutines, Volume 1. A collection of non-parametric statistics routines keyed to the text, *Nonparametric Statistics for the Behavioral Sciences*, by Sidney Siegal. The routines are written in Basic and can all be called from an easy-to-use menu. Full facilities for data storage, retrieval, and editing are also provided. Comes with a 100+-page instruction book. $99.95.

Beam Deflection. The first in Dynacomp's new series of structural analysis software packages. Consists of two programs. First program permits the development of data files that describe the problem. Following this, the analysis program is called. $39.95.

Digital Filter. A comprehensive data processing program that permits the user to design his own filter function or choose from a menu of filter forms. The filter forms are subsequently converted into nonrecursive convolution coefficients that permit rapid data processing. $53.95.

Harmonic Analyzer. The third in Dynacomp's series of Fourier transform software packages. Whereas *Fourier Analyzer* and *Transfer Function Analyzer* were designed with limited duration signals in mind, *Harmonic Analyzer* is specific to repetitive wave forms (cyclic processes). $33.95.

Multilinear Regression. The third program in the statistics series. Capable of treating multivariate situations with no limit (other than available computer memory) on the number of dimensions. $28.95.

Regression I. A complete and coordinated regression curve fitting package for the analysis of linear and nonlinear, one-dimensional data. Based on various subroutines and techniques presented in volumes one and two of *Basic Scientific Subroutines* by F. Ruckdeschel. A powerful statistical tool for use in engineering, business, and the social sciences, as well as education. $23.95.

Regression II (Parafit). A parametric least squares regression program designed specifically for the determination of nonlinear coefficients in complicated mathematical expressions. This is to be contrasted with the linear polynomial coefficients calculated by *Regression I*. Features include automatic plotting of the data fitted function and residuals, cassette (or disk) data saving and loading, and data file building/editing. $23.95.

Roots. If you want to determine the zeros of a polynomial having real coefficients, *Roots* is the program for the task. Employs a relatively little-known algorithm described in the computer mathematics literature several years ago. The algorithm iteratively seeks all of the roots simultaneously. The convergence is cubic (and therefore rapid) and very stable, requiring no explicit initial guesses from the user. $19.95.

Stattest. Performs statistical tests of hypotheses and includes t-tests, chi-square tests, and F-tests as well as simple regression and a random number generator. Data can be entered under program control or from tape or disk. Any external file that already contains data in the simple format required may also be used. Once the data is loaded, it may be edited by the program's own data manipulation routine. Ideal for the experienced statistician as well as the occasional user. $33.95.

el Dorado Software

Bizi-Calc. Library of twenty standard financial/accounting forms for popular spreadsheet programs. Each ready-to-use form includes on-screen *Worknotes* for easy completion. Both disk and manual include a six-part spreadsheet tutorial. Manual features a comprehensive applications section for using each form for forecasting and analysis. $60.

Calc-Kit. *VisiCalc* enhancement program for data management and presentation. Printed report designer offers variable width columns and cells plus multiple typestyles. Cell list documents your spreadsheet formulas. Interfile data mover allows information interchange between multiple *VisiCalc* files, and graphic Interpretor offers nine graphic portrayals of data stored in various files. $100.

50/50. Forty business management forms for popular spreadsheet programs. Each ready-to-use form includes on-screen Worknotes for easy completion. Manual includes a spreadsheet tutorial. Forms range from an advertising analysis to vehicle maintenance costs and include breakeven, depreciation, loan amortization, profit point, compound growth, linear regression, and investment analysis. $60.

In the Mail. Business letter generator for popular word processing programs such as *Apple Writer II* and *WordStar*. Ninety-nine professional letters covering standard business correspondence needs. Twenty

informative reports. *Information Master* will organize and print everything from mailing lists to stock market data. Simply specify what kinds of records you want to store, type in the information, and let *Information Master* do the organizing, calculating, and reporting. $150.

Job Control System. Can be used by any small or medium-sized company in construction, manufacturing, or service industry. Can be easily integrated with a company's existing method of collecting hours, costs, and quantity produced data. Reports generated include individual job activity reports and daily post audit trial. Work-in-progress inventory value computed accurately. $450 to $950.

Order Scheduler. Simplifies the shipping and scheduling process. Once a purchase order has been entered, it will prioritize over 500 purchase orders by the date received, print a listing of the items to be shipped on any given day, maintain up-to-date purchase order information, remove filled purchase orders, and produce several useful reports. $150.

P.A.C.E. A general-purpose estimating product that acts as an aid in appraising equipment, labor, material, and general construction or manufacturing project needs. It calculates and produces a statement of estimated cost, as well as types and amounts, of resources needed. Includes costs, automatic estimate updating when prices change, and the flexibility for user-defined calculations. $395.

Doctor's Office Companion. A medical billing package that is designed to support 5,500 guarantors for a one to five-doctor office. Patient data is gathered for automatic printing of the HCFA 1500 Universal Insurance form. *DOC* gives particular attention to insurance billing activities, but also provides for other payments such as cash payment. Accounts receivable aging reports capability is included. Will support up to 1,000 CPT codes, for which *DOC* will provide the corresponding description when entered during daily transactions. $995.

The Store Manager. A point-of-sale package that is also an inventory control system capable of handling up to 1,160 items. Produces invoices, purchase orders, receiving reports, expense vouchers, packing slips, and quotations. Maintains up-to-the-minute sales totals, generates valuable inventory management reports, and maintains a current customer and vendor list with up to 1,115 names. Updates your inventory figures and your name and address list immediately after each sale. $250.

Transit. Converts Apple data files into *Information Master* files. Lets you upgrade from outdated software. Once you have converted your data files into *Information Master* files, you gain all the sorting, searching, and printing features of *Information Master* without writing a single line of code or reentering a single record. $50.

Howard Software Services

Real Estate Analyzer. Performs detailed objective projections of after-tax flow, IRR, ROI, and FMRR on commercial and residential property. Dissimilar properties can be directly compared. $225.

The Tax Preparer. A tax package for year-long record keeping and end filing. Prints on preprinted 1040 and generates supporting in IRS facsimile format. Easy to use for the professional tax er and individual. $225.

Human Systems Dynamics

Anova II. A complete analysis of variance package with analysis of riance. *Anova II* accepts up to five factors in randomized designs, ted measures designs, or any mixed design. Also gives a complete a table with all SS, DF, MS, F, and P values. $150.

Regress II. A multiple regression program package with a research base and five full multiple regression solutions. Offers simultaneous ward, backward, stepwise, and polynomial solutions. Gives correla- and covariance matrices, multiple and partial correlations. $150.

Stats Plus. A complete general statistics package with database nagement. Provides most statistical analyses required by the profes- onal researcher, including one to five-way cross tabulation, analysis of ariance, t-tests, regression, and nonparametric tests. $200.

Hy-Tek

Friendly File Folder. While not intended to compete with major database programs, this one fills the need for a moderately sized database. $39.95.

Innovative Programming Associates

Labcat (Research Pathology/Toxicology Software). A user-oriented system designed for easy storage, sorting, and retrieval of necropsy and histopathologic observations. Records animal and pathology numbers, days on test, and more. Prints nine tables, seven of which can be sorted by user-defined parameters for fate and days on test. $14,995.

Real Estate Listings Maintenance. Comprehensive residential listings maintenance program that can store up to twenty-eight characteristics on a home and search the listings based on an individual's requirements. Requirements can be stated as needs or preferences, and all homes matching these are sorted and printed out or viewed on-screen. $3,000.

Intra Computer

Printer X Switch. Permits businesses with two computers and two parallel printers (dot-matrix and daisy wheel) to direct either computer's output to either printer for word processing or graphics. Including printer cables, $220.

Intra Day Analyst

Analyst for Commodities. Provides real-time graphics and technical analysis for futures price action. Tracks twenty commodities. Each has a variable length bar chart and one of fourteen technical studies on-screen simultaneously. A strong support system is maintained for user problems. Members receive regular updates. $1,500.

Analyst for Stocks. Provides on-line graphics and technical analysis of real-time stock price action. No fifteen-minute delay. System follows quotes for one hundred stocks and displays bar charts for fifteen stocks along with any one of fourteen analyses for each chart. Members receive program updates frequently. $1,500.

Investor's Software

Evaluation Form. Computer adaptation of the National Association of Investment Clubs method of common stock selection. No modem is required. All data is free. Full documentation, any exchange, fundamentalist-based. Plots any stock with six years of data. Educational. Especially good for new investors. Buy/sell/hold ranges, risk/reward ratio, "what if" capability. $80.

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J R Software

Stock Price Forecast. A fundamental analysis program designed to isolate profitable investments. The program develops a model of the stock's yearly high and low prices based on the company's past financial history and several economic indexes. Using the model, the stock's future price is forecast based on estimates of the company's future earnings and dividends. Menu-driven. $135.

Jupiter Island

microCellarmaster. A beverage inventory and wine list printing program. Maintains detailed inventory for up to forty locations, prints elegant wine lists, produces many administrative reports. Single-user package, $750; multi-user, $1,500.

Key Enterprises

Payroll Check. A simple payroll program written for small to medium-size businesses. Designed for easy use with minimum knowledge of computers and payroll procedures. Prints checks, information for quarterly reports, W-2s, and many detail reports. $395.

LJK Enterprises

Data Perfect. A single-load, easy to use database manager system with the user in mind. Multiple searches are allowed in the same field. The package includes utilities generator, report generator, mailing labels generator, and a built-in calculator. $129.95.

Macro-Trend

Macro-Trend. A totally automated commodity trading system. Generates entry points, exit points, reversals, and protective stops. Shows distinct success as a long-term trading method that identifies major trends very early. $2,500.

MBSI RealWorld

RealWorld. Applications consist of flexible, integrated accounting and business packages designed for use in small businesses. Compute accounts receivable, accounts payable, general ledger, order entry, inventory control, payroll, and sales analysis. $650.

Megahaus

MegaFinder. An easy-to-use filing system that allows you to create the form of your choice and then file information away using the form. Also included is a powerful report generator. Allows information such as names and addresses to be merged with letters. $59.95.

MicroComputing Research

The Computing Investor Series. Seven programs for the small investor who wishes to take advantage of the Apple's analysis help. The programs cover technical, fundamental, and accounting aspects of portfolio monitoring. $99.

Micro Data Base Systems

KnowledgeMan. An all-in-one information management system that integrates relational data management, a query language (like SQL/DS), third generation spreadsheet, statistics, printed-forms management, form-oriented screen I/O management, a full-scale programming language, plus security safeguards, including encryption. $500.

Micro Decision Systems

DocuCalc. Used by financial analysts to review complex models during development. Grid arrangement shows equations in correct position without truncating. All global details, ranges, graphs, and so on reported. $95.

Microfinancial

Flexware Accounts Payable. Designed to increase profits through reduced labor involvement in processing payables, better cash flow forecasting, and improved vendor discount processing. Integrates with *General Ledger*, *Inventory*, and *Purchasing*. Duplicate invoice protection; batch control of invoices; posting of one month's transactions before the last month is closed; unlimited distribution of expenses; account number validation; partial payments; and scheduling of payments based on due dates, vendor priority, and available cash. $1,200.

Flexware Accounts Receivable. Program can be used by itself with invoices entered manually directly into the system, or it can be used with *Flexware Order Processing* for automatic invoice generation. The general ledger update is automatic. Open item system; instant inquiry and update of account status; general ledger account number validation; multiple ship-to addresses; partial payments; automatic finance charges; automatic statements and dunning notices; automatic recurring entry processing; order discounts; and extended descriptions. $1,000.

Flexware Application Development System. A mature and complete application development system that provides simple application definition using a data dictionary and database, easy application modification, and automatic writing of end-user documentation. Creates applications that are multiuser, transportable, and reliable. Provides formatted screen data collection, totally consistent operator interaction, fast execution, and extensive on-line help. $5,000.

Flexware Financial Reporting and General Ledger. Designed so that detailed or summarized information flows into the system from the other Flexware applications. Allows you to specify your own account number structure. Standard reports, plus allows users to create as many and varied financial reports as they wish. Multicompany accounting; standard financial statements; user-defined financial statements; comparisons to budget and/or previous years; current year summaries; automatic recurring entries; account number validation; statistical data reports; job cost interface; complete audit trails; and up-to-the-minute financial status with a trial close. $1,500.

Flexware Inventory Control. Gives management the information needed to optimize inventory levels. Tracking by inventory class and product category; perpetual inventory; receipt, sale, and adjustment processing; physical count adjustment; reorder point and reorder quantity processing; multiple prices; and part number cross-reference. $900.

Flexware Order Processing. Instant update and inquiry of customer status; reference to orders by customer or order date; ship-to variable by order with multiple ship-tos for each customer; generation of acknowledgements if desired; payment terms vary by customer; credit memo processing; credit limit checking; credit hold protection; reservation of inventory; back order processing; noninventoried item processing; multiple warehouse; price lookup or allows special pricing; calculates taxes. $1,100.

Flexware Payroll. Provides comprehensive processing, recording, and analytical functions for managing a large or small payroll. Can be modified to accommodate individual customer's requirements. Multicompany; hourly and salaried employees with multiple pay rates; user-defined and standard deductions; variable pay frequencies; check processing; advances and pay adjustments; commissions and bonuses; quarterly and annual reports; W-2 printing; control over access to sensitive data. $1,500.

Flexware Sales Analysis. Gives general management and sales management the timely information they need to control production, purchasing and marketing efforts. Provides various levels of summarization and selection in reporting to allow focusing of effort on areas of interest. In addition to the standard reports, allows the user to analyze his sales data and answer his own questions.

MicroLab

Asset Manager. Balance sheets, amortization of assets. Prints and figures tax schedules. $200.

The Data Factory. Powerful database with flexible entry and retrieval. Formats reports to your needs. Free one-year extended warranty. $300.

Invoice Factory. An invoice maker that also generates statements, aged receivable reports, product or customer reports, and sales analyses. $200.

Payroll Manager. Automatically prints out your business payroll checks. Figures hours and makes all deductions. Fast and easy. $300.

The Tax Manager. Easy to use to figure federal income taxes and print out returns. An extended warranty option keeps the program current with the latest tax laws. $180.

Wall Streeter. Portfolio management. Enter today's closings, ratings, and S&P. Project buys, sells, and holds. $300.

MicroPro International

CalcStar. An electronic spreadsheet and financial planning tool that

calculates solutions to complex numerical problems in finance and helps you answer that "what if" question in business. By combining *CalcStar* with *WordStar*, you gain printing options such as boldface and underlining, and you get the ability to insert *CalcStar* spreadsheets into *WordStar* documents. Requires CP/M. $195.

DataStar. Allows you to enter, update, and retrieve virtually any kind of information commonly used in business. Allows the user to create numerous tailor-made applications, from customer record systems and company telephone directories to inventory systems and real estate listings. *DataStar* can combine with *SuperSort* for additional capabilities. Requires CP/M. $295.

InfoStar. Easy-to-use microcomputer database management system that doesn't require the user to learn a computer programming language. Four levels of help menus in simple English guide the user through each step of data entry form design and detailed report generation. Updates records easily across file boundaries; provides up to nine control breaks plus arithmetic calculations within a report; allows the user to incorporate data from multiple files. Print enhancement features include boldfacing and underlining of selected data fields. Requires CP/M. $495.

MailMerge. Data/text file merging program. A multipurpose file merging tool that works with *WordStar* software. Can be used to generate personalized form letters, invoices, mailing labels, and documents constructed from commonly used paragraphs. Requires CP/M. $250.

PlanStar. A comprehensive financial modeling tool. Handles up to 1,000 worksheets per modeling project, with a capacity of more than 32,000 cells per worksheet and the ability to consolidate any number of worksheets. Financial models are created by writing calculations in English instead of entering formulas in worksheet cells. This information is stored separately from the actual worksheets and can therefore be edited in a variety of ways to produce multidimensional reports. Data may also be displayed in bar charts or line graphs. Requires CP/M. $695.

Microsoft

Microsoft Multi-Tool Budget. A tool designed to help you develop interrelated budget planning and control worksheets for one product or for an entire product line. Helps you learn about or brush up on the fundamentals of budgeting with a "textbook" tutorial and case study. Provides a self-teaching demonstration that teaches how to use the budget system in a matter of minutes. *Multi-Tool Budget* requires *Multiplan* for the same operating system. $150.

Microsoft Multiplan. Lets you design a worksheet to fit your needs. Starts as an open grid, so you can personalize it to your specific project. Saves you hours in examining different alternatives or updating from forecast to actual figures. Recalculates the entire worksheet automatically when one number is changed. Helps in all types of business analysis and forecasting (cash flow analysis, budget planning and consolidation, pricing analysis, resource allocation, and merger analysis). Plan weekly, monthly, and yearly budgets, then see how a few changes in spending affect your total financial picture. $275.

Microsoft Multi-Tool Financial Statement. A financial analysis tool for gaining valuable insight into all major aspects of a company's business. The program computes eighteen of the most important and commonly used financial ratios, including three liquidity ratios, four leverage ratios, five efficiency ratios, and six profitability ratios. The program provides you with a short, interactive, self-teaching demo so you can learn to use the *Financial Statement* system in a matter of minutes. Requires *Multiplan* for the same operating system. $100.

Momentum Software

Litmas, by Eric Sohr, M.D. A powerful cross-indexing database, originally developed as a medical application in patient files and disease-symptom cataloguing. $140.

Multisoft

Multi-Trieve. A high-performance database displaying multiple records in the form of a table. Horizontal scroll can be used to shift a table to the left or right. File reorganize, label and report printing are standard. $99.

Muse Software

Address Book. Store 700 names and addresses, then print envelopes and mailing labels. Use with form letter or alone. $49.95.

Data Plot. Create and include charts and graphs, right in your reports. Four different kinds of charts available. $59.95.

Navic Software

Business Analyst. Compares historical business expenses with projected expenses, and calculates overhead and G&A burden rates. Useful for contractors and manufacturers in preparing bids and proposals. Especially effective for government contractors in complying with government requirements for cost reporting. $55.

Cash Controller. Functions as a specialized accounts payable program. Capacity is 300 invoices. Sorts by age and amount so that cash required can be adjusted to handle small invoices regardless of amount, along with those that are due because of age only. Automatically alphabetizes and prints reports. $30.

Mortgage Maker. Calculates monthly payments on a loan, and prints detailed amortization schedules. $19.95.

Portfolio II. Tracks up to forty stock market investments. It has provision for user-determined sell-off criteria and prints lists of portfolio contents and sell-off lists. Displays price trends in hi-res graphics. Calculates yields and portfolio value at any point. $27.50.

Stockroom Manager. One thousand-item inventory program. The program makes provision for searching by part number or description. It accommodates unit price, stock quantity and minimum stock level, and prints reports for reordering. Stockroom location is listed for each item, and there is a routine for calculating the value of the entire inventory. $30.

Tax Shelter. Calculates 1983 individual income taxes. User responds to computer-prompted questions regarding type of income, deductions, credits, and payments. The computer then calculates tax liability and stores the database on disk. User is then able to recall the data and evaluate the impact of changes to any entry. $45.

Client List. A mailing list program with a capacity of 250 names. Prints labels, alphabetizes, sorts by zip code, sorts by two optional categories, and so on. $35.

Nordic Software

The Media Master. A complete log and billing system for radio stations. Functions include scheduling, availability, affidavits, sales projections, log generation, billing, sales recap, traffic order and client lists. Requires five-megabyte hard disk and a wide-carriage printer. $6,000.

Apple Dance. A computer matching program. Use the questionnaire provided or design your own. The program will print up to ten compatible partners. Sell these lists at your next dance to raise money for your class or group. $75.

Vehicle Maintenance Reporter. A complete record keeping system for vehicle fleet repairs, maintenance, and expenses. Capable of handling large and small fleets. Parts costs; labor costs; reports on work codes, vendors, mechanics, vehicles, and departments all at machine language speed. $649.

Norell Data Systems

Visualize. A documentation utility program that helps the user of *VisiCalc* in the design, development, and documentation of template spreadsheets. Hard-copy reports of the template layout, the calculations, and any anomalies found in the design are produced by the software. Each report includes file information, size statistics, and global parameters. Three sample application templates are included: check register, cash flow, and a balance sheet and operating statement. All sample templates are fully annotated, and the package comes completely documented. $100.

N-Squared Computing

Stock Analyzer. A series of programs incorporating all major technical analysis functions for the detailed study of individual stocks and commodities, including routines for popular price-volume indicators, and the capability for creating and testing custom indicators. $295.

Interface. Optional program for automatic updating through CompuServe (N-Squared Data Base) and Dow Jones DJNS (stocks). Program includes interfaces for *VisiCalc*, *Dow Jones Market Analyzer*, and *Compu-Trac* data files. Requires D.C. Hayes Micromodem II. $450.

The Internist. Written for members of the medical/health profes-

sions. Based on the *Merck Manual*, allows the user to run differential diagnoses on any combination of over 450 symptoms for 331 common chronic and acute diseases/conditions, including nutritional deficiencies and disorders. User also has the option of either displaying or printing out diagnoses and references. Package includes a protective vinyl binder, user manual, program disk, and database disk. $95.

Market Illustrator. Consists of two complementary programs for plotting, smoothing, and comparing all types of financial data. One program (*Stock Illustrator*) features price, volume, and on-balance volume charting for stocks and futures/commodities. The second program utilizes split-screen displays for comparing data with program-generated indicators and includes a complete weekly historical database, comprising over 130 statistics compiled from *Barron's* (latest 120 weeks). $195.

Market Analyzer. Versatile and adaptive program that provides essentially total manipulative capability to create and compare the most complex indicators and indexes. $295.

Omega Microware

Tax Templates. *VisiCalc* templates that will handle most of the tax schedules used in conjunction with the federal 1040 forms. A copy of Laser's *Your Income Tax* is included. This package is designed for use with versions of *VisiCalc* providing DIF and Boolean logic & IF functions. $49.95.

The Chart Trader Plus. A software package with various programs that allow user to make an in-depth analysis of a portfolio, as well as to predict price movements in both the futures and the equity markets. This package includes data file management and hi-res graphics that can chart up to 240 days at once. $149.

Financial Trader. A software package with various programs that encompass Engineers System, Moving Average Crossover with Optimization, Colver Method, Wilders Six System, Relative Strength Index Trading System, and Gann's Square of Nine. Provides for the creation and maintenance of data files in the *Compu-Trac* data format. $499.

Professional Trader. A software package with various programs that encompass Engineers System, Moving Average Crossover with Optimization, Directional Movement System with Optimization, Wilders Six System, Relative Strength Index Trading System, and Gann's Square of Nine. Program provides for the creation and maintenance of data files in the *Compu-Trac* data format. $699.

Super Expander. A *VisiCalc* preboot package that, combined with one or two Ramex 128K expansion boards, expands the usable space of a *VisiCalc* template. By changing the memory format on a disk, this package will enable the user to establish a 255K template—while taking only twenty seconds per memory board to store or save a template. $64.95.

Super Expander (Eighty Columns). A *VisiCalc* preboot package that, combined with one or two Ramex 128K expansion boards, expands the usable space of a template. By changing the disk's memory format, this package can establish a 255K template—while taking only twenty seconds per memory board to save a template. $99.99.

Super Expander Plus. A *VisiCalc* preboot package that, combined with the Ramex 128K memory expansion board, expands memory to 135K (255K with two Ramex boards). Twenty-six additional *VisiCalc* commands enable the user to get more utility out of *VisiCalc*. This version is compatible with the Videx Videoterm (with inverse EPROM), M & R Enterprises' Sup'R Term, Computer Stop's Double Vision, Omni Vision, Vision 80, and Apple's IIe eighty-column card. $125.

Options-80

Stock Option Analyzer. Compares alternative opportunities. Allows user to optimize return based on judgment of how share prices will behave. Handles buying and selling of puts, calls, spreads; includes risk, commissions, cost of money, and dividends. Graphs and tables. $125.

OR-D System

A Complete Medical Management System. Diagnosis, treatments, and prescriptions; various insurance forms; insurance monitoring per patient; complete accounts payable system; various management reports, such as aging and provider analysis; marketing and letter writing; state-of-the-art recall system. Written in Pascal for a hard disk system. $3,500.

A Complete Dental Management System. Per-visit billing, daily income, various insurance forms, insurance monitoring by patients, complete accounts payable system, state-of-the-art recall system. Marketing and letter-writing feature provides analysis reports and patient history. Written in Pascal for a hard disk system. $3,500.

A Complete Legal System. Includes time billing, trust account, and case monitoring by various dates. Unlimited number of reports to choose. Keeps track of amounts owed according to arrangements. Complete accounting system. Written in Pascal for a hard disk system. $3,500.

Orrington Economics

Micromarkets II. A database of demographic and retail sales variables for use by market researchers and sales managers. Designed for easy use with *VisiCalc* and other spreadsheet programs. Contains information for each state and for each of the 200 largest metropolitan areas. $99.

Peachtree Software

Access Pak. A data exchange product that consists of four programs: *Information Access*, a *WordStar*-to-*PeachText* translator, an *EasyWriter*-to-*PeachText* translator, and a *VisiCalc*-to-*PeachCalc* translator. The file conversion programs translate ASCII files produced by other packages into the proper format for *PeachText* or *PeachCalc*. Also converts any embedded commands into their Peachtree Software equivalents. Requires CP/M. $525.

Information Access. Serves as a bridge between Peachtree Software's accounting packages and office productivity products. Allows the user to create procedures that will convert accounting data files to formats that are readable by *PeachText*, *PeachCalc*, or *List Manager*. Requires CP/M. $375.

Job Cost System. Gives small-business people a reliable means of entering estimates and cost transactions and of tracking cost and profitability on a job-by-job basis. Operators can enter costs for labor, equipment, materials, subcontractors, and other overhead as they occur and generate various management reports as needed. These reports will enable managers to compare estimated and actual costs for specific tasks within selected jobs, pinpoint unprofitable areas, meet deadlines, and outbid competitors by estimating more accurately. Requires CP/M. $750.

List Manager. Gives the user complete control over the design and application of information and mailing lists. Serves as an excellent database manager for some applications. User can define and create records with up to fourteen line items, order files by three preset "keys," and have lists sent to the screen, disk, or printer. Has sophisticated conditional commands that precisely control output. Requires CP/M. $250.

PeachCalc Electronic Spreadsheet. Allows the nonprogrammer to use the microcomputer's memory as a large automated worksheet containing up to 254 rows and sixty-three columns of text, numbers, and formulas. Lets operators analyze numerical and financial data faster and more accurately, reduce preparation time, and produce paper reports. Requires CP/M. $150.

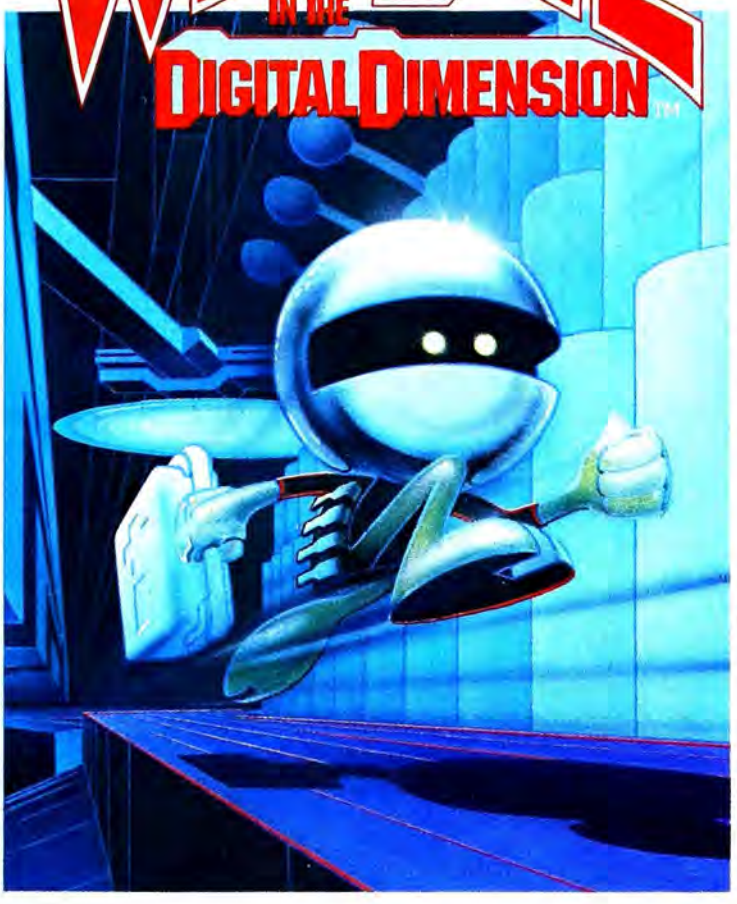
Peachpak/4. *Accounts Receivable*, *Accounts Payable*, and *General Ledger*. Consists of three interactive business application packages for the small business with limited microcomputer capacity. Modules can be purchased separately. Requires CP/M. $395.

PeachPay Payroll. Supported by the *PeachTax* service for tax record maintenance, offers a comprehensive range of controls over all aspects of the payroll accounting function (including tax and other withholding requirements). Can be used independently or in conjunction with *General Ledger*. The *PeachTax* update service, an annual subscription, keeps the user informed of tax changes. Requires CP/M. $750.

Personal Calendar. An effective, convenient scheduling tool. Can accommodate as many as ninety-eight people or facilities. Can also be used to manage the time of conference rooms, machines, or other facilities. Helps schedule, reschedule, and cancel appointments and meetings. Enables users to automatically schedule a recurring appointment or meeting on a daily, weekly, or monthly basis, and can schedule a group meeting for as many as ten participants after finding a commonly available time. Requires CP/M. $195.

Accounts Payable. Can be an independent application or interfaced with *General Ledger*. Besides maintaining a complete file for each ven-

WILLY BYTE IN THE DIGITAL DIMENSION™



CHARACTERS

Willy Byte: electronic hero
Hex Luthor: digital archvillian
Cybil Nibble: 13 year-old player of Willy Byte in the Digital Dimension
Sidney Nibble: 16 year-old brother

Scene – A suburban home in the 1980's on a late Sunday evening. A teenager, Cybil Nibble, has been playing (for the umpteenth time) Willy Byte in the Digital Dimension, the newest creation in computer software from Data Trek, Inc. She decides to go to bed and quickly enters into a deep sleep that plunges her into the Digital Dimension. She finds herself on the ground gazing at eight towering electronic circuit poles, each emitting an orange glow that consumes the entire sky. Fascinated and perplexed by the sudden change in



environments, Cybil notices an animated object, high in the heavens, swinging from pole to pole.

Cybil (whispering to herself): The lightning speed, the energetic response, the total commitment, it must be Willy Byte!

(At that moment the game's charismatic electronic hero, Willy, sees Cybil and slides gracefully down the pole to meet his newest acquaintance.)

Willy Byte (cheerfully): Greetings, Cybil! Welcome to the Digital Dimension.

Cybil: The Digital what?

Willy: You know my home, the inside of your computer. Watch this!

(Off he scampers about the keyboard room, pulling and tugging on each bit while dodging the stinging sensation of static charges. As soon as Willy completes his task and the byte has safely left the keyboard room, a pale expression comes over Willy's face.)

Cybil: Are you alright?

Willy Byte (concerned): Problems in the Power Room.

Cybil (confused): What problems?

Willy Byte (assertive): Follow me!

(As Willy and Cybil sprint toward the I/O port, a sinister laugh is heard from above – the laughter of Hex Luthor. Suddenly a bolt of static charge is seen thundering its way toward Willy Byte.)

Cybil: Watch out, Willy!

(Cybil awakens from her dream to find her brother Sidney standing in her doorway.)

Sidney (concerned): Cybil, are you alright?

Cybil: I guess I was dreaming.

Sidney: As I was walking to the kitchen I noticed that the computer was left on. The screen's got a picture of a new game on it, but I can't find the disk.



Cybil (animatedly): Yeah, it's Willy Byte in the Digital Dimension. Mom and Dad bought it for us. I'll show you.

Sidney (sarcastically): They did what!?

Cybil *(on a sudden upsurge of emotion)*: Dad says that when I play Willy Byte I **learn** all kinds of stuff about computers.

Sidney: Like what?

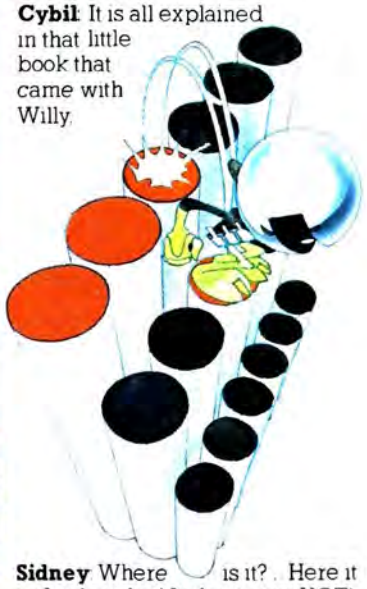
Cybil: First you jump into the CPU room. And then there are lots of other game rooms to explore, and each is a part of the computer.

Sidney: Oh really?

Cybil: Yeah! And in **this** game you guide Willy on his wild adventures while he skydives into the Power room, operates a crane in the RAM room, bounces in and out of the CPU, and zips around the Disk Drive room. I got extra points for flowcharting Willy's . . .

Sidney (perplexed): Flowcharting? What's flowcharting?

Cybil: It is all explained in that little book that came with Willy.



Sidney: Where is it? . Here it is. Look at that! Is that cover HOT! It looks like an album cover. From the looks of all these pictures, . . . This looks great . . . Got to Play! Where's the disk? . . . Cybil!

Cybil (dashing to the computer): Mom and Dad will let us play as long as we want and I'm first.

Sidney (impatiently): Go for it!

Look for Willy Byte in the Digital Dimension at your nearest dealer or call DTI Data Trek toll-free at **(800) 654-SOFT.** In California, call toll-free **(800) 652-DATA.**

Suggested Retail: **$39.95**

dti data trek

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Available for the Apple II, Atari 400, 800, and 1200

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How to get in touch

KoalaPad™ Touch Tablet puts the controls at your fingertips.



Paint the screen with colorful graphics or play lightning-fast games with just a touch of your finger. The KoalaPad™ Touch Tablet makes using your computer more fun than ever before. Just moving your finger across the special touch-sensitive surface controls graphics, game commands, and much more. It's a great way to get the most out of your computer while you just sit back and

with your computer.

relax. The KoalaPad fits comfortably in the palm of your hand for easy use. And once you have it in your hands, it's hard to put down. That's because the KoalaPad does much more than joysticks, paddle controllers or the "mouse." Each KoalaPad set is packaged with a KoalaWare™ graphics program* for creating beautiful, high-resolution graphics right on the screen. And that's just the beginning.



Dancing Bear™ *brings a funny, furry cabaret star right into your home where your own programmed performances will win applause every time.*



Spider Eater™ *the game that attacks musical education with a voracious appetite, taking a bite out of the task of learning the musical scale.*



There's a full line of KoalaWare programs to choose from with a perfect combination of entertainment and education.

Logo Design Master™ *uses computerized graphic design to help children and adults learn the basics of programming and prepare for more advanced applications.*

Spellicopter™ *takes off into the world of spelling with aerial acrobatics to challenge young students.*

Add a touch of excitement today to your Apple,® Atari,® Commodore® or IBM® computer.

See the KoalaPad Touch Tablet at the computer store nearest you. To locate the dealer in your area, call toll free 800-227-6703. (In California, 800-632-7979.)

Koala Technologies Corporation

We make computing more personal.™



*Software included with Touch Tablet varies with computer type.

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AD474

dor, it helps determine which invoices to pay by due date, discount date, or according to certain cash requirements. Prints checks and check register. $750.

Accounts Receivable. Used independently or in conjunction with *General Ledger*, *Accounts Receivable* helps prepare bills for and obtain timely collections from customers. Prints invoices, statements, and aging reports and maintains customer account information, sales taxes, and the accounting detail for posting to *General Ledger*. $750.

General Ledger. The center of a sophisticated series of interactive business application packages. Used independently or in connection with other Peachtree accounting packages, it allows the manager to maintain a complete financial picture of his business. $750.

Inventory Management. Offers detailed control over all aspects of inventory operations, whether used independently or in conjunction with *Accounts Receivable* and *Sales Invoicing*. Features include four types of transactions, eleven reports generated, flexible master file format, length of time an item is on reorder, and so on. $750.

Sales Invoicing. A bridge between *Accounts Receivable* and *Inventory Management* that allows simultaneous access to and updating of the two packages' data files. Using *Sales Invoicing* eliminates the laborious two-step method of entering data in *Accounts Receivable* and *Inventory Management*. $750.

Phantom Software

Blank Forms 1. Collection of predefined blank form templates for use with *Microbase*. Contains invoices, statements, purchase orders, and so on that are available from several computer forms distributors. Can be modified. $17.95.

Business Letters 1. Contains assorted business letters for use with *Microbase*, each professionally written. Includes sales letters, credit inquiries, collection letters, and so on. Can be modified. $17.95.

Microbase. A small database program written in Word Processing Language designed to enhance *Apple Writer III*. Allows the creation and maintenance of blank forms, standard documents, and data files, which can be integrated and printed automatically. $39.95.

Phoenix Software

Invoice File, by John Zornes. The invoice is the single most important source of vital business information. Yet many companies fail to utilize this source, often wasting precious time and money reinventing the wheel. *Invoice File* is a template for *DB Master* that helps you pull useful reports from your invoices. $89.95.

Communicate and Win. Developed by behavioral psychologists, this program provides you with techniques for dealing with people. Whether you have to interact with customers, your supervisor, employees, or suppliers, your success depends on knowing the other party and knowing how they react to you. Now you can build profiles of others as well as yourself. $250.

Forms Foundry, by Rick Rohlfing. Using the "universal form" or plain paper, you may print invoices, sales receipts, purchase orders, debit and credit memos, statements, and more. $149.95.

PMS

Medical/Dental Billing System. Handles the billing needs of up to ten doctors and enables the user to master the system within only a few hours. System is modular and easily accessible through a main directory. Handles up to 20,000 active patients and 6,000 transactions per billing cycle. Standard insurance forms, an immediate itemized statement at time of service, plus twenty-five other management reports can all be generated. Requires Corvus hard disk. $1,995 to $2,495.

Physical Exam. Uses a combination of constant values and a format that, when filled out, will print a report for the patient. Default section is for stating the physician's "normal" descriptions for up to fifty organ systems. This covers almost any part of the body that is required for a physical exam by insurance companies, government agencies, private corporations, small and large companies, and health and education-related professionals and organizations. Name of the patient, chart number, date of birth, sex, age, blood pressure, temperature, pulse, respiratory rate, weight, and height are logged. $99.

Professional Management Systems

Dental Disk. Fully integrated and tested. Produces management reports, allows easy data entry daily to produce insurance forms, billing, prophy lists, recall notices and lists, and more. Written in plain English for the first-time user. Menu-driven. Will support multiple doctors. $1,500.

Optic Disk. Designed for optometric field. For the first-time user, a plain English package to produce management reports, recall patients, and print lists, bills, and mail labels. All menu-driven. Starts at $1,500.

The Book. Complete record keeping for all of a stock broker's customers and prospects. Keeps objectives, account types, personal information, and date last contacted. Also retains transactions, name of security, date, price, P/L, and commissions. Two hundred fifty customers and 150 transactions per disk. Lists; mail labels by multiple fields. $395.

Spinal Disk. Chiropractic office management system. Handles daily transactions, billing, and insurance forms. Production and management reports. Patient lists from a number of fields. Menu-driven. Training time is only a few hours. Easy-to-follow manual. Starts at $1,500.

Programmed Press

Bonds and Interest Rates Software, by Dr. Albert Bookbinder. Sixteen interactive programs on bonds and interest rates for anyone interested in using the computer to evaluate price, risk, and return on fixed income investments. $100.

Commodities and Futures Software, by Dr. Albert Bookbinder. Thirteen interactive programs for commodities and futures for anyone interested in using the computer to evaluate price, risk, and return on futures or commodities. $100.

Foreign Exchange Software, by Dr. Albert Bookbinder. Eleven interactive, profitable programs for foreign currency exchange. For anyone interested in using the computer to evaluate price, risk, and return on foreign currencies. $100.

Handbook, by Dr. Albert Bookbinder. Lists all Basic programs and provides background information to help the reader understand concepts and applications. $19.95.

Investment Software Package, by Dr. Albert Bookbinder. Fifty interactive programs for anyone interested in using the computer to evaluate price, risk, and return on investment. Includes six packages: *Stocks*, *Bonds*, *Options*, *Futures*, *Foreign Exchange*, and *Statpak*. $100.

Option Values Software, by Dr. Albert Bookbinder. Based on the best option valuation models, eight interactive programs for options on stock or futures. For anyone interested in using the computer to evaluate price, risk, and return on options and futures. $100.

Statistical Software for Forecasting, by Dr. Albert Bookbinder. Twenty statistical programs for use in forecasting. For anyone interested in using the computer to make more profitable forecasting business decisions. $100.

Stock Market Software, by Dr. Albert Bookbinder. Seventeen interactive programs for investment in common stock. For anyone interested in using the computer to evaluate price, risk, and return on investments. $100.

Pro/Pac

Financial Management Models. Designed to help a service firm determine its billing rates, budget and control projects, plan staff assignments, monitor billable time, estimate fees, forecast cash flow, and more. Uses *VisiCalc* to maintain flexibility and perform "what if" analysis. $295.

Rainbow Computing

Daisy Professional, by Kevin C. Killion. Offers full range of statistical capabilities; basic stats, correlations, hypothesis testing, multiple regression, crosstabs, nonparametric stats, data/time series transforms, analysis of variance. Handles missing data. $199.95.

Reader's Digest Services

ListMaker. Designed to help manage lists and files efficiently and creatively. Allows the user to input information and produce hard copy in whatever format the user requires. For use by small businesses, clubs, or individuals who need to manage information. $97.50.

Howard W. Sams

Financial Facts, by Ed Hanson. Instantly computes the majority of data you'll commonly need in personal and small-business financial man-

agement, and allows you to print out major factors. Quickly figure annual, nominal, and effective interest rates; loan principal, term, balance, regular payment, last payment, and amortization; straight-line, declining balance, and sum-of-years depreciation; required investment for future value; minimum investment for withdrawals; annuities; and more. $59.95.

Financial Planning Mind Tools. Automatically supply your *Multiplan* or *VisiCalc* spreadsheet with the correct formulas and column headings to instantly calculate present, net present, and future values; yields; internal and financial management rates of return; and basic statistics. Also lets you do break-even analyses; depreciation schedules; ACRS; and variable-rate, graduated-payment, graduated-payment adjustable, and wraparound mortgages. $79.95.

Instant Recall, by Charles R. Landers. Friendly and extremely fast data handler allowing free-form entry and instantaneous search and retrieval of characters, words, or combinations in files more than 28,000 characters long. Each screenful of data you enter becomes a record you can edit, file, manipulate, or print out as it appears. Loads files in five seconds or less and supports all types of printers. Allows use of Apple IIe's special keys, features, and lower-case characters. $59.95.

Money Tool, by Herb Honig. A financial tracking and budgeting system that gives you the information you need to manage income, expenses, and tax information for your home or small business. Provides reports of all financial activities, keeps your checkbook balanced and reconciled, and manages your savings and checking accounts for maximum earned interest with minimum bank charges. $59.95.

Satori Software

Bulk Mailer. A complete mailing list program for the serious user. Features include duplication elimination, zip and alpha sorts, multiple search parameters, automatic entry defaults, ease of use, and large capacity (up to 2,400 names). A special hard disk version is available with a 32,000-name capacity. $125.

Inventory Manager. A comprehensive inventory control program designed especially for retailers, wholesalers, or other businesses involved with merchandise sales. Up to thirteen major categories and 2,700 items are managed with numerous reports available including sorts by vendor, gross profit, items sold, and so on. Prints purchase orders and work sheets. $150.

Legal Billing. Efficient billing program for law firms. Computer screen models professional time slips. Prints statements, aging reports, lawyer time reports, and more. Handles up to eighteen lawyers, 200 clients, and 2,000 monthly time slips. $350.

SBCS

Agri-Ledger. A flexible accounting program for use on any farm or ranch operation. Prints income statement, balance sheet, budget reports, audit trail, and Schedule F. *VisiCalc* cash flow template included. Large, flexible chart of accounts. Enterprise analysis reports for up to twenty-six farms with ninety-nine enterprises on each. Free program updates. $550.

General Ledger. Double-entry accounting program features nine profit centers, budgeting, and a variety of reports. User-defined chart of accounts. Detailed documentation, practice session, sample chart of accounts. Program backup included. Free program updates. Free replacement of damaged disks. $349.

Accounts Receivable. An open invoicing accounts receivable program. Menu-driven program provides for credit and debit memos, full or partial payments, progress billing, invoice aging, and printing of statements. A flexible system for general business. Use alone or integrate with SBCS General Ledger. $249.

Scitor

Project Scheduler. A project management program designed to help management meet deadlines and beat cost targets through fast and easy project forecasting, scheduling, control and tracking of project status. Menu prompts permit easy data entry for modification or updates to large, complex project plans. Provides "what if" analysis capabilities. $285.

Select Information Systems

Information Please. A true relational database combined with sophisticated spreadsheet capabilities. Designed to store and retrieve information the way people do. *Information Please* features *Fast Finder, Forms Fill-In, Gyro-Printing,* and *Network TV* (a unique learning game that teaches relational information management through a simulation game). $295.

Sky Software

Paypac. Job cost payroll management package maximizes profits through the accurate tracking of labor costs. *Paypac* prepares an entire company's payroll, tax deposits, and reports quickly, easily, and inexpensively as it simultaneously updates personnel files, labor distribution accounts, and job cost records. $395.

Sofstar

VisiCalc Real Estate Templates. Amortizations, personal financial statements, ACRS depreciation, income property investment analysis, internal rate of return, mortgage loan analysis. A versatile problem-solving package for executives, developers, brokers, accountants, attorneys, and real estate analysts of all kinds. Combines the power and flexibility of *VisiCalc* with the simplicity of a menu-driven program. $129.

SoftCorp International

SpeedStat. Analysis of variance is a sophisticated but easy-to-operate research and analysis tool. Handles up to six factors. Factors can be crossed and nested, fixed or random (user specifies hypothesis tests). Randomized, block, or split-plot experimental designs. Can analyze completely general (balanced) factorial experiments and hierarchical experiments. $249.

Speed Stat 2: Regression and Correlation. A powerful, menu-driven, state-of-the-art regression package. It provides five regression methods: standard multiple linear, forward stepwise, backward stepwise, forward selection, and backward elimination. Handles up to thirty-two independent variables and 2,048 cases. Extensive editing and transform capabilities. Accepts DIF files. $299.

Soft-Life

Attach. Driver allows user to do screen dump of text to any printer from programs, help screens, menus, and so on. Also allows user to toggle dot-matrix printers between normal and condensed size print. $29.95.

Softlink

Practical Accountant. A single-entry, small business accounting program. It's friendly enough to balance your checkbook, yet sophisticated enough to provide you with the cash flow, profitability, and forecasting information important to managing a small business. Among the key features are easy data entry, automated reports, flexible, customized chart of accounts, and easy access to records. Prints checks and keeps track of accounts payable and accounts receivable. $149.95.

Softsmith

Datadex. Can't keep up with your information flow? At last there is a powerful Apple DOS database manager with all the power and speed normally found only in CP/M systems. Answers all your information management needs easily, quickly, and accurately at the touch of a key. $150.

4 in 1. Comprehensive utility program that combines word processing, database management, complex calculations, and mailing lists and labels into a single, easy-to-use program. You can jump from word processing to calculations without ever switching disks. $179.95.

SoftVue

Tutorial Videotapes. Business software such as the PFS series can be taught or learned easily—forget the manual. SoftVue tutorial videotapes teach the beginner one step at a time. Learn the program, not the programming. Ideal for office training and vocational classes. $125 each.

Software Arts

TK!Solver. First-ever equation processor for personal computers. A revolutionary tool for anyone who uses equations, formulas, and mod-

eling for analysis, design, planning, or problem solving. The program features a unique backsolving ability, iterative and list solving, tables and graphs, automatic unit conversion, and thirty-four built-in functions. $299.

TK!SolverPack for Financial Management. Designed for use with the *TK!Solver*. Includes thirteen models with the equations, values, and tables necessary to solve problems common to financial analysts and managers. Topics include compound interest, net present value, level debt service, cost of equity capital, analysis of financial statements, stock option pricing, bond swaps, convertible debt, and bond refunding decisions. $100.

TK!SolverPack for Mechanical Engineering. Designed for use with the *TK!Solver* program. Includes thirteen models, each complete with the equations and values necessary to solve problems common to mechanical engineers. Topics include analysis of elastic beam bending, springs, area moment of inertia, Mohr's circle, rotational systems, heat transfer, fluid flow, and hydraulics. $100.

Software Connections

Timekeeper. Electronic appointment scheduler and address book. Personal appointment calendar replaces standard appointment and address book. Multiuser scheduling capability automatically selects available time slots in calendars of several users for group meetings. $195 to $695.

Software Publishing

PFS:File. Allows the user to record, file, retrieve, and summarize information in a fraction of the time it would take with a conventional filing system. Information is organized on forms designed directly on the computer screen. Sorts by any item on the form and can search for a numeric range. Wildcard or opposite match. $125 on II and IIe; $175 on III.

PFS:Report. Sorts, calculates, formats, and prints presentation-quality reports from information in files that are created with *PFS:File*. Totals, subtotals, averages, subaverages, counts, and subcounts can be printed on every column. Has comprehensive sorting capabilities plus automatic page numbering, title printing, and centering. $125.

PFS:Solutions. Ready-made applications of PFS software for specific recordkeeping tasks. Each *PFS:Solutions* comes with a complete form design and three to seven predefined reports that are used with *PFS:File* and *PFS:Report*. Just enter your information onto the predefined form that appears on the computer screen. A few keystrokes will produce the lists and reports you need. Twelve disks with guides. $20 each.

Software Technology for Computers

Accounts Payable. Maintains pertinent data on up to 300 invoices, sixty charts of accounts, and 120 vendors on file at any time. Various reports are generated, as well as a check-writing routine. Provides a complete audit trail on all transactions. $275.

Apartment Manager. Automated recordkeeping system designed specifically for use in residential income property management. Maintains financial and managerial data for up to six separate apartment, rental, or condominium complexes on each data disk. Provides accurate records of monies received, expenses paid, and vacancies. $395.

The Creator. An applications designer that produces finished Basic applications programs in the following categories: graphics, invoicing, database, searching, sorting, instructions, listing, mailing list, sound, word processing, output, budget, menu, aging, input, and format. Create versatile, customized applications by simply answering English questions. $250.

IFO. Employs the use of Capass algorithm and Soundex intelligence to phonetically find information that you can't spell or pronounce. Global edits, calculated fields, screen-building routines, duplicate options, five-level Boolean search capabilities, quick formatted prints, and sort files. No prior programming knowledge required. $200.

Inventory Program. A menu-driven program with several error protection devices. Each inventory record contains stock number, description, vendor number, class location, reorder point, and so on. Each record can be entered, edited (on screen), updated, or deleted. Records can be sorted in ascending or descending order. $275.

Mailing List Program. A menu-driven program that requires no

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Elevates printer for smooth paper feed and storage.
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- Model #PS910 is 5-1/2" (h) × 15" (w) × 13" (d) for paper 8-1/2" wide - $25.00

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programming knowledge. Maintains a complete mailing list and generates a telephone listing that includes last name, first name, phone number, and record number. Up to 800 labels can be stored on a single disk. $60.

Media Scheduling. Uses ISAM-structured routines (VTSR) to make it extremely fast and responsive. Various reports are generated. Provides a year-to-date analysis of all your bookings and scheduled films, plus current and YTD analysis of your scheduling accounts. $500.

Payroll Package. A complete system for doing payroll, but will also maintain an employee history file. Will handle commissions, bonuses, sick pay, holiday pay, overtime, and cash advances. Prints payroll checks, W-2 forms, summary reports, and year-to-date reports. $275.

Professional Time and Billing. Performs time management and billing functions. Up to 120 user-defined rate codes of time, expenses, or fixed fees can be used. Requires no previous background in computers or programming. $395.

Sonora Enterprises

Sauce. Flexible database/language system, similar to SAS mainframe system. Concatenates, merges, interleaves, or fuzzy merges with up to sixteen open files. Record size is 25,600 bytes, no record limit. Selection and computation with compiler flexibility. Redefine databases. Multilevel sorts, plots, custom formats, data entry. Winchester/Ramdisk-supported. $350.

Sophisticated Software

Labeler. A program engineered to let you design and print your own custom labels. Print any number you like, any way you like. Prints large print and centers lines automatically. Great for making your own time-saving, custom return-address labels. $19.95.

Le Menu. Tired of cataloguing and having to run or brun the programs you want? *Le Menu* eliminates the hassle. With only two keystrokes, you can access any program you want. Works on hard disk systems. $39.95.

Little Black Book. Sophisticated and simple. Ideal for anyone who wants to maintain a "little black book" of names and notes electronically. You can add any number of notes to client files in any form you choose, all indexed by name and date. Simple to use and lightning fast. $99.95.

Micro-Mass Mailer. Sends your message with the impact of a telegram in a customized, impressive, businesslike form. The computer prints your message inside the envelope and addresses the outside all at the same time. $69.95.

Print-A-File. An electronic filing system that lets you store, retrieve, and print client information by any criteria you select. Organize according to age, name, address, account number, date, or whichever method best suits your needs. Ideal for anyone who has to keep track of large numbers of people and send specific groups of them mailers or literature. $39.95.

Scheduler. Keep your life simple with the *Scheduler*. Don't forget those important dates and events. Schedule as far in advance as you like. Review your day's schedule at the touch of a few keys, or print out a daily schedule. $69.95.

SouthWest EdPsych Services

Check Writer. A flexible and powerful mini-accounts payable system. Maintains accurate records on 400 checks per month, 100 vendors, and 100 separate accounts. Unique format system allows layout of the printed check to be customized by the user so any check can be used. $69.95.

SSR

Infotory. A stand-alone inventory management system that can accommodate up to 1,400 inventory items. *Anyreport* is its unique, built-in data management subsystem that allows the user to custom design reports based on the eighteen predefined fields of information provided for each item. *Anyreport*, along with three other reporting functions—sales and cost analysis, price report, and a standard inventory report—is available from *Infotory*'s main menu. $295.

State of the Art

Accounts Payable. Helps you manage your payment policies and accurately forecast your cash needs. This system can speed invoice processing, calculate discount opportunities, and generate cash requirement forecasts whenever necessary. Also provided are up-to-the-minute recordkeeping and purchase reports detailing purchases and returns. $395 to $595.

Accounts Receivable. Gives you better control over your collections, cash receipts processing, and credit policy decision making. Automatically maintains credit limit and balance-due information that can be accessed instantly. Delinquency and invoice aging reports may be generated to help identify trouble spots and aid in collections. $395 to $595.

Billing System. Can turn the records of time invested and expenses incurred into detailed bills to your clients, including charges and expenses exactly as you want your client billed. Also tracks client billings and processes receipts. Other aspects are a detailed aged-open bill report and month-end summary. Allows for multiple levels of employees and billable employee rates storing individual employee records that may be analyzed. $395 to $595.

Budget and Financial Reporting. Expand your *General Ledger* recordkeeping to include budget and history information. Provides for divisional, departmental, budgetary, and comparative reporting, along with automatic posting of recurring journal entries. Produces an automatic audit trail of all activity to date. $395 to $595.

General Ledger. A fast, easy-to-use, and accurate recordkeeping system that allows your company to produce valuable and extensive financial reports on demand. With interactive account maintenance, simplified journal entry, and audit trails, the system lets you record your accounting data quickly and accurately. Because the system is interactive, you can have immediate account inquiry and up-to-the-minute reporting. $395 to $595.

Inventory Control. Combines sophisticated database management and reporting capabilities. Allows for minimum/maximum quantity, economic order quantities, and maintains purchase order and on-hand data. Multiple costing methods are available concurrently, including Average, Last Receipt, and Original Cost. Automatic generating of count sheets with location and costing information is also provided. $395 to $595.

Payroll. All of your compensation and deduction calculations, including printing checks, are performed automatically with corresponding audit trails. Accommodates multiple payroll periods and pay rates. Lets you process both hourly and salaried employees, and provides extensive on-demand inquiry and reporting that you can use to evaluate employee records. $495.

Sales Invoicing. Invoice entry is made faster by accessing address and terms information from the customer file. Billing instructions and pricing data may be retrieved instantly from stored information. Comprehensive Sales Journal reporting includes daily invoice recaps, gross profit analysis, sales commission reporting, and monthly profitability reporting by invoice, salesperson, and customer. $395 to $595.

Stoneware

DB Master, Version Four. Create and use large files with this file management program. Offers faster screen displays, random searches, and report printing. Also includes easier file and report format design and improved screen prompting. $350.

Sum Software

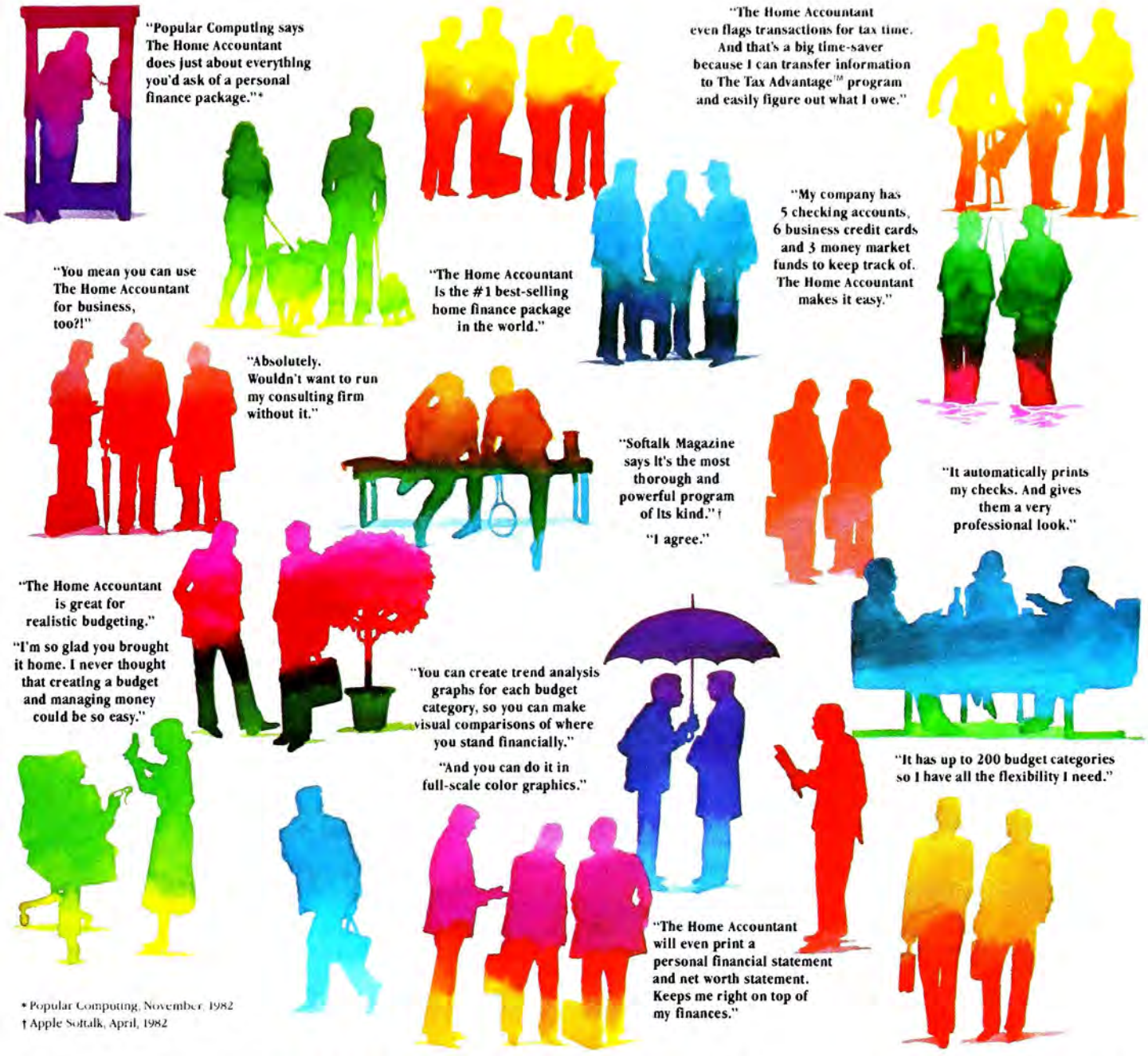
Fig Factory. Generates and stores symbols and figures and complete on-screen pictorials without a graphics tablet. Arrow or joystick input. Color version (requires 256K) or black and white super hi-res version (128K). $74.95.

Sunrise Software

Tax Mini-Miser. A professional tax planning package. Allows the user to quickly compute the tax consequences of up to six alternative tax strategies and to project the tax effect of a strategy up to six years. Automatically computes the regular tax, income averaging, alternative minimum and preferences taxes. $295.

Superex International Marketing

Superex Retailer. Issues sales receipts and invoices, updates inventory (1,000 items on floppy, 20,000 on hard disk), tracks back orders and receivables, creates receiving reports, maintains a customer mailing list, tracks sales by item and salesperson, and contains a powerful report



* Popular Computing, November 1982
† Apple Softalk, April 1982

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generator. Floppy disk version, $300; hard disk version, $450.

Systems Plus

Books! The Electronic Ledger. Powerful, flexible, easy-to-use accounting software. Appears on-screen as a typical ledger page with entries accomplished by simply pointing to a function. AP, AR, recurring entries, and enhanced budgeting modules. $345.

The Landlord. Handles all the paperwork and recordkeeping functions for any type of income rental property. Can maintain multiple owners and multiple rental units and types. Prints a variety of financial and management reports, checks, and mailing labels. $595.

TCS Software

TCS Q/Label. Generates labels from information stored in data files. The label format is completely user-defined, allowing the flexibility to create labels in the exact format required. Can also be used to prepare "labels" on media other than standard labels. User-definable file and label formats and the capability to print labels from one to twenty lines long, one to one hundred thirty-two columns wide, and from one to four labels across. Price determined by dealer installation and support. $300 through $700.

TCS Simple. A unique database management system that uses data files to their fullest advantage. User can generate customized reports; query, display, enter, or delete data from data files; and separate files created in *Simple*. Includes customized reports and queries, English sentence form commands, subtotals and totals of fields or report columns, and cross-referencing and multiple-sort indexing. Price determined by dealer installation and support. $300 through $700.

TCS Total Inventory. Inventory control package that provides numerous management reports for effective decision making. Includes multiple locations and departments handled with item ID, fractional units calculated to three decimal points, control reports that provide accurate audit trails and programs, and reports available by department, location, or vendor. Price determined by dealer installation and support. $500 through $1,200.

TCS Total Ledger. A complete general ledger system designed to record financial transactions, provide balance sheets and income statements, and generate comparative data on financial position over a two-year time frame. Price determined by dealer installation and support. $500 through $1,200.

TCS Total Payables. Designed to keep track of current and aged accounts payable. The system maintains a complete record for each vendor, determines which vouchers to pay by due or discount date or within certain cash requirements, and prints checks automatically with a check register. System includes full check-writing capabilities, fifty-state capability, a detailed check register, and flexible compensation methods. Price determined by dealer installation and support. $500 through $1,200.

TCS Total Payroll. Designed to record the employment history of each employee in a company, allow departmentalized reporting of employees, and keep current monthly, quarterly, and yearly totals for each. It has user-specified information to compute state and federal taxes, 941s and W-2s, and to calculate weekly, biweekly, monthly, and semi-monthly salaries. Price determined by dealer installation and support. $500 through $1,200.

TCS Total Receivables. A complete invoicing and monthly statement-generating system that keeps track of current and aged accounts receivable. Includes open item or balance forward accounts, flexible open credit reconciliation, and statement and invoice billing on plain paper or preprinted forms. Price determined by dealer installation and support. $500 through $1,200.

TCS Total Utilities. A package consisting of eight database utilities that aid in the backup, translation, and verification of data files. Allows the user to perform mass changes and deletions, rebuild indexes, recover damaged keys, and back up data when files get too big for one disk. Price is determined by dealer installation, training, and support. $300 through $700.

Technical Horizons

Calc-Connector. Converts formatted reports and text files directly from your favorite software into *VisiCalc* or DIF format. The data can then be manipulated in *VisiCalc* for further analysis. Converts any CP/M or Apple DOS ASCII text file. $49.95.

VisiCalc Instructor. Learn *VisiCalc* in less than an hour while running the *VisiCalc Instructor* on your Apple. Comes complete with training manual and disk. $29.95.

Telephone Software Connection

Desk Calendar II, by Leighton Paul. Use at home or office to help remind you of important dates and appointments. Prints easy-to-update daily schedule with room to add your own notes. Can search by keyword and knows most holidays. Stands alone or works well with most clocks. $35.

Titan Technologies

VC/80. Enhances *VisiCalc* with supported eighty-column cards. Allows upper/lower-case letter entry. $49.95.

VC-Expand/80. Enhancement to *VisiCalc*. Increases memory up to 177K, allows eighty-column display, individual column widths, and other features such as multiple disk storage of large worksheets. $79.95.

Troy-Folan Productions

Stock Momentum Studies. Allows the user to chart stocks, commodities, and indices using momentum, moving averages, and percentage changes. Includes Momentum Indicator Signals, a decision-making system. With four disks, manual, and Apple Dumpling board. $525.

Twentieth Century Business Systems

System Consulting, Design and Programming Services. Serving the Chicago area metro business community. Specializing in *VisiCalc* and *dBase II*. Custom application development. References available. Consulting services since 1979. $20 to $60 per hour.

Videx

Preboots for Apple Writer and VisiCalc. Preboots allow Videoterm and UltraTerm owners to use these software packages with the expanded display of the Videx hardware. Contact the manufacturer for the specific version necessary to ensure compatibility between your software and expanded display card. *Apple Writer* preboot, $29; *VisiCalc* preboot, $69.

Westware

The Ledger. A professional-quality accounting program written for use in general business or CPA applications. Supports a general journal and five subsidiary journals. Produces a clear, formatted report of balance sheets. Has flexible account numbers, produces general ledger report containing detailed audit trail, generates a combined report or individual profit center report. $495.

The Payroll. Designed to give an extremely flexible performance base to a wide range of difficult pay situations. Comes with nine different pay type categories, as well as an other-pay module that will support almost any conceivable pay situation. The deduction module is also designed with the idea of handling a wide range of difficult payroll deductions. $595.

The Turningpoint Series. A fully integrated business accounting system containing general ledger, inventory, receivables, payables, and payroll. A simple database is included with the package for general office use. The system uses a KSAM firmware card that permits high-speed searches on a key field and eliminates external sorting after data entry. $1,595.

Weyer-Ware

Master Business Analyzer. A unique *VisiCalc* template that allows rapid and easy five-year and ten-year financial analysis of a new business or product. Provides an easy-to-use data entry format to answer "what if" financial questions about a new proposal. Therefore, it is possible to rapidly screen various new business or product options under many different assumptions. $59.95.

Woolf Software Systems

Micro Financier. A personal and very small business finance program for systems using CP/M or compatible operating systems. Full facilities are provided for manipulation, reporting, and graphing expenditures and budgets. The system supports any number of user-definable accounts. $125.

Money Street

CHECKBOOK FINANCIAL SYSTEM

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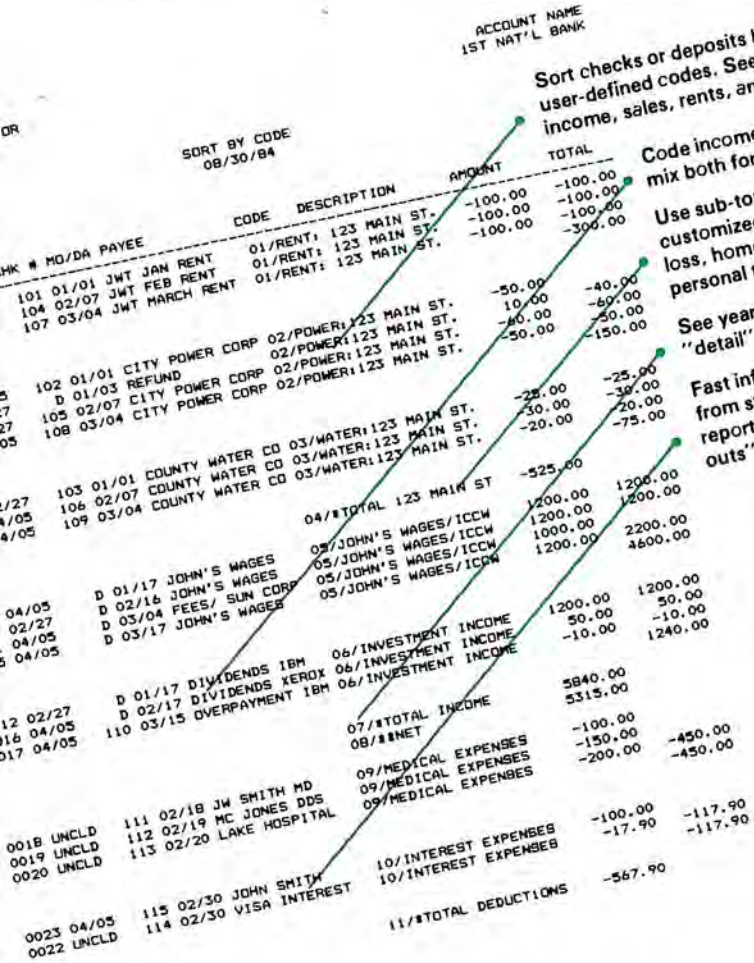

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The idea is simple: as the computer manages your checking account, it creates a valuable library of financial facts.

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Money Street maintains running totals of 100 account categories. Best of all, the totals are up-dated with each check or deposit you enter.

3. Save accounting fees. Money Street gives you neat, crisp reports. It generates 90% of the data needed for taxes, ledgers, and journals.

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Data Entry Screen



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Communications

Action-Research Northwest

Zip-Comm. Communications add-on for *Zardax*. Turns *Zardax* into a communicating word processor to send and receive text files. Talk to other Apples, mainframes, information services, typesetters. Includes terminal mode. 300 or 1200 baud. Works with serial, modem, and popular eighty-column cards. Log-on files and X-on X-off supported. $80.

Advanced Micro Techniques

Intelligent Terminal. Allows user to connect to other computer systems or communications utilities such as the Source or CompuServe. With *Iterm* you may record all received data into a disk file; also transmit data previously recorded in a disk file. While on-line you may display disk directories, erase files, alter the communications parameters, and open and close the receive and transmit files. $150.

MicroEZLNK. An interface to Western Union's EasyLink service. Provides automatic dialing, automatic message formatting, and automatic log-on to EasyLink system with a single keystroke. Through the use of *MicroEZLNK*'s Directory Services function, the user is able to send a single message to multiple recipients with a single connection. Takes care of formatting the message for the various types of messages available, including telex, TWX, Mailgram, telegram, and international cable, all automatically from the same message file. $150.

MicroTLX. Turns your CP/M computer into an intelligent telex/TWX machine. You may send and receive telex and TWX messages from anywhere in the world; also send Mailgrams, telegrams, cables, and multiaddress messages to any location. Provides all these facilities through a simple-to-use, menu-driven interface. Telex II (TWX) network. $150.

Advanced Systems Concepts

ASCI Switch. Port expanders, sharings. For computers and modems using RS-232 or parallel ports. Allows remote operation of peripherals and computers under software control of electronic switches. Staff available for configuring peripheral networks. Twenty-four-hour ASCI Express Service available. Expanding line of data communications products. Each port, $50 to $200.

Alpha Logic Business Systems

DOS File Exchange II (DFX II). Allows you to transfer any type of DOS 3.3. file between two Apples and to "chat" on the screen simultaneously. In reflexive VC mode, both users can work on the same *VisiCalc* screen simultaneously. You may also program together in Basic. $79.95.

Alpha Software

The Apple-IBM Connection. Allows for communication between

two computers—the IBM pc/XT and the Apple. Menu-driven and easy to use, providing the necessary utility program to convert file types A, I, or B. Requires the Hayes Micromodem II plug-in modem board, a Mountain Computer CPS Multifunction Card, a CCS Card, or the Super Serial Card for transfer. On the IBM side, requires any RS-232 interface card. $250.

CompuServe

CompuServe Consumer Information Service Starter Kit. A versatile, easy-to-use, interactive videotex service designed especially for the personal computer user. With a computer, modem, and the CompuServe Starter Kit, a local phone call (in most United States cities) will connect you with a world of information, communications, and entertainment. $49.95.

Dab Systems

Micromover. Tranfers files from disks on one Apple II to disks on another Apple over a phone line. Only one copy needed as the other Apple is downloaded. DOS 3.2 and 3.3. No file conversions required. Hayes Micromodem II/Apple Communications Card/other interfaces. $50.

Digisoft Computers

Mailcom. Send over 2,000 letters per hour, delivered in less than forty-eight hours, at twenty-six cents apiece, from your computer, using the United States Postal Service's E-Com system. *Mailcom* is interactive, easy-to-use, menu-driven software, including a text editor, mailing list manager, set-up and format programs, as well as other communications aids. $195.

Digital Laboratories

Micro Matrix. A push-button central exchange for eight serial data units such as computers, video displays, Teletypes, printers, modems, and instruments. Different signaling systems can be used in any combination, including RS-232, current loop, and TTL. $995.

Micro Matrix II. A line-controlled, general-purpose switching unit for eight industry-standard RS-232/20ma ports. Includes protocols suitable for both terminal and computer control. One port may be permanently in control, or any port may obtain command. $995.

ESP-1. Creating four software-controlled ports from one, the ESP-1 consists of a control port that connects to one of four expansion ports. Connections are established upon the control port's receipt of two characters—a prefix followed by a port designator. $395.

MultiSpool. A 60K buffer that networks multiple computers to printers in any combination. Data to be printed is allocated to individual spool buffers, and held in a queue if necessary, for transmission to printers as they become available. Computers may continue on their next tasks after transmitting to *MultiSpool*. $595 to $995.

3R. A compact connection unit that allows three current loop and RS-232 devices and terminal equipment such as Teletypes, high-speed printing terminals, video displays, computers, and modems to be combined in a common system. $395.

TLC-1. A push-button device that connects a wide variety of equipment such as terminals, printers, modems, and computers. Logic circuits enable switching of all data paths in any combination: A-B, B-A, A-C, C-A, B-C, and C-B. Six control bits, each indicated by an LED, direct data movement between TLC-1 ports. The three ports are each assigned a key that turns these bits on and off. Each bit, when "on," connects a transmitter of one port to the receiver of another. $245.

Digital Marketing

MicroLink II. Conducts keyboard conversations, sends and receives electronic mail, and exchanges any file (up to disk capacity). Saves all or selected parts of transmission to disk. Development of the *MicroLink II* was based on input from thousands of data communication users. Designed by, and for, the nontechnical user. $99.

Exec Software

Execucom. Turns Apple with modem into an intelligent terminal work station. Features unattended long file capture, 300 or 1200 baud operation, backscrolling to review text off-screen, file capture "after the fact" from backscrolling buffer, full-screen editor, macros, execs, and more. For most modems. Hotline. On-line newsletter. Thirty-day satisfaction guarantee. $79.95.

Fountain Computer Products

Tekterm. Intelligent terminal software with both communications and graphics capabilities. Emulates a Tektronics 4010 graphics terminal, offers five modes of operation and other unique features, supports most serial cards and modems. $125.

GameMaster

GameMaster. The fun-oriented computer network housed in a thirty-five-room electronic mansion in Evanston, Illinois. Open to computer gamers who enjoy challenging, interactive, multiplayer games. Introductory membership (includes four hours on-line), $15; full membership (includes fifty-page system documentation plus ten hours on-line), $50. On-line hourly rate, $3.

Giltronix

Automatic Scanner. Enables keyboard or computer program controlled sharing of a common device among numerous computers, terminals, and modems. Switches eight lines, RC-232 interface. Available with one I/O and three, five, or seven communications ports. Includes integral line drivers/receivers for improved data transmission. $359 to $509.

Automatic Switching Unit. Enables selection of peripherals in local or remote locations under keyboard or computer program control. Asynchronous; RS-232 protocol. Fixed and auto baud rate. Available with one I/O port and three, five, or seven communications ports. Includes integral line drivers/receivers for improved data transmission. $459 to $609.

Distributed Control Unit. Enables either a peripheral device connected to one of the communications ports to establish connection with the common (I/O) port, or a device on the I/O to select any peripheral. Asynchronous; RS-232C, eight wires switched. Fixed or auto baud. Available with one I/O port and three, five, or seven communications ports. $599 to $699.

Hayes Microcomputer Products

Smartmodem 300. Connects directly to the phone line and your computer's RS-232C port to communicate with remote computers from 0 to 300 baud. Executes and responds to your commands and special parameter settings. Features include built-in audio monitor, Touch Tone or pulse dialing, and full or half duplex. Requires RS-232C serial port, RS-232C cable with DB-25 connector, software. Estimated retail: $250.

Smartmodem 1200. High-speed version of the popular Smartmodem 300 with identical operating features. Operates at 1200 baud or at 0 to 300 baud; compatible with Bell 212A-type modems. Extensively tested; compact design; competitively priced. Both modems are FCC approved for direct connection to any U.S. telephone system. Requires RS-232C serial port, RS-232C cable with DB-25 connector, software. Estimated retail: $695.

Micromodem IIe. Single board (no microcoupler) plugs into peripheral slot and connects directly to a standard modular phone jack to allow your computer to communicate over phone lines. Built-in command language dials phone numbers, sets duplex and baud rate (110 or 300), and permits control of your computer from remote locations. Onboard speaker for monitoring calls; handles Touch-Tone dialing and plugs into single- or multi-line connections. Includes *Smartcom I*. $329.

Smartcom I. Communications software for the Micromodem IIe with any of three Apple operating systems: DOS 3.3, CP/M, or Pascal. Menu options: originate/answer call, create, list, transfer files, set communications parameters. Three file transfer protocols, including verification for error-free transmission between Hayes programs. Stores three telephone numbers and displays in forty- or eighty-column mode with lower-case letters. $119.

IAS

Genterm. A complete communications package for file transfers and communicating with most any micro, mini, or mainframe computer in use today. *Genterm* offers auto dial, auto log-on, and protocol customization. Buffered file capture enables receiving files larger than memory. Transfer seven- and eight-bit files with error checking. $79.95.

Metatek

Metascope. A hardware/software extension of the Apple that turns the system into a sophisticated data line monitor. Monitors RS-232C at speeds to 19.2K bps. Asynchronous, byte-oriented synchronous, and SDLC protocols. 4K data capture with trigger feature. Display in hex, ASCII, or EBCDIC. $895.

Microcom

Micro/Courier. An electronic mail program that communicates between Apple IIs. Can send and receive messages (any Apple DOS 3.3 file) automatically and unattended when phone rates are lowest. Maintains a mailbox of one hundred phone numbers and up to twenty-six distribution lists for group mailings. Menu-driven, includes an editor. $150.

Micro/Terminal. A terminal emulation package for the Apple II and III that allows communications with remote mainframes or microcomputers, public data networks, or other personal computers. Adjustable terminal options and communications parameters permit you to log on, execute commands, capture or send data, and log off automatically and unattended. Other features include simulprinting, keyboard mapping, an editor, and autodial/redial. Apple II, $84.95; Apple III, $99.95.

PCS/2000 Networking Modem. Designed for error-free unattended file transfer between microcomputers at 1200 or 300 baud. The PCS/2000 LCD clock and 32K file buffer combine to permit unattended file transfer. Features include configurable printer buffer, data transparency, auto-dial/auto-answer, nine stored phone numbers with battery backup, simulprint, additional RS-232 port. $995.

RX/1000 Networking Modem. Auto-dial, auto-answer, Bell-compatible 212A error-correcting modem. Ensures error-free communications between any two Microcom modems and can also communicate with any standard Bell 212A modem. Creates an error-free network between personal computers, terminals to minicomputers, and mainframes. Nine stored phone numbers with battery backup, simulprint, flow control, and two independent RS-232 ports. $895.

Micro Decision Systems

LoadCalc. VisiCalc loader. Converts text data downloaded from mainframes into DIF files. Handles mixed text and values without special formatting or programming. Now you can move your mainframe database into *1-2-3* or *VisiCalc*. $95.

MicroSparc

TelText. A general-purpose data communications package. Lets you send text to and receive text from computer bulletin board systems, commercial time-sharing systems, or other personal computers equipped with a modem. Other programs included can be used to convert Apple Pascal text files, Applesoft, Integer Basic, and binary programs to DOS 3.3 text files. Also allows you to create a phone number directory so that numbers can be accessed by pressing only two keys. $79.95.

Multi-Tech Systems

Modem II. A complete 300/110 baud communications system. Plugs directly into one of the computer's I/O slots. Comes complete with communications software. $399.

W.H. Nail

Radio Teletype and Morse Code for Radio Hams and SWLs. Allows direct connection of the Apple computer (via the cassette ports) to transmitter/receiver. No interfacing hardware required. $59.95.

NewsNet

NewsNet. Distributes more than 125 specialized business newsletters on-line. Latest issues often available on-line days before print editions. Read full text, scan headlines, search for any meaningful keywords. *NewsFlash*, NewsNet's electronic clipping service, constantly monitors all incoming newsletter issues, plus UPI and PR Newswire, for users' preselected phrases. Prices start at $18 per hour.

Novation

Apple-Cat II. Direct-connect modem that plugs directly into a slot in the Apple II. Three hundred baud full duplex, 1200 baud half duplex. Comes with its own terminal software program. Can communicate with deaf community. Many options available. $389.

Cat. An acoustic coupler that operates in answer, originate, and test modes at data rates up to 300 baud. Compatible with Bell 103 and 113 modems. FCC approved. $189.

D-Cat. Direct-connect modem with RS-232C interface. Offers the portability and low cost of an acoustic modem, operates at half or full duplex in five operating modes. Compatible with Bell 103 and 113 modems and FCC approved. $199.

J-Cat. One-fifth the size of an ordinary modem, yet has several unique features including auto search (automatic code selection), an audio beeper, and two LED status indicators, as well as an RS-232/TTL-compatible serial interface. $149.

212 Auto-Cat. This modem operates at 1200 baud full duplex, has auto answer capabilities with automatic data rate selection, includes a seven-segment operating mode display, delayed test mode, and pulse dial mode, with dial tone detection. Has RS-232C interface. $695.

212 Apple-Cat II. Separate board provided as upgrade card to Apple-Cat II to give 1200-baud full duplex operation. Can also be purchased as a two-card system. All same features and software as in Apple-Cat II. $389 as upgrade; $725 as two-card system.

Peachtree Software

Telecommunications. A high-performance, easy-to-use data communications package. It provides electronic communications capabilities with other computers, including timesharing systems, large-scale computers, subscription information utilities, public access bulletin boards, and other telecommunications users. In a matter of minutes, via regular telephone lines, *Telecommunications* can send a document or data file around the block—or around the world. $150.

Rogue River Software

Odd-Couple. A set of machine language programs that allow communications between an IBM pc and an Apple computer. Communications can be direct or through a modem at speeds up to 9600 baud. Menu-driven for ease of use and can transfer any file. Communications can also be Apple to Apple or IBM to IBM. $79.95.

Howard W. Sams

Hello Central, by Bruce Kallick. Use this menu-controlled terminal program and any compatible modem to communicate with information networks and other microcomputers. Built-in, twenty-command text editor lets you prepare, save, retrieve, manipulate, and print the letters, files, and other material you send and receive. Dials voice calls, takes messages, allows remote control, converts Basic and binary files, and much more. $99.95.

Sensible Software

Tele-porter. A new standard in telephone transfer programs. Individual DOS 3.3 files or entire five-inch disks (CP/M, DOS, Pascal, ProDOS, or SOS) can be transferred between Apples using modems at up to 2400 baud. Files can be transferred simultaneously in both directions, with automatic data compression and complete error checking, while users chat with each other. $79.95.

Softronics

Softerm 1. A powerful and flexible terminal-emulation program that provides basic TTY-compatible terminal communications to a variety of host computers, timesharing services, and information services. DOS, CP/M, and Pascal disk formats may be used for file transfers using multiple protocols, including Xmodem. $135.

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. Terminal emulations include ADDS Regent 20, 25, 40, 60; ADDS Viewpoint; Data General D200; Datapoint 3601; DEC VT102 and VT52; Hazeltine 1400, 1410, 1500, 1520; Honeywell VIP7205; IBM 3101-10, 20; Lear Siegler ADM-3A, ADM-5; and Televideo 910, 925. $195.

Software Connections

Electronic Mail Software Package for Corvus Omninet. Allows users to send letters and transfer files to each other locally or to users at

other networks over the phone lines. Letters may be addressed to individual users or to a predefined distribution list. $745 to $1,195.

Software Sorcery

A.B.B.S. Communicate with friends and associates; meet other computerists; give customers that extra bit of help, and attract new ones. With *A.B.B.S.*, a modem, and a phone line, turn your Apple II into an electronic message center. $74.95; deluxe version, $164.95.

Source Telecomputing

The Source. An on-line information and communication service for personal computer owners providing electronic mail, bulletin boards, conferencing, UPI news, stock and bond quotes, financial news, electronic shopping, airline schedules, movie reviews, hotel and restaurant guides. Membership, $100 (one-time fee), hourly fees, $7.75 to $20.75.

Southwestern Data Systems

ASCII Express. SDS's first communication package, this program still offers an economic solution to the basic communication needs of the Apple owner. Features include a built-in directory, keyboard macros, a text editor, and more. $59.95.

ASCII Express: The Professional. Powerful Apple DOS communications package. Easily transfers files of any type or size. Supports all popular modems and eighty-column cards. Features include interactive macros, 1200+ baud capability, unattended operation, protocol transfers, plus subscription offers from CompuServe, BRS After Dark, NewsNet, and Delphi. $129.95.

Online. Lets your Apple become your own private-access dial-up system. Four levels of passwords for complete security. Fifty user accounts; ideal for electronic mail or announcements by clubs or businesses. $89.95.

P-Term: The Professional. For the Pascal Apple. Supports all popular modems and eighty-column cards; 1200-baud operation, protocol transfers, and more. Includes subscription offers from CompuServe, BRS After Dark, NewsNet, and Delphi. $129.95.

Z-Term. Sophisticated, full-feature terminal package for the CP/M Apple; send files of any size, receive files up to 41K, auto-save mode, terminal emulation, and much more. $99.95.

Z-Term: The Professional. Powerful communications package for the Z-80-equipped Apple. Supports all popular modems and eighty-column cards, protocol transfers, 1200-baud operation, auto answer, unattended transfer, plus subscription to CompuServe, BRS After Dark, NewsNet, and Delphi. $149.95.

Telephone Software Connection

Answering Machine, by Ed Magnin. Automatically answers modem phone line with your name, takes messages, gives outgoing messages to friends when they call in. Owner can retrieve messages or exit program to Basic from remote terminal. Displays or prints detailed system log, has sophisticated security routines. Requires Micromodem. Works well with most clocks. $35.

Phone Secretary II, by Ed Magnin and Bob Kovacs. Let your modem also manage your voice calls. Place calls by name, not number. Time calls (no clock required) and keep a log to compare with phone bill. Holds over 1,000 names, two phone numbers each. Prints personal phone book for travel. Also times and logs incoming calls. For Micromodem or Apple-Cat (with ROM). $40.

Telephone Transfer II, by Ed Magnin and Leighton Paul. Sends Applesoft, Integer, binary, or text files from one Apple to another. Two countdown timers show remaining transfer time. "Chat" while sending files. Automatically corrects errors due to line noise. Compatible with Micromodem or Apple-Cat (with ROM). $75.

Terminal Program, by Ed Magnin. Memorizes and repeats your logon to most systems. 16K capture buffer can be reviewed/printed while on- or off-line. Upload text easily. Supports upper and lower case, keyboard macros, untypable characters with or without an adapter. Formats display for forty-column screen. Requires Micromodem. $35.

Transend

Transend 1. Allows instant information exchange with other Apples,

THE AFFORDABLE ACCOUNTING PROGRAM

EZ-LEDGER The answer in the 80's for self-employed professionals or small businesses operating out of the home.

EZ-LEDGER uses the simplest form of bookkeeping possible. Single entry bookkeeping requires only posting transactions either under INCOME or EXPENSE.

EZ-LEDGER will keep track of expense items under any one of 99 user selected tax codes plus all year-to-date and monthly running totals for each of the selected items. Expense items may be entered under DEDUCTIBLE or NON-DEDUCTIBLE type codes.

EZ-LEDGER will produce INVOICES with an automatically incremented invoice number and then automatically post the data to an ACCOUNTS RECEIVABLE holding file or directly to INCOME and updates all totals.

The accounts receivable and accounts payable files are "holding" files with their own running year to date totals. Transactions in these files may be automatically posted to INCOME or EXPENSE and all respective totals will be updated automatically.

FEATURES:
- Up to 99 EXPENSE accounts and 9 INCOME accounts
- VISICALC / MAGICALC interface
- 1500 transactions per disk • 1 or 2 disk drives
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- Produce invoices • 80 or 132 column printer
- Great for HOME accounting or BUSINESS

EZ-LEDGER requires 48K ram, APPLESOFT rom and DOS 3.3

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mainframes, and public networks. Allows user to automatically save information to disk, print while receiving, and download or upload information. Can temporarily store information in a capture buffer for editing, printing, or storing at user's convenience. Also supports keyboard and log-on macros for automatic connection to other computers. $89.

Transend 2. Gives user all the options of *Transend 1*, plus the ability to send multiple data with full CRC error detection and automatic retransmission. An estimator determines the length of each transmission in advance. User-created transmit lists allow user to send a series of files with just one command. $149.

Transend 3. Allows automatic information exchange between Apples. Automatic redial and password file protection guarantees the security of user information. Supports multiple addressing of up to 128 people, complete text editor, personal appointment scheduling. Clock/calendar scheduling lets user schedule correspondence for any future time. $275.

AMC 300 Modemcard. A 110 and 300 baud modem. Supports the following features: auto dial/auto answer, Touch Tone and pulse dialing. Line monitoring allows the user to hear the carrier, busy signal, or bad connection. The AMC 300 Modemcard is Bell 103-compatible and fits completely inside the Apple without any external parts except for the RJ11 cable that connects to the wall jack. Micromodem II-compatible, and includes a free subscription to the Source. $325.

Trutec Software

Person-to-Person. A high-performance phone and address database. Has a comprehensive auto-dialer, dials voice and computer calls, uses Sprint, pays bills, and so on. Is also an address book, does mailing lists, merge-prints form letters, and keeps memos. Menu-driven, fast, and friendly. $69.95.

U.S. Robotics

Telpac. Telecommunications software that gives dynamic transmission interaction, allowing your computer to serve as a dumb terminal, send and receive files, act as host, autodial from a nonvolatile library of numbers (with auto log-on), and time dial with pre-set commands. Utilizes a simplified, friendly format. $79.

Telpac Software. Using the terminal mode, this will allow the microcomputer to function as a standard terminal to communicate with a host computer system. Will send a file from the local disk drive to a host computer; receive files from a host computer using standard communications protocols; allow a microcomputer to be accessed remotely using the host computer mode. In this mode, any standard terminal can be used with the system to run programs, retrieve data, or send data. $79.

Password. A 300/1200 autodial, auto-answer modem. Full/half duplex Bell 212A, 103, and 113 compatible. Utilizes only 12 ICs on a single board design. May be used with a wide variety of communication software, including *Telpac*, Ward Christensen's public domain programs, and *Crosstalk*. $449.

Woolf Software System

Move-it. A smart terminal and file transfer program for small computers running CP/M, CP/M-86, MS-DOS, and other operating systems. All *Move-it* commands can be controlled from one end, allowing communication to unattended computers. Features include transmission/reception of files, error-free transfers between *Move-its*, support for autodial modems, local and remote directories/user numbers, and messages. Includes configuration and help utilities. $125 to $150.

Zoom Telephonics

Netmaster. A "communications freeway" that lets you speed any Apple file to another computer through noisy phone lines without errors. Lets you transfer games, computer graphics, documents, any DOS 3.3 file directly from disk to disk, all with computer accuracy. Works with any modem, compatible with other communications software. $79.

Networker. Plug-in 300-baud, single-slot, direct-connect modem. The Apple Communications Card is on-board, and it comes with both *Networker* communications software on disk and a subscription to the Source. $129.

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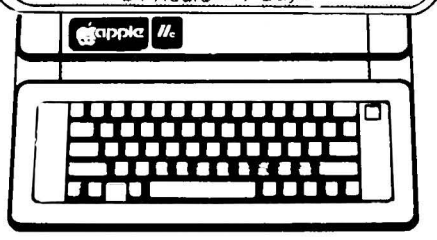

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Anthro-Digital

Hebrew II. A mini-word processor for the Hebrew language. Prints from right to left, includes optional vowels, prints numbers from left to right, can label any Apple graphics screens, and prints out on most printers. $60.

Hebrew II Plus. A mini-word processor for Hebrew and English. You can switch between languages at will; each prints in its proper direction, and Hebrew provides optional vowels. Create word lists and bilingual texts. Print out on most printers or use separate graphics dump to print giant letters. $90.

F.A.R.M. Designed to teach agricultural accounting, based on the way farmers actually work. Each student can set up and operate several working farm models. Provides extensive reporting to show effects. $165.

Apple Computer

Apple Logo. A sophisticated, proven tool for problem solving, both for children and adults. It's a language for programming, designed to accommodate both the beginner and the advanced user. An ideal tool for home education. Teaches problem-solving skills by providing a flexible tool for individual exploration. $175.

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Elements of Medical Terminology. A drill and practice course in medical terminology. Twenty-one lessons teach the student to construct a virtually unlimited vocabulary of medical and anatomical terms through the assembly of combining forms, prefixes, and suffixes. Institutional version allows up to 100 students to take the course concurrently. $20; institutional version, $40.

Introduction to IBM OS/JCL. An interactive tutorial in IBM Job Control Language for OS that runs on any Apple with Applesoft. Ten lessons cover JCL syntax, record blocking and space allocation, condition codes, partitioned and sequential organization, catalogued data sets, and IBM utilities. Institutional version tracks up to 100 students concurrently. $25; institutional version, $50.

Beginning Basic. An interactive tutorial in Applesoft for the beginning programmer. Twelve lessons cover everything from screen formatting and branching to looping techniques, arrays, and graphics. Dynamic examples are developed on the screen and allow the student to see execution in real time. An on-line index of terms is included. $34.95.

Artworx

Monkeymath, by Dennis Zander and Roger Harnish. Marvelous graphics and animation couple the fun and excitement of an arcade game with the opportunity to learn and practice number placement, addition, subtraction, multiplication, and division. Each skill may be practiced at three levels of difficulty. For ages four to ten. $23.95.

Hodge Podge, by Marsha Meredith. Provides knowledge in a most enjoyable (and nonintimidating) fashion for children from eighteen months to six years of age. Many cartoons, animations, and songs; each key provides something different for the child to explore, from apples to zigzags. $19.95.

ATV Research

Imagesoft Public Domain Compilations. Programs include graphics/sound, home, education, business and finance, games, and utilities. Ideal for those learning Basic. Each program is listable, permitting users to analyze and learn from, as well as to modify, the program. One category, $24.95; all seven categories, $89.95.

Avant-Garde

Word Scrambler and Spelling Tutor. A fun way to teach spelling. A word is flashed on the screen and the student must spell it correctly. Cor-

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AEN Grading System. Designed to eliminate tedious hours with a grade book. Alphabetizes, calculates, and records grades of one student, many students, or categories of students. The user can choose from number grades or any of three types of letter grades. The package includes a demo, manual, and tutorial. $70.

Electronic Flash Card. This program turns the monitor into a flashcard. Parents or teachers create files on math, vocabulary, foreign-word translations, or questions and answers. The program also supports foreign characters and accent marks. $29.95.

ZES Authoring System. An authoring system designed to allow teachers to develop their own lessons without programming knowledge. This menu-driven system includes graphics, animation, branching, and extensive record-keeping. The program comes with four disks and an extensive, 200-page manual. $250.

Sentence Diagramming. Four separate exercises designed to enforce grammatical ideas. The user is required to identify parts of speech, usage, and types of sentences, as well as to diagram sentences. Twenty sentences and three levels. $29.95.

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Ultra Function Plot. Calculates and graphs values for any equation that can be written in Applesoft Basic, including sine, cosine, quadratics, and more. The user chooses the equation and the range of X values; the program calculates and graphs the Y values. The program also allows overlays and blowups. $59.95.

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Behavioral Engineering

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Berry Systems

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The VisiCalc Program. Computer-based training on the use and applications of *VisiCalc*. $69.95.

CET Research Group

French Curve. Employs a cubic spline algorithm in least squares smoothing and expansion of tabular data. Noisy data sets may be smoothed before further processing of the data. Also offers interpolation, numerical integration, and graphical display of tabular data. $95.

NLLSQ. A nonlinear least squares (nonlinear regression) program designed to fit a user's data to a model of his or her choice. A primary application is in analyzing experimental data from physical and engineering research. The user must provide suitable data set and Basic code that defines the problem of interest. $150.

COMPress

EnBasic. If you are familiar with Basic, you'll be able to create high-quality CAI materials without hardware modification. Unlike most authoring systems, which simplify CAI by limiting the range of approaches, EnBasic allows full control of the logical structure of instructional design. $150.

Compu-Tations

Spanish Vocabulary Drill. A drill-and-practice program for learning Spanish vocabulary words. Includes several files on the disk; also allows the user to input and save additional files. $24.95.

German Vocabulary Drill. Similar to *Spanish Vocabulary Drill*. Includes practice in German-to-English translation and vice versa. $24.95.

French Vocabulary Drill. Similar to *Spanish Vocabulary Drill*. Includes practice in French-to-English translation and vice versa. $24.95.

Basic Judaism. Eight quizzes covering Jewish life, leaders, holidays, services, and so on. A menu-driven program that reinforces right answers and repeats missed questions until the subject is mastered. $34.95.

Early Elementary I. Four programs with counting, color, number, and shape drills. The programs require very limited keyboard skills and provide positive comments, graphics, and optional music reinforcement. A comprehensive *Teacher Management File* is included; the documentation includes ten behavioral objectives. Preschool through grade two. $29.95.

Early Elementary II. Four programs with drills on the alphabet, numbers, and the inside/outside concept. Classrom-tested. Includes a password-protected *Teacher Management File* and documentation of behavioral objectives. Preschool through grade two. $29.95.

Special Skill Builders I. Includes the same programs as *Early Elementary I* for use in Special Education situations. Unique in that game paddles as well as the keyboard may be used to respond to screen presentations. $29.95.

Special Skill Builders II. Includes the same programs as *Early Elementary II* for use in Special Education situations. Also uses game paddles. $29.95.

Typing Teacher. A hands-on program that utilizes behavioral learning principles to teach anyone to master the typewriter or keyboard. Written by a behavioral psychologist, the program concentrates on drill, practice, and reinforced learning through eight phases of instruction. $14.95.

Word Power. A drill-and-practice program designed to help anyone from the third grade on increase vocabulary skills. The disk includes several practice files; users can input, revise, store, and retrieve their own files, each including up to thirty different words. $24.95.

Schoolhouse I. A collection of ten educational programs on one disk, primarily oriented to the elementary and intermediate grades. $24.95.

Soccer Math. Math program that utilizes graphics of soccer players. Includes addition, subtraction, and multiplication problems in ten skill levels. *Teacher Management File* automatically adjusts the skill level of each user based on the number of correct anwers. $24.95.

Study Quiz Files. A user-oriented program that allows you to create lessons in quiz form on any subject without programming knowledge. Place an entire course on the disk, with modular lessons that can be re-

trieved, run, or revised at will without having to rewrite lessons. $24.95.

Multiple Choice Files (MCF). Similar to *Study Quiz Files*, except it creates multiple-choice tests. Contains randomized questioning and stimulating, high-impact, immediate-feedback learning strategies. *MCF* provides for five choices to each question stem. Hard copy multiple-choice tests can be printed. $24.95.

Computer Tutor Publishing

Computer Tutor. Four one-hour videocassettes that explain how to use the Apple II and IIe computers. Each tape is divided into easily manageable 15-minute segments for interactive use with the computer. Titles: *First Byte of the Apple*, *Basic Programming*, *Graphics*, *Problem Solving*. $135 each.

Basic Programming: Coding, Counting, and Comparing. Used to teach fundamentals of Basic on any microcomputer. Demonstrates ways to get data into the machine, examines types of variables, describes looping and subroutines, and explains how the machine decides what to do next. Ages twelve to adult. $135.

First Byte of the Apple. Looks at main components inside the Apple and shows operational hook-up. Explains software and floppy disks, and shows how to initialize a disk and develop a simple program. Also discusses input and output devices, CPU, RAM, ROM, and bytes. Ages twelve to adult. $135.

Graphics: A Picture Is Worth 1000 Words. Explains lo-res graphics, hi-res graphics, text windows (including peek and poke), and the concept of shape tables (creating, storing, and manipulating). Ages twelve to adult. $135.

Problem Solving: Calculating, Formatting, and Filing. Teaches math functions (RND, INT, LOG), explains how to format the screen and use some useful string functions, discusses how to read and write text files, and gives an overview of word processing with *Apple Writer* and record keeping with *VisiCalc*. Ages twelve to adult. $135.

Control Data

The Computer Literacy Series. These short, independent courses cover basic concepts of computers in order to help the novice overcome "computer anxiety," develop computer skills that can be used on the job, and understand and choose computer-related careers. $49.95 each.

PLATO Travel Vocabulary. Teaches over 500 common travel words related to transportation, lodging, food, health, and general conversation in Spanish, French, and German. $49.95.

PLATO Vocabulary for Shopping Use. Designed with over 500 words in French, Spanish, and German relating to shopping for clothing, personal items, toys, tools and outdoor equipment, furniture, groceries, and household items. $49.95.

The Life Coping Skills Series. Four courses to help you learn more about yourself and improve relationships with others on a personal or business level. Topics include *Building Relationships*, *Forming Positive Behavior*, *Increasing Self-Esteem*, and *Communication Skills*. $49.95 each.

Basic Number Facts. Designed for elementary math students. Gives practice in numbers zero to ten using an animated racetrack and two cars. Students solve problems, trying to improve speed and accuracy with each race. Each time the problems are solved faster, the student wins the race. $49.95.

Physics: Elementary Mechanics. Designed for senior high physics students. Tests and evaluates knowledge of the principles of mechanics. Simulated physical situations are presented with animation. A question is asked and the student is challenged to use the least possible amount of help and information. $59.95.

Counterpoint Software

Early Games for Young Children, by John Paulson. Nine games designed to teach basic skills to children ages two to six: matching numbers, counting blocks, adding and subtracting blocks, matching letters, working with the alphabet, typing names, comparing shapes, and drawing colorful pictures. No adult supervision required; picture menu gives children control. $29.95.

Early Games Music, by John Paulson. Four games encourage children ages two to twelve to experiment with music. They learn to play tunes, add graphics, and create original tunes, using the computer to record and play back the music. Names of notes and keys of the piano are introduced. $29.95.

Early Games Piece of Cake, by Dr. Robert Eyestone. At the bakery, children learn to add, subtract, multiply, and divide cakes as they come out of the oven. In *Catchacake*, players go through the same operations—at high speeds, so the cakes won't splat on the floor. Challenging fun for elementary ages. $29.95.

Early Games Fraction Factory, by Dr. Robert Eyestone. At the fraction factory, children see and describe fractions, find equal values with different denominators, multiply whole numbers by a fraction, and add and subtract fractions. Colorful graphics and musical sounds help children visualize and understand the concepts. Grades three through six. $29.95.

Early Games Matchmaker, by Jane Adolf and Charles Boody. Playfully guides children through discrimination games involving colors, shapes, sizes, and directions. Musical sounds and colorful graphics help children understand why their responses are right or wrong. Matching games are fun for learning prereading skills. Even two-year-olds need no adult supervision. $29.95.

Courseware

Courseware's Authoring System. Allows educators to create exciting, interactive, computer-based instruction—without programming. Lessons including concept, instruction, examples, review, and quiz can be built easily and linked into entire courses. Color, graphics, scrolling, and other features enhance lessons with the touch of a key. $255.

Creative Curriculum

Speed Reading Courseware. A complete program for high school through adult that will increase your reading rate at least 250 percent with high comprehension—in twenty easy-to-use lessons. Program contains twenty-eight articles on disk and fifteen articles in a supplemental reading book to help transfer skills to the printed page. $99.

Phase Reading I and II. High interest/low difficulty program that teaches reading and comprehension skills, correct eye movement, short-term visual memory, phrase reading techniques, and new vocabulary. Accompanying skillbook helps to transfer what students learn to the printed page. Reading level three to four. $49.95 and $59.95.

Fight for Independence. One of six programs developed to increase reading comprehension and improve study skills. Motivating material from United States history develops new vocabulary words, basic perceptual training, and skill practice with phrases. Accompanying skillbook allows for the transfer of reading skills to writing areas. Reading level four. $79.95. Five other programs, reading levels five through nine, also available at $79.95 each.

Alaskan Gold. Similar to *Fight for Independence*. Reading level nine. $79.95.

North to Alaska. Similar to *Fight for Independence*. Reading level eight. $79.95.

Building the Transcontinental. Similar to *Fight for Independence*. Reading level seven. $79.95.

The War Between the States. Similar to *Fight for Independence*. Reading level six. $79.95.

The Westward Movement. Similar to *Fight for Independence*. Reading level five. $79.95.

Cross Educational Software

Create-A-Test. Enables teachers to produce perfectly formatted tests in ten minutes. Prints selected questions from question disks. Teachers can write their own question disks with the built-in text editor or use prepared disks. Twenty-one disks are available in chemistry, physics, biology, geography, and physical science. $89.95.

Physics: Vectors and Graphing. Contains seven vector programs and one graphing program. *Datagraph* sets up a graph, fits a line to data, and calculates the intercept and slope of the line. $15.

Physics: Statics. Five programs that teach the procedures for solving statics problems. Each problem is illustrated, and vectors are drawn at appropriate points. Some of the problems ask students to use their own calculators while working along with the computer. $20.

Physics: Motion. Nine programs that teach the procedures for solving motion problems. *Graphing Motion* demonstrates the concepts of slope and area for students who are learning calculus. $20.

Physics: Conservation Laws. Eight programs on conservation of momentum, energy, and angular momentum. One- and two-dimensional collisions are discussed. *Bouncing Ball* is a game that teaches the conservation of kinetic and potential energy. $20.

Physics: Circular Motion. Four programs discuss the problem-solving methods of circular and harmonic motion. Two other programs use graphics to explain why a satellite stays in orbit. $20.

Physics: Thermodynamics. Seven programs for science and engineering students that solve heat problems and teach kinetic theory. In *Ideal Gas Cycles*, the P-V gas cycles are graphed on the hi-res screen. $20.

Physics: Electricity. Seven programs at the calculus level cover the traditional physics topics related to field theory and circuits. *Gauss's Law* and *Ampere's Law* each apply the laws to an example problem. $20.

Physics: Optics. Six large programs on two sides of a disk. Three programs cover ray diagrams used in geometrical optics. The other three discuss physical optics for more advanced students. $20.

Atomic Physics. Six programs that teach atomic and nuclear structure to physics and chemistry students. Some programs use little math. *Atomic Models* presents the historical development of atomic models from Democritus to quantum mechanics. $30.

Solar System Astronomy. Seven programs containing extensive hi-res graphics. No math required. Useful to grades nine through adult. *Inner Planets* and *Outer Planets* give up-to-date information on the planets and their moons, including data from NASA fly-bys. $30.

Stellar Astronomy. Eight programs useful to grades nine through adult. *Types of Stars* draws a hi-res diagram and explains main sequence stars, novas and super novas, white dwarfs, red giants, blue giants, and variable stars. *Cosmology I and II* discuss physical and philosophical theories of origins. $30.

Physics Gems. This disk is crammed with thirty math and science programs. They contain color pictures, animation, and user inputs. Programs include *Least Squares Fit*, *Metric Height and Weight*, *Finding Absolute Zero*, and *Weight on the Planets*. $35.

Physics Lab Interface—Light. Contains a kit of parts that can be plugged into the Apple game controller. Four phototransistors are included. The accompanying disk calibrates the interface and demonstrates each experiment. Experiments include timing a pendulum and measuring the acceleration of gravity. $60.

Physics Lab Interface—Heat. Contains a kit of parts that can be plugged into the Apple game controller. Four thermistors are included. The accompanying disk calibrates the interface and demonstrates each experiment. Experiments include melting point and specific heat. $60.

Physics Lab Interface—Sound. Contains a kit of parts that can be plugged into the Apple game controller. A speaker, microphone, and transistors are included. The accompanying disk calibrates the interface and demonstrates each experiment. Experiments include audio spectrum analyzer and speed of sound. $60.

Grade Reporter. Contains two programs. The large-class program prints reports that can be posted on a bulletin board; also makes histograms of test scores. The small-class program prepares detailed grade reports that can be given to each student. $19.95.

Spell-a-Vision. Builds visual memory by displaying words in large letters. Clues are included; spelling words must be typed correctly from just the clues to score 100 percent. Parents or teachers can enter spelling lists with the built-in text editor. The disk includes 1,500 words with clues for elementary students. $24.95.

Cygnus Software

The Metric System Tutor. A two-hour, in-depth study of the metric system. Consists of the following areas: development of linear, mass, and volumetric units; converting units; and final test. Removes students' fear and dislike of the metric system. Grades six to twelve. $66.

The Scientific Method. A one-hour program that introduces students to the scientific method of problem solving. The following areas are covered: define problem, collect information, make hypothesis, check hypothesis, reach conclusion. A series of puzzles, mysteries, and problems enable students to practice the scientific method. Grades six to twelve. $39.

The Characteristics of a Scientist. Introduces students to the methods of a scientist. Shows how curiosity, observation, skepticism, and open-mindedness enable the scientist to gather information and arrive at a conclusion. Students practice methods with a series of puzzles, observations, and so on. Grades six to twelve. $39.

Davidson and Associates

Word Attack. A vocabulary-building system with four well-designed and graphically appealing exercises, including a fast-paced arcade game. Words and sentences illustrating usage are presented on nine different levels (ages eight to adult), accessing data files of 675 words. Contains an easy-to-use editor. Additional data disks available. $49.95.

Math Blaster. Presents addition, subtraction, multiplication, division, fractions, and decimals operations in graphically appealing exercises, including a fast-paced arcade game. Extensive data files contain over 600 problems for students ages six to twelve. An editor makes it easy to enter additional problems. $49.95.

Speed Reader II. A complete reading improvement course. Professionally designed exercises build speed and comprehension with just thirty minutes of practice per day. Contains five activities with thirty-five reading selections, each with questions to check comprehension; also includes an editor that allows user to enter new selections and a grade-level analyzer to determine reading level. $69.95

Davka

Bible Baseball. Quiz game on the Old Testament. Animated ballpark and scoreboard with sound and music. Computer pitches Bible questions; correct answers score runs. Both easy and difficult question sets. Play against computer or another player. Supplementary disks cover other Bible subjects in depth. $24.95.

All about Chanukah. Teaches the origin and basic customs of Chanukah. Includes a spinning dreidel game. Shows the Maccabean revolt in full-color graphics and concise text. A bouncing ball teaches the Hebrew blessings for the Menorah. Other sections include *Facts About Chanukah*, *Words of the Sages*, and a quiz. $30.

DesignWare

Crypto Cube. A challenging word-puzzle game for one or more players ages eight to adult. The game features a rotating cube that has crossword-puzzle grids on four sides. Players take turns uncovering letters hidden behind the grid and trying to guess the words. Comes with 1,000 words; user can also add word lists. $39.95.

Creature Creator. An educational game that allows children to create dancing creatures and practice pattern analysis. Once formed, a creature can be programmed to hop, stomp, wave, roar, and make other motions. The computer makes one creature dance, and the child tries to program another creature to do exactly the same dance. For ages four and up—even adults! $39.95.

Spellicopter. An action spelling game for ages six and up. Players pilot a helicopter, maneuvering it through skies crowded with balloons, thunder clouds, and other obstacles in order to rescue the stranded letters. Context sentences are displayed; if a word is misspelled, the correct spelling is displayed. Includes 400 words. $39.95.

Developmental Learning Materials

Arcademic Skill Builders in Math. Six fast-paced, brightly pictured arcade games that give practice in math operations. The series includes *Alien Addition*, *Minus Mission*, *Meteor Multiplication*, *Demolition Division*, *Alligator Mix* (addition and subtraction), and *Dragon Mix* (multiplication and division). Includes blackline masters and flashcards. $39 each. All six for $220.

Arcademic Skill Builders in Language Arts. Similar to *Arcademic Math*, but gives practice in language arts areas. The series includes *Verb Viper* (subject/verb agreement at four levels), *Word Man* (word building through patterns), *Word Invasion* (recognition of parts of speech), *Spelling Wiz* (spelling demons), *Word Radar* (sight word recognition), and *Word Master* (antonyms, synonyms, and homonyms). Includes blackline masters. $44 each. All six for $245.

Digipac Computer Consulting

Titrator. Hi-res simulation of an acid-base titration. Uses sound and color graphics. Draws the pH curve as the titration progresses. Titrates either strong or weak acids. $23.95.

Gradebook. Stores students' scores on individual assignments. Calculates weighted averages, does statistical analysis on marks, plots a

mark distribution graph. Marks can be normalized and adjusted. Prints reports. All data is easily entered and edited. $23.95.

Graphical Analysis. Scientific graphing program to plot fitted curves using least squares analysis. Fits both linear and curved mixed-case labels, plus superscripts and subscripts. Overlays are possible in different colors. Includes suggested experiments requiring graphical solutions. $23.95.

Disk Depot

Seating Chart. Allows a teacher or secretary to sort students quickly into a seating chart according to the particular teacher's method of arrangement. Students are seated alphabetically, randomly, or by any other method desired. Changes can be effected quickly and new charts printed easily. $29.95.

Generic List Generator (GLG). Allows an alphabetical list to be extracted from a main list by typing only the number of the item, thereby saving typing and alphabetizing time. *GLG* has been used for attendance, field trip lists, and overdue books, but you may have other applications. $39.95.

Special Reports to Parents. Includes two programs: *Deficiency Slips* and *Excellence Slips*. These programs enable the teacher to personalize special report notes to parents. Written in Applesoft; can be modified for each teacher. $29.95.

Book Questions. Files and prints out questions at a student's request. Teachers may input up to twenty-five different questions per book, save them on a disk, and modify them or add to them whenever necessary. $19.95.

Math Facts Teacher's Aide. Students take brief tests to determine math facts known, slow facts, and facts not yet mastered. The computer then prints out its findings and provides practice sheets for slow and unknown facts. When the student has mastered all the facts, a Certificate of Mastery for that level is issued. $79.95.

Registration 1L (One Level). Allows teachers to select students for classes by sorting them according to their choices or by random sorting. Note: This is designed for one level of classes. Ideal for elementary, one department, or a special activity. $39.95.

Dynacomp

Children's Carrousel. Nine menu-selected games with great color and sound (including the carrousel and alphabet songs). Games include matching shapes, counting, letter recognition, and more. Field tested. Preschool children. $19.95.

Teacher's Gradebook. Store, retrieve, summarize, update, or otherwise use and report student data—student rosters, grades, and absences. Up to seven grading categories and twenty marks for each category. Includes password protection, easy data entry and retrieval, and versatile record structure. $49.95.

Teacher's Aide. Drills for addition, subtraction, multiplication, and division. Five levels of difficulty. Includes an option to display each step in long division and multiplication. Features large block graphics for easy readability. Grades one through six. $13.95, cassette; $17.95, disk.

Probability Through Problem Solving. Twelve programs treating probability—with dice, coins, marbles, playing cards, and more. Easy to use, entertaining, challenging, and student-tested. A self-test is included. Two disks. Grades seven to twelve. $39.95.

Celestial Basic. Twenty-three programs for amateur astronomers and students. Quickly find planetary positions, rising and setting times of planets, sun, and moon for any locality, on any date. Check lunar eclipses, view the skies from any spot on Earth, and learn the constellations. Two disks. $49.95.

Spell It. A spelling quiz system with more than 1,200 words. The words flash on the screen, and the user must type the word from memory. Misspelled words are repeated. Scores are reported and can be printed. Users can also make their own ten-word quizzes. $19.95.

Earthware Computer Services

Volcanoes. A simulation of volcanism in game format, allowing players to do "real-life" investigations and interpret ambiguous data. May be played by two to four players, or teams. Highly educational and fun. In use by over 200 colleges and universities. $49.50.

Star Search, by Mark Goles in consultation with Gordon Goles. A planetary exploration game. Player must configure his own spaceship

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Educational Courseware

The Basic Tutor. Series of nine disks designed to provide a guided tour into the world of Basic programming. Includes system commands, programming commands, graphics commands, music and sounds, text files, shapes/pictures, sample studies, advanced topics, and programming aids. Complete series, $280; per disk, $36.

Educational Media

Self-Exploration Series No. 1. Four interactive guidance instruments designed to allow high school and college students to learn more about themselves. Includes *Money Values Inventory*, *Parent Relationship Scale*, *Self-Concept Inventory*, and *Stress Management*. $39.95.

Self-Exploration Series No. 2. Four interactive guidance instruments designed to allow high school and college students to learn more about the area of career exploration and selection. Includes *Occupational Values Inventory*, *Occupational Orientation Matrix*, *Career Planning Questionnaire*, and *Internal-External Occupational Orientation Survey*. $39.95.

Self Exploration Series No. 3. Four interactive guidance instruments designed to allow high school and college students to assess their own study skills. Includes the following: What is your study quotient? How do you think? How do you study? and How do you learn? $39.95.

Counselor Log. A system of counselor accountability that allows counselors to keep track of daily activities and to generate complete and accurate reports covering a specific period of time. Data is stored on personal disks. Package includes two duplicate disks, manual, and case. $59.95.

Creativity. Designed to increase student creativity through the use of rhyming couplets and word puzzles. Features color, large and small character fonts, and both visual feedback and feedback through songs. $19.95.

Math Machine. Utilizes a child's natural curiosity to foster the learning of math skills. Challenges students in grades two to eight with an arcadelike format in which response speed becomes significant as skills develop. $19.95.

Ed-U-Comp

Individualized Math. A drill-and-practice program in addition, subtraction, multiplication, division, or all four operations that meets the exact needs of each child. Can be easily reviewed and revised when necessary. Includes game as reward. Choose sound or silent play. Quantity discounts to schools. $24.95.

Edutek

A Clock Game. An excellent device for developing and reviewing time-telling skills. Students can win up to $500 (Play Bucks) by telling time. The game saves reports for the parent and optionally prints checks for the Play Bucks earned by the student during a session. $25.

Counting Fun. A fun activity that helps beginners find the numerals one to nine on the keyboard and exercise counting skills. A colorful lightshow rewards players for typing numerals in the correct sequence. Players are also rewarded for correctly counting small sets of objects. $20.

Edu-Ware Services

Algebra, Volumes One to Six. This first-year algebra course offers a selection of learning styles. Work sample problems, solve equations step-by-step, study rules, and/or read discussions of concepts. Hi-res color flowcharts show progress, and volume six reviews concepts with a comprehensive test. Volumes one through four, $39.95 each; volumes five and six, $49.95 for the set.

Spelling and Reading Primer. Two programs that make basics of spelling, reading, and computer operation fun and easy. Adjusts to individual learner's needs, allows selection of particular word groupings, and reviews recorded performance. Hi-res graphics display word/picture combinations. $39.95.

Spelling Bee Games. Skyhook, *Squadron*, *Dragon's Puzzle*, and *Convoy*—four colorfully animated games that develop hand coordination, memory skills, and motor skills of young children. Choose from twenty-two word lists for each game to build spelling and reading readiness skills. $39.95.

Compu-Read. Develops and strengthens reading skills for speed, recall, and test-taking. Adjusts to learner's individual skill level and gives detailed feedback on progress and reading rates. $29.95 each.

SAT Word Attack Skills. Gain familiarity with the SAT format as you prepare for the antonym portion of the test. Each word has been carefully selected for its frequent appearance on the SAT. Two disks—*Prefixes* and *Roots*—each with six lessons. $49.

PSAT Word Attack Skills. Tutorial for deciphering new or unfamiliar words to improve test-taking skills. Develops language skills in mastering word definitions, connotations, and applications. Two disks—*Prefixes* and *Roots*—each with six lessons. $49.

Compu-Spell. Ideal for classroom or home. Keeps records for up to sixty users, displays all spelling words in sentence context, records most recently misspelled words. Use with data disks that contain word lists for grades four to eight. *Compu-Spell*, $29.95. *Compu-Spell* data disks, $19.95 each.

Eiconics

The Eureka Learning System. A courseware authoring system that gives educators the freedom and flexibility to design their own courses. $300.

Electronic Arts

Music Construction Set. An interactive music composition and learning tool easy enough for beginners and powerful enough for experts. Pick up notes, rests, sharps, clef signs, and other symbols, put them on the staff, and immediately hear them play. Save to disk or print your compositions. Examples included. $40.

Electronic Courseware Systems

Seventh Chords. Designed to improve aural skills in the perception and identification of seventh chords. Hard copy reports may be obtained with the use of a printer. Diagnostic information is available to the learner at the completion of each lesson. $39.95.

Intervals. Similar to *Seventh Chords*, but designed to improve perception of intervals. $39.95.

Basic Chords. Similar to *Seventh Chords*, but working with basic chords. $39.95.

Elements of Mathematics. For individuals interested in teaching mathematics fundamentals using computers. Contents include adding fractions (common denominators), adding more fractions (unlike denominators), reducing fractions, and student record-keeping option. $49.95.

ECS Computerized Gradebook. Designed to provide a statistically accurate method of keeping students' scores and assigning grades. Up to fifty names, ten scores each; computed final score and letter grades; conversion to standard scores; scores individually weighted; distribution of any score set, with mean and standard deviation; letter grades assigned. $49.95.

Aural Skill Trainer. Designed to improve aural skills in the perception and identification of intervals, basic chords, and seventh chords. Hard copy instructor reports available with printer. Diagnostic information is available to the learner at the completion of each lesson. $99.95

Keyboard Drill. Designed to increase speed in identifying notes randomly placed on the bass and treble staves. A keyboard display is used; correct answers are selected with a movable cursor. Time limit is set by the user to adjust level of difficulty. $39.95.

Key-Signature Drill. Designed to increase speed in identifying major and minor keys on bass and treble staves. Drill reinforces key relationships by asking for both the major and minor keys of a given signature. Drill can be timed and the time limit set to adjust difficulty. Summary score is presented. $39.95.

Note Name Drill. A music activity drill designed to increase user's ability at naming notes in treble and bass clef. Twenty notes are randomly presented one at a time; a summary score is presented when a lesson is finished. The drill can be timed, with the limit set by the user. $39.95.

Elements of Music. For individuals interested in teaching music fundamentals using computers. Developed for use with children and

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nonmusic majors who wish to learn the elements of music at an entry level. Contents include note names, pitches on the keyboard, key signatures, and student recordkeeping. $99.95.

Encyclopaedia Britannica Educational

Keyboard Master. A keyboard skills program that introduces three- to eleven-year-olds to computer keyboards. Includes an exciting game that rewards good keyboard skills. $34.95.

Math Basics. Introduces math skills to children ages four to eleven. Addition, subtraction, multiplication, and division tutorials with practice lessons. $39.95.

Crossword Challenger, SAT Version. Helps high schoolers prepare for this all-important exam through the challenge of crosswords. $49.95.

Word Scrambler, SAT Version. High school students can prepare via a challenging and fun word search game. $49.95.

Crossword Challenger. A vocabulary-improvement game for all ages that utilizes the challenge of crossword puzzles. $44.95.

SAT Fragmentation. Helps high schoolers prepare for the all-important SAT via a challenging word game. The objective: connect words that have been split into two parts. $49.95.

Word Scrambler. A word-search game for all ages. Improves word recognition and vocabulary skills through the fun of a challenging word game. $44.95.

Fragmentation. Improves word recognition and vocabulary skills through an exciting one- or two-player game. Players connect words that have been split in two. For all ages. $44.95.

My First Words. A child's first step to reading. For preschoolers (ages three to six). $34.95.

Master Writer. A perfect first word processing program for ages nine to adult. Invaluable for junior high, high school, and college students as well as home and business. This word processor performs most of the functions of more expensive programs. $49.95.

Master File. A perfect first database program for ages nine to adult. Enter, store, sort, and list any information you wish. $49.95.

Math Helper. A math skills program for ages nine to adult. Evaluates computations, stores calculations and science formulas, and solves problems that the user presents. $39.95.

Essertier Software

Basic Math System S. An eight-disk set covering all basic math from second through ninth grade. Completely menu-driven; tutorial in nature. Includes five curriculum disks, one data storage disk, one test disk, and one class disk. $350.

FlipTrack Learning Systems

How to Use WordStar and Mail Merge. A tutorial with four audio cassettes. User learns to create, edit, format, and print documents; use *WordStar* commands for underscore, boldface, search and replace, and more; use *Mail Merge* to prepare and merge-print form letters, mailing labels, and so on. Includes User's Guide. $75.

How To Operate the Apple III. A tutorial with four cassettes. Designed for the first-time computer user, it teaches how to set up the computer, use the keyboard, and run programs. Also, it teaches how to use *System Utilities* disk. Demonstration disk, files, and an Operator's Guide are included. $110.

How To Operate the Apple IIe. A tutorial with three audio cassettes. Teaches student to use each key and essential operating system command, run programs, enter data, make backup copies of files and disks, and much more. A quick, easy, nontechnical approach for the nonprogrammer. Includes Operator's Guide. $57.

How To Use WordStar. A tutorial with three audio cassettes. User learns to use *WordStar* to create, edit, and reorganize documents; merge forms and print documents; specialized commands for underscore, boldface, page headings, subscripts, search and replace, microjustification, and much more. Includes User's Guide. $57.

How To Use Multiplan. A tutorial with four audio cassettes. User learns to use commands to build a cash flow model, answer "what if" questions, and change data. Includes User's Guide. $75.

How To Use Apple Writer. A tutorial with three audio cassettes. User learns to create, edit, format, and print documents. Includes User's Guide. $57.

How To Use VisiCalc. A tutorial with four audio cassettes. User learns to use *VisiCalc* commands to build a cash flow model from scratch; answer "what if" questions about the model; enter labels, values, and formulas; use replication; and more. Includes User's Guide. $75.

How To Operate the Apple II Plus. A tutorial with three audio cassettes. User learns to use each key and essential operating command, run programs, use the System Master disk, enter data, make backup copies of files and disks, and more. Includes Operator's Guide. $57.

How To Operate Your Computer Under CP/M. A tutorial with three cassettes. Users learn how to use the most common CP/M commands for formatting and copying disks, copying and erasing files (including "wild-card" shortcuts), creating and editing documents, and using batch processing to run application programs. Includes Operator's Guide. $60.

Focus Media

The Basics of Basic. Here's a great way to learn Basic programming: twelve lessons that hold your hands and guide you through introductory programming in easy-to-follow screens with beautiful graphics. Extensive documentation with review is provided, but you won't need it. $99.

Fullmer Associates

Typemaster. A shell program that improves typing skills. The teacher inputs drills, which the computer uses to control progress toward the speed and accuracy objectives. Unique drills are computer-generated by student's performance. Detailed progress reports available and printable. Sample drills included. $60.

Division: One Digit Divisors. High-quality, multi-track lesson. Includes pretest, posttest, reteaching and drill, story problems, and dividing with money. $30.

Function Plotter. Utility program for teachers, students, engineers, and experimenters. Helps find maxima and minima and view overall curve shapes. Plots up to five equations at the same time. Various plotting and viewing options. $75.

The Learning Box. Winner in Johns Hopkins national search for handicapped aids. A drill shell/authoring program. Outputs facts on any subject in a tic-tac-toe format with color and sound. Teacher inputs answers and questions to disk, which the computer uses to control the game. No programming skill required. More than fifty drills per disk; sample drills included. $50.

Alphabetize. Teacher utility for presenting words for alphabetizing or spelling drills. No programming skill required. Words randomly selected during drills. $50.

Funk Vocab-Ware

Power of Words. Volumes One and Two. A word builder geared to high school through college-level vocabularies. Humor, sound effects, and amusing graphics. $29.95 each; both for $52.95.

Gessler Publishing

Anagramas Hispanoamericanos. Teaches and reviews locations, names, capitals of Spanish-speaking countries. $37.95.

Poker Pari. A culture game for intermediate or advanced French students based on poker. $39.95.

Poker Listo. A culture game for intermediate or advanced Spanish students based on poker. $39.95.

Poker Parat. A culture game for intermediate or advanced German students based on poker. $39.95.

La Guillotine. A "hangman" game with language learning activities for beginning to intermediate Spanish students. $27.95.

La Corrida De Toros. A "hangman" game with language learning activities for beginning to intermediate French students. $27.95.

Deutsche Grammatik: Der-Die-Das. Teaches how to decline definite article; accusative, dative, either/or prepositions. $29.95.

Le Present Et Le Passe Compose Des Verbes Reguliers Et Irreguliers. Formation of present and past tenses of regular and irregular French verbs. $32.95.

La Carte De France. Explore the various regions of France while reading about each province. $43.95.

Pronoms Relatifs Et Interrogatifs. A review of these pronouns with rules and exercises. $33.95.

Un Cours De Grammaire. A French grammar review program with

multiple-choice and fill-in questions. $43.95.

Spanish Word Order. An interactive program using linguistic patterns to teach basic sentence structure. $34.95.

Spanish Grammar Review. A series of seven disks covering the most important topics in Spanish grammar. $199.

Gnosis

P-Lisp. A full Lisp interpreter for the Apple II, featuring floating point mathematics and hi-res graphics. This version of Lisp contains all standard functions found in large computer Lisps and includes full support for Apple disk functions, machine code programming, and full graphics capability. $149.95.

Gold Disk Quality Software

Scandura Training Systems, by Dr. Joseph Scandura. A complete set of diagnostic pretests and retention posttests, tutorials, and mastery tests in whole number arithmetic (grades one to six) and language arts (grades three to seven). This is an intelligent teaching system. $35 each.

Harcourt Brace Jovanovich

Computer Preparation SAT. An interactive learning system that helps students score high on the SAT. Includes a 470-page textbook, two double-sided disks, and a fifty-page user's manual. Four complete practice tests (verbal and math) that are timed, scored, and results diagnosed. Personalized study plan. $79.95.

Hartley Courseware

Analogies Tutorial. Teaches children how to attack and solve analogies. Strategy is the key. The child learns how to identify an analogy and then complete it. Hints or explanations guide children toward the correct answer. Analogies may be modified to provide a challenge for everyone. Two disks, $49.95.

Clock. Even preschool children can learn to tell time by moving the hands of the clock to match the digital time. Includes three different lessons and five levels of difficulty. The computer keeps track of errors, generates new problems, and provides a simple tutorial in the event that the child misses a problem. $39.95.

Memory Match. A "concentration" type game for children from four to forty. Players challenge the computer or friends, or try to better their own scores. Words at three levels of difficulty are included. Easily modified by users. Match the heart for twice the points. $35.95.

Medalists—States. A habit-forming game that teaches all about the United States. Students play the game over and over to try to improve their own scores, or they compete with friends. Learning exercises are presented randomly and can be changed often. $39.95.

Medalists—Continents. A challenging game that encourages students to study and learn about world geography. The students "buy" clues as they compete against their old scores or challenge the top three students—the Medalists. Clues may be changed frequently to keep the game exciting and current. $39.95.

Hayden Software

microDivision. Animated fish and boats convey the principles of, and provide practice in, basic counting and division of whole numbers. Drill in long division through the twelves table. Visual and musical reinforcement. Correct answer provided after three incorrect responses. Single-function calculator included. Ages four to ten. $29.95.

microMultiplication. Similar to *microDivision*, but animated rabbits teach basic counting and multiplication of whole numbers. Drills in column multiplication through the twelves table. Ages four to ten. $29.95.

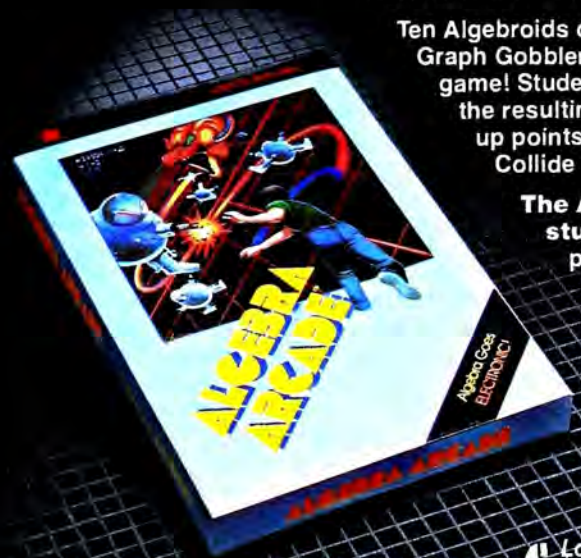
Microtyping II. Drill and practice for beginner typists. User may select single characters, short words, computer program listings, or paragraphs; may also create and save own practice text, which is easily modified with a built-in text editor. Words-per-minute and number of errors reported. Junior high and up. $29.95.

microSubtraction. Similar to *microDivision*, but teaches subtraction of whole numbers. Drill in column subtraction of two-place numbers requiring borrowing from the tens place. Ages four to ten. $29.95.

microAddition. Similar to *microDivision*. Animated apples and balloons provide practice in basic counting and addition of whole numbers. Drill in column addition of two-place numbers showing carrying to the tens place. Ages four to ten. $29.95.

ALGEBRA GOES ELECTRONIC!

ALGEBRA ARCADE was created by math instructors and student-tested for four years. It's educational software that really works.



Ten Algebroids on a coordinate system, the villainous Graph Gobbler and suddenly algebra is a game! Students enter in an algebraic equation and the resulting graph zaps the Algebroids and racks up points—but watch out for the Graph Gobbler! Collide with him and you lose points and up to three turns.

The ALGEBRA ARCADE is challenging to math students of every skill level. Beginners enjoy playing with simple straight lines while math sophisticates can create complicated curves using the ten algebraic functions included in the game (sine, cosine, tangent, etc.).

ALGEBRA ARCADE—educational software that brings algebra to *electric* life.

ALGEBRA ARCADE is available for $49.95 on the Apple II, IIPlus and IIe, IBM PC, Atari 800 and Commodore 64.

Look for ALGEBRA ARCADE at your local computer dealer.

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10 Davis Drive / Belmont / California / 94002

Factor Blast. A mathematics game that sharpens skills in factoring whole numbers up to 100. Hi-res graphics and sound effects. Three levels of difficulty, plus a penalty option that adds challenge. One or two players ages ten and up. Paddles optional. $34.95.

How to Program in Applesoft Basic. Twelve self-paced, interactive lessons that teach Applesoft Basic to the novice. Material covered includes input, if-then conditionals, for-next loops, arrays and subscripts, functions, strings, gosub and return, color graphics, and program organization. Last lesson defines, analyzes, codes, and tests a practical programming task. Junior high and up. $49.95.

Programmer's Workshop. Comprehensive tutorial and set of utilities in structured Basic programming for both beginners and experts. Workbook provides step-by-step instruction in structured programming, while program disk contains subroutines for sound generation, screen control, keyboard input, mathematical computations, and other useful functions. Junior high and up. $49.95.

High Technology Software Products

Chem Lab Simulations #1: Titrations. Hi-res graphics gives users realistic control over three experiments: an acid-base titration experiment; determination of a weak acid equilibrium constant, including a titration experiment and a pH-meter experiment; and the determination of Avogadro's Number, including a titration experiment and a monomolecular experiment. One-time license fee, $100.

Chem Lab Simulations #2: Ideal Gas Law. Features colorful lo-res graphics; written in machine language for fast response time and immediate feedback as users change the gas environment. Illustrates the ideal gas law, the kinetic-molecular theory, and the principles of diffusion. One-time license fee, $100.

Chem Lab Simulations #3: Calorimetry. Demonstrates Hess's Law as user determines the heats of reaction of three separate chemical reactions. Dynamic hi-res graphics provide a realistic animation of the actual steps of the experiments, such as heating water with a Bunsen burner and mixing reactants in a calorimeter. One-time license fee, $100.

Chem Lab Simulations #4: Thermodynamics. In this simulation, capillary tube experiments illustrate heat of vaporization and the thermodynamics of an equilibrium reaction. One-time license fee, $100.

Harmonic Motion Workshop. Visually presents harmonic motion with hi-res graphics. An object is placed in harmonic motion on the screen. Using the keyboard, the student can alter the phase, amplitude, the damping factor, and so on, immediately seeing the effect made on the motion of the object. One-time license fee, $75.

Projectile Motion Workshop. Four programs designed to illustrate projectile motion under a uniform force of gravity. The user controls the projectile's initial velocity and its angle of fire. Covers vertical motion, firing upward and downward, horizontal firing, and component motion. One-time license fee, $75.

Charged Particle Workshop. Three programs that simulate the motion of a charged particle under the influence of various combinations of electric and magnetic fields and crossed electric-magnetic fields. The fields, initial velocity, mass of the particle, and its electric charge can be varied. One-time license fee, $75.

Lab Statistics Package. Uses hi-res graphics to provide an interesting, interactive demonstration of least square curve fitting (linear, exponential, geometric, or parabolic); also performs statistical calculations on actual data, giving the mean, standard deviation, correlation, and more, for ongoing usefulness. One-time license fee, $50.

Hi Tech

Word Search. Develop word-search puzzles for classroom, clubs, newspapers, or for fun at home. Move words around on screen in any direction. Beautiful format printouts using any letter quality or dot matrix printer. $34.95.

Word Match. Develop matching tests, quizzes, or fun activities for home or classroom use. Easy and quick way to do fill-in-the-blank curricular activities. Professional printouts on any printer. $24.95.

Word Scramble. Develop word scramble puzzles using your word lists. Scrambles letters on screen and prints to any printer in seconds. Beautiful printouts with student name line, date, titles, and more. $24.95.

Homeware

Stacey's Math Series. Four programs to assist children in grades one to three in addition, subtraction, multiplication, and division. Simple single-digit problems are flashed on the screen using lo-res color graphics. A correct answer gets a "happy face" and a computer fanfare. $20.

Teddy Bears Counting Fun. Teaches elementary math and counting concepts to preschool and first-grade children as they count the number of teddy bears appearing in six different scenes. $10.

Innovative Programming Associates

Module I—Intro to Computer. A basic foundation module covering the use of the keyboard and the operation of computer system components. Introduces the user to computer terminology and theory and presents a brief historical background. $44.95.

Module II—The Computer as a Calculator. Shows how the computer can be used to perform calculations ranging from simple arithmetic functions to more advanced topics such as trigonometry and combined functions. $29.95.

Module III—The Printer. Reviews the purpose of a printer and describes the varieties available. Demonstrates various forms of output, specific applications, and graphics. Available to run on an Epson printer with an interface board (MX-100 or MX-80 with Graftrax). $36.95.

Module IV—Computer Graphics. Provides a comprehensive introduction to computer graphics. Deals with both hi-res and lo-res graphics and their many applications. Game paddles or joysticks helpful. $44.95.

Module V—Business Applications. Demonstrates a variety of useful programs including income tax, mortgage, and college financial aid calculations. Also covers payroll, inventory, and sales reporting. $44.95.

Module VI—The Uses of a Database. Shows the advantages of using a computer to store and sort information. Discusses what is needed to create a database and allows the user to create his or her own database. Printer helpful. $44.95.

Module VII—Business Forecasting. Shows how the computer can be used to forecast future conditions based on past and current trends. Concludes by allowing the user to make projections for a hypothetical business. $36.95.

Module VIII—Computer Simulation. Guides the user through training, educational, and financial situations. Also includes interactive simulations in which the user makes decisions affecting the outcome. $36.95.

Module IX—Statistics. Illustrates, in a nontechnical and easy-to-understand manner, how the computer can be used to perform statistical calculations. Includes permutations and combinations, probability, mean-median-mode, regressions, and more. $29.95.

Interactive Video

How To Operate the Apple II (II and II/e) and How To Operate the Apple III. A straightforward video presentation on basic concepts about computers. $89.99 each. Available in interactive format, including computer program. $300 each.

Interlaken Technology

Calfex. A generalized, menu-driven program for analysis via mathematical equations. Provides the format for solving problems and displaying results while allowing the student access to the keyboard to create labels, input values, and write equations needed to solve problems. $250.

Island Software

I Love America Series. A local map-reading program. Two United States map programs teach city locations, longitude and latitude, directionality, names of states, and abbreviations. Also included: *Flyover Tour* map game and *History Star* game, an exciting way to review historical facts. Four disks, $100.

Foreign Language Series (Spanish, French, Italian, or Latin). Vocabulary drills that feature oversized letters and accent marks. User may respond in English or in the foreign language. Covers nouns, verbs, miscellaneous basic words; users can also create and save their own word lists. $80 each set.

Mindstretcher Series. Nine programs on five disks. This popular series was specifically designed for gifted/talented students in grades three to nine. Students are challenged to use analytical problem-solving techniques to solve entertaining and educational puzzles. Titles: *Jigsaw, Rubik/Candles, Traffic Jam/Chain Reaction, Black/Kayles,* and *Jinx/Welter.* $125 per set.

Young Folks Series. Four graphically appealing programs for ages four to seven. *Puss in Boots* teaches location concepts. *Word Factory* helps identify spelling reversal problems. *Letter Games* teaches letter discrimination and helps identify letter-reversal problems. *Milk Bottles* teaches quantity concepts. $100 per set.

J&S Software

The Apple Grade Book. A grade reporting program for teachers of all grades. Grades can be weighted, sorted by class alphabetically or numerically. A disk can handle up to 250 students, each class can handle up to eighty students, and there can be up to thirty-five grades per student. $34.50.

The French Game. Designed to help beginning, intermediate, and advanced French students improve their vocabulary. A hi-res racing game is used to motivate students. Actually, there are eight games in one. Easy to change and list words. $34.50.

The Vocabulary Game. Designed for students in grades nine to twelve, it's a hi-res baseball game that helps improve vocabulary. Almost 1,000 words. High scores are recorded, and it's easy to list and change any or all words. $29.50.

The Antonym Game. A hi-res automobile racing game designed to help students improve their vocabulary. Especially designed for SAT review. A special utility permits changing and listing of words; high scores are recorded. $29.50.

Jefferson Software

Career Directions. Developed for use by young adults who are preparing to enter college or the job market. The occupational database analyzes student interest for over 460 specific occupations that range from high-level professions to entry-level jobs. $59.95.

Korsmeyer Electronic Design

Mentor. The state of the art approach to circuit design; diverts precious time from calculator usage and text reference to more creative design work. Currently in use by major development labs and educational institutions nationally. $174.95.

Krell Software

Krell's Basic Educational Skills Tutor Instructional Modules: Mathematic Topics. A multidisk series that teaches basic concepts of mathematics. Each program maximizes student-computer interaction to foster understanding and to guide progress as students demonstrate mastery of the lexicon of mathematics. An entertaining context to ensure student involvement. Two sets of disks, $169.95 each.

Plato's Cave. Spectacular game for aspiring scientists of all ages. Players probe Plato's Cave with light beams as they explore the relation between illusion and reality, and the relation between evidence and inference. Graphic, dynamic, and challenging, with difficulty levels suitable for all. $49.95.

Botticelli. Players compete to teach the computer how best to interrogate their opponents in order to discover which famous people, characters in fiction, mythological beings, animals, places, or things their fellow players are thinking of. A delightful introduction to the world of artificial intelligence and the art of questioning. $34.95.

Adventures in Flesh, by Professor Fred Williams. Reveals the human body in a fascinating and exhilarating adventure game. Program informs players about the details of human anatomy and physiology. Both scientifically serious and enthralling; extensive documentation. It provides hours of instruction and entertainment to ages twelve and up. $49.95.

Descartes' Delight, by Professor John Miller. Takes you step by step as you explore the world of graphs and learn to write your own programs in a special language that makes learning coordinate geometry both simple and fun. Extensive documentation and dynamic special effects. $79.95.

Isaac Newton and F.G. Newton. *Isaac Newton* challenges players to assemble evidence and discern the underlying "laws of Nature" that have produced this evidence. Players propose experiments to determine if new data conform to the laws. *F.G. Newton* presents all data in graphic form. Players select difficulty levels. $49.95.

Time Traveler. Using the Time Machine, players face a series of historical situations in which they build alliances and struggle with ruling powers. Each unique game confronts players with complex decisions and demands, for real-time action. Quite different from the usual children's adventure. $24.95.

Sword of Zedek. Treachery, deceit, and witchcraft are confronted in the fight to overthrow Ra, Master of Evil. Players encounter wolves, elves, dragons, and others in their search for treasures and special powers. In this fantasy world, players must use powers of persuasion, military skill, and logical analysis. $24.95.

Galileo, by Professor Roger Hickey. A scientific adventure game. Players explore the world of optics, learning as they go. As in other adventure games, players must search out treasures (in this case, optical components) and build scientific tools essential to their quest. Age twelve and up. $34.95.

Graduate Record Exam Series. More than thirty programs covering vocabulary, word relationships, reading comprehension, all aspects of mathematics, graphs and charts, and analytic reasoning. Thoroughly tested. Customizes programs to match individual study needs, so user can concentrate efforts on the areas of greatest potential score increase. $349.95.

Micro-Deutsch. Twenty-four grammar lessons covering instruction of an introductory German course. Includes four test units. Grammar lessons use substitution transformation drills, item ordering, translations, and verbal skills. Suitable for use with high school or college textbooks. Extensively field-tested at SUNY-Stony Brook. $179.95.

Krell's Connections. Offers children of all ages a new world of entertainment and intellectual challenge. Parents and educators will be gratified by its intriguing, yet serious, nature. An initial set of databases is included, dealing with geography, chemistry, mammals, mathematics, tools, and everyday objects. $99.95.

Odyssey in Time. An advanced form of *Time Traveler*. Includes all the intellectual challenges of *Time Traveler*, but adds ten additional historical eras. Also, the player must now contend with a formidable and treacherous opponent, the Adversary. Games may be saved for later play. $39.95.

Black Death. Players fight the spread of this deadly plague by choosing strategies for inoculation. Designed to teach basic principles of epi-

PERSONALITY PROFILE
A self-analytic program that will give you some brilliant insights into who you really are. $29.50

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A complete program to evaluate and help you analyze your dreams. Included is a 123 page illustrated book BEYOND DREAMING. $49.50

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A program to help you become the self assertive person that you have always wanted to be. $29.50

STRESS MANAGEMENT
A program that defines what stress is; measures the stress in your life and helps you deal with its causes. $29.50

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With this tool you can understand your relationships and the effectiveness of your interactions. This program opens the doors of communication. $29.50

ON BECOMING A HERO
The program that allows teenagers to clarify their life values and identify their most cherished ideals. $29.50

THE PUPPET
A marvelous program for children that deals with one of the most important life issues: taking responsibility. $20.00

THE SCAREDY-CAT
A program for children from 8 to 80 that helps them deal with the issue of FEAR. $29.50

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demiology and public health decision making. Portrays the medical options and costs of fighting epidemics in the context of a sophisticated, scientific simulation game. Highly graphic. $49.95.

Pythagoras and the Dragon. A mathematics game that introduces Pythagoras as a mentor to the player of *Sword of Zedek*. When help is requested, Pythagoras poses mathematical questions. Depending on speed and accuracy of responses, he confers secret information useful to overthrow Ra, Master of Evil. Levels available range from arithmetic through plane geometry. $39.95.

Electoral College and Primary Fight. Illustrates the workings of the United States Electoral College system. Users actually simulate presidential elections, selecting candidates and estimating their likelihood of winning on a state-by-state basis. Graphic and numerical results are displayed. A wide range of options is available. $39.95.

War of the Samurai. Game of combat and intrigue, it's an exciting, easy to play, but strategically complex version of Go. Many options, including mobility and probabilistic rules of capture. Detailed graphics. For two to four players—with all the possibilities of alliance building, negotiation, and opportunities for double cross. $39.95.

Krell's SAT Prep Series. Forty-two-program series. Complete coverage of all SAT topics, including the Test of Standard Written English. All materials presented in SAT format and at the same level of difficulty encountered in SAT exams. Scoring and explanations provided instantly. Guarantees a seventy-point SAT score increase. $299.95.

Krell's Logo. The MIT authorized version. Comprehensive four-disk set includes two copies of *Logo*, all utility programs and Sprite drivers, all MIT demonstration programs, shape editor, music editor, twenty-one-program *Alice in Logoland* tutorial series, and massive documentation, including full-color wall chart. $89.95.

Alexander the Great. The ultimate game for developing word and arithmetic skills. Permits equal competition between players at different skill levels. Complete graphics and range of options. $49.95.

Krell's Basic Educational Skills Tutor. A multipurpose diagnostic, exam simulator practice, and worksheet generator package for help in mathematics. Complete documentation provides full instruction on user options and analytic features. Topics include language of math, operations, geometry, graphs and charts, measurement, word problems, and equations. $269.95.

Operations and Processes. The Great Fibonacci, Master of Mathematic Processes and Operations and renowned "magician," introduces students to the wondrous world of arithmetic skills. He offers charm and enlightenment in a systematic, step-by-step, and highly interactive exploration of arithmetic. Designed for self-teaching at home or in school. $169.95.

Linear Equations. An engaging, yet thorough, introduction to the world of linear equations. Join Detective Ranch Holmes as he explains the most elementary concepts about equations: what they are, how we use them, how we build them, and how we solve them. Designed for self-instruction. $119.95.

Shakespeare and the Dragon. A spelling game that introduces Shakespeare as a mentor to the player of *Sword of Zedek*. When help is requested, Shakespeare poses spelling questions. Depending on speed and accuracy of responses, he confers secret information useful to overthrow Ra, Master of Evil. Levels available range from elementary through college level. $39.95.

Galactic Magellan. A graphic cosmic adventure. Players create and explore unknown galaxies, using the stars they discover to help them successfully complete exploratory expeditions. Cooperative or competitive. A wonderful introduction to the art of scientific reasoning. Ages eight and up. $34.95.

The Learning Company

Juggle's Rainbow. While playing with dancing rainbows, butterflies, and windmills, children develop reading and math readiness skills. In colorful, delightful games, children learn spatial concepts like "above" and "below," "left," and "right." Even a pre-reader can learn how to use a computer. Ages three to six. $29.95.

Bumble Games. By playing with Bumble, a friendly character from the planet Furrin, children learn fundamental math skills. Children learn to plot numbers and even create their own computer graphics. Ages four to ten. $39.95.

Bumble Plot. While trapping robbers and discovering underwater treasure, children learn advanced math skills and learn to create computer graphics by plotting positive and negative numbers on increasingly complex grids. Ages eight to thirteen. $39.95.

Gertrude's Secrets. Children develop logical thinking skills in the animated world of Gertrude, the go-getter goose. They learn to categorize and recognize patterns while solving playful puzzles and can even create their own puzzle pieces. Ages four to ten. $44.95.

Gertrude's Puzzles. In the animated world of Gertrude, the go-getter goose, children develop abstract thinking skills by solving complex puzzles using colors and shapes. They can even design playing pieces with Gertrude's graphic editor. Ages six to adult. $44.95.

Rocky's Boots. A "build-your-own-computers" kit. $49.95.

Moptown Parade. A progression of seven playful games designed around colorful Moppet characters. Teaches logic, strategy development, and pattern recognition by arranging and matching Moppets in the imaginary world of Moptown. Ages six to ten. $39.95.

Moptown Hotel. In seven increasingly challenging games, children test hypotheses, use analogies, and develop strategic thinking skills. Children arrange Moppets in Moptown's fantasy world. A sequel to *Moptown Parade*. Age nine to adult. $39.95.

Magic Spells. Sharpen spelling skills in *Magic Spells*' adventure world of castles, demons, and wizards. Children spell and unscramble words with fourteen word lists. Players can tailor the game to any level by creating their own lists. Ages six to ten. $34.95.

Learning Tools

Administrative Planning System. Provides interactive access to a small or large student/client database. Prints information for program planning; local, state, and federal reporting; and other purposes as specified by the user. English-like language is used to answer administrative inquiries and sort information. $1,195.

Individualized Planning System. Organizes, manages, and locates user-defined information on each individual student or client. *IPS* prints individualized plans and other user-defined reports. Confidentiality is maintained through passwords and authorization levels. $495.

Curriculum Management System. Centralizes and coordinates instructional and service resources including goals and objectives textbooks, learning activities, library materials, films, field trip ideas, and others. Users can create, access, edit, and print curricula in any subject area and exchange *CMS* curriculum and resource files through the nationwide SMSNetwork Exchange. $295.

Linc Associates

The Specialware Directory. A complete listing of microcomputer software/courseware for special education. Thoroughly indexed. Indicates curriculum skill areas, educational levels, hardware compatibility, instructional approach, handicap/special audience, and professional level. Lists software/courseware from approximately 200 publishers. $13.95.

MicroLab

Learning System. Prepare a tutorial for training or testing. Test for comprehension and learning. $75.

Math SAT. Fast, effective way to improve math SAT scores. Unique instruction and test modes help users learn quickly. $30.

English SAT. Fast, effective way to improve verbal SAT scores. Unique instruction and test modes. $30.

Highrise. Build a tower of blocks; twenty levels of block-balancing and fun. Play against the clock or in instructor mode with no timing or scoring. $30.

Micro Power & Light

Country Combo. This quiet, educational puzzle strengthens a young person's perceptual and inductive reasoning skills while exercising his creativity and aesthetic sensitivity. Experimentation involving the congruence of shape, pattern, and color is an essential part of this game puzzle. For children in primary and early elementary school. $29.95.

The Ear. The human ear, presented graphically in color. The parts of the outer, middle, and inner ear are shown by shape and location, their functional relationship to other parts, and movement. Users can choose a narrative in either Latin terms or lay terms. $24.95.

Library Skills. Describes what is in the library and how to use it. Tu-

torial; entertaining exercises covering fiction, nonfiction, and biographies; the Dewey Decimal System; using the card catalog; and using reference material. Presented in a format that elementary students find enjoyable. $24.95.

The Program. Computer literacy about programs and programming. Numerous illustrations. Addresses questions like: What is a program? Why are there different program languages? What makes a program good? How easy is it to program? Is there more to it than programming? Written for junior high to adult. $34.95.

Micro Program Designs

Stock Market Tycoon. Exciting money-game has players invest in a simulated stock market. Watch the accelerated price "board" and charts. Call the "broker" to buy, sell, or sell short. Fast action; several weeks take only thirty minutes. For kids ages nine to ninety. No stock knowledge required. $29.50.

Mr. Krypto. Designed for fun, but spelling ability and logical thinking powers improve during play. A series of word games for ages six to adult. Scrambled words, coded words, coded messages, cryptograms. Level of challenge is player-selectable. Help always available. $29.50.

Math Alert. Arithmetic refresher course for grades four to adult. Numbers, addition, subtraction, multiplication, division, fractions, decimals, and percentages. Applications in retail selling, discounts, depreciation, interest, bank accounts, and take-home pay. Work at your own pace. Develop confidence, speed, and accuracy with numbers. $19.50.

Microsoft

Microsoft Typing Tutor II. Helps users acquire or improve typing skills with a combination of individualized lessons and drills. Gives instant feedback on progress and tailors future lessons to work on weak areas. Three options for evaluating progress: individual key drills, paragraph drills, or tests. $24.95.

Milliken Publishing

Educational games use sound, color, graphics, and animation to teach kids ages four to fourteen basic skills in math and language. Four word games, twelve map games. Two per disk. Includes user guide and support materials. $32.95.

Minnesota Educational Computing Consortium

Mathematics: Elementary Volume One. Games of logic and drills on basic facts and the metric system. Eleven programs, including a drill on rounding numbers and a sophisticated game, *Hurkle*, that teaches the coordinate system. Support manual includes an illustrated worksheet for each program. For grades three and four. $36.

Language Arts: Elementary Volume Two. Use the computer to provide individualized word and spelling drills to students. Seven programs generate crossword puzzles, mazes, scrambled word games, and timed spelling tests; also, the *Talk* program introduces young children to the computer by having them carry on a conversation with it. $37.

Mathematics: Elementary Volume Three. Seven programs confront students with real-life situations that teach a wide variety of skills. *Civil* simulates fourteen Civil War battles; *Sell Apples*, *Sell Bicycles*, *Sell Lemonade*, and *Sell Plants* all call for economic and business decisions. Provides drill and practice on United States capitals. $39.

Mathematics: Elementary Volume Four. *Odell Lake* simulates a typical food web; *Odell Woods* is similar. Gives drill and practice in estimating math problems, and *Math Game* provides drill in the four basic operations. *Solar Distance* teaches concepts of distance in astronomy, while *Ursa* is a tutorial on constellations found in the Northern Hemisphere. $39.

Social Studies: Elementary Volume Six. Five simulations that add excitement to geography, history, or economics lessons. Simulates the fur trade of the 1870s while developing map-reading skills. *Oregon* simulates a trip to Oregon in 1847, *Sumer* takes place in an ancient kingdom, and *Voyageur* simulates the transportation of furs by canoe in the early 1800s. $41.

Language Arts: Elementary Volume Seven. Nine programs that add fun and magic to teaching prereading skills. Letter recognition and alphabetical ordering are learned in *Caterpillar* and *Train*. Initial consonants are covered in *A Is for Apple*. *Pictures*, *Words*, and *Shapes* challenge children's memories, and *Smile*, *Wuzzle*, and *Spaceship* all make learning about numbers fun. $37.

Using Computers in the Classroom. A comprehensive training manual that can be used to teach instructors having little or no knowledge of computers and educational computing. The material has been organized into eighteen different modules so that a combination of sessions or workshops can be held. $20.

Grade Manager. A powerful and highly flexible computer grading package for the classroom teacher. Allows teachers to record and print scores and to compute letter grades. Up to 1,088 students. Percentage and curve grading can be used. First-time users are guided step by step by the manual. $37.

Teacher Utilities Volume One. Nine programs that enable teachers to design posters and puzzles and create their own tests and drills. Five programs can be used with a printer to make master or individual copies of word games tailored to students' needs. The support manual contains suggestions on classroom use. $40.

Nutrition Volume One. Helps students learn the importance of a balanced diet. *Food Intake Analysis* performs a quick, accurate nutritional analysis of foods consumed by an individual in a day. Support manual contains a food catalog, food diary, nutrition report, evaluation, and menu plan. $37.

Muse Software

RobotWar, by Silas Warner. The best-selling game that teaches programming. Players program robots and let them loose on the battlefield of the future. Hours of fun for kids of all ages. $39.95.

Three Mile Island, by Richard Orban. Players decide whether or not nuclear technology is too complex to handle as they manage the facility and either supply electricity profitably or lose their license to operate. Sloppy operation or pushing too hard may cause a radiation leak—or worse. $39.95.

The Voice. A talking disk for the Apple. Learning is fun when the Apple talks back, and it can with *The Voice*. Easy to use; a favorite of kids of all ages. $39.95.

U-Draw II. You'll be amazed at what you can draw. Hours of fun and learning! $39.95

Elementary Math Edu-Disk, by Ed Zeidman. Math is easy when learned with color pictures and demonstrations. Keep score and test math skills with *Elementary Math*. $39.95.

Know Your Apple IIe. Introduces users to the capabilities of an Apple IIe computer. Especially for new users. Uniquely packaged for holiday gift-giving. $24.95.

N-Squared Computing

Nutritionist. An interactive diet analysis program with graphics. Displays analyses of foods, recipes, and diets in percent of RDA and weight for nineteen or thirty-eight nutritive components. Shows diet deficiencies and excesses and their sources; automatically creates food lists. $145.

Opportunities for Learning

Opportunities for Learning. A catalog of educational software designed for the home, with courseware covering math, science, language arts, programming, history, and games for the family. Featured are the new generation of "learning games," which are ideally suited for home use. Free upon request.

Peachtree Software

Compu-Math Arithmetic Skills. Lets young children interact comfortably with the computer, which is the key to establishing computer literacy. Not only uses hi-res graphic displays and a minimum of text commands, but offers a "rehearsal" sequence at the bottom of its screen displays in which an animated hand demonstrates keyboard procedure. Arithmetic skills cover counting, addition, subtraction, multiplication, and division. $49.95.

Compu-Read. Powerful tool for improving reading speed, recall, and test-taking skills. Because *Compu-Read*'s level of difficulty matches the user, the system can be used in the home or in the classroom by students with a wide range of reading abilities. In addition, custom designed upper/lower-case letters are available in two sizes for easy reading. Ages eight to adult. $19.95 to $29.95.

Compu-Spell. Tracks and maintains records for up to sixty individual

learners, displays all spelling words in sentence context, records any misspelled words, and draws from this list to remediate and strengthen learning. Accommodates from one to sixty individual learners. $29.95.

Counting Bee. Introduces young children to counting, addition, subtraction, shape discrimination, weight, and measure. Colorful graphics and animation. Black Counting, Moving Circles, Comparing Lengths, Dragon's Mixed Shapes, Dragon Subtraction, Green Water Height, Comparing Weights, and Dragon Addition. Ages four to eight. $29.95 to $39.95.

EduWare Algebra. A sequence of six independent volumes that constitute a first-year course in algebra. In each unit you may select one or more distinct learning styles. Work sample problems, read a discussion of a concept, watch as an equation is solved step by step, or study the rules that govern an operation. Algebraic concepts, monomials and simple factoring, introduction to graphing, irrational numbers, quadratic inequalities, and so on. $39.95 to $49.95.

EduWare Fractions and EduWare Decimals. Build and reinforce learners' mathematic skills. Animated figure cues the learners' attention to individual components of the equation or concept shown on the screen, breaking the process down into sequential steps. Learners may advance to a new concept or backtrack to review a previous one. Both *EduWare Fractions* and *EduWare Decimals* offer a Learning Manager System. $49 each.

PSAT Word Attack Skills and SAT Word Attack Skills. Tutorials that give you an edge in mastering vocabulary, deciphering new or unfamiliar words, and taking tests. *Word Attack Skills* prepares you for the antonym portion of the SAT. Each word in the package has been carefully selected for its frequent appearance on the SAT. Helps develop important language skills such as word definition, word connotations, knowledge of roots and prefixes, application, and familiarity with the SAT format. $49.

Spelling and Reading Primer. Covers simple two and three-letter words, four-letter one-syllable words, one-syllable words with diphthongs, simple multi-syllable words, hard c's and silent, double vowels/consonants, directions, and numbers. Two styles of learning: Spell word or select object by pressing space bar. Ages five to ten. $39.95.

Personal Computer Art

Math I. Instruction and drill in number identification, word problems, area, perimeter, metric system, circles, triangles, absolute and integer values, ratios, percents, positive and negative numbers, squares, and square-roots. Good for both home and school; completely self-prompting. Keeps score. $38.

Game Pac I. Selected games that teach logic, and a few extras for fun! Eleven games in school version; fourteen (which include simulated gambling) in home version. Four games include some form of graphics. School version, $24.95; home version, $27.95.

Sci-Math. Math utility for teachers of advanced math, engineers, scientists, and math students. Noninstructional. Seventeen problem types, including definite integral, derivative, interpolation, matrices, vectors, roots of quadratic and trigonometric, polynomials, coordinate and angle conversions, area of many-sided figures. $79.50.

Personal Tutor Associates

An Audio Instructional Course for PFS:File/Report. Consists of three ninety-minute cassettes. Hands-on learning to set up several types of files to manage data using *PFS:File* and to report, analyze, sort, and calculate using *PFS:Report.* $49.95.

An Audio Instructional Course for VisiCalc. Consists of three ninety-minute cassettes and an examples disk. A hands-on guided tour takes students through the commands and functions of *VisiCalc.* It also helps students make templates and "what if" models. $49.95.

An Audio Instruction Course for WordStar. A hands-on course with three ninety-minute cassettes. Taught from a beginner's level in noncomputerese language to bring students to a more advanced level where they can extract full use of *WordStar.* $49.95.

An Audio Instructional Course for dBase II. Includes three ninety-minute cassettes. Takes students through the commands and techniques involved with this database manager. $59.95.

The Pillsbury Company

Eat Smart. Analyzes users' diets for one day in terms of recommended dietary allowances for eight key nutrients. Also offers suggestions for improving the diet. Includes a program disk, educator's guide, supplementary worksheets, and thirty nutrition brochures. $19.75.

The Professor

The Great Creator. Makes it simple to create and operate multiple-choice and fill-in-the-blank questionnaires in any of seventeen languages, including English. There is no limit to the number of questionnaires that can be created. No programming skills necessary; the program is menu-driven. $399.95. Demo, $5.

The French Computer Series. An effective way to learn and improve French language skills. Each program includes a bilingual (French and English) instruction manual plus a program disk that is entirely in French. Ten programs in the series. Brief descriptions follow.

Savoir Ecrire. An excellent introductory program for developing and/or expanding the ability to read and spell in French. Utilizes hi-res graphics and sound effects to facilitate easy learning of the material presented. $45.95.

Cherchez La Difference. Reinforces reading comprehension in French while building vocabulary. User chooses the word that doesn't fit into a specific category (e.g., red, blue, house, green). Five levels of difficulty feature more than 2,000 words. (Lower-case display with accented letters; no additional hardware required.) $24.95.

Augmentez Votre Vocabulaire I. Contains a French vocabulary list of over 2,000 words. Ten modules consist of graded vocabulary questions on synonyms and antonyms. (Lower-case display with accented letters; no additional hardware required.) $24.95.

Augmentez Votre Vocabulaire II. Similar to *Augmentez Votre Vocabulaire I,* but with a more advanced word list. $24.95.

Mots Caches. Offers a stimulating system to improve French vocabulary in the form of a French wordsearch game. Words are hidden horizontally, vertically, or diagonally, as in popular wordsearch puzzles. Hundreds of different puzzles can be made by the computer. $24.95.

Mots Caches Geographie. Similar to *Mots Caches*, except geographical locations are used. Hundreds of different puzzles are possible. $24.95

Mots Croises Et Mot Secret. Hundreds of different crossword puzzles develop French vocabulary skills. Secret word games are included for increasing both vocabulary and spelling skills. Puzzles and games are created by the computer working from a vocabulary list of over 700 words. $24.95.

Le Prisonnier. In French. Darkness...drowsiness...sleep...deep sleep...awake..."Where am I?" You have been abducted to The Island, a dreaded prison at the end of the world, where sophisticated brain-washing techniques, electronic surveillance, plots, and counterplots abound. Are you ready to put your French skills to work? $34.95.

Terroriste. In French. It is the year 2000. The world is an immemse armed camp. Countries are struggling with internal conflict. Violence is the way of life. Opposing forces try to stop you from completing your mission. Game paddles required. $34.95.

Les Bathisseurs d'Empire. In French. A role-playing fantasy adventure into the unknown. Participate in the birth of an empire. Graphics, animation, and sound effects present a fascinating way of practicing and learning French. $37.95.

The Professor's Physics Series, by Steve Kamm and Mark Cross. Authors are university professors with many years of experience teaching college physics. Labeled diagrams, detailed text, and interaction between user and programs. Animation and color graphics are utilized to enhance the learning of material presented. Eleven programs in the series. Brief descriptions follow.

Vectors and Graphing. Vector resolution, vector addition, dot products-magnitude and direction form, cross products-magnitude and direction form, products using unit vectors, vectors and scalars quiz, and graphing data. $15.

Statics. Method, easy beam problem, beam problems, ladders, and inclined planes. $15.

Motion. Graphing motion; one-dimensional kinematics; gravity problems; projectile; dynamics. General method, motion on an inclined plane, and rotational acceleration. $15.

Circular Motion. Constant speed, acceleration, simple harmonic motion, orbit theory, and the circular orbit game. $15.

Conservation Laws. Linear momentum, angular momentum, one-

dimensional collisions, inelastic collisions, conservation of energy, conservative forces, nonconservative forces, and energy of a bouncing ball. $15.

Electricity and Magnetism. Gauss's law, Ampere's law, resistor combinations, capacitor combinations, RC circuits, RCL circuits, and Lorentz force. $15.

Thermodynamics. Thermodynamic processes and cycles, heat engines, calorimetry, ideal gas cycles, and molecular motion and pressure. $20.

Optics. Mirror ray diagrams, lens ray diagrams, types of images, waves, diffraction, and lasers. $20.

Atomic Physics. Atomic models, particles and waves, electron clouds, Rutherford scattering, radioactive decay, and various nuclear reactions. $30.

Solar System Astronomy. Inner planets, outer planets, greenhouse effect, history of the solar system, life in the solar system, and comets are covered. $30.

Stellar Astronomy. Types of stars, galaxies, constellations, Sirius and the White Dwarf, death of a star, the Doppler effect, and cosmology are examined. $30.

The Professor's French Series. Nine programs, all in French, which are translations of English-language programs put out by other companies. The series includes programs on math (fractions, decimals, and arithmetic), on perception, on prereading skills (same and different, letter identification), and on programming. Also, the series includes an educational game concentration. $24.95 to $77.95.

Program Design

Reading Comprehension: What's Different? Students select the word that doesn't belong in a series. Analytical skill and reading comprehension are the keys to mastering the challenge. Course contains hundreds of exercises. Ages eight and up. $23.95.

Spelling Builders. Master the difficult words that stump most people. Is it *supercede* or *supersede*, *combustable* or *combustible*? A voice narration accompanies the programs, which offer both a spelling drill and a method of approaching difficult words. Final test of 320 words. Junior high and up. $26.95.

Vocabulary Builder One: Beginning. Eleven programs include a set of graded vocabulary questions on synonyms and antonyms (the most common type of vocabulary questions on an IQ test). The last lesson is a vocabulary test. Total of 400 questions; 2,000 words in course. $23.95.

Vocabulary Builder Two: Advanced. Eleven programs like those in *Vocabulary One*, but using a more advanced word list. $23.95.

Vocabulary Builders Package. *Vocabulary Builders One and Two*, packaged in one convenient container. $44.95.

Analogies. Defines and describes some common types of analogies. Six programs teach a method for analyzing analogies and provides practice in handling all types of analogies. Final lesson tests abilities. $23.95.

Number Series. 1,2,4,7,11...What's next? Learn how to approach number series problems and how to analyze their patterns. Then practice with increasingly difficult problems. The computer provides clues if you have trouble. $23.95.

Preschool IQ Builder One. Children decide whether pairs of figures are the same or different. They also match the letter on the monitor to one on the keyboard. Both programs teach vital cognitive skills and are wonderful introductions to the computer. $23.95

Preschool IQ Builder Two. Children make the face on the screen sing a happy song by matching letters, numbers, symbols, or words. A program that small children love. Ages three to six. $23.95.

Preschool Package. *Preschool IQ Builders One and Two*, packaged in one convenient container. $44.95.

New Step by Step. Learn to program in Basic. Package includes a computer program that shows sample program outputs, checks student work, and scores quizzes. Audio explains what is being shown on the computer screen and assigns problems for students to solve. Workbook reviews material and gives extra practice. $89.95.

Preparing for the SAT. Teaches more than subject matter; teaches how to take the SAT. Includes *Analogies*, *Vocabulary Builders One and Two*, *Number Series*, *Quantitative Comparisons*, a unit on time strategy, and a unit that evaluates test-taking strategies. Consists of six disks and one audio cassette, a manual, and the booklet, "Making the Grade." $119.95.

Step by Step Two. The sequel to *Step By Step*. Covers intermediate Basic programming, machine language programming related to Basic, and hi-res graphics. Consists of a workbook, disks, and voice cassettes in a convenient storage binder. High school to adult. $89.95.

Quantitative Comparisons. Eight programs that prepare students for SAT-type math problems. Problems start with elementary concepts and cover most material that appears in the test. Comprehensive guide included. A final test is given, along with explanations. $26.95.

Memory Builder: Concentration. Test powers of concentration, memory, and attention span by matching pairs of words hidden behind the grid of boxes on the screen. The games get tougher as players continue. The computer keeps score; players play against themselves, the computer, or friends. Ages six to adult. $23.95.

Psychological Psoftware

On Becoming A Hero. A tool to help young people clarify which life values are most important. Enables them to choose their most cherished ideals. Also gives methods for evaluating character and maturity. $29.50.

Psychotechnics

Telemath Disk One. Four arcade-style programs provide math reinforcement for grades two to three. Includes *Frog Fun*, *Addition Baseball*, *Pirate's Gold*, and *Moo*. Combines validated software with arcade game action to make learning fun but effective. $39.95.

Telemath Disk Two. Four arcade-style programs for math reinforcement in grades three to six. Includes *Plumb Crazy:1*, *Geoterm*, *Totem Pole Toppers*, and *Witch's Brew*. Makes learning fun but effective. $39.95.

Telemath Disk Three. Four arcade-style programs provide math reinforcement for grades three to six. Includes *Pic-N-Plot*, *Line Up*, *Move and Measure*, and *Coin Connection*. $39.95.

Telemath Disk Four. Math reinforcement in grades four to six. Features four arcade-style games: *Dyn-O-Mite:1*, *Multiplication Baseball:2*, *Jump Daredevil Multiplication*, and *Dewey Packum*. $39.95.

Telemath Disk Five. Four arcade-style programs for math reinforcement for grades three to six. Features *Jump Daredevil Subtraction*, *Kingpin Decimals*, *Dribble Division*, and *Multiplication Baseball:1*. Combines validated software with arcade game action for learning that is fun but effective. $39.95.

Telemath Disk Six. Math reinforcement for children in grades five to seven. Includes four arcade games: *IRS Average*, *Target Practice:1*, *Area Bridjit:2*, and *Dribble Subtraction*. $39.95.

Telemath Disk Seven. Four arcade-style programs for math reinforcement for grades four to eight. Includes *Dribble Multiplication*, *Plumb Crazy:2*, *Concentration*, and *Area Bridjit:1*. $39.95.

Telemath Disk Eight. Four arcade-style programs in math reinforcement in grades four to eight. Includes *Dyn-O-Mite:2*, *Jump Daredevil Division*, *Target Practice:2*, and *Fraction Football*. Combines valid instruction with fun game action. $39.95.

Telemath Disk Nine. Math reinforcement for grades four to eight. Features four arcade-style games: *Dyn-O-Mite:3*, *Jigsaw Fractions*, *Jump Daredevil Fractions*, and *High Stakes*. $39.95.

Telemath Disk Ten. Four arcade-style programs for math reinforcement in grade eight. Includes *Tic-Tac Subtract*, *Search and Score*, *Divide and Conquer*, and *Bridge It*. $39.95.

Telemath—Trial Size. Two arcade-style math reinforcement programs from the validated set of eighty Telemath activities. Features *Plumb Crazy:1* and *Dribble Multiplication*. Telemath combines validated software with arcade game action to make learning fun but effective. $10 (limited time offer).

Quality Educational Designs

Factoring Whole Numbers. Twelve highly interactive programs that present the concepts of factoring in both a tutorial and an exploration game. Individually paced, providing choice of difficulty and speed of presentation. A teacher's manual is provided. Designed for middle school or adult review. Three disks, $90.

Arith-Magic. Three highly interactive programs that present motivated practice in whole-number operations. Includes *Diffy*, the case of the disappearing difference, *Tripuz*, an addition or multiplication puzzle, and *Magic Square*, an exploration of patterns. $35.

Reader's Digest Services

Chambers of Vocab. Use your knowledge of word meanings to work through four mazes as quickly as possible. A total of 300 words on the disk; players may enter personal lists of new words, eight at a time. One to four players. $39.95.

Key Lingo. An adventure game taking place in a sea of words. One to four players act as co-captains of the *Loquacious II* and sail the seas trying to match words with appropriate meanings. A total of 300 words on the disk; players may enter personal lists of new words, eight at a time. $39.95.

Trickster Coyote. Object of this chase game is to capture a tricky coyote by demonstrating a knowledge of vocabulary words. A total of 300 words on the disk; players may enter personal lists of new words, eight at a time. One to four players. $39.95.

Right On Programs

Challengit Series. Two complete social studies packages for grades five and six. Each set contains three programs plus reproducible vocabulary, reproducible crossword puzzle, and bibliography. Fifth grade: *Indian Life*, *Patriotic Songs of America* (with music), and *American Inventions that Changed the World*. Sixth grade: *The Middle Ages*, *The Renaissance*, and *Seven Wonders of the World*. $100 per set.

Researchit. Six individual programs to familiarize young people with six valuable reference tools that every educated person must know how to use. All programs geared to a specific book, and that book is included. *The World Atlas*, $59.95; *The World Almanac*, $99.95; *Reader's Guide to Periodical Literature*, $44.95; *Telephone Directory*, $44.95; *Roget's Thesaurus*, $59.95; and *The Dictionary*, $99.95.

Puzzleit??? A series of word ladders that teach vocabulary, definitions, and pronunciation. Graduated in difficulty from simplest three-letter word puzzles to most difficult six- and seven-word puzzles. Available in sets. Set A—thirty-six puzzles, three and four-letter words, $99.95; Set B—thirty-six puzzles, five-letter words, $99.95; Set C—sixteen puzzles, six and seven-letter words, $99.95.

Rocklan

Picture Parts. An exciting, challenging mathematics action game that offers three levels of fun and practice in basic addition, subtraction, and multiplication. Give the correct answer before adding another picture part. $39.95.

Space Journey. In this mathematics action game, players pilot their spaceships toward home. Reach home by correctly answering problems in percent skills. $39.95.

Howard W. Sams

Music Games, by Lydia Bell. Twelve menu-driven games that use musical tones and an animated color display of notes on a scale to test the player's ability to recognize notes and rhythms. Games can be competitive or noncompetitive and are designed with various skill levels for one or more players from ages five through adult. Comes with complete game descriptions and instructions. $29.95.

Scarborough Systems

Songwriter. Brings the world of music to life. At the touch of a key, a note can be positioned higher or lower on the scale, the tempo adjusted, or notes simply erased. The songs can be replayed through the computer or on a home stereo via a connector cable that is included in the package. $39.95.

Picturewriter. Makes it fun for children ages four to twelve to create colorful graphics and line drawings on the computer while learning the basics of computer programming. Users learn about spatial relationships, the relationships between colors, and the development of geometric patterns. This is the second of *Scarborough Systems' Arts Series*. $39.95.

Lightning Software's MasterType. Provides typing instruction by means of an exciting video game. Defend your command ship by typing the enemy words correctly—otherwise, the words will zap you. Includes eighteen progressive lessons, graduated from home letter recognition to nine-letter words, numbers, and a variety of programming words. Gives you the ability to create your own lessons. Fun for all ages. $39.95.

Scholastic

Square Pairs. A fun approach to developing basic learning skills by matching numbers, words, and patterns. Children become familiar with logical concepts and strengthen their skills while playing the game. Comes with a library of subjects and allows young users to design their own games, making them simple or complex. $39.95.

Tot Turtle Tracks. Makes computer programming an exciting adventure. Children learn the fundamentals of computer programming as they control the movement of a "turtle," commanding it to select colors, draw lines and circles, and create other shapes. Children learn problem-solving skills that help prepare them for the study of Basic, Logo, and other programming languages. $39.95.

Scientific Software Associates

Q-Card. A questionnaire analysis package. Can process rating scales, true/false or yes/no items, checklists, and multiple-choice items. Includes master-tabulation, user-selected sorts, cross-tabs, correlations, frequency distributions, and more. Data may be entered via keyboard or an Optical Mark Reader. $395.

Scott, Foresman Electronic Publishing

Early Reading. Through color graphics, animation, and carefully constructed context, children are taught fifty-two new words. Sentence completion offers practice, and "Make a Story" allows users to determine the courses that their stories take. A help function key allows young readers to get help as needed. Grades K to two. $54.95.

Reading Rainbows. Offers seven activities through which children study, practice, and apply skills in recognizing class, size, and part-whole relationships. Includes an adventure story in which Clyde the Dragon takes users along on a search for a rainbow. Makes use of color graphics, animation, music, and a help function. Grades K to two. $54.95.

Reading Fun. Offers seven interactive activities in recognizing problems and solutions, cause-effect relationships, and the feelings of characters. Includes the fable of the lion and the mouse and a folktale entitled "Why Bats Fly at Night." Uses color graphics, animation, music, and a help function. Grades one to three. $54.95.

Reading On. Seven interactive activities through which users study, practice, and apply skills in using maps, graphs, and schedules. Content includes stories about a family of goblins and a near-crisis in space. Enhanced by color graphics, animation, music, and a help function. Grades two to four. $54.95.

Reading Roundup. A Western theme is found in seven interactive activities. Helps users understand figures of speech, recognize appropriate word meanings, and understand idioms. Content includes a story in which characters solve riddles to find an old Indian hideout. Enhanced by personalization, animation, music, and a help function. Grades three to five. $54.95.

Reading Rally. Users learn to distinguish fact from opinion, recognize author's purpose, and recognize bias and connotations of words. Seven interactive activities, including a highly animated reenactment of the Boston Tea Party. Users can read the story from three different points of view. Grades four to six. $54.95.

Reading Flight. Users learn to classify and summarize information and to outline. Seven interactive activities, including *Balloon Smash*, a game where darts reward correct responses in the practice sections for each skill. Enhanced by color graphics, animation, music, and a help function. Grades five to seven. $54.95.

Addition and Subtraction Three. Color, animation, and an adventure theme help to teach addition and subtraction. Students learn to regroup numbers and to find sums and differences with and without renaming. Each activity offers a tutorial, as well as practice exercises. Includes management system. Grades one to four. $39.95.

Multiplication Two. Mighty Multiplication, an animated character, helps teach multiplication by multiples of ten and one hundred, multiplication of two- or three-digit numbers with or without renaming, and word problems involving multiplication. Tutorial as well as practice provided. Includes internal management system. Grades two to five. $39.95.

Numeration One. Uses color, animation, and a circus theme to teach numeration and place value. Teaches students to identify and order one-,

two-, and three-digit numbers; to identify ordinal numbers; and to compare numbers using greater than and less than symbols. Tutorial, practice exercises, and management system provided. Grades K to three. $39.95.

Numeration Two. A carnival theme helps to teach numeration concepts with large numbers. Students learn to identify place value, write numbers through nine digits, and round numbers off to the nearest ten, hundred, or thousand. Tutorial, practice exercises, and management system all provided. Grades two to six. $39.95.

Fractions One. Teaches students to identify what fractional part of a whole or a group is shaded, to write and illustrate fractions, to write equivalent fractions, and to write and illustrate mixed numbers. Features color and animation; includes tutorial, practice exercises, and management system. Grades three to six. $39.95.

Decimals. Color, animation, and a sports theme to help teach decimals: to give the decimal for a graphic presentation, to compare decimals through hundredths, and to subtract decimals through hundredths. Each activity offers a tutorial as well as practice exercises. Management system included. Grades three to six. $39.95.

Decimals Two. Color and animation in the "Decimal Deli" teach advanced decimal concepts. Students learn to give the numeric form of a decimal when given its word form; to compare, order, and count decimals through hundred-thousandths; and to multiply decimals. Tutorial, practice exercises, and management system included. Grades four to six. $39.95.

Probe: Beginning Basic Programming Activities. A series of spiral-bound practical workbooks that provide an introduction to Basic. Available for four grade/age levels: grades one to three, four to six, seven to eight, and nine to adult. All books provide glossaries of computer terms and commands; each has a corresponding instructor's guide. $39.95.

Select Information Systems

Teach/M. The first on-screen tutorial designed to teach users about the CP/M operating system. Leads users through all set-up procedures, including booting the system, initializing and copying disks, and transferring files from one disk to another. Self-paced instruction method. Explains DIR, STAT, PIP, and more. $79.

Sensible Software

Report Card. Enables teachers to track the progress of their students throughout the school year. Calculates student and class averages, ranks students, posts exam results, and more. Custom editor allows easy correction of mistakes and removal of incomplete grades. $59.95.

Sierra On-Line

Learning with Leeper. Introduces preschool children to practice sessions in math, and to reading and writing readiness. Includes *Dog Count*, *Balloon Pop*, *Leap Frog*, and *Screen Painting*. $34.95.

Bop-A-Bet. Uses the popular maze game format to teach alphabetical order. Students move around the maze, selecting letters in sequence as they go. $27.95.

Dragon's Keep. A captivating adventure into dragon territory; develops reading comprehension. Any child who can read at the second-grade level can play the game. $29.95.

Troll's Tale. A compelling adventure through a fantasy land; develops reading comprehension. $29.95.

Silicon Valley Systems

E-Z Learner. A study program to help students or hobbyists learn large amounts of information effectively and conveniently using a flash-card type of study atmosphere. Enter the questions and answers, and *E-Z Learner* will quiz you to see how many you get right. Has capabilities to study several different subjects at once. $39.95.

Rapid Reader. A speed-reading program that allows the user to increase reading speed utilizing the Apple as his teacher. $39.95.

Toddler's Tutor. A Sesame Street type of game for children to learn their ABCs. Vibrant with color monitor. $24.95.

Simulations Software

The Doctor Game. Patients come to the doctor for help and become better or worse depending on diagnosis and treatment by the player. Includes tutorial of lab facilities and glossary of common medical terms. $27.95.

Sirius

Type Attack. Teaches typing skills in a fast-action, arcade-style format. Giant groups of words and letters falling from the sky can be repelled only by typing the same words or letters on the computer keyboard. Includes thirty-nine preprogrammed lessons, a Lesson Creator, and a real-time words-per-minute bar with player-selected speeds from one to ninety-nine. $39.95.

Sliwa Enterprises

SEI Literature Series. A twenty-six-disk series that provides a comprehensive review of literature at the high school to college level. Titles include *Shakespeare*, *Poe*, *Twain*, and *Women Authors*. Each disk contains 300 questions, hints, and in-depth analyses. SEI authoring system can be used to expand the database. $25 each; set, $550.

SEI Foreign Language Set. Four disks that focus on vocabulary of French, Spanish, and German (beginning to intermediate levels) and "foreign" words in English. Each disk contains approximately 800 words and phrases; the SEI authoring system can be used to expand the database. $30 each, $100 for set.

SEI SAT Skills Set. Developed over the past three years as aids to students preparing for college board exams. Sentence completion, word analogy, and vocabulary are covered on three disks; two math disks cover fractions to trigonometry, including computer graphics. Available separately; $110 for set.

SEI Private Pilot Written Exam. Hundreds of questions from the FAA Private Pilot-Airplane Written Test, chosen by experts to cover all required FFA private pilot subject areas. A hint is provided for each question, and all charts and diagrams are included. $30.

SEI History of Space Flight. Hundreds of questions lead students through the space age. People, places, events, politics, physics—the milestones and turning points of space exploration are all covered. A hint, reference, or in-depth information is given for each question. Designed to build recall and understanding. $25.

SEI History and Government Series. Ten disks that provide review, reinforcement, and insight into world history and world government for students at the high school to first-year college level. United States history and government are emphasized, with additional special disks to cover world affairs. Available separately; $215 for set.

Softdisk

Applesoft from the Ground Up, by Dallas Snell. Author of *The Quest* has made this Applesoft tutorial user-friendly and interactive. If you have always wanted to learn Applesoft but found the manuals intimidating, now is your chance to get started. $12.95.

Machine Magic—Part One, by Greg Malone. Cuts through the veil of darkness enveloping the mystical world of machine language programming. Part one sheds light on the basic incantations and techniques necessary for creating quality graphics and sounds from machine language. For the would-be graphics programmer. $12.95.

SofTech Microsystems

SoftTeach. A computer-aided instruction package for the UCSD Pascal programming language. Progresses step-by-step through a dual set of quizzes: one quiz tests your knowledge of UCSD Pascal, and the other quiz requires you to write a Pascal program. A documentation package is included. $75.

SoftVue

SoftVue Tutorial Videotapes. The easy way to learn to use computer programs such as *Apple Writer* and the entire *PFS* series. Forget the manual, learn by watching. The continuing library is ideal for schools, offices, and computer stores to teach how easy many computer programs really can be. $125 each.

Software Arts

TK!SolverPack for Introductory Science. Designed for use with the *TK!Solver* program. Covers topics in chemistry, biology, physics, ther-

modynamics, and population studies at the high school and college level. Contains twelve models with the equations, values, and tables needed to solve particular problems in these fields. $100.

Software Connections

Classroom Monitor. Disk-sharing/printer-sharing network software that lets a teacher view the display of any student from the teacher station, broadcast one student's display to screens of other students, and download a program from shared central disk drives to all student stations. Floppy version, $395; hard disk version, $495.

Software Masters

The Visible Computer 6502. An integrated system for learning 6502 machine language. Includes a "6502 simulator" that shows the inner workings of a 6502 microprocessor and a 150-page tutorial manual. $49.95.

Software Technology for Computers

Language/Reading Development. Appropriate for elementary students as well as adults. Objectives are to develop speed while maintaining or improving perception, increase concentration, improve spelling skills, develop vocabulary, and expand vocabulary through drill exercises. $175.

SouthWest EdPsych Services

The Math Machine. Over 110 instructional objectives cover math skills typically taught in kindergarten through sixth grade. Innovative reinforcement system, record keeping, and management included. For schools and parents. $79.95.

Math Wars. An exciting multiple-player arcade game for children and adults. Fast, hi-res color graphics are combined with sound educational content to produce a truly educational game. Over thirty-five instructional objectives cover addition, subtraction, multiplication, division, fractions, and decimals. $39.95.

The Reading Machine. Covers reading skills typically taught in kindergarten through third grade, with over twenty-eight instructional objectives. Record keeping, management, and reinforcement systems included. Large hi-res letters, pictures with each word, and upper/lowercase letters. $59.95.

The Spelling Machine. Child-tested, inexpensive, effective instructional software to improve spelling skills. Contains 700 words and sentences, innovative reinforcement system, record keeping, management, and text-editing system for insertion of user-selected words. For schools and parents. $49.95.

Spelling Sorcery. Three exciting color graphics programs that harness the power of arcade games to make spelling fun for children and adults. $34.95.

Southwestern Data Systems

Spanish for the Traveler. Opens up the magic world of being at ease while traveling in a foreign country. Intended for those who wish to learn the essentials of Spanish needed for traveling, or those wanting to brush up on earlier classes in Spanish. Makes it easy to learn the language quickly. Includes disk, manual, and four audio cassettes. $59.95.

Spin-A-Test Publishing

Game Power for Phonics. Helps remedial reading students by diagnosing 241 specific reading difficulties and giving them intensive practice in word structure and phonics. Each game focuses on one skill, playable seven ways. Emphasizes word recognition, comprehension, vocabulary building, sentence improvisation, listening, and spelling. The forty-page manual has instructions for 1,280 language arts games. $55.

Spinnaker Software

Alphabet Zoo. A combination of two maze games that teach the relationship between sounds and letters; sharpen skills. $29.95.

Delta Drawing Learning Program. Children create colorful drawings on the computer screen by using single-key commands to control the cursor. Can be used in graphics or text mode. $49.95.

Facemaker. Three-part learning game in which a child completes a blank face, animates the face, and plays a Simon Says type game with the computer. $34.95.

Hey Diddle Diddle. Three-part learning game that introduces children to Mother Goose lore. $29.95.

In Search of the Most Amazing Thing. B-Liner pilot goes in search of the Most Amazing Thing in the land of Darksome Mire. Each time the player solves this educational adventure, clues leading to the location of the Most Amazing Thing change. $39.95.

Kindercomp. Collection of six learning games that prepare a child to read, spell, and count. $29.95.

Rhymes and Riddles. Letter-guessing game presented in three formats: nursery rhymes, riddles, and famous sayings. $29.95.

Snooper Troops I and II. Learning adventures. Players are private detectives trying to determine who perpetrated the crime and what the motive was. Players drive around town, question suspects, search houses for clues, and use a Snoopnet computer. $44.95.

Story Machine. Learning game in which child writes a story with supplied vocabulary. Stories are animated and can be saved to disk. $34.95.

SRA

Educational Software. To teach the basics in computing, mathematics, reading, administration of classrooms, games, and many others. Write for catalog. License fees $65 to $1,600.

SubLogic

Whole Brain Spelling, by David Manton and Susan Campanini. Has received widespread critical acclaim from educators in the field for its new approach to the development of improved spelling skills. Uses color graphics to provide positive user feedback and to emphasize visual aspects of the learning process. Available in six word-list categories: General (ages eight to adult), A Child's Garden of Words (preschool to eight), Fairy Tale, Medical, Scientific, and Secretarial. $34.95.

Sunburst Communications

The Factory: Strategies in Problem Solving. Color graphics and animation are used in this three-level program that challenges students to create a geometric product on a simulated machine assembly line that they design. Focuses on several problem-solving strategies, including working backward, analyzing a process, determining a sequence, and applying creativity. $49.

Meet the Computer. A how-to program designed for students and teachers who want to develop computer literacy from the beginning or brush up on their computer skills. Package includes quick-reference folders for programmers, reproducible graphs and charts for plotting and keeping records, disk with answers, and additional activities. $29.

M-ss-ng L-nks: A Game of Letters and Language. Young people's literature. Engrossing language puzzles improve students' reading, writing, grammar, and comprehension skills. Helps develop an appreciation of syntax, vocabulary, and the mechanics of writing. Passages from nine classics of children's literature are offered. Nine difficulty levels permit the creation of over 500 different puzzles. $49.

SuperSoft

Basic Tutor. A self-study program using both computerized lessons and a printed manual to teach Basic programming. Each of the nine lessons contains numerous problems, tests, and a thorough summary. A solutions disk is provided. Students will learn to analyze problems and then design and code Basic programs to solve them. $99.

Systems Design Lab

Multiple Regression Analysis. A statistical program used for multipurpose predictions. The program may be used in business, education, or any field where historical information is used to predict future events. Includes system disk and comprehensive documentation. $39.95.

The Forecaster. A statistical program used for linear regression trend analysis. The program may be used in business or education, where historical information is used for trend and graphing analysis. Includes system disk and comprehensive documentation. $29.95.

Taurus Software

CP+. A very effective training course for new computer users. Also includes a combination of control and file management "utility" pro-

grams. Provides simple communications between users, the computer operating system, and application programs through English-language directions. $200.

Teach Yourself by Computer Software

Individual Study Center. A miniauthoring drill-and-test program for grades 1 to 12. Maintenance authoring system, six presentation programs, user manual, and demonstration question/answer set. Can be used with over fifty prepared subject data files; or user, with no programming knowledge, can create own program. $54.95; subject data files, $5.95 each.

Mind-Memory Improvement Course—Steps One and Two. *Mind-Step One* is an introductory course in memory techniques with ten tutorial and exercise programs using graphics and animation. *Mind-Step Two* supplements *Mind-Step One* using audio cassettes for listening-skill practice. Junior high to adult. Integer Basic. *Mind-Step One*, $31.50; *Mind-Step Two*, $36.50.

Lesson Tutorgraphs—Shore Features. Full-color tutorial program with hi-res graphics on the geographical features of the shore/beach area of the coast. Programmed presentation of lesson material with reviews based on user's response. Test is provided. High school to college level. $24.95.

Lesson Tutorgraphs—Weather Fronts. Full-color tutorial program with hi-res graphics on weather fronts, their structure and nature. Programmed presentation of lesson material with reviews based on user's responses. For incorrect answers, information is presented again in different format. A test is provided and graded. High school and college level. $24.95.

Telephone Software Connection

Time Tutor. Patiently quizzes your children on "telling time" by having them look at an analog clock and type the time, and then making the clock's hands match a digital display. Five skill levels. Keeps progress chart for each user. $25.

Math Tutor. Generates random drills in the four basic operations based on each user's ability level. Student profiles can be easily modified to challenge any age. Encourages mastery of math facts by limiting response time. Displays and maintains progress charts on each user. $25.

Spelling Tutor. Patiently quizzes your children on their spelling words for school. Easy entry of new words. Old words are accumulated into a review list. Keeps a running progress chart for each child. Uses tachistoscopic technique. $20.

Terrapin

Terrapin Logo. The original Logo for the Apple. A powerful, easy-to-use programming language. Turtle graphics allows even preschoolers to begin developing mastery of programming techniques. Step-by-step tutorial with appendix and reference guide. $149.95.

Three Sigma

The Gene Scene. A human genetics game and educational activity. Learn the basic principles of Mendelian genetics as you gain awareness of the emotional, ethical, and financial considerations that must be faced during genetic counseling. For one to four players. $30.

SAT Review. High school students! Prepare yourselves for the upcoming SAT examinations by reviewing over 3,000 synonyms and antonyms. Features include multiple-choice answering, definitions, and illustrative example sentences. $50.

Twentieth Century Business Systems

BINS. You are the line manager of a small warehouse. During any eight-hour day there are shipments to store and orders to fill. How well you complete the requirements of the job will decide how many days you can play. $29.95.

Merchant Mariner. Objective: to accumulate wealth by trading commodities on numerous islands in the "Samon Sea" in the late 1800s. Excellent learning game for the commodities and equities markets and the law of supply and demand. Watch out for sea monsters, disasters, robbers, and the guild. Can save game at any time. $39.95.

Vernier Software

Orbit. Simulates the motion of an earth satellite. Launch site, angle,

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and speed of launch are selected. Students may experiment with velocity. $24.95.

Precision Timer. Uses the computer as a lab timer. Measures times to 0.1 millisec in ten different timing modes. Time data is collected, and the computer can help analyze it. Times may be displayed in large block letters. Use with PASCO photogates or with homemade photogates (complete instructions included). $39.95.

Vector Addition. Graphically demonstrates the head-to-tail addition of vectors. Magnitudes and directions are input; the vectors and their resultant are drawn. Numerical results are also calculated. $24.95.

Projectiles. Allows students to experiment with projectile motion, including the effects of air resistance and wind. $24.95.

Ray Tracer. Uses hi-res graphics to illustrate the principles of geometrical optics. Reflection, refraction, Snell's Law, total internal reflection, image formation with lenses and mirrors, dispersion, and spherical and chromatic aberration demonstrated. May be used as a lecture demonstration aid or as an educational game. $24.95.

Charged Particles. Simulates the motion of various charged particles in a magnetic field. Student selects the particle, speed, and the magnetic field strength. $24.95.

Wave Addition. Graphically demonstrates the superposition of waves. Various phenomena such as interference, beats, the "shaping" of waves by the addition of harmonics, and Fourier synthesis can be demonstrated. $24.95.

Graphical Analysis. Plots well-labeled graphs of experimental data. After data is entered, modified versions of the graph (e.g., with x-axis data squared before plotting) may be quickly drawn to help in the search for the relationship between the variables. Copies of the graphs may be made on a printer. $24.95.

Kinematics. Students control the starting speed, acceleration, and elapsed time for the motion of a truck which moves across the screen. They attempt to cause the truck to move according to preassigned parameters. $24.95.

Versa Computing

Color Me. A children's coloring book of twenty-five pictures. Child uses joystick or paddles to dip cursor into a choice of thirty-two paint pots for color-filling any part of the picture. Colored picture may be saved. For added learning, each picture is labeled in large type. Joystick or paddles required. $29.95.

Solar System. Hi-res, full-color graphics bring each planet, the sun, the moon, and beyond, down to earth. Tests knowledge of astronomy with hundreds of questions on different skill levels. $39.95.

Meet the Presidents. An educational game presenting the forty presidents of the United States. Tests skills on historical facts about United States presidents. Gives practice in visual recognition as portraits unfold on the screen. $39.95.

Globe Master II. Nine hi-res, full-color maps and hundreds of questions about states, capitals, countries, landmarks, and history. The maps include Europe, Asia, Africa, South America, Australia, the world, Canada, and United States topographicals. $39.95.

Anatomy I. Ten hi-res, full-color graphics that deal with human anatomy. Includes cell types, digestive system, circulatory system, skeletal system, and more. Hundreds of questions test general knowledge. $39.95.

Alphabet Squares. An ideal program for a young computer-user learning the ABCs. Excellent hi-res color graphics present three familiar objects and a letter. Child uses joystick or paddles to move a pointer to the correct picture, which expands to fill the entire screen. Joystick or paddles required. $29.95.

Wadsworth Electronic Publishing

Algebra Arcade. Provides a whole new formula for having fun while learning and practicing algebra. Players enter an algebraic equation that will zap as many Algebroids as possible with the resulting graph. After an equation is entered, the Whirlwind rushes along the path of the graph, knocking down the Algebroids and racking up points. $49.95.

John Wiley & Sons

One Hundred Top Colleges: How To Choose and Get In, by McClintock. A book and disk set designed to match up students' needs and desires in colleges—social, academic, avocational, and geographic—with the characteristics of top colleges. This allows students to focus their attention, energy, and application dollars. $34.90.

Winners Circle Education

Math Invaders. So much fun that children won't even realize they are strengthening their math skills. Immediate and graphic feedback generates excitement and motivation. Novel Galactic Navy ranking system spurs enthusiasm. Includes instruction booklet, disk with forty developmental sequence and numerical sequence drills, and reference card. Grades K to twelve. $45.

PSST—Problem Solving Strategy Training. Is your child struggling with word problems? Relieve frustration and tension with a lighthearted approach to problem solving. An amusing game that assists children by strengthening their ability to reach valid conclusions through sound reasoning. Grades four to high school. Disk and manual. $24.95.

Xerox Education Publications

Exploring Tables and Graphs, Grades Five to Six. Students experiment with tables and picture, bar, line, and area graphs. Fun applications and topics include satellites, women in industry, incomes, and more. Double-sided disk, teacher's guide, and twelve Line Masters included. $34.95.

Exploring Tables and Graphs, Grades Three to Four. Children learn how to use tables and bar, picture, and area graphs. Topics include animals, languages, populations, and more. Double-sided disk, teacher's guide, and twelve Line Masters included. $34.95.

Stickybear Shapes. Three games: *Name a Shape*, *Pick a Shape*, *Find a Shape*. Correct answers make animated pictures come alive. Includes disk, hardcover book, poster, instructions, stickers, and vinyl binder. Ages three to six. $39.95.

Stickybear Opposites. Big, colorful, animated pictures—Stickybears, unicycles, balloons, and more—teach opposites. Up/down, full/empty, in front/behind, and lots more. Disk, hardcover book, poster, user's guide, stickers, and vinyl binder included. Ages three to six. $39.95.

Stickybear Numbers. Colorful moving objects—trucks, ducks, planes, and others—teach numbers and counting. Over 250 picture combinations. Disk, hardcover book, poster, stickers, user's guide, and vinyl binder included. Ages three to six. $39.95.

Stickybear ABC. Award winner. Full-screen, full-color, animated pictures and sound represent each letter in the alphabet. Disk, hardcover book, poster, user's guide, stickers, and vinyl binder included. Ages three to six. $39.95.

XPS

The Dean's List. Education at all levels utilizes word/meaning association as an effective learning aid. *The Dean's List* provides a highly interesting and motivational way to encourage students to study word or phrase associations. Flexible enough to be an indispensable study aid for almost any subject. $24.95.

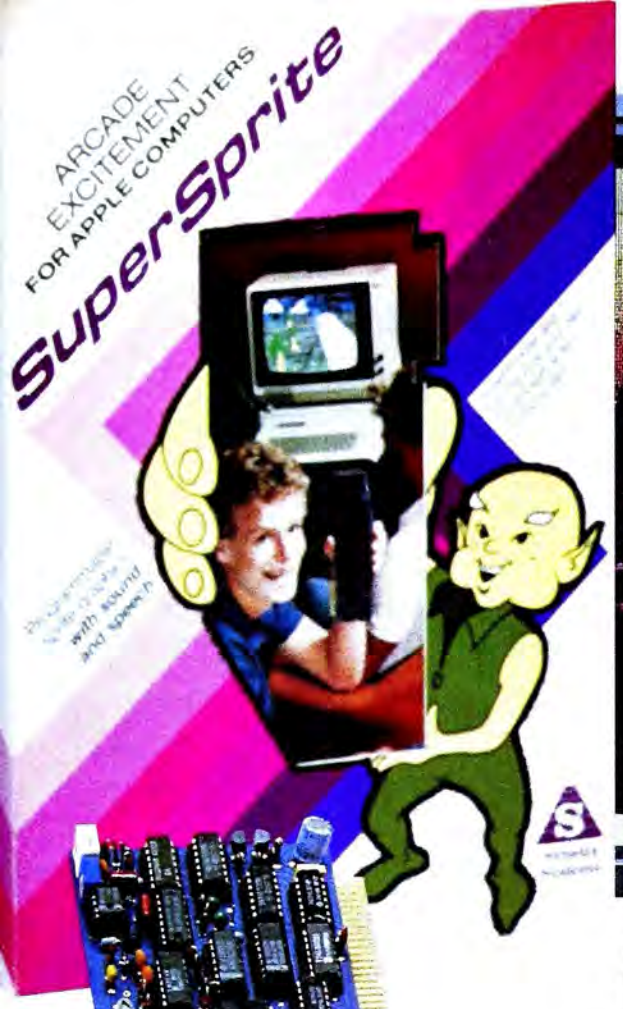
Crypto-Gen. Converts typed-in text into exciting cipher puzzles. Features three different difficulty levels; instructor may provide a clue with each puzzle. Puzzles take only seconds to prepare, have a maximum length of 250 characters, and print on either the screen or on paper. $24.95.

Drill Master/Drill Instructor. Provides question drills needed to reinforce learning. Presents drills in user's choice of format and content. *Drill Master* is used for automatic preparation of instructions and questions. *Drill Instructor* converts information into an automatic instructional package for student use. English commands; no special programming required. $39.95.

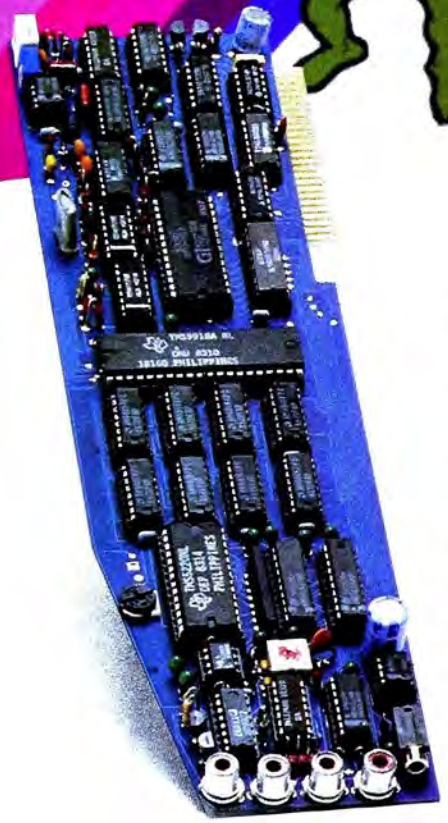
Ziggurat Software

Gradekeeper Plus. The answer to classroom record keeping. Organizes grades for 150 students per file. Features easy grade entry, class or student summaries, grade editing, statistics, sorting by grades or averages, screen or printer-directed output of data, file editing and merging, alphabetized class lists, and more. $34.95.

Spelling-Binder. Allows students to recognize, find, and correct mistakes in spelling, usage, or any course content testable in sentence form. Comes with three twenty-five-sentence spelling drills and software to create original exercises for any course content. Excellent for school or home use. $24.95.







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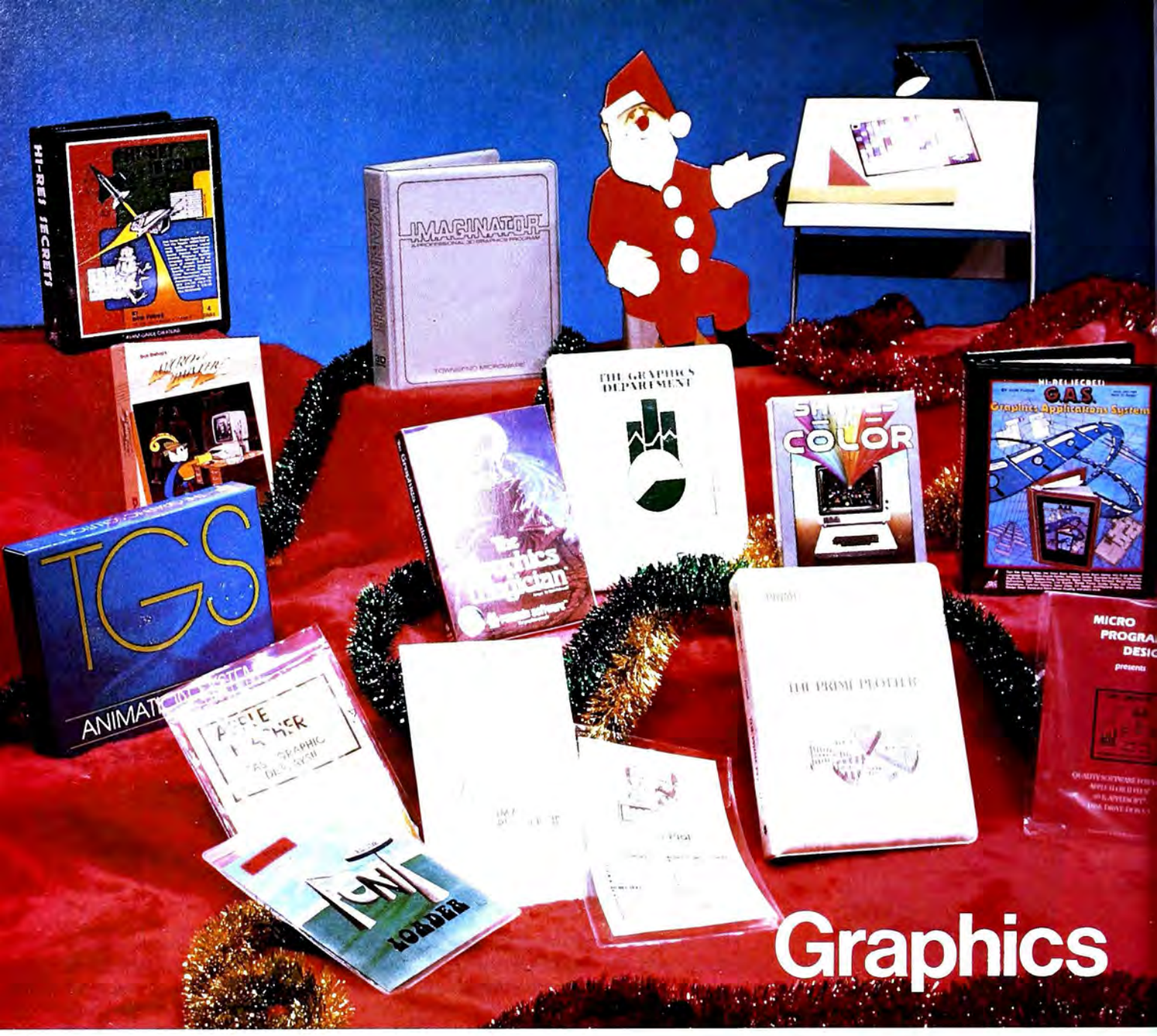


ABW

Teksim. The Apple II/Tektronix 4010 simulator uses the hi-res plotting capabilities of the Apple to allow the user to access *Plot 10* or *Plot 10*-compatible software packages on a host system. $475.

Accent Software

Accu-shapes. The most powerful, easy-to-use shape creation tool for Applesoft shape tables. Dual lo-res/hi-res capabilities for easy editing in magnified detail. $34.95.

TGS: The Graphic Solution. Powerful animation system for the non-programmer. Ideally suited for training, education, and promotional purposes. Create interactive animated presentations combining text and graphics with movie-quality results. New version menu driven. Excellent tutorial manual. Expansion modules available for light pen or touch tablet. 64K, Apple II. $149.95.

Alpha Software

Type Faces. Offers the user fifteen different character fonts ranging from formal to friendly to conform to any printing situation. It is a powerful, easy-to-use printing tool that will greatly increase the capability of the user's dot-matrix printer. *Type Faces* provides typesetting capabilities to individuals who need to enhance business presentations or who want an inexpensive method of producing elegant reports or flyers. There are over one hundred symbols available ranging from Roman Complex, Italian Gothic, and English Gothic to special symbols and Greek lettering. $125.

Anidata

Market Analyst. The fastest, easiest to use, and most flexible technical analysis package available. Graphs basic technical studies in addition to user-specified formulas and features split-screen charting. Retrieves updates automatically over the phone; nine years of historical data available through the two databases. Also maintains portfolio records and includes a smart telecommunications system. $495.

Animation Graphics

A.G.I.L. Super Slide Show. Turns your Apple into a slide projector for briefings, demos, slide shows, or just plain fun. Uses pictures from *A.G.I.L. Paint Program* or another graphics program. Can include animation and will run continuously or stop to wait for a command to continue. Easy enough for children but also sophisticated enough for the professional graphic artist. $29.

A.G.I.L. Paint Program. Use to make quality illustrations and pictures. Includes sketch, pendraw, rubberline, animate, radial line, box maker, text, shapedraw, colorfill, cut and paste, point to point, scroll capabilities. Menu-driven, no programming needed, includes shape

tables and fonts. Usable by children or professional graphic artists. $35.

Arrow Data Systems

Arrow Code 150. A complete in-house numeric control programming system. Includes editor, calculations, trigonometry, plotting routines for mills, lathes, and turret punches. Utilizes interactive graphics and code words to define parts programming. Job cost estimating also available. Complete system, $8,900.

Avant-Garde

Hi-Res Secrets. A complete tutorial with Apple graphics designed for the user who wants to go beyond the Applesoft tutorial. Four disks and a 263-page manual lead the user through the routines needed to create block shapes, vector shapes, and H-plot shapes, as well as different types of animation. $125.

Hi-Res Secrets Graphics Applications System. The standalone sequel to *Hi-Res Secrets*, this package is a tutorial on how to put your graphics programming knowledge to use. Three disks and a manual lead the user on a step-by-step basis through techniques on improving Basic programs, going from Basic to assembly, creating three-dimensional drawings. $75.

Paintmaster Scene Utility. This is a perfect program for the person who wants to design adventure game scenes or who wants to do freehand drawing on the hi-res screen. It allows for line drawing, shape drawing, scene painting, scene editing, screen sketching, and screen compression. Over 300 colors and patterns are available. $34.95.

Super Shape Draw and Animate. This package consists of two programs that interact with each other—*Super Shape Draw* and *Super Shape Animate*. *Super Shape Draw* allows the user to draw in any direction, including diagonally, using keyboard commands. *Super Shape Animate* allows the user to choose from two types of animation. $34.95.

Balbesoftware Systems

Sight 'n Sound. Takes music/sound from a stereo or cassette player and synchronizes it with a light show of the user's design on the hi-res screen. Demos include laser design, kaleidoscope, EKG, and guitar player whose lips move with the sound. No hardware modifications. $26.95.

The Animator. A system for producing animated "film" strips. User enters only key frames, and *The Animator* calculates the in-between frames. Demo includes ballet sequence. Talented ballerina has twelve independently moving body parts. Fifty-seven-page manual, three tutorials, and shape generator that works independently. $51.95.

Beagle Bros

Alpha Plot, by Bert Kersey and Jack Cassidy. Create hi-res pictures and charts, appendable to your programs, with variable-sized, rotatable, proportionally spaced text. See lines before you draw; mixed and reverse colors; instant lines, circles, boxes, and ellipses. Relocate image sections on either page. Also reduce hi-res images to one-third disk space. Unprotected. $39.50.

Apple Mechanic Typefaces. Twenty-six proportionally spaced typefaces, large and small, for use with *Apple Mechanic*'s type-display programs. Many full ninety-six character, fully editable type fonts. Bonus *Beagle-Menu* greeting program catalogs only selected file names on your disks for one-key selection. Unprotected. $20.

Apple Mechanic, by Bert Kersey. Keyboard-draw shapes; shape tables written automatically and stored on disk for animation in your Applesoft programs. Use and design professional-looking proportionally spaced type; six fonts included on the disk. *Byte Zap* inspects/edits any byte on a disk. Includes sixty pages of instructions and useful Apple tips. Unprotected. $29.50.

Frame-Up, by Tom Weishaar. High-speed Apple presentation utility; lets you create professional displays of mixed hi-res, lo-res, and text. Loads hi-res in two and a half seconds. Each image keyboard or paddle advanced, or auto-run mode shows each frame in predetermined order and time. Send presentations on disk to friends and associates. Unprotected. $29.50.

C & C Software

T & G. A package for placing text and graphics on the Apple's hi-res screen. Accessed from Basic by expert or novice programmers, *T & G* prints three sizes of text and creates and displays full-color graphics and animation. Package includes tutorial, sample program, and complete documentation. $65.

Commsoft

PhotoCaster. Converts your Apple II into an instant camera for black-and-white or color photographs. With *PhotoCaster* you can take, display, edit, enhance, store, and print photos. The I/O board includes a modem that allows photos to be exchanged via telephone in eight seconds. With video camera, $749.95; without video camera, $499.95.

Crow Ridge Associates

Apple Flasher. More than a super slide projector simulation for hi-res (DOS 3.3) screen files, *Apple Flasher* helps manage collections of hi-res graphics screens. Fast loading. Scans disks for screens in one and one-half to two seconds. Displays screens at up to one-and-one-half to two seconds each. $34.50.

Data Transforms

Fontrix. Extends the Apple hi-res screen to sixteen times its normal size, allowing for graphics creation (*Fontrix* accepts input from keyboard, joystick, trackball, tablet, paddles, and mouse) and typesetting on screen (use fonts provided, or create your own with the font editor), then prints enormous graphics on over twenty-six dot-matrix printers. $75.

Desktop Computer Software

Graph 'n' Calc. The decision support-graphics system that links a spreadsheet and graphics package together. Within minutes you can master its single-key commands. With *Graph 'n' Calc* you can develop forecast models and analyze statistical and financial data. Then visualize your projections with a variety of different charts and graphs. $129.

Doublestuff Software Development

doublestuff. Using standard Applesoft Basic commands on the Apple IIe, you can program in two graphics modes: sixteen-color double lo-res (80×48) pixels and sixteen-color, hi-res (560×192) pixels. Includes manual, reference card, and eighteen demonstration programs. $39.95.

doublestuff designer. Paint on the Apple IIe in more than 512 colors. Different brushes contain magnify mode for precision touch-ups, mirror image, and color reverse capabilities. Includes manual, reference card, self-paced demonstration disk, and pictures. $69.95.

Fox and Geller

dGraph. A graphics system that can be used by anyone to get presentation-quality pie, bar, line, and piebar charts. It includes an easy-to-use data entry procedure and the ability to perform very powerful analyses of databases created by Ashton-Tate's *dBase II*. In addition, it can be combined with programs written in Basic, Pascal, and PL/I. $295.

Gold Disk Quality Software

Super Slide Show, by Ken Hatfield and Bob Flynn. A powerful slide show and animation utility, suitable for beginners or experts. $29.

Paint Program, by Ken Hatfield and Bob Flynn. A versatile and extremely powerful illustrator program for young graphic artists and would-be animators. $35.

Heller Software

Audio Spectrum Display. Multicolored graphics display of audio frequencies entering the cassette port. Connect your stereo and "see" your music. Entertaining and educational. One channel per octave over ten-octave range (31 Hz to 16,000 Hz). $21.95.

Human Systems Dynamics

Calcu-Plot. Transforms your complex equations into graphic displays. Use the included equations, enter your own equations, or enter empirical data. Plot with linear, semi-log, log-log, or polar coordinates. Add names and titles to graphs. Mathematical utilities solve equations. $150.

Insoft

GraForth. Graphics programming language for entertainment, educational, and other graphics software creation. Designed for novices and professionals alike, *GraForth* features fast three-dimensional animation graphics including rotation, scale, transposition, and perspective. Character set graphics are also included in full color, as are turtle graphics. *GraForth* also has a software-based music synthesizer for adding music or sound effects to your program. $75.

Interactive Microware

Curve Fitter. Permits selection of the most appropriate curve to fit experimental results. Available methods include scaling and transformations, averaging, smoothing, interpolation (polynomial, cubic spline, or Stineman) and least squares fitting (polynomial, geometric, or exponential). Data may be entered via keyboard or from disk. Data format is compatible with other IMI products, including *Scientific Plotter*, *Vidichart* and *QuickI/O*. $25.

DMP Series Plotter Adaptation. Enables use of IMI's *Scientific Plotter* program with Houston Instrument's DMP series color plotters as output devices for plots of scientific, engineering, and business data. $50.

D/S File Converter. Permits bidirectional data interchange between IMI's *Scientific Plotter* program and *VisiCalc*. $25.

HP 7470A Plotter Adaptation. Facilitates use of IMI's *Scientific Plotter* program with Hewlett-Packard's model 7470A two-pen color plotter as an output device for graphs and plots of scientific, engineering, and business data. $50.

Scientific Plotter Version II. Draws professional-looking graphs. Data may be input from the keyboard, disk, or from an end-user subroutine. Data may be supplied either as X,Y pairs or as Y values at a constant X interval. More than one data set may be plotted on the same graph. Control of length and position of each axis, grid size, and interval between numbers makes it possible to plot data in one, two, or four quadrants with different scales superimposed on the graph. *Scientific Plotter Version II* contains all previous updates to *Version I*. $25.

Vidichart. A high-speed machine language graphics display subsystem permitting CRT display of data from analytical instruments or end-user databases. Up to four different curves may be shifted left, right, up, or down on the screen and expanded or contracted along the X or Y axis. An on-screen report shows the current status of the display, including the scaled coordinates of the graphics cursor and the value of the curve under the tracking cursor. Data format is compatible with other IMI products, including *QuickI/O*, *Scientific Plotter*, and *Curve Fitter*. $25.

Interlaken Technology

Calfex/Graphics. Used with Calfex software. Allows text mode graphics and tables to be displayed or printed. Three plots may be displayed simultaneously for comparison. $75.

ISI Island Services

Graphics Service (Image-Base). Need electronic pictures for your Apple II? Would you like to send electronic greeting cards? Now you can call *Image-Base* twenty-four hours a day and download hi-res color pictures to your Apple. A complete library of functional graphic pictures is available, or ISI can create posters, logos, portraits, and other types of images for you. All pictures are automatically saved to disk. Average cost is $10 per page.

Madwest Software

Amperdump. Graphics printing utility. Can be used in menu-driven mode or incorporated into Applesoft programs. $40.

Ampergraph. An ampersand utility that adds twenty-two commands to Applesoft, allowing generation of professional plots of scientific or financial data. $45.

Micro Co-op

KoalaPad Illustrator. A quality graphics designer package. $106.25.

Micro Program Designs

Dr. Grafix. Economical, easy-to-use utility package for hi-res shapes and graphs. Design shapes directly on hi-res screen. Edit shape tables quickly. Tutorials; animation techniques; mixed text and graphics; conversion of numerical data into line, bar, pie chart forms. $19.50.

Micro Works

DS-65 Digisector. A random-access video digitizer that converts a TV camera's output into digital information the Apple can process. It features a 256-by-256 resolution, with up to sixty-four levels of grey scale. The DS-65 can be used for computer portraiture, security systems, moving target indicators, reading bar codes, and just about anything else. Comes with on-board EPROM software for displaying digitized images on the hi-res screen. $349.95; with camera, $599.

Picture Scanner. This software package is an applications tool for processing video images for display on the Apple's hi-res screen, as well as a sample program to assist anyone wishing to write their own image processing software. Demonstrates five methods of displaying digitized images with pseudo grey scale on the hi-res screen, for different applications. Requires the use of the Micro Works DS-65 Digisector; compatible with either Applesoft or Integer Basic. $39.95.

SuperScan. This software enables the user to enhance the Micro Works DS-65 Digisector's hi-res pictures with colors. Choose from twenty-one different colors and assign them to grey scale values. Modify pictures, zoom, enhance, contrast, and so on. Print routines for the Anadex 9500 and 9501, Epson MX-80 and Paper Tiger IDS-460 are provided. Written by Magna Soft for exclusive distribution by The Micro Works; compatible with Applesoft. $79.95.

Peachtree Software

Business Graphics System. A menu-driven, eight-color graphics program that produces ten specialized types of charts and graphs for output to screen, plotter, or printer. User defines chart characteristics; numeric data is entered through an on-screen data form, either from a *PeachCalc* file that *BGS* converts for graphing, or from a file created with an ASCII text editor. $295.

Peachtree Graphics Language. An interactive graphics programming language that consists of 150 English-language commands. Lets you build procedures and command files for creating a variety of charts good for business, engineering, and scientific applications. User defines shapes, vectors, grid axes, and axis labels; color (choice of eight), hue, saturation, and luminosity; and fill patterns with adjustable spacing and angle. $395.

Penguin Software

Additional Type Sets. Fifty extra fonts and character sets, both large and small, to use with *The Complete Graphics System*. Typefaces include Old English, Italic, Block, Oriental, Creepy, Three-Dimensional, Computer, and many others. Language type sets include Hebrew, Greek, Russian, and others. $19.95.

The Complete Graphics System. Includes packages formerly known as *The Complete Graphics System II* and *Special Effects*. Create two-dimensional graphic images with ninety-six brushes and over one hundred colors. Use the fast automatic fill routine and label your drawings with text. Assemble two-dimensional line drawings into a three-dimensional object, then edit and combine it with other drawings. The tricks included let you magnify any portion of the screen two to eight times to alter the individual points easily. Do full screen picture flips and much more. $79.95.

The Graphics Magician. Design shapes and assemble animations, then add them to your own programs. Store hundreds of multicolored pictures on a disk. Use the fast automatic color-fill routine, a paintbrush routine for shading and detail, text, and over one hundred colors. You will be able to transfer files between microcomputers. Unprotected. $59.95.

Magic Paintbrush. An easy-to-use drawing program for creating hi-res pictures with lines, circles, brushes, and color-filling in over one hundred colors. Includes dozens of "clip-art" picture screens from which you can take shapes and put them into your own pictures. $29.95.

Map Pack. Use computer-generated maps in your software or presentations. Includes outline maps of all fifty states, the United States, Canadian provinces, and the continents. Simply load the maps into *The Complete Graphics System* and add to the pictures as you like. $19.95.

Transitions. Turn your picture disks into professional presentations. Over thirty-five choices of screen wipes between pictures including spiral, radar, and geometric wipes; a windshield wiper effect; and many others. Pictures are stored in packed format allowing over one hundred per disk. $49.95.

Phoenix Software

Zoom Grafix, by Dav Holle. A hi-res graphics screen printing package that works with combinations of printers and interface cards. Prints upright/sideways, either screen, in any size or proportion. You may also print any portion of the hi-res screen using the zoom window. $49.95.

PrimeSoft

Prime Plotter. A comprehensive graphics and statistics package with built-in slide-show/replay capabilities and plotter interfacing. Its modular structure allows expansion and customization to user needs. $240.

Rainbow Computing

Poor Man's Graphics Tablet, by Vincent Arnold. This software was designed for precision drawing and tracing. Has an unlimited palette of colors and fifty-nine different textures. Full shape table functions are included. Can move, rotate, duplicate, or combine shapes. Complete documentation. $49.95.

Rainbow Graphics, by Bill Smith. Draws lines, dots, frames, circles, polygons, and boxes using your joystick and buttons. For use by artists, youngsters, handicapped, designers, or anyone who wants to have fun drawing. Full shape table functions. Joystick with two buttons. $29.95.

Reston Publishing

MovieMaker, by Interactive Picture Systems. A versatile and easy-to-use computer animation system. Operating in a microcomputer environment, up to 300 full frames of animation can be created and edited at any one time. Absolutely no programming is required by the animator. Includes four recordable color and sound tracks, cel painting and 128 colors. $60.

Sensible Software

Graphics Department. Comprehensive graphics system includes a complete charting system (for bar, scatter, line, and pie charts), a complete lettering kit with over thirty fonts, a slide projector presentation system, and an extensive set of graphic tools for adding the finishing touches to any hi-res picture. $124.95.

Image Printer II. Printer utility program for "dumping" any hi-res screen to over twenty different types of printers, including Apple Dot Matrix, Epson, and many letter-quality printers. *Image Printer* also extends the capabilities of most graphics printer cards. $49.95.

Sirius

E-Z Draw 3.3. A professional tool for developing graphics images. Includes twenty different and imaginative font styles; all Apple Basic colors can be used. Simple one-character commands allow user to reverse, slant, rotate, or mirror fonts and images in any part of a picture in any combination, and to expand and compress images horizontally and vertically. $39.95.

Pascal Graphics Editor. A complete editor for creating fonts, pictures, and images. Can be used directly for display or animation with included utilities. Any portion of the screen may be defined as a Draw-block array and rotated, inverted, mirrored, compressed, or expanded both horizontally and vertically. $39.95.

SofTech Microsystems

Turtlegraphics. A machine-independent, adaptable set of library subroutines that produce portable, hi-res monochrome or color graphics. UCSD Pascal, Fortran-77, and Basic can be used to create graphics software for use on any microcomputer that runs on the p-System. *Turtlegraphics* is included in the p-System Bootable System. $75.

Software Publishing

PFS:Graph. A graphics package that can work alone or use data from *PFS:File* or *VisiCalc* files to produce bar, line, or pie charts of presentation quality in minutes. Line and bar graphs can be mixed and matched, and four graphs can be displayed on a single set of axes. Bar graphs can be stacked. Automatic formatting, scaling, legend labeling, and pattern fill. Apple II, IIe, $125; Apple III, $175.

Software Technology for Computers

Coloring Board. Can create, change, store, letter (upper and lower case), and retrieve colored or black and white drawings. Requires no special add-ons. $75.

SubLogic

A2-3D1 Graphic Family, by Bruce Artwick, James Bozek, and David Denhart. A three-dimensional graphics program for professional applications. Features include selectable resolution, full color capability, and independent object call functions. Two disks, $119.85.

AB-3D1 Basic 3D Graphics, by Bruce Artwick. Ideal for those applications where a high-precision output (up to 4,000 × 4,000 resolution) is required. Can be used with plotter or any other type of application where output is to be processed in the same manner. $40.

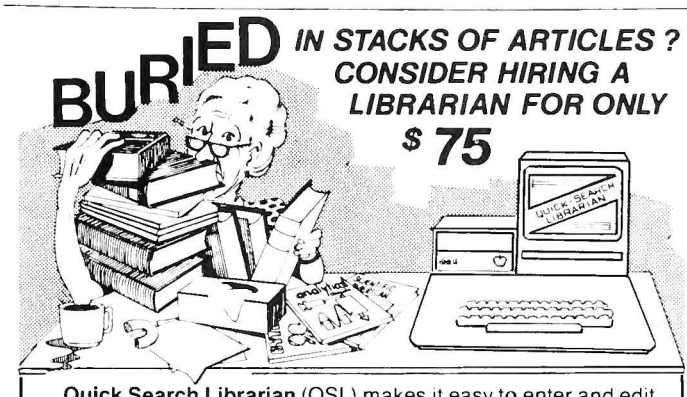
Summagraphics

MM Series. Low-cost, high-performance digitizing tables designed to perform cursor steering, menu picking, and graphics tasks, with the added flexibility of a mouse. Comes in three sizes of tilt-adjustable tables with either an RS-232 or TTL serial interface included. MM961, $395; MM1201, $500; MM1520, $1,300.

SummaMouse. Low-cost, high-reliability digital mouse for menu selection, graphics, and text editing. Offers up to 100 lines of resolution per inch. Available with either an RS-232 or TTL serial interface. $300; with RS-232 interface, $310.

Superior Software

Usable Graphics—Demo Disk I. A collection of over thirty-five graphics displays, programs, and routines you can use in your own pro-



Quick Search Librarian (QSL) makes it easy to enter and edit your journal references, search for articles, and print or sort a list of articles using the 48K APPLE* II + computer. Important QSL features include:

- Two keystrokes select any one of 255 keywords or any one of 255 journal titles.
- Four lines available for listing authors, title and/or comments.
- Powerful data base screen editing, copying and merging features.
- Average search speed is 50 articles/second with multiple criteria; average sorting speed is 40 articles/second when sorting on 3 fields.
- Typically, 1000 articles can be stored on a single disk.
- Includes sample data base and tutorial for *Scientific American*, 1981.

VISA or Mastercard orders accepted. QSL manual available separately for $5. (Price of manual deductible later with purchase of QSL software.) Add $1.50 for shipments made in U.S.A.

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grams. A full disk of usable fun and a great, inexpensive way to learn about Apple II graphics. $19.95.

Synetix

Sprite I and Sprite II. Graphics hardware devices that include software for sprite creation and background scene painting. In addition to sprite graphics, sound generation is included on *Sprite II.* Sounds and sprite movement/animation can take place simultaneously with no break in action. *Sprite I,* $149; *Sprite II,* $249.

SuperSprite. A full-featured graphics and sound package. It includes sprite graphics with sixteen hi-res colors, sound generation, and speech. These features are easily programmed with the included *StarSprite I* software for sprite creation, background scene painting, programmable speech and sound generation. Additional software available. $395.

Systems for the Arts

Video Loom II. Computer weaving; simulates handlooms with up to thirty-two harnesses and sixty-four treadles. Makes full use of hi-res graphics. Requires no knowledge of computer programming. $84.95.

T & W Systems

Cadapple/Versacad. For computer-aided drafting (CAD). $1,995.

Tangent 270

Fonts I. High quality characters based on Hershey's character repertory. Great for use in your graphing and report programs. Twenty-one character sets including Roman bold, Italic, Greek, Math, and Music. Characters can be rotated and enlarged or compressed under program control. *Fonts I* database, manual, and sample programs, $24.95.

Telephone Software Connection

Banner Maker, by Ed Magnin. Add some excitement to your next special event. Great for parties, club meetings, boosting your favorite team, sales promotions, or fun and profit (imagine your kids selling banners to your neighbors). Creates long banners on form-fed paper from whatever you type. Four letter sizes in both upper and lower case. $25.

Giant Graphics, by Ed Magnin. Turn your favorite hi-res pictures or graphs into giant three-by-three or three-by-five-foot posters. Needs form-fed paper but works well even with nongraphic printers. Includes free sample TSC poster. $35.

Tid Bit Software

Graphicmaster. A visual presentation system consisting of five interactive modules on a single disk that offers flexibility for the creation of text and animation, plus a graphic Ampersand Language for complete control of these elements through Applesoft Basic. $79.95.

Townsend Microware

Imaginator I. Exciting new professional-quality three-dimensional graphics program. Images created with the powerful, easy-to-use graphics editor can be manipulated and displayed in a variety of ways using the versatile interactive display commands. Display objects on screen, dump to graphics printer, or save to disk. Includes comprehensive manual with tutorial. $129.

United Software of America

Apple World. Create animated, three-dimensional color images in true perspective with full rotational ability. A powerful screen-oriented text editor is included to facilitate image formation. Now you can "sketch" your dream house, a car, or an office and view it from a distance, up close, and at different angles, both exterior and interior. $59.95.

Three-D Supergraphics. This product has three-dimensional color graphics that get drawn so quickly that animated displays are possible. The program is completely compatible with Integer and Applesoft Basic languages, DOS, and assembly-language programs. $39.95.

Versa Computing

Expansion Pac I and Expansion Pac II. Expanded software for the Apple *VersaWriter. Pac I* includes 350 predefined shapes. Shape tables for architecture, plumbing, electrical, circuit boards, landscape, and so on. *Pac II* includes commands such as shrink picture to one-fourth size in color, magnify picture segment to full screen, fast picture loader, and more. $39.95 each.

West Coast Consultants

Curve II. A combined business and scientific graphics package designed for use with several popular plotters. The program is menu-driven and also includes twenty-six Basic subroutines for highly customized output. *Curve II* plots Cartesian, parametric, and polar equations, bar, pie, and line charts in both linear and log space with flexible labeling. $275. *VisiCalc* DIF-file option, $25.

Curve Perspective. An economical, highly sophisticated CAD/CAM graphics program designed for use with most plotters. The program plots any three-dimensional object with or without hidden lines removed. Up to 500 line elements, circles, arcs, and the like may be used. The program translates, rotates, and scales the image on screen in either perspective or orthographic projection. $450.

Curve Three-D. Plots three-dimensional hard-copy graphics of user data, space curves, and mathematical functions of the form Y-F(X,Z) to a variety of plotters. Full 360-degree rotation of the surface with hidden-line algorithm, tick marks, and scale numbers allow you to quantitatively study three-dimensional information. $199; with CRT option, $250.

Curvefit. Performs up to four mathematical fits to X,Y data allowing you to replace the data with either a straight line, polynomial (up to degree 9), exponential, or power law equation. Goodness-of-fit parameters are displayed along with equation coefficients. Plots of the fits and "residuals" may be directed to any of several plotters. $99.50.

John Wiley & Sons

Imagination: Quilt, by Moshell. A vividly visual program for everyone from preschoolers to professional fabric designers. The user programs (and can edit, save, or combine) a multicolor pattern or "seed." *Quilt* then repeats it all over the screen. Teaches concepts of programming, planning, editing, and repetition. $34.95.

$20,000 Net Profit Last Year

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In the past three years, a personal computer has consistently produced a major profit picking Professional Basketball bets. A $200 bet on each computer pick last year produced $20,000 Net Profit.

The program is fully automatic and self-prompting. It even checks for typing mistakes. A practice program demonstrates how to use all the functions.

For each game, enter the team names and scores. The computer calaculates statistical medians for the point spread and total points.

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If you enter the performance of each team versus the spread, the computer also reports high percentage situations worth betting.

Diskette includes the complete program package for entering game data and obtaining predictions, for practicing use of the program and for erasing old data each year. You can even review the last predictions. It is complete, well tested, highly accurate and easy to use. The computer system costs about 10% of one year's net profit.

Program requires a 48K Apple II, DOS 3.3, 1 disk drive and Applesoft ROM. It is also available for TRS-80 Model III & others.

Each diskette comes with stats for games already played when you make your purchase, you can quickly be in the middle of the action.

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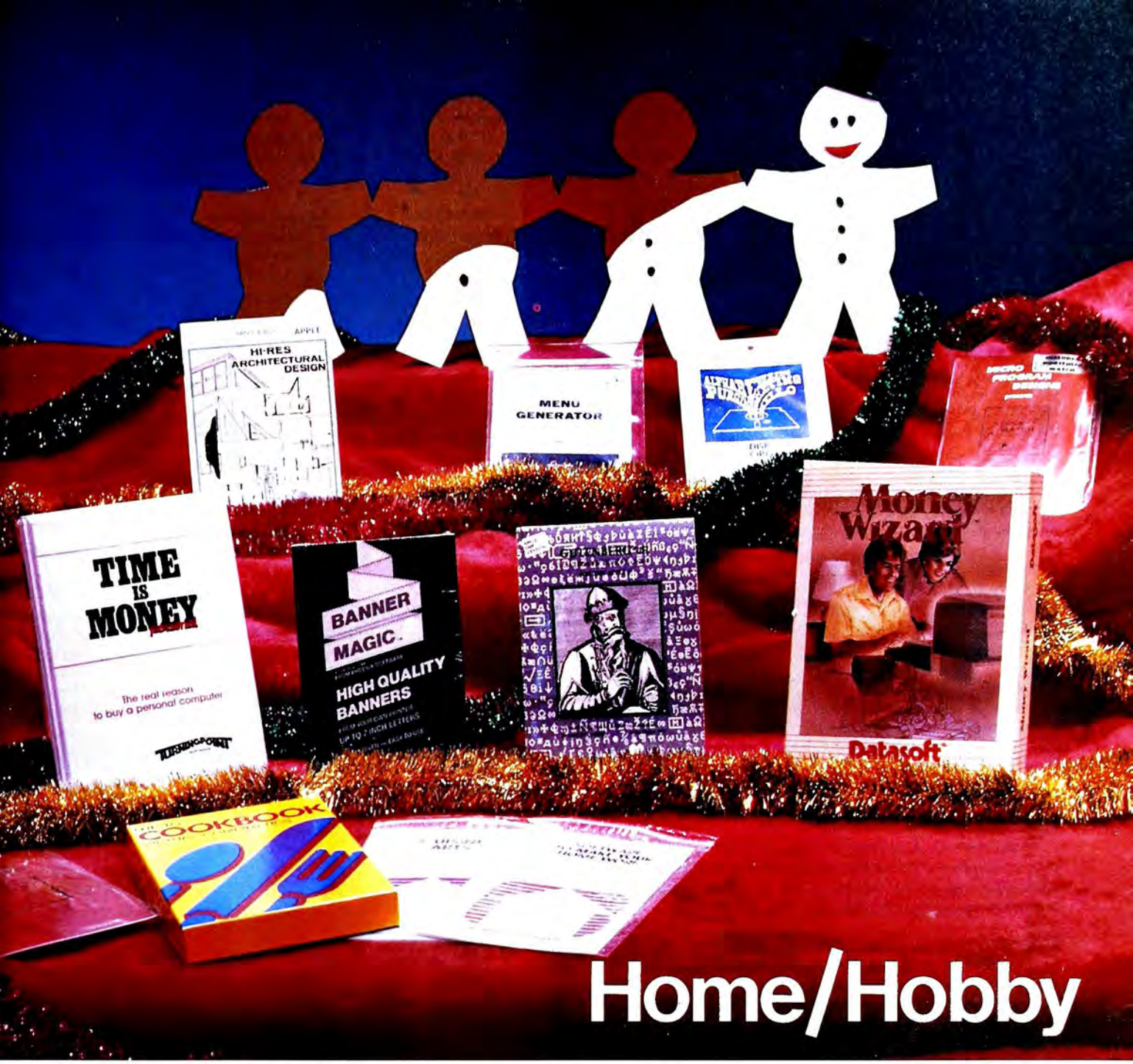

Home/Hobby

American Avicultural Art and Science

Bird Classification Program. User-friendly relational database program of birds. User simply selects location, size, and number of colors. Fast search algorithm finds name of bird, order, ecological status, habitats, and other information. Program includes 1,000 U.S. birds. $50.

ATV Research

Bonus-Plus Imagesoft Disks. Now for about the same price as a box of ten blank disks, micro users can also get approximately 100 "free" programs ranging from games, graphics, business, education, home, utilities, and so on. Programs are on back sides of a number of the disks and do not affect the use of the fronts. $29.95.

Avant-Garde

Hi-Res Architectural Design. Plan and design an individual room, a complete floor plan, or a total building. After using a paddle or joystick for drawing the walls, seventy-five different floor plan shapes are a keyboard command away. The program will calculate lengths, diagonals, and angles on screen. $29.95.

Creativity Tool Box. Designed to eliminate creative blocks, this program allows the creation of instant people and instant graphics with keyboard commands. It also helps the user write music and poetry. Also included are action sounds, hi-res scrolling, and the *Superfont* program, which allows seventy-two type size/style combinations. $44.95.

The BBE Company

Jogger Logger. A computerized runner's diary that allows the user to record and accumulate distances, times, and conditions by date; summarize and compute average rate (pace) and other statistics by month and year; and keep an accurate and professional record of a running program. $19.95.

Berry Systems

The Handle. Family finance program that maintains files on as many accounts as necessary. Easily access expense records by payee, date, amount, code, or a combination of all four. More than twenty options to aid you in maintaining and analyzing your expenses. Includes plotting with bars, lines, and monthly graphs. $59.95.

Computer Shopper. Let your Apple help you with your grocery list. Make list by choosing from large categorized grocery file. Get printout with item, price, and total. Add your own items and prices. Change and

delete items any time. $29.95. *Computer Cookbook* plus *Computer Shopper*, $45.

Computer Cookbook. Let your Apple maintain your recipe files. Comes with several recipes; add your own in easy-to-use, easy-to-correct format. Plan a whole meal—program adjusts ingredients for number served. Search recipe file by category or recipe name. $29.95.

Big Red Apple Club

Big Red Apple Club. A national Apple computer user group. Members receive the club's monthly publication, *The Scarlett Letter*, containing programs, utilities, and educational applications. Club also has a software library of over 3,000 programs distributed to members free of charge. One-year membership, $12.

Brahman Software

In Depth Poisoning. This is an educational tutorial on poisoning. It is packed with information about poison prevention, the worst poisons, a simulated poisoning, and a poison reference of the most commonly ingested poisons. $39.95.

CoinMinderII

CoinMinderII. Computerized filing and inventory system. Use to build an electronic catalog of your coin collection; retrieve and update information quickly; calculate appreciation of coins. $179.95.

Commsoft

Roots/M. A specialized database program designed to store, retrieve, and display thousands of facts about your family in standard genealogical format. Prints pedigree charts and family group sheets. Requires CP/M and 80-column cards. $49.95.

Compu-Quote

Coins. A unique program that enables a coin collector to catalog an entire collection and obtain various reports that provide personal investment information. The principal feature of *Coins* is a built-in market value file that supplies latest pricing information. $95. Quarterly market value updates. $25.

Computer Applications

Pathfinder II. A satellite tracking program that will track any circular or elliptical orbit satellite, display the orbit on a North American or world map, and provide tabular display of orbital information. Database of satellite reference orbit data included. $49.95.

Computerized Management Systems

Grocery List. Useful household program designed to organize supermarket shopping. Shoppers will instantly be able to use this easy, self-prompting program to scan a file of 500 user-defined shopping items, choosing those needed with a single keystroke and printing a shopping list organized by table, section number, and so on. $24.95.

Continental Software

The Home Accountant. The world's top-selling personal and small business financial management program tracks all your finances automatically. The program budgets, forecasts, keeps track of checkbooks, reconciles bank statements, and even prints checks. $74.95 .

Craftsbury Software

Personal Wealth. A comprehensive inventory system for keeping track of investments, valuables, and other personal possessions. Perfect for insurance, stock market, warranty, estate purposes, and so on. Includes seventeen descriptor fields, multifield search, sort by item name or category, and math functions. $39.95.

People Tracker. A mailing list and address book program that features instant, multifield search, name or zip code sort, labels in up to four columns, customized print formats, special multiple coding fields, auto date, and comment line. $39.95.

Memory Jogger. A flexible appointment and event calendar calibrated for the next 100 years. Never forgets a bill, birthday, engagement, or project deadline. Features one-time entry for recurring events and rapid search over all fields. The day of the week is computed automatically. User decides whether events are to be listed in chronological or alphabetical order. $39.95.

Wine Connoisseur. Combination cellar inventory and record of tasting notes that provides quick, accurate access to information on all wines in storage and pinpoints the right wine for the occasion in moments. Features fifteen inventory descriptors and twelve tasting descriptors. Comes with instructional disk that teaches how to select and taste wines. $39.95.

Micro Chef. Professional menu planner now available for the home. The data disk is filled with specially selected, fully tested gourmet recipes from around the world. Rescales serving sizes, prints shopping lists, finds lost or forgotten recipes instantly, prints recipes in three-by-five-inch card format and creates personalized recipe disks. $39.95.

Crane Software

Menu Generator. Save time with custom computer menus. The menus can run other programs, boot disks, and execute user-supplied commands or functions. Create menus in less than ten minutes without programming. Editing is even faster using the program's database capabilities. $39.95.

Creative Peripherals Unlimited

Time-trax. A time and date calendar program that will remind you of appointments, errands, birthdays, holidays, bills to pay, and much more. With a simple keystroke you can make, review, and edit entries or search for any entry from past, present, or future months. Clock module included. $99.95.

Cross Educational Software

Aquarium. A community aquarium simulation plus four games. Ten different kinds of fish interact, eat, breed, and grow up. You can catch them in *Aquarium Fishing*. $25.

The Christmas Story. A half-hour program in three parts: Shepherds, Prophecy, and Wise Men. Contains the story of the birth of Christ. Seven hymns and extensive hi-res graphics. $12.

Jonah. The Bible story of Jonah illustrated with twenty hi-res pictures. There are three versions: no text, easy text for young readers, and full text for older readers. $6.

Methodist, Bible Books and Hymn Book. Teaches the history of the Methodist Church rather than the Catechism. Also includes a game about John Wesley's twenty-five Articles. $15.

Presbyterian, Bible Books and Hymn Book. Package contains the Presbyterian Child's Catechism, games and songs that teach the books of the Bible, and hymns with a bouncing ball above the words. $15.

Samson. The Bible story of Samson illustrated with twenty-two hi-res pictures, in three versions. $15.

Samuel. The Bible story of Samuel illustrated with twenty hi-res pictures, in three versions. $15.

Custom Software Design

Stock. Stock investment analysis program designed to help the personal investor analyze corporate issues along the guidelines established by the National Association of Investment Clubs. Extensive earnings/share, price earnings, and dividend and sales growth analyses are included. A buy/hold/sell structure is developed. $89.95.

Decision Economics

Stockcraft. Stock market system featuring portfolio management, technical analysis, and optimized trading strategy. Expanded version. $188.

Decision Support Software

The Accountant Finance Database System. Double-entry bookkeeping system that does not require knowledge of debits or credits. User-defined accounts as well as tax codes. Permits back dating of entries. Menu-driven. Net worth statement obtained within three seconds. End-of-month reporting. Optional interface to *VisiCalc* or *Multiplan*. $129.

Dietware

Dietware. Allows a person to assemble a diet menu consisting of foods of one's own choice. Comes complete with the composition of 700 foods (calories, carbohydrates, proteins, cholesterol, and sodium). Recipes with nonstandard ingredients easily entered with the special reci-

pe-entering module. Diets can be printed out and/or stored on the disk. $59.95.

Don't Ask Computer Software

SAM (Software Automatic Mouth). An innovative software package that adds speech capabilities to the Apple. $99.95.

Dresselhaus Computer Products

Finger Print. Convenient add-on for Epson printers. Puts control of print modes at your fingertips. Condense, emphasize, or even skip perforations by simply tapping the control panel buttons. Does not interfere with normal printer functions. Plug-in module installs easily without soldering, comes with a reference label and one year warranty. $59.95.

Dynacomp

The Family Budget. Designed as a two-part electronic home data recordkeeping program. *Budget* is used to record expenditures, both cash and credit, and income on a daily basis for the period of one calendar year. *Charge Accounts* provides a continuous record of all credit transactions. Each program provides options for hard-copy printout of various data. $34.95.

Personal Finance System. Offers the user one of the most complete financial management packages available, allowing the individual or small-business person complete flexibility in maintaining all aspects of financial recordkeeping. $39.95.

8th Dimension Enterprises

Personal Inventory. General tool for the professional who does a lot of work at home. Professional resource search and sort reference program for professional or personal library, home inventory/insurance log, and locator for seldom-used items. $59.95.

Einstein Software

Einstein Memory Trainer. Expand your (human) memory and have fun doing it. The fully structured tutorial system with color graphics is based on the applied psychology of learning—the computer provides the dynamic interaction required for performance feedback, and Einstein's human factors engineering allows user compatibility with the computer. $89.95.

Family Life Software

Natural Family Planning Personal Charting Program, by Frank M. Ringsmuth. Used for the daily charting of a woman's fertility signs. Each cycle is displayed with temperature and cervical mucus signs plotted graphically, as well as in text. A statistical analysis of all charted cycles displays cycle length, peak day, and the post-ovulatory phase. $39.50.

GolfSoft

GolfSoft Handicapper. A computer program capable of producing handicaps comparable to those of the United States Golf Association. Both CP/M and Applesoft versions available. Printed reports produced of master list, posting sheet, handicap cards, distribution, and ranking. $175.

Statistician. Golf analysis program designed by a PGA golf pro to help golfers identify flaws in their games. Written for the Apple, *Statistician* provides twenty-six video or hard-copy reports. $34.95.

Gourmet Software

The Pizza Program. Database meal planning system. Answers the question, "What are we having for dinner?" Generates helpful dinner menus and shopping lists. Allows the user to modify the database to create menus that fit his taste and budget with detailed shopping lists. $34.50.

Heller Software

Checkbook. Records checks, reconciles with bank, lists for tax purposes and budgeting. Program is listable with rem statements. Unprotected. $26.95.

Store Coupon Program. Records coupons and lists by expiration date or category. Also tracks refund offers. Coupons and refund offers kept in



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High Technology Software Products

Some Common Basic Programs. The entire collection of seventy-six programs featured in the book of the same title by Osborne/McGraw Hill. The book is included with the disk. $40.

Homeware

Night Before Christmas. The beloved children's story of a visit from Saint Nick. A classic retold using lo-res graphics and sound effects. $20.

The Christmas Story. Story told from the Gospels using lo-res graphics and music. $20.

Caroling. Gather 'round your computer to sing your favorite Christmas carols. A total of nineteen carols with graphics. $20.

Menu Planner. Organize and store your favorite breakfast, lunch, and dinner menus, then let *Menu Planner* do all the work. Prepare menus for one, two, or three meals a day for up to two weeks plus print out a shopping list of needed items. $20.

Recipe File. Organize your recipes into twelve or more categories and store for future reference. *Recipe File* will also convert a recipe to serve a larger or smaller number than originally intended. $20.

Metric/English Conversion. Convert any metric or English measure into its equivalent in both measuring systems. Handles length, distance, weight, mass, liquid volume, dry volume, temperature, and recipe measures. $10.

C R Hunter & Associates

The Permanent Portfolio Analyzer. Based on a strategy devised by investment advisor Harry Browne, program shows the investor how to develop and track a portfolio that is inflationproof, so that its purchasing power (dollars adjusted for inflation) is protected no matter what course inflation takes. $295.

Hy-Tek

Sports Pool. Computerizes the neighborhood or office sports pool. Applicable to all sports and even comes set up for NFL football. All the record keeping and form generation is done by the computer. Put the fun back in tracking your favorites with *Sports Pool.* $39.95.

HLS Duplication/L&S Computerware

Crossword Magic. Creates a British nonsymmetrical puzzle using your words and clues. Simply input your words and watch the magic begin. Once your puzzle is complete, you can either play it on the screen or print out a hard-copy version using most graphics printers. $49.95.

Insoft

Electric Duet. A music synthesizer that can play two simultaneous notes without expensive add-on circuit boards. Play any of the selections included on the *Electric Duet* disk, or create your own music with the versatile music editor. Five-octave range and a choice of four different voices. $29.95.

Knossos

Health-Aide. Unique diet, nutrition, and exercise program that allows you to track nutrient intake, plan meals, or analyze thirty-four nutrient items plus cost. Includes an expandable database of over 700 foods, personalized requirements, meal planning, 150 energy activities, monthly/yearly graphs of all values, ten additional daily items, and weight control. $79.95.

Micro Ink

Micro on the Apple—Volumes I, II, and III. A disk of assorted programs: *Utilities*, *Applications*, and *Games*. Includes book with complete program descriptions. $24.95 each; $59.95 for boxed set of three.

Micromation

Gutenberg Jr. An easy-to-use, fully functional word processor for the Apple II that introduces the user to a revolutionary way of handling text. With ready-to-use formats. Superior text editor with full word wrap, forty/eighty-column hi-res and lo-res screen display. Offers 115 user-definable screen characters and two-file split-screen editing. $85.

Gutenberg Sr. A word program for the 64K Apple II. Because of its flexibility and power, it can meet the needs of many academic and technical writers. Some of the main features are the creation and inclusion of pictures in text, special formatting capabilities for mathematical expressions, and so on; modem communications; programmed editing; and data capturing capabilities. Also contains the *Gutenberg Paint Program.* $325.

Micro Program Designs

Stock Watch. Powerful but very easy to use. Monitors price and volume data for up to forty-five stocks. Hi-res data bar graphs. Multiple moving averages for trend spotting. No modem required. Includes *Portfolio Watch* disk for buy, sell, dividend, cash account record maintenance, and reports. $59.50.

MicroPro International

StarIndex. *WordStar* option. Allows you to create an alphabetized index with subentries, a table of contents with up to four levels of emphasis, a list of figures, and a list of tables, all in your own personal style. Requires CP/M. $195.

SpellStar. A spelling checker that works with *WordStar* to find spelling and typing errors. Scans documents at hundreds of words per second comparing what you've written with its comprehensive dictionary. Requires CP/M. $250.

WordMaster. A comprehensive video text editor used mainly by programmers. Screen-oriented editing allows you to see the results of insertions, deletions, and block moves immediately. Command mode allows the user to enter or execute editing commands and conduct searches, global replacements, and text moves. Insert mode accommodates high-speed data entry. Video mode allows the user to display a portion of the file on the screen and update as changes are made in the file. Requires CP/M. $150.

WordStar. Designed to be simple to learn for users with no computer experience, yet it contains more powerful capabilities than many stand-alone word processing systems. Features include a wide range of printing and formatting options, such as horizontal scrolling, hyphen help, column move, as well as help menus and training materials. Requires CP/M. $495.

Momentum Software

Pro/file Predictions—NFL. Professional football outcome predictor based on unique statistical averaging methods; easy to use. Free book, *Secrets of the Super Athletes*, included in package. Eighty percent accuracy in 1982 playoffs. $29.95.

Monogram

Dollars and Sense. Innovative easy-to-use software package for home computers that brings financial management within the grasp of average, as well as financially savvy, customers. An easy-to-create-and-maintain personalized financial database gives the user extraordinarily fast access to information. $100.

Muse Software

Advanced Blackjack. Designed to teach one of the most sophisticated, powerful, yet simple card counting strategies. $49.95.

The Eating Machine. If you are counting calories, health conscious, or just want a more nutritionally balanced diet, *The Eating Machine* will open your eyes to the world of healthful diet management and sound nutritional planning. $49.95.

Know Your Apple. Learn about your amazing Apple with animated screen graphics, music, and voice. $34.95.

Navic Software

Family Medical Advisor. Diagnose illnesses from overt symptoms that are easily observed by the patient. All in layman's language, the computer poses questions that are answered "yes" or "no" by the patient. A special algorithm is then used to calculate the most probable illness or medical condition producing those symptoms. Also includes symptoms of poisonings and drug abuses. $37.50.

Nikrom Technical Products

Notebook. Gives rapid in-out access to all your notes on financial information, insurance numbers, names and addresses, dates, DOS

notes, medical, business, auto, and other information. Automatically cross-references your memorandums and keeps an alphabetized index. Easy-to-use search routine. $55.

N-Squared Computing

Nutritionist. Diet analysis program that graphically displays analyses in weight and percent of RDA for nineteen nutrients. Identifies deficiencies, excesses, and their sources. Automatically creates food lists for special requirement diets. Includes all utilities for editing, expanding, and changing database and RDA files. $145.

Nutritionist II. Interactive graphics diet analysis program that analyzes foods, meals, recipes, and diets in weight and percent of RDA for thirty-six nutrient components including trace elements and amino acid breakdown. Identifies sources of deficiencies and excesses; identifies foods meeting user-specified requirements. $295.

PBL

The Personal Investor. Portfolio management, news terminal, and quotation system designed to allow the private investor to take control of securities investments. This system can connect your computer with the Dow Jones News/Retrieval Service to update the value of your portfolio, retrieve business news and information, and collect quotations. $145.

Peachtree Software

PeachText 5000. Consists of five of the Peachtree Software Office Productivity products in one package: *PeachText* word processor, *Random House Thesaurus*, *PeachCalc* electronic spreadsheet, *Spelling Proofreader*, and *List Manager*. Requires CP/M. $395.

PeachText with the Random House Thesaurus. Comes in two sizes—permits the user to access 4,400 indexed words and 26,000 synonyms (118K disk) or 5,000 entries and 50,000 synonyms (204K disk). Requires CP/M. $300.

Spelling Proofreader. A high-performance software package that finds spelling mistakes and typographical errors in documents prepared by word processors and text editors. Check a twenty-page document (about 10,000 words) in less than a minute. Comes with a 20,000-word standard usage dictionary, but any number of words can be added using the "Maintain Dictionary" option on the menu. Supplies you with figures on the number of words read, the number of unique words, the number of words that do not match the dictionary, and the percent of proofing completed. Requires CP/M. $150.

Spelling Proofreader with Black's Law Dictionary. Contains approximately 15,000 legal terms, including the 800 most frequently cited cases, for a total of about 36,000 entries. Requires CP/M. $250.

Spelling Proofreader with Stedman's Medical Dictionary. Comes in two sizes—22,000 and 50,000 words—giving a total dictionary size of 43,000 or 71,000 words. Requires CP/M. $250.

Phoenix Software

Banner Magic, by Barry L. Star. Now you can create fantastic banners on your own printer. Great for parties, picnics, sporting events, or special celebrations. Say it with style using seven-inch letters on large banners. $24.95.

Pickam Software

Baseball Predictor, by Jim Jasper. Written by the author of *Basic Betting*, this program is able to compute winners and overs/unders for the NBA. $139.95.

Portware

Portware. A family of modules and utilities for portfolio management. The *Portcom* module puts the portfolio on-line to Dow Jones for quotes and updating. The *Portrac* module keeps records. The *Portrend* module monitors portfolio and market performance. The *Portrate* module analyzes portfolio structure against goals. Modules available separately. Four-module system, $439.50.

Proforma Software

Tax Break Annual. For 1983 tax year. Superfast tax optimizer annually updated by an IRS enrolled agent with twenty-five years of tax planning experience to expose all loopholes, exclusions, and tax benefits the IRS never tells you about. The program examines 120 tax return options and automatically selects the one that saves you the most money. Scores your tax return for "risk of audit." $130.

Tax Break Planner. For 1983 and future tax years. Goes beyond *Tax Break Annual* to allow you to do "what if" simulations for investments and tax-shelter options. $180.

Tax Break—Federal Official Forms. Enhance your *Annual* or *Planner* to prepare approved, signature-ready federal forms of the optimized tax return. $75.

Tax Break—California Official Forms. Enhance your *Annual* or *Planner* to prepare approved, signature-ready California state forms of the optimized tax return. $75.

Psychological Psoftware

The Dream Machine. Complete program to evaluate and help you analyze your dreams. Included are helpful tutorials, a dream dictionary with over 200 listings, and a dream log. This program comes with the 123-page illustrated book, *Beyond Dreaming*. $49.50.

Stress Management. This program defines exactly what stress is and what causes it, measures the stress in your life, graphs it, and helps you to deal with its causes. The program is a tool for helping you to reduce the stress in your life. Student edition available. $29.50.

Assertiveness Training. Program to help you become the person you have always wanted to be. The art of assertiveness is clearly defined with tutorials dealing with all major aspects of assertiveness. You can learn how to say no without feeling guilty. Student edition available. $29.50.

Intimacy, The Art of Communication. This program is a tool for understanding and evaluating relationships. Helps you open the doors of communication and develop the skills necessary to get your needs met. You are helped to analyze, evaluate, and identify problem areas and significant issues. $29.50.

The Scaredy-Cat. This is a program to help children deal with their fears. The concepts presented are both psychologically sophisticated and delightfully simple. In this illustrated and animated story, the Scaredy-Cat tells how he deals with his fears. $29.50.

The Puppet. Program deals with one of the most important life issues: taking responsibility. In this story, Pookie the puppet tells how he allowed other people to pull his strings instead of taking responsibility for his own behavior. When he began to take responsibility, life became an exciting adventure. $20.

Personality Profile. A self-analytic program for determining one's personality dynamics. Gives insights into who you really are and includes useful tutorials on understanding personality growth and development. $29.50.

Quinsept

Family Roots. For your genealogy. Stores standard and custom information, does group and individual sheets, four types of charts, various indexes, general searches, and much more. Very comprehensive. Satisfaction guaranteed. $188.50.

Rainbow Computing

Bat-Stat, by Bob Bernstein. Designed to keep track of cumulative batting statistics for a baseball team of up to twenty players. Batting averages are automatically computed. *Bat-Stat* features easy data entry and editing, error-handling, blank score sheet printing, team roster listing, game and season report printing. $49.95.

Super Sound, by Tom Cleaver. Musical rhythms, gunshots, sirens, lasers, explosions. Add these and many more exciting sounds to your Apple. Use them in your programs or create your own sounds. $19.95.

Bowling Data System 2.0, by Arnold Hooten. Data management program provides accurate record keeping and report generation for bowling leagues of up to forty teams with six bowlers per team. Eighty-column printer. $149.95.

Rally Electronics

The Beale Cipher Tool Kit. A collection of programs to aid in your search for the solutions to the Beale ciphers. Contains the history of the Beale ciphers and the story of the Beale treasure. $39.95.

Howard W. Sams

Personal Finance Analysis Mind Tools. Gives you an additional,

businesslike edge with a sophisticated budgeting system that helps you use your spreadsheet to manage your personal finances as you would manage a business. Five instantly available worksheets help you keep track of income, expenses, investments, accounts receivable, cash and credit account balances, check register transactions, and taxes. $79.95.

Sansoft Plus

Sex-O-Graphic. Based on the theory of biorhythms. This program allows you to plot your daily biorhythm chart or your *Sex-O-Graph* chart and print them on an Epson with graphics. $19.95.

Sensible Software

Disk Recovery. Certifies that DOS disks have not developed any bad spots. Helps recover valuable data should a defect occur later. Allows use of the back sides of disks with greater confidence. $30.

Super Disk Copy. The "standard" copy program for transferring DOS files between one or more Disk II drives. Also features undeleting files, alphabetizing file names, lock/unlocking files, and fixing file sizes. $34.95.

Multi-Disk Catalog IV. A fast, friendly database program designed specifically for keeping track of all the files on your Apple CP/M, DOS 3.2., DOS 3.3, and Apple Pascal disks. $25.

Disk Organizer. Provides complete control over the organization of a DOS disk catalog. "Fancy titles" are easy with the built-in line editor. Supports alphabetizing, deleting, renaming, locking files, undeleting files, changing the name of the hello program, plus more. $30.

Shadetree Software

The Store House, by Mike Baker. Personal inventory system with thirteen definable categories, automatic file setup, multiple files, printer options (top and bottom margins, form length, number of copies). Inventory household items, disks, coin collections, and so on. Thirty-page manual. $36.95.

Silicon Valley Systems

The Collector. A great help for hobbyists who collect stamps, coins, baseball cards, and so on. Helps to log and keep track of exactly what you have in your collection. Will help you collect anything except dust. $24.95.

Sleeping Bear Software

CheckMinder. A checkbook budgeting program that will track income and expenses for up to 999 categories and for up to 3,400 active transactions per disk. An extremely easy to use, easy to understand package with an extensive variety of reports. The entire program runs in RAM. A deluxe version includes a sixty-page three-ring binder with backup program disk. The economy version includes four pages of instructions. Deluxe version, $69.95; economy version, $24.95.

Smith Micro Software

Stock Portfolio System, Second Edition. An investment portfolio accounting, record keeping, and timing control system. Investments covered include stocks, bonds, options, money markets, CDs, and other cash accounts. Security values entered either manually or via modem. Terminal mode provided for access to Dow Jones. $185.

Soft Ctrl Systems

Sort ROM. Sorting routines become a permanent part of the Applesoft Basic language. A single basic command to the Sort ROM is all that is required to sort any size or type of array with the lightning speed of machine language. $39.95.

Soft Touch

Recipe Handler II. Now, something to suit your Appletite. Store, expand, contract hundreds of cooking recipes. Print recipe, instructions, and/or ingredients for easy shopping. (Coded sorting, too.) A gift for gourmet and cook alike. User-friendly and thorough. $39.95.

Software Specialties

Filter Design I. Designs electronic passive (LC) Butterworth and Chebychev filters. The filters may be low-pass, high-pass, band-pass, and band-rejecting using two different configurations. The source and load impedances may be equal or unequal. The program will also graphically plot the attenuation versus frequency and the time-domain response. $34.95.

Filter Design II. Designs active electronic Butterworth and Chebychev filters. The filters may be low-pass, high-pass, band-pass, and band-reject. The program will also graphically plot the attenuation versus frequency characteristic of the filter over any desired range. The response to a square wave input can also be plotted by the filter design program. $39.95.

Sundex Software

Certified Personal Accountant. Organizes, analyzes, and manages your personal finances. Easy to learn and use with on-line help and tutorial. Use it for tax planning, budgeting, bill paying (with check writing), and stocks. Handles many checking, credit card, money market, savings, and cash accounts, as well as stocks, assets, and liabilities. Prepares net worth, cash flow, tax, and other reports. $99.95.

Personal Payables. Takes care of all bill paying and keeps personal and family bookkeeping well organized and up-to-date. Helps at tax time, too. Prints on personal and continuous-form checks. Handles recurring payments and alerts you to those coming due. Tracks up to ten accounts, with flexible reporting by date, payee, tax, and so on. Easy to learn and use with on-line help and tutorial. $49.95.

Syntauri

Simply Music. System is for the person or family that wants to learn, listen to, and play music with the computer. $1,495.

Systemics

GolfCap. An easy-to-use golf recordkeeper and handicapper. Stores USPGA-type handicaps, prints lists alphabetically or by handicap. Two hundred fifty golfers per single-sided disk. Perfect for leagues, courses, or country clubs. $49.95.

Systems Design Lab

Pro Football (NFL): The Gold Edition. A sophisticated pro football prediction system designed for serious handicappers. The program has produced encouraging results against the Las Vegas line and comes complete with a system disk, a data disk, and over one hundred pages of documentation. $199.50.

USFL: The Gold Edition. Designed for serious pro football handicappers. The program produced excellent results over the Las Vegas line during the first USFL season. Comes with a system disk, a data disk, and over one hundred pages of documentation. $199.50.

Win at the Races. A thoroughbred handicapping system that employs the formulas of the currently popular book, *Winning at the Races*, by Dr. William Quirin. The program has been thoroughly tested and comes with the system disk and comprehensive documentation. $49.95.

Tax Man

Taxman-84. With *VisiCalc/SuperCalc*, prepares your form 1040. This template series includes all forms and schedules in IRS approved printable format. The logic provided will identify your deductions, which exceed statistical standards, compare this year's data and tax results with last year's, and will flag forms that change due to last-minute changes in your input. Complete set of all forms and instructions is included in the comprehensive manual. $95.

Telephone Software Connection

Video Librarian, by Rick Connolly. Maintains an electronic card catalog for your videotapes and videodiscs. Quickly locates entries by title, category, or keywords. Prints entire list in order by title, tape number, or blank time remaining. $40.

Checkwriter. Save unnecessary steps, reduce errors. Prints form-fed checks at same time it records them into your checkbook. (Also accepts hand-written checks.) Powerful search and summary with totals by payee, memo, or tax code. Easy bank statement reconciliation. $40.

Three Sigma

Personal Financial Planner. Small changes in savings and spending

habits can have a great impact at retirement time. Categorize and analyze your data; assess your current and future financial situation; instantly see the answers to your "what if" questions. $35.

Turning Point Software

Time Is Money Personal. Designed for the person with no accounting or bookkeeping background who wants a fast, flexible personal accounting system. Suitable for a single checkbook or an entire small business. The program is a single disk system and a printer is optional. $100.

Universal Barter

Dial Your Match Maintenance Program. Version 1.1 is designed for special use in conjunction with the Dial Your Match bulletin board. Program maintains and records all data for usage on all DYM systems, including passwords, address codes, system access number, and date of your last call. Records up to ninety-nine systems. Version 1.2 maintains files on specific people on each DYM system and records up to 255 DYM systems. Version 1.1, $15.95; Version 1.2, $29.95.

Vagabondo Enterprises

Ceemac. *Ceemac* is the language of *Fire Organ*, which was the first "soft visual album." It is designed to create dynamic, abstract visual entertainment "scores" that can be played interactively or simply enjoyed passively. Complete with fifty-two-page manual. $75.

Versa Computing

Here's Hollywood. Tests your knowledge about the movies and Academy Award-winning stars. Practice visual recognition as the portraits unfold before your eyes. You can change the clues for further enjoyment. Twenty-four hi-res portraits. $24.95.

Virtual Combinatics

Micro Cookbook. Computerized cookbook and recipe management system. Easy to use and complete with international entree recipes. Enter, modify, or remove recipes, even create your own cookbook disk. Print a shopping list and recipes. Automatically adjust serving sizes. Select recipes by name, ingredient(s), and/or classification(s). $40.

Micro Barmate. Computerized bar guide and beverage management system. Enter, modify, or remove beverage recipes, even create your own bar guides. Print a shopping list and recipes. Select a recipe by ingredients on hand. Select by name, ingredient(s), and/or classification. Stocking, bartending hints, party planning, and glossaries included. $40.

Weyer-Ware

Apple Cooler. Unique adaptor mounts your heat-producing power supply outside your Apple case in only a few minutes using a screwdriver as your only tool. Instructions included. $6.95.

John Wiley & Sons

Imagination: Music, by Moshell. A music-writing program that lets anyone make up tunes, even with no musical knowledge. User selects notes, choosing pitch, tempo, duration, by reference to previously chosen notes. All notes stay on screen. Teaches planning, editing, and some musical notation. $34.95.

Imagination: Picture Programming, by Hughes. A story-writing program that lets even preliterate children make up their own animated cartoons. User selects, directs, and edits the movements of a dozen vividly portrayed animals to create an original "movie." Teaches concepts of programming, planning, editing, and memory. $39.95.

Personal Investment Analysis, by Held. A personal financial planning program that analyzes investment options. Lets users assess the relative profitability of tax-free versus taxable securities, analyze mortgage terms, weigh convertible bonds, plan a retirement income program, and more. $60.

Investment Tax Analyst, by Advanced Investment Strategies. A *VisiCalc* template to help individual investors or financial professionals weigh the tax effects of potential investments. Incorporating all current federal tax liabilities, credits, and savings expectable from any investment(s) for up to six years and compares net present value. $150.

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MicroLIB. Allows the user to store many files into a single larger file. Once a file is stored in the library, it is managed, updated, and retrieved through simple *MicroLIB* commands. This means that less space is required on disk to contain the same number of files. Also, once a file is placed into a library, *MicroLIB* provides two levels of security: password and encryption. $295.

DPatch. Allows the user to recover data from damaged floppy and hard disks. Provides for complete control by the user. *DPatch* also provides a complete surface analysis to examine the surface of any disk unit and flag I/O errors so that CP/M will not attempt to use the faulty areas. *DPatch* allows the user to recover files that have been erased from the disk. $195.

Adventure International

Apple Spice, by Corey Kosak and David Fox. A set of fast assembly language routines that alleviate some of the drudgery of writing programs in Applesoft Basic. *Apple Spice* allows you to concentrate more on your program logic and less on things like "prettifying" the screen and detecting keyboard entry errors. Greatly expands Applesoft's capabilities by adding features found in many larger Basics such as Print Using, String Search, If-Then-Else, and Line Input. $29.95.

Anthro-Digital

DOS-PAS. Gives you a way to transfer your files back and forth between DOS 3.3 and Apple Pascal. All kinds of files are supported including text files, as from a database, and binary files, such as machine language routines and graphics created with one of the many DOS graphics programs. $35.

QuickTrace. A comprehensive machine language debugger allowing user-definable breakpoints, a variety of display formats, the ability to single-step, trace, or run in background. You can change memory contents at will and display pointers, the stack, and contents of selected locations. $50.

Amper-Magic. Volume one is the way to expand the Applesoft language. It provides the means to attach additional commands to your Basic program; you need not know any machine language to use it, not even addresses. Includes the attaching program and twenty-three commands. $75.

Amper-Magic Command Library. Volume two provides twenty-seven more Applesoft commands that you use just as if they were built into Applesoft. Absolutely no knowledge of machine language required. Requires *Amper-Magic* volume one. $35.

Avant-Garde

Amperfinesse. A programmer's utility package that enables the user to give Applesoft the power and versatility of higher-level languages like Fortran. The package allows the user to chain Applesoft programs, use new program editing routines, add 8K of storage to a disk, simplify graphics, and much more. $79.95.

Super Quality Epson Hi-Res Dump. For the Epson MX-80, FX-80, and MX-100. This package allows you to print the hi-res screen in your choice of three sizes and three qualities. You are also given the choice of mirror, negative, flip, or rotated images. All printouts are true black-and-white copy and automatically centered. $25.

Barrington Educational Computer Cooperative

The Integer Fix. A utility program that converts disks containing programs written in Integer Basic so they may be run just as if an Integer Basic firmware card were installed in your Apple. $20.

Beagle Bros

Beagle Basic, by Mark Simonsen. Rename Applesoft commands, plus add new features—else follows if-thens. *Swap* swaps variable values. *Tone* makes music-writing easier. *HScrn* reads any hi-res dot. *Scrl* scrolls text up or down. Also goto and gosub, a variable or expression, create inverse rem statements, redefine Apple's Bell, and much more. Unprotected. $34.95.

Double-Take, by Mark Simonsen. Two-way scrolling for catalogs and listings, with new improved list format (each statement on a new line for clarity). Monitor listings feature up/down scroll too. Variable display shows all current variables/strings with values and line numbers. More—auto-line-number, instant hex converter, free-space-on-disk display. Unprotected. $34.95.




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Flex Text, by Mark Simonsen. Run Applesoft programs with twenty, forty, fifty-six, or seventy-column text, upper and lower case, without extra hardware. Program as usual with standard commands (plus Htab 1-70!), with the ability to add hi-res graphics to text. Each character redefinable, or use with *DOS Tool Kit* fonts. (Seventy-column feature requires black and white monitor.) Unprotected. $29.50.

Pronto-DOS, by Tom Weishaar. Triple the speed of disk operations. Bload hi-res in three seconds instead of ten. Load a sixty-sector program in four seconds instead of sixteen. Supports all Apple DOS commands. Init new disks with fifteen extra sectors of storage. DOS may be moved to language card or IIe high memory for 10,000 extra bytes of usable memory. Unprotected. $29.50.

Tip Disk #1, by Bert Kersey. One hundred programs from *Beagle Bros Tip Books* one, two, three, and four. Fascinating tricks to make your Apple do things it's never done! All programs are listable, copyable, and changeable. Each teaches an interesting Apple programming technique. Comes with useful Apple Command Chart and Peeks & Pokes Chart. Unprotected. $20.

Utility City, by Bert Kersey. Twenty-one useful programming utilities on one disk. Reformat Applesoft listings with page breaks; catalog in multiple columns; auto-post run-number and date in programs; put invisible commands in programs and invisible and trick names in catalogs. Much more—twenty-one listable, customizable programs. Unprotected. $29.50.

DiskQuik, by Harry Bruce and Gene Hite. Requires IIe and extended eighty-column card. Enjoy the benefits of another disk drive without buying one. *DiskQuik* makes your Apple IIe's extended eighty-column card act like a silent, super-fast disk drive in slot 3. All normal DOS functions such as *load*, *save*, *catalog*, and so on are supported simply by specifying slot 3 (for example, CATALOG, S3). Unprotected. $29.50.

GPLE, by Neil Konzen. *The Global Program Line Editor* lets you instantly edit Applesoft program lines without cursor-tracing and the like. Features global search and replace and programmable escape functions (escape-C can catalog, escape-L can list, and more; anything you want). Now compatible with Apple IIe eighty columns and most all eighty-column cards. Unprotected. $49.95.

Big Red Apple Club

Amper Clamper. Allows you to add the power and speed of machine language to your Applesoft programs. It comes prepackaged with over twenty machine language routines that you can start using right away. Some of these include fast text file read and write, wildcard array search, and fast array sort. $19.95.

Broadway Software

Disk O' Utilities. Thirteen handy programming tools on one DOS 3.3 disk. Check free sectors with every catalog; find hidden control characters; automatic line numbers; sort catalog—three ways; dump screen to printer; undelete files; verify disks; and much more. Full documentation included. A real software bargain. $13.95.

Cache Data Systems

Cypher, by Bruce Scott. A dynamic algebraic calculator for the CP/M Apple. Allows the user familiar with simple algebra to set up and execute sequences of equations without resorting to formal programming languages. Features straightforward entry syntax, automatic equation sequencing, query variables, plus model storage and recall in standard text format. $75.

CRVFIT, by Bruce Scott. Automatically curve-fits up to 1,000 data pairs against up to nine different arithmetic functions. Data entry in delimited free-form directly from keyboard or text file. Single-key operation, printer control, detailed and alpha-graphic presentation of results. For the CP/M Apple. $55.

Classical Computing

Speak Up! This one hundred percent machine-language program features easy text-to-speech conversion from within your own Basic programs. $39.95.

Computer-Advanced Ideas

Ultra Fast Copy. A utility disk that improves access to the computer by increasing the speed of copying disks. Offers means of securing disk protection. $29.95.

Bug Byter. A sophisticated utility program that aids users in learning machine language and debugging machine language programs, as well as educators who wish to demonstrate the operation of the computer's central processor. $47.50.

Ultra Disk Test. A utility program that allows the user to test and confirm the working condition of the disk drive. $29.95.

Ultra Fast Loader. Simultaneously boots DOS and files in one-tenth of the usual time, then loads additional files in less than ten seconds. Displays space remaining on your disks. Lets you create DOS-free disks with ten percent more storage. $29.95.

Ultra Disk Pack I. A package of three utility programs: *Ultra Fast Copy*, *Ultra Disk Test*, and *Ultra Fast Loader*. $59.95.

Computer Systems Design

Print II. Enhances your existing print statement by formatting floating point and integer output. Also makes X,Y cursor positioning easy. Allows for insertion of $ and leading * in appropriate formats. Transparent to user, not affected by rebooting. $25.

D & MM Software

Development and Debugging Aids. Contains *Applesoft Variable Dump*, a utility that will produce "snapshot" dumps of Applesoft variables in either immediate or deferred execution mode; and *Qwik*, a utility that will generate predefined or user-defined character strings in place of one-keystroke inputs. $19.95.

Datam Consultants

Applecode. An Applesoft code generator. User sets up a screen as it should appear in the program. Applecode then writes code to create the screen, handle input and printing of variables, and produce sequential and random access files. Code becomes part of your program and is accessible to user. $30.

Datascan Software

The Silencer. Changes the Apple II flashing cursor to a steady block. Also allows switching between steady block and flashing modes at any time. Activated upon boot-up. No hardware adjustments required. $16.95.

Data Security Concepts

Universal Text Formatter. Reads and prints any sequential text file including word processor files with such options as printer/screen, proportional spacing, page break, conversion to upper case, visible display/replacement of space, return, and control characters. An excellent debugging tool. Handles any size file. $19.95.

David Data

David-DOS Enhancer. Speed-loads text files, Basic, and binary. Ten additional new DOS commands: *Tload*, *Tlist*, *Tsave* all text files. Dump and disassemble binary. HIDOS moves DOS to upper 16K. Find hex. Date stamp files with or without clock card. / = catalog. Automatically supports Integer card. Copyable and full documentation. $39.95.

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Mailcom. Send over 2,000 letters per hour, delivered in less than forty-eight hours, at twenty-six cents apiece, from your computer, using the U.S. Postal Service's E-Com system. *Mailcom* is interactive, easy to use, menu-driven software, including a text editor, mailing list manager, setup and format programs, and communications. $195.

Diversified Software Research

Diversi-DOS. A DOS 3.3 compatible disk operating system that

speeds up the processing of Basic, binary, and text files. The system includes an improved *list* format for Basic programs, keyboard macros, insert/delete mode, wildcard file names, catalog abort key, lower-case commands, keyboard typeahead buffer, and print buffer. $30.

Dynacomp

The Shape Magician. Has several very powerful graphics features that include the ability to define shapes in a shape table. The shapes may then be drawn, rotated, and scaled on the hi-res graphics screen. This ability is useful for applications that require the repetitive drawing of similar shapes at different locations or angular orientations. $29.95.

Util. Menu shows the list of options available in *Util*, along with the currently selected slot/drive and track/sector numbers. Contains a full set of functions for disk manipulation. $19.95.

Eden II Computing

Insta-Load. Set of five utility programs. Chief is *"Fastrack,"* which saves Applesoft and binary files in fast-loading format without modifying DOS. Others delete such files, create extremely fast-booting disks, map disk contents, and check disk surface. $19.95.

Einstein Software

Einstein Compiler. Automatically translates Applesoft Basic programs into efficient Apple machine language, reducing running time as much as twenty times in some instances. By accelerating a program's execution speed, it enables the user to retain the programming convenience of Applesoft and still produce sophisticated programs. $129.

Ellis Computing

Nevada Edit. A CP/M-based, character-oriented full-screen video text editor designed for computer program text preparation. Features include single-key commands for cursor control, scrolling, block-moves, search and replace, customizable tab stops, default file type, keyboard layout, and CRT by menu selection. Easily configured to most terminals. The disk comes with an easy-to-read manual for $29.95.

Enhanceware

DICE 83. Dan's I/O Control Enhancements make it easy to use lower case on any Apple equipped with a Dan Paymar lower-case adapter. *DICE* also provides other enhancements to the Apple's I/O system. $10.

Fountain Computer Products

Master-Cat. Enables you to find any program in your disk collection in seconds. Builds a master catalog of all the files on all your disks organized alphabetically and by disk number. $39.95.

Fox and Geller

Dutil. A utility that performs a variety of functions for users of Ashton-Tate's *dBase II*. These include syntax checking, increased speed, documentation, and program improvement. $99.

Gryphon Microproducts

dBRx. Adds mathematical, statistical, and string functions to *dBaseII*—exponentiation, square root, log and trig functions with precision from seven to nine digits. Also includes BTrim, Pack and NoSpace string functions. Written in machine language and *dBase* code. $150.

PUP1. Moves Basic files (text, binary, Integer, Applesoft) to a Pascal disk and produces printer-formatted listings of Pascal text files. Supports Pascal wildcards, single or multi-user drive operations, forty/eighty-column outputs. On-line user assistance, understandable error messages. $39.95.

PUP2. Moves Pascal text files to a Basic disk and displays and modifies any byte from a Pascal or Basic disk. Supports Pascal wildcards, single or multi-user drive operations, forty/eighty-four column outputs. On-line user assistance, understandable error messages. $39.95.

High Technology Software Products

The Tool. An entry screen generator, database manager, and report formatter designed to reduce application development time. Assists a program developer by handling all screen editing, field formatting, and

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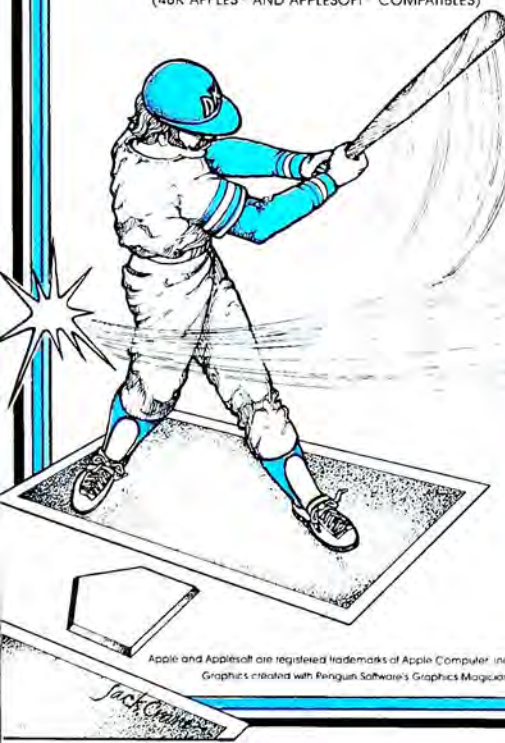

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Hy-Tek

The Utility Company. A compilation of useful information, programs, subroutines, and other data designed to make personal computing easier and more enjoyable. $39.95.

Jupiter Island

Colortext. Accesses the capabilities of the IDS Prism printers without programming: more than twenty-one colors, six type sizes, foreign language characters, proportional type, many text-formatting features. Fifty-three commands. $149.

Krown Computing

The Last One. A code generator accepting plain English commands from diversified menus translates into cost reduction. Produces ready-to-use programs in Basic, error-free. Tailor-made, in-house modification capability. Reduces programming time ninety percent. $395.

Laumer Research

Full Screen Editor. Window-oriented, forty-eight column editor upgrade kit for the *S-C Macro Assembler*. Requires 16K RAM card or Apple IIe. Supports Videx, STB80, and Apple IIE eighty-column video systems. Allows rapid professional assembly language development. Includes source code and Applesoft Sysgen program. $49.

Flash! Runtime Source Code. Lets you use the *Flash!* compiler and *S-C Macro Assembler* as an assembly language development system. Develop programs in Integer Basic, compile into assembly code with the *Flash!* compiler, and optimize the code with the *S-C Macro Assembler*. $39.

Flash! Integer Basic compiler. Includes thirty-three extensions to Basic and ability to list generated machine and assembly language with symbolic labels. Compiled code doesn't require Integer Basic to run. $79.

LRH Enterprises

The Menu Maker. Will help you create and edit disk program menus. Allows up to thirty items per menu and up to fifteen sub-menus plus full editing: add, delete, change, and rearrange display order. *The Menu Maker* generates a Basic program that you can modify. $14.95.

Metaresearch

Metatext. Eighty-column option involves high-density character packing. Because CRTs vary in their graphics resolution, a forty-column editor is also provided. The eighty-column packing is extremely useful, especially during rudimentary text editing, and uses a font that has been carefully designed for optimum readability. The Medroff text formatter allows right justification, hard margins, indentation, headers, pagination, form feeds, and so on. Medroff also allows for the replacement of formatted files back onto the disk. $79.

3DRB. Three-dimensional graphics, animation, and red/blue stereo package. One way to fully utilize the color graphics capability of your Apple II. Designed to provide graphics software for many applications. Easy to use. $59.

Micro Ink

Micro Utilities Disk. Four utilities: Applesoft variable dump, garbage collection, Applesoft compression program, and disk zapper. $12.

MicroLab

Life Saver. First aid for blown disks. Data recovery program that works at the nibble level. $25.

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Implementations of the Forth Computer Language. Conforms to the latest standard and includes a 200-page tutorial and reference manual. $140.

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SuperSort. Combines speed and flexibility in sorting, merging, and selecting information from data files. Allows a wide variety of user-specified criteria during the sort/merge process. *SuperSort I* (eight-bit systems), $250; *SuperSort II* (sixteen-bit systems), $200.

MicroSparc

AmperSoft. Moves the Apple's disk operating system into the upper 16K of a 64K computer, increasing usable program memory by about 10,000 bytes. Also allows access to program files on disk with only two-character commands. *AmperSoft* includes the popular print using feature to allow fast and easy formatting and alignment of numeric and alphabetic output. It is also a powerful machine language utility for superfast sorting of numeric and string arrays. $49.95.

AmperKit. Programming tools that work with MicroSparc's *AmperSoft*. With *AmperKit* you can do multicolumn sorting (up to nine levels), use names and expressions instead of line numbers for branching, correct running Applesoft programs without destroying the data that has been generated so far, and much more. Like *AmperSoft*, all commands are used with one-line statements preceded by the ampersand. There is even a special double ampersand command that allows you to use your own amper-routines. $39.95.

The Assembler. Used to translate a 6502 assembly language source file into machine language; built-in editor to allow entry and modification of an assembly language program. 8080 assembler macros, a subroutine library, several utility functions, and macro libraries. It can also assemble Sweet-16 programs. $69.95.

MacroSoft. A tool for writing Basic programs that are compiled directly into 6502 machine language. *MacroSoft* is made up of a library of assembly language macros. It is twenty-five times faster than compiled programs because it does not have a run-time package. A *MacroSoft* program is entered into memory with the editor that is supplied with MicroSparc's *The Assembler*, after which it is assembled directly into machine code. $49.95.

GALE. An Applesoft program development tool that performs line editing, output control, hexadecimal/decimal conversion, auto-line numbering, search and change, renumber, append, variable cross-reference, and user-definable macro functions. *GALE* uses word processing techniques to facilitate all phases of program development and editing. $49.95.

Directory Master. Allows you to format and customize the screen display that appears when the catalog command is used. *Directory Master* also lets you create your own disk header, sort the catalog in any sequence, add disk titles at any position in the catalog, and hide files so they're not displayed when the disk is catalogued. $29.95.

AMP (Amper Memory Program). Increases the usable program space in your Apple II by providing an extra 10,000 bytes of directly accessible memory. *AMP* moves the disk operating system into the upper 16K of a 64K Apple computer. $29.95.

Proof. Assists users of *VisiCalc* in retrieving and printing the formulas and variables used in creating models and tables. *Proof* prints your *VisiCalc* data models in row sequence, column sequence, or grid format. The way it is organized in your *VisiCalc* model, *Proof* will print models out to the maximum limits of normal *VisiCalc*. $49.95.

Key Perfect. A utility for detecting errors in programs entered from magazines or books. Use it after you've finished typing in a program from a magazine or book. A quick run of Key Perfect and a comparison of the Check Code tables accompanying the new program will verify correct entries and expose incorrect ones. $29.95.

Micro-Ware

Font Loader. Load custom fonts into your dot-matrix printer and use them to turn your printer into a custom typesetter. A font editor is also provided to allow you to create your own graphics, text, foreign language letters, and math and electronics symbols to load into your printer. $39.

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Nikrom Technical Products

Master Diagnostics II and Master Diagnostics IIe. Will examine every functional operation of your computer, detect errors, and report any malfunctions. Besides the diagnostics part of the analysis, both provide routines for complete external and internal maintenance of your computer. Disk drive speed calibration, head cleaning routines, motherboard ROM test. Also tests Micromodem II, parallel PROMs, RAMs, eighty-column card test, and monitor skew. $55.

Nordic Software

Super Tracer II. A step and trace utility for Applesoft Basic. It allows you to trace and display the actual statements and variables of your Applesoft program while it is running. *Super Tracer II* is completely transparent to the program being traced. Does not interfere with graphics, text display, DOS, or other I/O commands. $44.95.

Omega Microware

The Manager. Allows DOS to be loaded onto a 16K memory card to provide more motherboard memory usage. In addition, will permit the user to utilize a 16K RAM card as a forty-five-sector disk emulator. $34.95.

The Consolidator. A *VisiCalc* utility that allows user to manipulate the data of separate files without reentering them on another template. Consolidate several different files that are located on the same disk. $49.95.

The Transporter. Enables the user to move the *VisiCalc* program to a Corona Starfire hard disk drive and to save the templates on the hard drive. Consequently, the user can incorporate a hard drive, load a *VisiCalc* file in just a few seconds, and save innumerable *VisiCalc* files on the Starfire. Program utilizes forty columns (explicitly). $49.95.

Copywriter. A disk utility that will copy unprotected software quickly (approximately 20 seconds per disk drive) onto blank disks. A Ramex 128K or Saturn 128K is required. With an Apple II or Apple IIe and a memory expansion board, you can apply up to seven disk drives within the duplication process. $99.99.

The Inspector. Available in an EPROM or floppy disk. This package enables the user to manipulate the memory of a floppy disk and the Monitor, map disk space, edit disk sectors, and display memory in hexadecimal/ASCII. It is an ideal tool to rebuild a blown disk, but note that the EPROM requires Integer Basic on the motherboard or on a language card. $59.99.

Watson. A complementary utility that is available in an EPROM or floppy disk. This package adds a disassembler, hex/decimal/signed decimal converter, and unlock disk space. This is an ideal tool to rebuild a blown disk, but note that the EPROM requires Integer Basic on the motherboard or on a language card. $49.99.

Penguin Software

Transitions. Create professional slide show demonstrations from hi-res picture files. Offers choice of forty-four screen wipes including spiral, windshield wiper, radar, and more. Permits miniature catalog preview of pictures, which are stored in packed format. $49.95.

Paper Graphics. Print out any hi-res graphics screen using hundreds of printer/interface card combinations. Crop the screen and print any portion, magnify any area, print sideways, upright, reverse, upside down, and even label your screens with text. $49.95.

Short Cuts. Add extra commands to Applesoft Basic by using the ampersand command. Sort strings, real numbers, or integer arrays as well as associated pointers to disk and data records. Get extensive error-

checking during user input and error messages generated at run time. Do quick and easy print formatting and include help screens. Coexists with almost every other Apple utility. Unprotected. $49.95.

Port-A-Soft

Disk Format Conversion/Downloading Service. Convert to/from over one hundred disk formats, including various IBM and Apple disk formats. Minimum charger per disk, $5.

Practical Software

The Disk Labeller. Program for automatic printing of disk labels showing sectors free, sectors used, DOS, and files. Features include built-in default and escape functions, automatic configuration for printer slots and drives. Completely menu-driven—requires no documentation. $59.95.

Pro/Pac

PCP—Printer Control Program. Sets up your dot-matrix printer for many different print styles with just the touch of a key. $29.95.

Quality Software

Bag of Tricks. Four comprehensive utility programs and documentation that includes these programs: *Trax*—displays the internal Apple disk formatting operation; *Init*—will reformat one or more tracks and can change sector order; *Zap*—a sector editor with more than fifty commands; *Fixcat*—automates the process of repairing a damaged disk catalog. $39.95.

R R Software

Janus/Ada. A subset of the Ada programming language developed by the U.S. Department of Defense. A structured language enables programs to have a modular construction that simplifies program development. Also simplifies program maintenance. Complete package, $310; development package, $420.

S & H Software

Amper Sort/Merge (AS/M). General-purpose text file sort-merge utility program used by itself, called from a user's program as a subroutine, or called from within *VisiFile* for super-fast sorting. $69.95.

DOS Enhancer. Quick DOS. Over eighty-five-page manual, training program, support disk with approximately twenty support programs for quick copying of disks, and so on. Publisher and author phone support. $69.95.

Howard W. Sams

Apple Aids, by Allen Wyatt. Package of twelve Apple II-based programming aids that let you copy disks, format disks with no DOS, remove existing DOS from a disk, see an improved directory (including any deletes), and undelete deleted files. Also lets you map free and in-use sectors on any disk; list tracks and sectors used by files; load, inspect, alter, and write to any sector of any normally formatted disk; do text dumps; and lots more. $49.95.

The Programmer. Create your own custom software with this powerful Basic code generator that translates your ideas into runable, unlocked Basic as you choose from items in a menu series. Helps you create graphics, database management software, engineering and accounting programs, and more. Completely documented and illustrated. $199.95.

Sansoft Plus

Compress/Expand. This program takes large thirty-four-sector picture files and compresses them into much smaller files that take up fewer sectors on a disk. The *Expand* program recovers these files with no loss of quality. Since fewer disk sectors are used, the pictures load much faster. Unprotected, with source, documentation, and demos. $20.

S-C Software

Disasm 2.2e. Symbolic two-pass disassembler handles data tables, displaced object code, lets you substitute meaningful labels of your choice. An address-based cross-reference table gives insight into the inner workings of machine language programs. Designed to complement the S-C assemblers, but will also support *DOS Tool Kit* and *Lisa* assemblers. $30.

Double Precision Floating Point. For the scientist or engineer who is not satisfied with Applesoft's nine-digit precision. With this 2,048-byte machine-language augmentation package, you can get twenty-one-digit precision out of Applesoft whenever you need it. Supports +, −, *, /, Input, and Print. Includes subroutines for standard math functions. $50.

Es-Cape. Full-function, user-friendly, interactive program editor for Applesoft. Complete line editor for fast, easy changes; split-screen display; single-key operation; global search and replace; automatic line numbers; keyboard macros; and more. $60.

S-C Docu-Mentor for Applesoft. Complete documentation of Applesoft internals. Using your ROM Applesoft, produces ready-to-assemble source code with full labels and comments. Educational, entertaining, and extremely helpful. Requires *S-C Macro Assembler*, two disk drives. $50.

S-C Macro Assembler. Combined editor/assembler includes twenty-nine commands and twenty directives, with macros, conditional assembly, global replace, edit, and more. Provides new level of power and performance for beginner and professional programmer alike. $80.

S-C Macro Cross Assembler Modules. Owners of the *S-C Macro Assembler* may use their Apple II as a development system for most other

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microprocessors, including 6800, 6805, 6809, 68000, Z-80, 8085, 8048, 8051, and LSI-11. Individual modules priced from $32.50 to $50.

S-C Xref. Generates an alphabetized listing of all labels used in an *S-C Macro Assembler* source file, showing with each label the line number where it is defined, along with all line numbers containing references to the label. $20; with complete source code, $50.

Sensible Software

Edit-Soft. Line editor for Applesoft programmers that features global search and replace, user-definable macros, line splicing, auto line numbering, and a "characters inside quote" counter. $39.95.

The Bug. Machine-language debugger for both novice and experienced programmers. Features many memory and register breakpoints, selective full-speed execution, and more. $50.

Build Using. Applesoft print-using utility that formats and justifies strings as well as all types of numbers. Easily added to almost any Applesoft program. $30.

APlus. Allows Applesoft programmers to write structured programs. *APlus* provides several new "structured programming" commands to control logic flow and automatically indent program listings. $39.95.

Appleguard. A sophisticated disk duplication system for software authors that provides both "in memory" and "nibble copy" protection. *Appleguard* gives an author time to create another masterpiece instead of worrying about protecting the first. $250.

B.E.S.T. Applesoft programming aid that will cross-reference variables and lines, remove remarks, shorten variables, pack lines, merge and renumber, auto line number, and more. $40.

Shadetree Software

Amper Expander I, by Mike Baker. Fast, easy-to-use machine language utilities for the Applesoft programmer. Input anything, print using, ring bell, clear to end of line or page, swap variables, sound effects, if-then-else, wait time, wait key time, DOS free space. Includes manual with examples. $31.95.

Smart Systems

Smartscreen. A screen-generating utility for use with Apple Pascal. Helps develop sophisticated applications; as easy as filling out a form. Allows freeform screen design with forty- or eighty-column screens. Online documentation and hard copy of a screen with one keypress. Price includes documentation, tutorial, and shipping and handling. $75.

The Screen Printer. A Pascal library procedure that may be called at any point in your program. You may print the left- or right-hand side separately or the full eighty columns. Price includes documentation, demonstration program, and shipping and handling. $25.

Pascal Screen Utilities. A Pascal library unit that includes procedures to clear, blink, or reverse any rectangular region on the screen. Read any screen location and return string. Save the current screen, clear and display something else, and then restore the original screen. Price includes documentation, demonstration program, and shipping and handling. $25.

Soft Ctrl Systems

Disk Copy ROM. A resident disk duplication program in ROM. Fast, convenient, and easy to use. Promotes disk backup because it's always in memory, ready for use. $39.95.

FID ROM. Moving any kind of disk files is not only fast but convenient and easy. Includes volume number selection for hard disk users and can be used with any combination of floppy disks, hard disks, and disk emulators. $39.95.

Renumber/Merge ROM. Apple Computer's infamous renumber program resident in ROM. Renumber all or part of an existing program, move portions of an existing program within itself, or merge two programs into one. $39.95.

Utility ROM. Five resident utilities for Applesoft programmers. Alphabetize a disk catalog; recover a lost program from memory after *fp*, *new*, a crash; expunge DOS from a disk. Automatic program line numbering and program listing control. $39.95.

Softdisk

Super Utilities and the Best of Chris Koeritz. A two-sided, unprotected disk filled with utilities, three adventures, an arcade game, and more. Do a hi-res dump to an MX-80 without Graftrax, scroll the screen backward, convert machine language to Basic, and so on. Hi-res screen designer. In Softdisk's Rich and Famous series. $9.95.

SofTech Microsystems

Basic Compiler and UCSD Pascal Compiler. Supports structured programming and separate compilation. Basic is fully integrated and compatible with UCSD Pascal and Fortran-77. A documentation package is included. The *UCSD Pascal Compiler* features the de facto Pascal standard for microcomputers. UCSD Pascal is a fully developed language with extensions for systems development and commercial applications programming. A documentation package is included. *UCSD Pascal Compiler*, $375; *Basic Compiler*, $225.

p-System Adaptable System. A form of the p-System designed for adaptation to a specific microcomputer. The adaptable system also includes the Advanced Development ToolKit and a documentation package. The *p-System Adaptable System* is available for many of the major microprocessors. $250.

p-System Bootable System. A fully functional operating system designed for text processing and application execution. Combined with a p-System language, the *p-System Bootable System* is also a complete application development system. It includes screen editor, file manager, application services, printing and configuration utilities, command menu, library manager, p-machine emulator, turtle graphics support, and a documentation package. The p-System is available for most major eight-bit and sixteen-bit microcomputers. $250.

KSAM. A programming package that can be incorporated into application programs. It supports sequential and keyed retrieval of data and is designed to help you write programs that require fast access to information. The *KSAM* package also provides utility programs for maintaining a *KSAM*-managed database. A documentation package is included. $100.

Edvance. The p-System advanced, menu-driven screen editor. *Edvance* can edit files of unlimited size and features nested editing, the ability to edit more than one file at a time, and macro command functions, plus the ability to assign many functions to a single keystroke. Combined with the p-System print utility, *Edvance* is a text processor. A documentation package is included. $100.

Advanced Development Tool Kit. A collection of programming tools designed for use with the p-System and at least one programming language. The tool kit includes symbolic debugger, native code generator, assembler, linker, program analysis tools, and a documentation package. A version of the tool kit is available for each microprocessor supported by the p-System. $150.

Softstalker

Simple*DOS. An easy-to-use-utility that edits, creates, retrieves, maintains, and sorts Applesoft-usable direct, random, or sequential text files. Includes a facility to incorporate file access into your program. Also allows you to write simple programs in Basic that perform sophisticated file handling. $49.95.

SoftVue

Demonstration of Apple Writer. The easy way to learn to use the *Apple Writer* word processing program. Forget the manual; learn by watching. This tutorial videotape guides you through *Apple Writer* in short, easy to learn steps. Ideal for office and vocational classes. $125.

Southwestern Data Systems

Apple-Doc. An Apple software classic, designed for anyone writing Applesoft programs. It's easy to create lists of every use of every variable in a program, along with referenced lines and constants. Global replace function renames any variable name throughout a listing. $39.95.

Applesoft Command Editor. Powerful utility designed to speed up program listing entry and editing. Functions include a line editor, macros, hexadecimal conversion, memory dump, renumbering, and

more. $39.95.

Copy-Cat. Versatile copy and catalog editing combination. Features include file copying, converting, comparison; lock/unlock; delete/undelete; verification; and more. Powerful catalog editor offers catalog listing, delete, sort, rename, file move, exhume, and zero-size text file creation. $34.95.

Disk Library. An elegant, user-oriented system for creating and maintaining a thorough, cross-referenced index of all your disk-based programs and files. Instantly retrieves any file name, sorts in four seconds, and consolidates up to 1,200 catalog entries into one file. Produces reports formatted to your printer for easy notebook insertion. $49.95.

Doubletime Printer. Gives your printer true independence from your Apple. Print files while you run completely different programs. Background printing is not limited to RAM. $99.95.

List Master. Helps Applesoft programs run faster and use less memory by removing rems, combining lines, and shortening variable names. A smart renumber routine retains the logical structure of listings. A listing comparator shows lines added, deleted, or changed when comparing two programs. $39.95.

Merlin. Top-selling macro-assembler makes assembly language programming easy; user-oriented manual, very powerful editor, twenty-eight pseudo-ops. Eighty-column and RAM card support, compatible with many other assemblers. Includes *Sourceror,* which creates labeled source listings from raw binary data. $64.95.

Munch A Bug. Powerful, full-featured assembly language debugging program with many unique options. Makes it easy to find errors in machine language code for the beginner or pro. Special options allow it to become dormant until specified conditions are met, at which point it activates a powerful trace mode. $49.95.

Holiday Special: Merlin Combo. *Merlin*, *Munch A Bug*, and Roger Wagner's *Assembly Lines: The Book*. Everything you wanted to know about assembly language programming made easy. $119.95.

Printographer. Hi-res printing utility to print your hi-res graphics on any graphic printer. Also lets you do printing from within your own programs with a minimum of effort. Features include picture cropping, horizontal or vertical printouts, inverse inking, almost unlimited magnifications, and more. $49.95.

The Routine Machine. Choose from a library of machine language subroutines and install them automatically in your Applesoft program. No knowledge of machine language or memory allocation necessary. Menu-driven; combines the speed and efficiency of machine language with the convenience of Applesoft. $64.95.

&Array. The first library package of the *Routine Machine* system. Over thirty routines for array manipulation and program enhancement, including array delete, clear, redimension, rename, high-speed read, write, sort, and search. String garbage collection is speeded up forty times, and numeric arrays can be treated as matrices for overall mathematical calculations. $49.95.

&Chart. Greatly simplifies the creation of chart graphics. Commands such as axes and scale instantly provide the graphic environment you want. Highly sophisticated system for hi-res graphics. Features include hi-res character sets for labeling, automatic grid scaling, logarithmic scales, printer dump routines, and more. $49.95.

&Sampler I. Over twenty-five machine language routines covering a wide range of applications that can be used in almost every Applesoft program such as if-then-else, number input, get, catalog modifications, disk sector map, find free sector, shell sort, and more. $49.95.

&Screen. Dedicated to creating screen displays. Uses a screen generator editor to create a text screen that is then turned into a single ampersand-linked statement. Create menus, report screens, data-entry templates, and more. Includes many additional routines. $49.95.

Speedstar. Full-function Applesoft compiler that lets you compile all or part of a program and/or pass variables between the compiled modules and your Applesoft program. Easily converts programs to fast and efficient 6502 machine language. $99.95.

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Assembler Development System. A 6809-based system with all nec-

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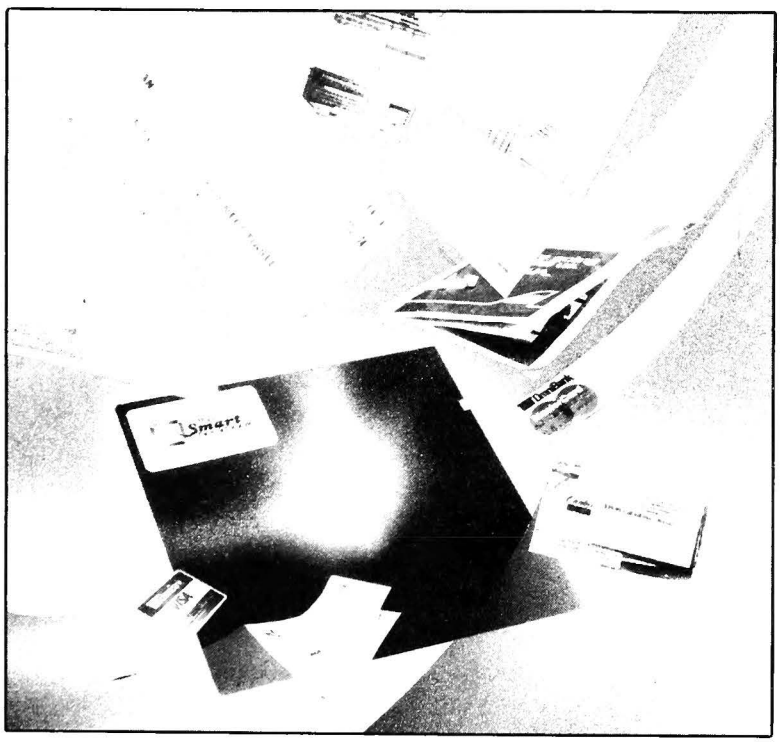

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SubLogic

Music Maker, by Jim Baldridge. Sound quality and ease of use make this a choice of novice users and professional musicians alike. Create and play four-voice music on your Apple with no additional hardware requirements. Enter whole to 256th notes, dotted notes, triplets, quintuplets, staccato, regular, or legato notes; all flats and sharps. $39.95.

Sun Microsystems

The Bridge. Allows users of *PFS:File* to pass information from their *PFS* files to other applications that accept standard DOS 3.3 text files or DIF files as input. With this program, users may use *PFS* to store information and then pass it to word processing programs, spreadsheets, or user-written programs. $39.95.

Sympathetic Software

Certify Apple II Disks. Both front and back. Ensures you will not lose data because of bad sectors. Allows you to use disks even if they have flaws. $25.

Techware

Chartech. Turns *WordStar* into a scientific-technical word processor capable of printing ninety-four Greek/math or other special characters on a printer with dot-addressable graphics. Characters displayed on screen with Videx eighty-column card and Greek/math ROM. $95.

Telephone Software Connection

Data Disk Creator, by Tony Dahbura. Preformatted data disks for the Apple? Easily make your own! Keep handy for whenever needed. Thirty-two extra sectors for programs or data. If booted, will reconnect to DOS already in memory. Requires DOS 3.3. $20.

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Quick Compare, by Ed Magnin and Leighton Paul. Quickly compares the program in memory with earlier versions on disk—without the nuisance of converting both to text files. $25.

Desk Calculator II. Tired of explaining to your friends why you need both a computer and a calculator? Then use our ninety-eight functions: hexadecimal, trigonometry, metric, statistics, ten memories, and much more. Hard copy of calculations on your printer is optional. $30.

Thermal Scan

Pseudo-disk. Apple owners with 16K RAM cards now have the use of another superfast, solid state, sixty-two-sector capacity disk drive. Seven files may be saved on it at one time. Hi-res pictures loaded in under three seconds. Works with Basic and machine language programs. $34.95.

Titan Technologies

Pseudo Disk. For Saturn 32K RAM card. Creates pseudo disk in RAM for spontaneous response to data commands. A great gift idea for the owner of a Saturn 32K RAM card. Pascal. $32.95.

Ember. Extended Basic interpreter creates up to four megabytes of memory for Applesoft when used with Saturn RAM cards. A great gift idea for the Saturn RAM owner. $49.95.

U-Microcomputers

Structured Basic. Adds structured commands to Applesoft without the operating system and other complexities of Pascal. Includes full procedure handling, including disk resident procedures, local variables, and so on. Interpreter allows all thirty-two new commands to be used in immediate mode, listed and executed in programs like other Basic commands. $135.

U-Net. A shared resources network for Apples and VIC-20 allowing use of common disk drives and printers. Includes full file security; users have own catalog and file, printer spooling on one or two printers, message facilities. $100.

Super Kram. Keyed Random Access Method (K.R.A.M.) converts your computer into a powerful database. *Super Kram* is added to your Basic programs and is configured for your own particular needs. Features include multiple key fields, automatic file reorganization, direct and sequential access, and support of multiple disks. $135.

Versa Computing

Advanced X-Tended Editor (AXE). A professional programming aid that provides the user with a text-editor-style extension to the standard Applesoft operation system. Over thirty commands. $69.95.

XPS

XPS-Diagnostic. A comprehensive, easy-to-use diagnostic. Each program comes complete with a simplified user manual, backup disk, and lifetime warranty. Tests all major functions of your Apple II or IIe system with minimal user input, and it speaks your language. The tests included are Main Memory, System ROMs, Disk System, Drive Speed, Keyboard, Printer, CPU, Peripherals, Monitor Tests, Game Port, and Media Verify. $49.95.

Ziggurat Software

Formater III. Many of the same features as the *Proportional Text Formater* but for use with the NEC PC8023A printer and its proportional character set. Also features enhanced characters and has the same requirements as the *PTF.* $34.95.

Proportional Text Formater. Proportionally formats text for your Centronics 737/739 printer. Features proportional, condensed, elongated, and underlined characters with full, left, centered, and right justification, plus full, half-forward, or reverse linefeeds, column tabbing, pagination, and more. Interfaces directly with *Apple Writer II.* Requires Apple, CCS, Grappler, Mountain CPS, JBE, or similar interface cards. $39.95.

Universal Mono-Spaced Formater. Allows use of your printer's software-controlled features. Select print styles, double widths, underlining, reverse linefeeds, graphics, alternate character sets, and so on. Limited only by your printer. Comes with Epson, Centronics, and PC8023A commands, plus customizing software for other printers. Same requirements as other Ziggurat formatters. $34.95.



Action-Research Northwest

Zardax. Designed for the business and professional environment. Simple control commands. Typewriter-style shift and lock. Glossary. Form letters and mailing lists. Menus for disk access and printing DOS 3.3-compatible text files. Forty- or eighty-column display. Modifiable drivers for most interface cards and printers. $210.

Aguila

AE-Typeset. Provides typeset control within *Apple Writer*. Any font, width, intensity, line spacing, or extra character feature is now available. On-line help menu recalls single-key selection codes, and a comprehensive manual-on-disk provides the keys to perfect formatting control. For II+/IIe and Epson, Gemini, Okidata, NEC, and Prowriter. $59.95.

Maestro. An interactive training system that operates within *Apple Writer*, providing self-paced, multilevel instruction at your convenience. Anyone can learn the basics quickly and master advanced features only as needed. You can use what you've learned and then return to where you left off. For *Apple Writer II+/IIe*. $39.95.

Artsci

Magic Window II. Successor to the *Magic Window* word processing system, operates with a forty-column display, with an eighty-column board, or in a seventy-column, no-hardware mode. User-friendly, menu-driven, and designed to automatically use many add-on hardware accessories. Has an editing command card for easy reference. $149.95.

Beaman Porter

Power Text. Automatic word processing system for the Apple II, IIe, and III. Automatically produces headers, footers, closings, cover pages, and table of contents. $199.

Broderbund Software

Bank Street Writer. Features include add, move, insert, and erase blocks; universal search and replace; document chaining; page numbers/page headers; and automatic word wrap. The program comes complete with a self-teaching tutorial, easy-to-use reference manual, and a free backup disk. $69.95.

Circadian Software

CircaScript. Word processor for Apple II family. Eighty-column available for IIe. Over fifty features including underlining, tabbing, page headings and numbering, indentations, embedded printer commands, save and insert text blocks, access to DOS, global search and replace, text centering. Menu-driven, machine language. $39.95.

Concept Group

Masterspec2 Disk Library Service. Available to current subscribers with PSAE div. AIA Service Corporation. *Masterspec2* A/S/C and M/E text on 5¼-inch disks for microcomputers in Basic and Short Language versions. Text includes "notes to specifier" (nonprinting) in A/S/C library. Requires *WordStar* (CP/M) word processor. $695 first year, $250 renewal fee.

Cross Educational Software

Peachy Writer. A text editor that is easy to learn and use. Features include editing, upper and lower case, right justification, and disk management routines. Printer control characters can be inserted in the text. $24.95.

Flowersoft

D-Labels +. A multifunction label printer that uses your printer's enhanced capabilities to produce professional-looking sorted disk catalog labels. Designs and stores mailing or shipping labels, which can be sorted and searched for selective mailings. $49.

Kensington Microware

Format-II. New word processing package supports all advanced features of the Apple IIe. Single-keystroke editor is fast and easy to learn. Text is displayed on screen exactly as it will print on paper. $150.

Living Videotext

ThinkTank. An outlining tool that gives you the power to create, print, review, and edit your ideas on a personal computer. Self-documenting and intuitive commands make it easy to organize and reorganize ideas with a single keystroke. $150.

LJK Enterprises

Letter Perfect. Allows you to see how your document will look in print on the screen. This software has many editing commands and choices for controlling the way your text is printed, including turning on and off justification, altering line or page length, and including headers and footers. $149.95.

Spell Perfect. Indicates words that are possibly misspelled in a document and gives the opportunity to correct the word immediately instead of proofreading a second time. The program lists similar words to avoid use of a dictionary. You may also expand your program to meet your individual needs. $89.95.

Megahaus

MegaSpell. A spelling checker designed to be used with its companion word processor, *MegaWriter*. *MegaSpell* ignores *MegaWriter* for matting commands and comes complete with a 40,000-word dictionary to which the user may add 10,000 more words. $59.95.

MegaWriter. An easy-to-use yet powerful word processor. Part of a complete family of programs, it comes with mail list merging and a document organizer included. $59.95.

Midwest Software

Write Away. An advanced word processor that uses all the features and keys of the Apple IIe, Franklin, and Basis 108 computers, local area networks, and hard disks. $175.

MicroSparc

LexiCom. A general-purpose file conversion program. Can convert *Apple Writer* documents into a form that may be used by *Superwriter* and vice versa. May also be used to convert *Apple Writer I* or *Super-Text* documents into standard sequential text files that may be used by several different word processors. *LexiCom* can convert sequential text files into a form that can be edited by *Super-Text* or *Apple Writer I*. Other features include the ability to read Apple CP/M files, Muse *Address Book* files, *VisiCalc* files. $49.95.

MicroLab

Home Writer. Easy-to-use word processor with built in database and mail list merger. $49.95.

Muse Software

Form Letter Module. Send a personalized letter to everyone on your mailing list with *Form Letter Module*. $100.

Super-Text Home/Office. One of the best values in word processing, offering forty, fifty-six, or seventy-column screen display using no additional hardware. Unique design mode for creating special character sets. $99.

Super-Text Professional. Deluxe word processor featuring on-screen formatting and help reference guides, eighty-column screen, math mode, and split screen. $99.

Palantir

Palantir. Provides "what you see is what you get" word processing. Accomplished with multiple stored document formats, keystroke glossary, quick pagination, multiple headers/footers, and extensive help screens. Includes a powerful *Mailout* using conditionals, keyboard data entry, include statements, integer math. $350.

Phantom Software

Business Letters 1. Contains assorted business letters for use with *Microbase*, each professionally written. Includes sales letters, credit inquiries, collection letters, and so on. Can be modified. $17.95.

Blank Forms 1. A collection of predefined blank form templates for use with *Microbase*. Contains invoices, statements, purchase orders, and so on that are available from several computer forms distributors. Can be modified. $17.95.

Microbase. A small database program written in Word Processing Language. Allows the creation and maintenance of blank forms, standard documents, and data files, which can be integrated and printed automatically. $39.95.

Quark

Lexicheck IIe. Spelling check program that can be invoked from within *Word Juggler IIe* with a single keystroke. Contains a 50,000-word dictionary that checks your documents at a rate of 8,000 words per minute. Your own specialized terms can also be added to the dictionary. $129.

Word Juggler IIe. Virtually nothing to memorize. Comes with easy-to-install replacement keycaps that label functions. The touch of a button deletes characters, words, paragraphs. Has single-keystroke control of document preview and printout. Comes with *PFS* and *Quick File* interface. $239.

Raised Dot Computing

Braille-Edit. A word processor that uses the screen, voice, or braille, depending on the user's needs. It is designed to meet all of the word processing needs of the blind and those working with the blind. $300.

Howard W. Sams

Pen Pal, by Chris and Ann Moller. Highly versatile and powerful word processor that displays your text on-screen as either a continuous text file or as it will appear when printed out. Permits left/right justification, centering, indentation, auto page-numbering, text search, search-and-replace, delete, block manipulation, and much more. Handles text as either a standard Apple text file or as a binary file (your choice). $59.95.

Select Information Systems

Select. A menu-driven, full-feature word processor with single-key commands, a built-in expandable spelling checker, and a merge program. *Select*'s on-screen tutorial, *Teach*, guides the user step-by-step through a series of lessons that teach every aspect of word processing in ninety minutes or less. $495.

Sensible Software

Black's Law Dictionary. The only brand-name legal dictionary available for the Apple. A total of 20,000 legal terms are combined with 15,000 of the most commonly used words from the *Random House Dictionary* on a single disk. Can be used with the *Sensible Speller* and the *Apple Speller*. $99.95.

Sensible Speller IV. Top-rated spelling verification program includes the 80,000-word official *Random House Dictionary*, concise edition. Compatible with practically all Apple word processors. $125.

Sierra On-Line

Screen Writer II. Bestselling word processor contains two disks, complete documentation, and quick reference boards. $129.95.

Silicon Valley Systems

List Handler. Eliminate paperwork and introduce accurate record-keeping with the *List Handler*. Simple, versatile filing program not only stores and prints lists and labels, but also merges with other word processors to print letters. $49.95.

Spell Handler. A 90,000-word dictionary for *Word Handler*. Will check and mark spelling and typographical errors in a *Word Handler* document. Also allows you to create custom dictionaries that include your own words. Will scan your document for errors at the rate of ten words per second. $59.95.

Word Handler. An easy to learn and use word processor. Direct-to-disk editing allows documents larger than memory, simplicity of operation, and clarity of display format, including upper and lower case, underlining, bold, superscript, and so on. Will give full lines on-screen in sixty-six-column format, or will give eighty columns with Videx or Videx-compatible eighty-column board. $59.95.

Soft Ctrl Systems

Format ROM. A resident word processor for all Applesoft print statements. Includes all the features of a full-blown word processor: right and left justification, indenting, centering, page titling and numbering, and so on. Also includes print using routines. $49.95.

Software Publishing

PFS: Write. An easy-to-learn, easy-to-use word processing package that interfaces with the other members of the *PFS* family and with other popular software programs. In addition to its comprehensive editing functions, also allows the user to print personalized form letters from *PFS:File*, to merge *PFS:Report* and *PFS:Graph* output into the body of a *PFS:Write* document, and to merge output from other programs, such as *VisiCalc* and *Lotus 1-2-3*. $125.

Southwestern Data Systems

The Correspondent. Extremely versatile and economical, with many of the features found in more expensive word processors. Nearly sixty commands include character and line insert/remove, block copy/move/delete, forward/reverse tabbing, word gobble, split screens, help and note pages, math functions, bidirectional scrolling, centering, right justification, and more. $44.95.

United Software of America

Apple Typewriter. Full-function backupable word processor requiring no additional hardware. All eighty columns so that "what you see is what you get printed." Supports all special print modes of all printers. Unlimited document size. Includes word wrap, auto headers and footers, changeable margins, and more. $34.95.

Venture Software

Direct Mail II. Selects information from database files to merge with text created by most Apple-compatible word processors. Prints personalized letters, invoices, labels, or almost any form. Accepts keyboard entry with no database required. $99.95.

Letter Menu. An integrated series of WPLs consisting of more than 900 lines of WPL commands designed to simplify daily correspondence. Letter building and addressing become automatic. Completely menu-driven. Complements *Direct Mail II*. Tutorials. Educational tips to writing better WPLs. $39.

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Meet Dennis Jarvis, a firefighter from Southern California. About five years ago he broke his leg in a fire-related accident and was confined to the house for about six months. To keep him occupied, Dennis' wife bought him a computer.

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Accessory III

Key III. New detachable keyboard adapter for the Apple III. Comes with a lower keyboard cover, thirty-six-inch extension cable, and complete installation instructions. Cable hides under the keyboard when in normal position. $129.

Apple Computer

Business Graphics III. Makes presentation of financial models and plans even more effective. Convert any numerical information into comprehensive, easy-to-read charts and graphs. Reports, forecasts, and proposals will look more professional and have greater impact. $175.

Senior Analyst III. A flexible financial modeling and planning program for managers or professionals who need to analyze, consolidate, and share financial information. Easily develop complex models and consolidate many models into one, or pull information from existing models into a newly created one. Model budgets, planning, profit and loss reports, cash flow projections, and forecasts. $350.

Access III. Communications program for time-sharing and standalone tasks; gives access to remote information services, minis, and mainframes. $150.

Apple Business Basic. High-level structured programming language. $125.

Apple Speller III, by 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. $175.

Apple III Pascal. Program preparer with editor, compiler, disassembler, linker, filer, system library. $250.

Apple Writer III, by Paul 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. $225.

BPI General Accounting, by BPI Systems. Includes *General Ledger*, *Accounts Receivable*, *Accounts Payable*, and *Payroll*. 256K, ProFile. $495.

Mail List Manager. Generates, stores, sorts, edits, and prints mailing list files. $150.

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. $100.

Applied Software Technology

VersaForm, by Joseph Landau. Business forms processor. Does invoicing, purchasing orders, mailing lists, client billing.

Creative Software

Data Base III. A menu-driven database management and reporting system that supports over 32,000 records. It provides user definable screen layouts and reports, up to eight keys for searching, calculations, subtotaling, text file processing, and a mail list interface to *Apple Writer III*. $250.

Fiberbilt

Apple III Carrying Case. Features foam-padded cover and base, removable locking cover that allows for cables to exit the case with the cover closed and locked, nonmetalic hold-down strap, rubber no-slip bumpers, and sturdy ABS plastic end-cap construction. Brown. $100.

Great Plains Software

Harddisk Accounting Series: Payroll. Program is user defined, allows for multistate payroll with twenty different pay types and deductions per employee. Produces W-2 and 941 preparation reports. Has

eight different pay periods. System requires hard disk. $495.

Accounts Receivable. Maintains customer file of up to 32,766 customers, retains detailed history of each customer, allows partial payments, and will access finance charges at straight percent or dollar amount. Allows balance-forward and open-item customers. System requires hard disk. $495.

Accounts Payable. Maintains vendor file up to 32,766 vendors, will automatically calculate and take advantage of early payment discounts, print checks or handle manual checks, make full or partial payments, post cash requirement reports to simplify cash management. Requires hard disk. $495.

Inventory Control with Point of Sale. Maintains parts file up to 32,766 parts, as well as maintaining serial numbers. Suggests substitute items and will calculate commissions eight different ways. *Point of Sale* will print sales slips and invoices. Requires hard disk. $595.

General Ledger. Maintains up to 32,766 accounts and 999 profit centers and retains the details of each transaction for the entire fiscal year. Provides user-formatted financial statements and retains monthly totals for current year. Last year and budget figures. Requires hard disk. $495.

Kline Productions

Merge III. Merge file utilities allow data files created by *Apple Writer III* or ***PFS III*** to be merged with any letter document created by *Apple Writer III*. These jobs are simple but powerful examples of the capabilities of *Apple Writer III*'s Word Processing Language. $79.95.

Last Electronics

Plexa-Lok III. Acrylic protective cover for the Apple III. Slips over keyboard, protecting it from spills, dust, and unwanted little fingers. Apple can be left on for extended periods without worry of overheating. Enhances the look of that expensive investment. $24.95. Frosty Apple: $1.50 extra.

Microcom

Micro/Terminal. Gives access to any in-house or remote database; set up and log only once. Built-in editor or edit off-line. $99.95.

Peachtree Software

Accounts Payable. Can be an independent application or interfaced with *General Ledger*. Besides maintaining a complete file for each vendor, it helps determine which invoices to pay by due date, discount date, or according to certain cash requirements. Prints checks and check register. $750.

Accounts Receivable. Used independently or in conjunction with *General Ledger*, *Accounts Receivable* helps prepare bills for and obtain timely collections from customers. Prints invoices, statements, and aging reports and maintains customer account information, sales taxes, and the accounting detail for posting to *General Ledger*. $750.

General Ledger. The center of a sophisticated series of interactive business application packages. Used independently or in connection with other Peachtree accounting packages, it allows the manager to maintain a complete financial picture of his business. $750.

Inventory Management. Offers detailed control over all aspects of inventory operations, whether used independently or in conjunction with *Accounts Receivable* and *Sales Invoicing*. Features include four types of transactions, eleven reports generated, flexible master file format, length of time an item is on reorder, and so on. $750.

Sales Invoicing. A bridge between *Accounts Receivable* and *Inventory Management* that allows simultaneous access to and updating of the two packages' data files. Using *Sales Invoicing* eliminates the laborious two-step method of entering data in *Accounts Receivable* and *Inventory Management*. $750.

Phantom Software

Blank Forms 1. Collection of predefined blank form templates for use with *Microbase*. Contains invoices, statements, purchase orders, and so on that are available from several computer forms distributors. Can be modified. $17.95.

Business Letters 1. Contains assorted business letters for use with *Microbase*, each professionally written. Includes sales letters, credit inquiries, collection letters, and so on. Can be modified. $17.95.

Microbase. A small database program written in Word Processing Language designed to enhance *Apple Writer III*. Allows the creation and maintenance of blank forms, standard documents, and data files, which can be integrated and printed automatically. $39.95.

Quark

Lexicheck. High-performance spelling checker designed for use with *Word Juggler*. Contains a 50,000-word dictionary that checks your documents at a rate of 10,000 words per minute. You can also add your own terms to a personal dictionary. $149.

Terminus. Communications program designed for use with *Word Juggler*. Allows you to communicate between your Apple and other RS-232 devices. You can predefine the that are protocols necessary for communicating with as many as fourteen different systems. Ideally suited for electronic mail as well as other communications applications. $89.

Word Juggler. Virtually nothing to memorize. Special keyboard templates label most editing functions. The touch of a button deletes characters, words, paragraphs. Has single-keystroke control of document preview and printout. Comes with ***PFS*** and *Quick File III* interface. $239.

Catalyst. Allows boot from hard disk; transfers all programs to ProFile. $149.

Soft-Life

Attach. Driver allows user to do screen dump of text to any printer from programs, help screens, menus, and so on. Also allows user to toggle dot matrix printers between normal and condensed size print. $29.95.

Software Publishing

PFS:File. Form-oriented information-management system stores and retrieves up to 32,000 entries. $175.

PFS:Graph. Works alone or interfaces with PFS databases and *VisiCalc* files. Produces bar, line, and pie charts, merging data from several sources. $175.

PFS:Report. Generates reports; sorts, calculates, and manipulates data filed with ***PFS:File***. $125.

State of the Art

State of the Art General Ledger and ***Business Modules.*** Standalone interfaceable modules for twelve accounting periods. Includes *General Ledger*, *Accounts Receivable*, *Accounts Payable*, *Payroll*, *Inventory Control* ($595 each), *Sales Inventory*, *Budget and Financial Reporting* ($495 each), and *Professional Time and Billing*, $795.

Sum Software

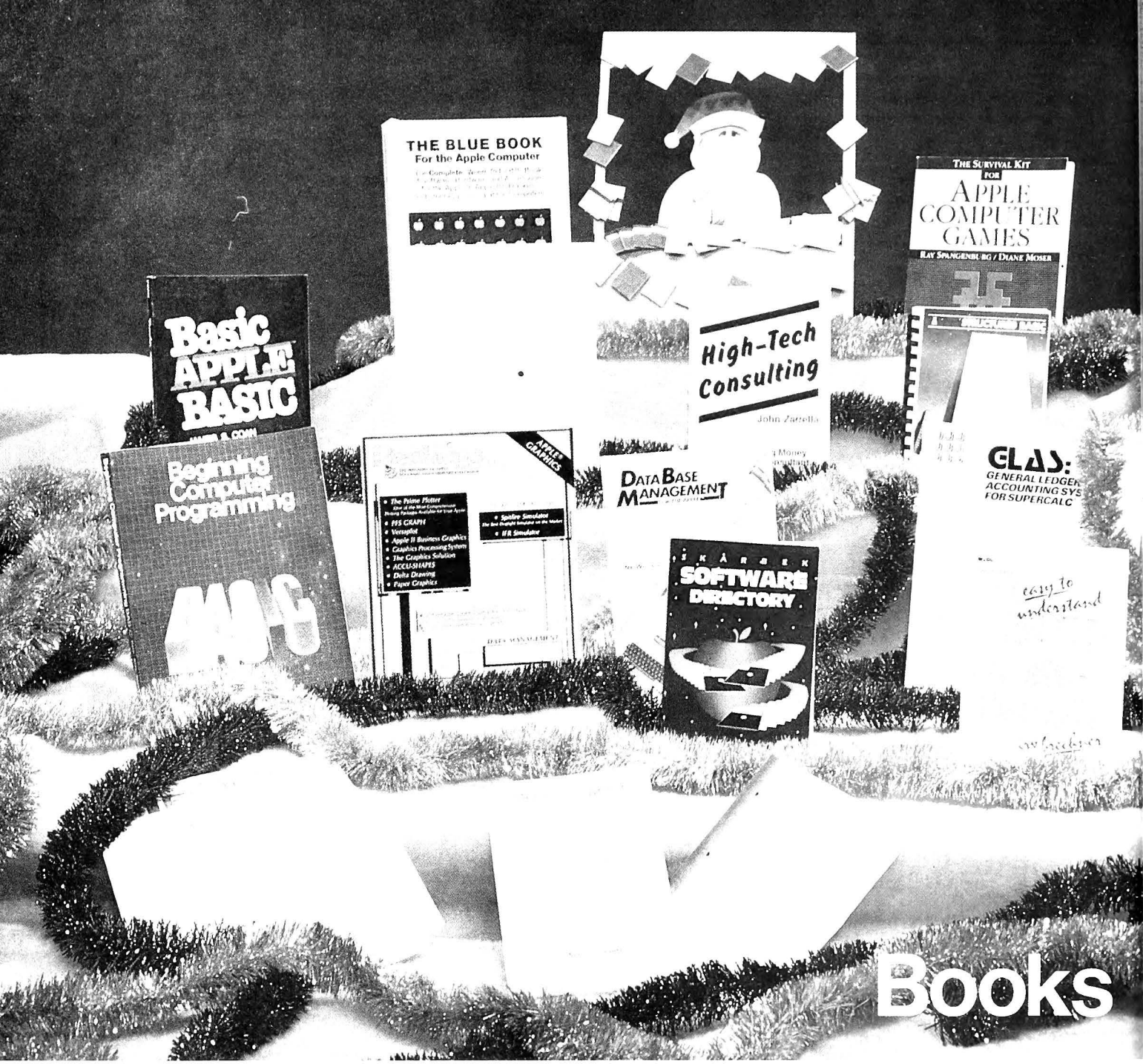
Fig Factory. Generates and stores symbols and figures and complete on-screen pictorials without a graphics tablet. Arrow or joystick input. Color version (requires 256K) or black and white super hi-res version (128K). $74.95.

VisiCorp

VisiCalc Advanced Version. 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. $400.

VisiCalc III. Expanded memory, u/lc, eighty columns. Four-way cursor movement. $250.

VisiSchedule. Critical path PERT scheduler. $300.



Addison-Wesley

Computers in Teaching Mathematics, by Peter Kelman et al. Presents a wealth of ideas, including the basic information mathematics teachers need to introduce computers into their schools. Emphasizes the traditional uses of the computer in teaching mathematics and explores the potential for a revolution in curriculum. $13.95.

Computers and Reading Instruction, by Leo and Olga Geoffrion. Brings together the many ways in which computers can be used to teach reading. Every chapter includes useful computer applications, descriptions of actual computer programs, and ideas for future developments by both individual classroom teachers and the educational computing industry. $13.95.

Practical Guide to Computers in Education, by Peter Coburn et al. Spans all grade levels and all major subjects. Contains practical tips, techniques, recommendations, strategies, resources, and scenarios based on actual classroom computer operations. Also includes a special resource section. $9.95.

The Addison-Wesley Book of Apple Software 1984, edited by Jeffrey Stanton, Robert P. Wells, Ph.D., Sandra Rochowansky, and Michael Mellin, Ph.D. The 1984 edition of this software guide has been completely updated. It provides all the necessary information on more than 500 software programs for the Apple. Offers not only a listing of available software programs for education, business, utilities, games, and entertainment, but also a critical analysis of every program. Each review is done by an expert. $19.95.

Applesoft Basic Toolbox, by Larry G. Wintermeyer. Teaches the fundamentals of using the language to solve any number of simple programming problems. Most programmers find themselves at a loss when attempting more difficult tasks such as those that require the computer to store and retrieve information from floppy disks. *Applesoft Basic Toolbox* helps programmers bridge this knowledge gap. $16.95.

Teach Yourself Apple Basic, by Peter Mears. This easy-to-follow book/software package shows new Apple users or new Basic programmers how to understand and use Applesoft Basic in only four hours. Shows how to operate the Apple with confidence: how to turn it on, insert the disk, and begin the program. The self-paced software teaches the essentials of Applesoft Basic programming in short lessons. $34.95.

Apple Visions, by Bob Bishop, Harry Vertelney, and Lucia Grossberger. In this book/software package, the authors combine sound and color graphics with games and other educational programs to guide even the newest programmer through the elements of assembly language. The software contains convenience programs that help users achieve sophisticated effects in their own programming. $39.95.

Applegate Computer Enterprises

Periodical Guide for Computerists. A resource tool for locating up-to-date information, indexing articles, reviews, and more published in major computer magazines. 1983 bound edition, $15.95; CP/M "SoftIndex" edition, $29.95.

Black Box

The Black Box Catalog. A mail-order catalog of over 300 data communication devices and accessories. Products range from cables and switches to protocol converters and statistical multiplexors. Free.

Black Sun Program Exchange

The Black Sun Catalog. Offers Apple users the opportunity to rent, buy, sell, or swap new and used Apple software. Over 700 titles to choose from. Lifetime membership, $25.

The Book Company

Apple Graphics and Arcade Game Designs. The book provides the advanced Basic or beginning machine language programmer with a solid introduction to Apple computer graphics and arcade game design concepts. Presents a thorough grounding in the Apple's screen architecture and in the advantages of doing bit-mapped designs. $19.95.

The Book of Apple Software 1984. Save hundreds of dollars by taking the guesswork out of evaluating programs before you buy. Each evaluation is written by an expert in his or her field. Features the latest on hardware options, software vendors, and tips on getting maximum use and enjoyment from your Apple computer. $19.95.

The Apple User's Encyclopedia. A complete guide for Apple owners. Contains exhaustive listings of software and hardware enhancements available, as well as information about the operating systems, the Basic language, and major programs. $19.95.

What If...? A Guide to Computer Modeling. Beginning with a historical introduction to modeling, the book details the technique of building a model for use on a microcomputer. Many of the modeling packages on the market are described, allowing readers to choose one suitable to their needs. Finally, several examples are given that tie together modeling principles and working methods in a comprehensive manner. $19.95.

Chilton Book Company

A Critic's Guide to Software for the Apple II Computers, by Phillip I. Good. Evaluating and using the most popular spreadsheet, word processing, data management, and graphic packages. For professionals in business, agriculture, law, and health. $12.95.

Clark Software

A Guide to Investor Software. Lists the names, addresses, and phone numbers of all companies offering software for investors. The programs are described in detail, including price and required configuration. Section on database services, associations, books, and computer games. $5.95.

CompuSoft Publishing

The Basic Handbook, An Encyclopedia of the Basic Computer Language, by David A. Lien. Large, up-to-date collection of Basic words. Each Basic word is alphabetically listed with test programs and sample runs. Variations in usage combined with alternate spellings provide complete cross-reference for each Basic word. A special section provides valuable tips on how to translate a program with "foreign" Basic to run on your computer. $19.95.

Dataphile Digest

Dataphile Digest. A monthly survey of Apple-related computer periodicals. Each month, after reading over sixteen magazines, the authors reference and categorize everything that has to do with Apples in an easy-to-use format. Includes short condensations of each item. Subscription for one-year (twelve issues), $36.

Digit Magazine

Digit. A magazine designed for young people ten to sixteen and their families who are interested in computers and high technology. Single copy price, $1.95; six issues, $8.95.

Diskazine Publications

Diskazine. A bimonthly magazine on disk. Games, contests, demos, and more. Trial issue, $8.50; one year subscription, $39.

Electronic Courseware Systems

A Planning Guide to Successful Computer Instruction. For individuals interested in the educational applications of computers. Contents include introduction to computer hardware, selection criteria for computer hardware, selection and evaluation criteria for courseware, computer instruction site development, sources and software for educational use. Eighty-one-page three-ring binder. $19.95.

Hayden Book Company

Basic Apple Basic. A complete guide to Applesoft Basic. It takes the reader from beginning concepts such as entering data, obtaining output, and planning programs to more advanced topics such as numeric and string arrays and sequential and random access files. $14.95.

Data Base Management for the Apple. Teaches the basics of storing and organizing information on a home computer. Includes *Data Base*, a simple, functional, and cross-referenced database management program written in Applesoft Basic. $12.95.

Hy-Tek

Selling your Software—The Personal Computerist's Guide to Fame and Fortune...Maybe! A guide of what to do and what not to do in trying to sell that program you have labored over for so long. Written by the staff of Hy-Tek's Software Division, it is based on actual experience. $9.95.

Mentat

Mentat. An amateur magazine. Contributors write articles about their interests in computers and computing. Free.

Menu

The International Software Database. On-line database of software information that is publicly available. Complete details on over 50,000 software packages from vendors worldwide are contained in the ISD. The ISD is currently available as File 232 through Dialog and through the Knowledge Index. A $60 per connect-hour fee applies to Dialog, and $24 per hour to Knowledge Index.

Microcomputer Applications

High-Tech Consulting. Provides essential information for anyone considering a career as a computer consultant. Discusses finding work, setting rates, and interfacing with clients. $18.95.

Micro Ink

Best of Micro, Volumes Two and Three. A collection of the best articles from *Micro* magazine. Volume Two, $8; Volume Three, $10.

What's Where in the Apple, by Professor Luebbert. A complete description of the Apple memory, including the Monitor, Basic, and DOS. Includes a programmer's guide for use from Basic and machine language. Book, $24.95; database disk, $14.95.

New York Zoetrope

Directory of Online Databases. Directory of more than 1,500 online databases and services available via personal computers, terminals, and videotext receivers. Descriptions include subject, content, analyses, producer, address, and price. These databases support research and development activities, individual and organizational planning, financial analyses, operations and evaluation, and provide the latest industry information. Thoroughly indexed. $29.95.

Osborne/McGraw-Hill

Apple II DiskGuide. This computer-side aid gives users quick reference tips on DOS, Basic, Exec files, machine language Monitor, peek and poke locations, the system memory map, and more. Includes illustrations for easier understanding. $7.95.

Apple II User's Guide, 2nd Edition. The second edition of this user guide includes operating instructions for all the Apple IIs. It also has tutorials in Basic programming plus additional information on the Ap-

ple eighty-column card, DOS utility programs, graphics, and sound. $17.95.

The Osborne/McGraw-Hill Guide to Your Apple III. This one-volume guide will quickly teach you about the Apple III system, files, and utilities, and the Sophisticated Operating System (SOS). A comprehensive guide to Business Basic is included, and a variety of special topics are covered in the appendixes. $17.95.

Peelings II

Peelings II. Computer publication devoted entirely to the in-depth evaluation of software and hardware for the Apple II. *Peelings II* is a "consumer's guide" that provides its readers with the information necessary to make intelligent choices rather than chance purchasing decisions. The topic areas are broad, ranging from entertainment products to business software. Cover price, $3.

Prentice-Hall

The Apple Personal Computer for Beginners, by Seamus Dunn and Valerie Morgan. Written for hobbyists and students, this "learn-by-doing" introduction to the Apple concentrates on the most popular configuration: Applesoft Basic and a disk system. The book is divided into eleven compact, sequenced chapters that teach the reader how to program and make full use of the different facilities available on the Apple. $12.95.

The Apple House, by John Blankenship. Provides a complete, workable system for computerizing the home with the Apple computer, including schematics and program listings. Explains in an educational and structured manner how the system is designed so that readers can customize their own systems to meet specific requirements. $22.95.

Pascal for the Apple, by Ian MacCallum. Suitable as a self-help guide for hobbyists, as a text for freshman/sophomore-level courses in Pascal programming, or in introductory microcomputer courses. Leads the reader line by line through sample programs. The effect of each line is demonstrated on the screen with comments. Contains 200 exercises with solutions. Introduces methods of designing correct programs. $26.

Programmed Press

Computer-Assisted Investment Handbook, by Dr. Albert Bookbinder. Get new ideas and fifty profitable programs from author's forty years of experience in stocks, bonds, options and futures, foreign exchange, and statistical package. All fifty programs explained to help reader understand concepts and applications. $19.95.

Quality Software

Beneath Apple DOS. Covers the intricacies of Apple's DOS. How DOS 3.3 differs from other DOS versions, how disks are protected, how tracks are formatted, and so on. Includes a large number of diagrams and tables, source listings of useful disk utilities, glossary of over 150 terms, and many programming examples. $19.95.

Reston Publishing

Better Basic for the Apple, by J.N.P. Holt and R.C. Holt. Contains all the necessary information about Basic and DOS to use the Apple effectively. Write, enter, edit, and run programs interactively using Applesoft Basic. The text contains numerous programming examples, as well as detailed descriptions and examples of graphics. $14.95.

The Apple Logo Primer, by Gary G. Bitter and Nancy Watson. Find out what an exciting, useful, and creative language Logo really is. This handbook makes learning easy for anyone—no previous experience needed. Simple-to-follow instructions, many examples, and an in-depth discussion of all concepts. Suggested activities encourage learning Logo through discovery and exploration. $14.95.

Fancy Programming in Applesoft, by Gabriel Cuellar. Discover the "hidden" secrets of Applesoft Basic. *Fancy Programming in Applesoft* offers users the tips, techniques, and shortcuts to give programs that professional touch. Complete program listings and subroutines like *Backspace*, *Length Control*, *Bubble Sort*, *Screen Dump*, *High-Resolution Editor*, and *Shape Generator*. Also available with a program disk. Book, $15; book/disk, $30.

Howard W. Sams

Apple Fortran, by Brian D. Blackwood and George H. Blackwood. Gives full programming details on Apple Fortran 77, plus an introduciton to Apple's Pascal language card, the use of Fortran on single or multiple disk drives, and several programs in Fortran that you can use immediately. $14.95.

Apple Interfacing, by Jonathan A. Titus, David G. Larsen, and Christopher A. Titus. Describes the internal Apple II control signals available for I/O interfacing and shows you how to use them with Applesoft to control devices and communicate with other computers, modems, serial printers, and more. Furnishes real, tested interfacing circuits that work, plus complete breadboarding to help you check out your own interfacing ideas. $11.95.

Applesoft for the Apple IIe, by Brian D. Blackwood and George H. Blackwood. A detailed Applesoft programmer's reference manual written specifically for the Apple IIe and covering all aspects of IIe syntax and programming techniques. Ideal for new owners and users of the IIe, as well as students and advanced programmers. $12.95.

Applesoft Language, by Brian D. Blackwood and George H. Blackwood. Now in its improved and updated second edition. New material includes coverage of disk operations and presents additional detail on numbers and number programming. Quickly introduces you to Applesoft syntax and programming, including advanced programming techniques, graphics, color commands, sorts, searches, and more. $13.95.

Apple II Applications, by Marvin L. De Jong. Provides engineers, technicians, teachers, and others with a broad spectrum of tested programming and board-level interfacing applications usable in the real world or as classroom demonstrations. Applications can be modified to fit your needs. Includes serial and parallel I/O boards, EPROM boards, remote data acquisition system, and more. $15.95.

Apple II Assembly Language, by Marvin L. De Jong. Specifically directed to the beginning assembly language programmer who has no prior experience with the language. Shows you how to use the three-character, fifty-six-word assembly language vocabulary of Apple's 6502 microprocessor to create powerful, fast-running programs. $15.95.

Apple II Circuit Description, by Winston D. Gayler. Provides a detailed circuit description of the Revision 1 Apple II motherboard, including the keyboard and power supply. Compares Revision 1 with other revisions and includes timing diagrams for major signals. $22.95.

Basic Tricks for the Apple, by Allen L. Wyatt. Clearly written by a seasoned professional. Useful reference for programmers that provides ideas, examples, and special Applesoft subroutines to use or modify as part of your own Apple programs. Helps with a lot of the niceties that make Apple programs look polished and run well. Assumes a working knowledge of the language. $10.95.

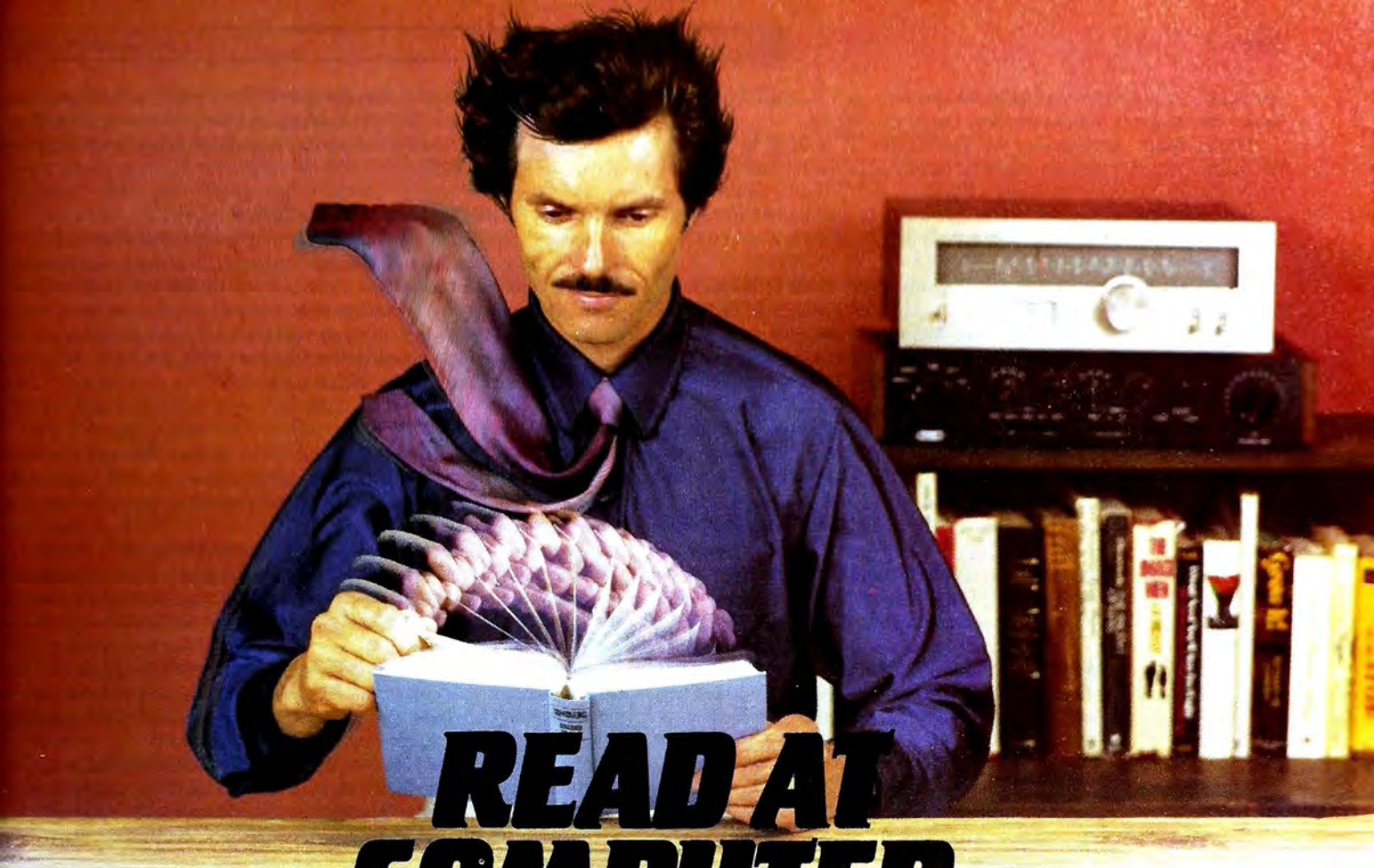
Circuit Design Programs for the Apple II, by Howard M. Berlin. A series of ready-to-run engineering programs in Applesoft that show you "what happens if" and "what's needed when" as they apply to periodic waveform, rms, and average values, the solution of simultaneous equations, and more. Ideal for electronics design engineers and others faced with solving problems related to plotting and simple verification of experimental data. $15.95.

Disks, Files, and Printers for the Apple II, by Brian D. Blackwood and George H. Blackwood. Provides basic to advanced details for using disks, files, and printers, including explanations for Apple programming with sequential-access, random-access, and executive files. File structure is emphasized by programs written in sections, explained in detail, and then put together as a functional unit. $15.95.

Enhancing Your Apple II, Volume 1, by Don Lancaster. Among other things, readers learn to mix text, lo-res, and hi-res together anywhere on the screen and in any combination; how to make a one-wire modification that will open up whole new worlds of three-dimensional graphics and other special effects; plus a fast and easy way to tear apart and understand somebody else's machine language program. $17.95.

Intimate Instructions in Integer Basic, by Brian D. Blackwood and George H. Blackwood. A complete guide to using Integer Basic. Includes much to help build Integer programs that run smoothly and take full advantage of that dialect's rapid-running characteristics. Also covers graphics, games, and many ready-to-use programs. Good companion book for *Applesoft Language*. $8.95.

Intermediate Level Apple II Handbook, by David L. Heiserman. Hard to find, practical information that uses ROM-based Integer Basic to lead you into Apple 6502 machine and assembly language programming. Helps you get deeply into Apple's memory map, program video peeks



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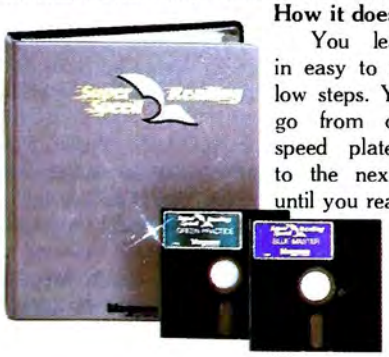
What it does

Super Speed Reading teaches you to read at incredible speeds, with improved comprehension! Everything from light novels, heavy books, newspapers, reports, trade magazines, memos, school books to computer code.



How it does it

You learn in easy to follow steps. You go from one speed plateau to the next - until you reach the high speeds you want. Perhaps 800, 1500 or 3000 words per minute.



The on-screen directions include dramatic graphics which make every example crystal clear, even for a youngster. The screen text is in upper & lower case (in your choice of 3 type styles)...all without extra hardware!

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The instruction manual is uncomplicated and very reader friendly. It's loaded with extra information (if you're curious) and many reading and comprehension exercises as well.

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and pokes, deal with lo-res and hi-res graphics, mix machine code with Basic, use Integer's mini-assembler, and more. $16.95.

Mostly Basic: Applications for Your Apple II, Book I, by Howard Berenbon. Provides an assortment of twenty-eight useful and ready-to-use Applesoft programs including a telephone dialer, digital stopwatch, a spelling test, house-buying guide, gas mileage calculator, and many more. All have been completely tested and debugged for use on your Apple II. $13.95.

Mostly Basic: Applications for Your Apple II, Book 2, by Howard Berenbon. A second gold mine of fascinating Basic programs, including two dungeons that test your math and history abilities and another one that's strictly for fun, eleven household programs, a monthly savings plan and six more on money or investment, two that test your level of ESP, and more—thirty-two in all. $12.95.

Polishing Your Apple, Volume 1, by Herbert M. Honig. Clearly written, highly practical, concise assembly of all procedures needed for writing, disk-filing, and printing programs with an Apple II. End your searches through endless manuals to find the routine you need. Useful for any new Apple user, regardless of experience level. Ideal for classrooms. $4.95.

Polishing Your Apple, Volume 2, by Herbert M. Honig. Guides intermediate-level programmers in making finished, commercially salable products. Guides you in creating professional-looking menus, doing effective error-trapping, and improving program flow. Includes routines for generating whole-dollar entries that automatically align and round to two decimal places. Eliminates using return on most entries, and offers four-digit dating that shows day, month, year, and more. $4.95.

S-C Software

Apple Assembly Line. Monthly newsletter for assembly language programmers, beginner or advanced. Tutorial articles, advanced techniques, handy utility programs, commented listings of code in DOS and Apple ROMs. $15 a year, add $3 for first class postage in USA, Canada, and Mexico; add $13 postage to other countries.

Skarbek

Software Directory for the Apple Computer. Over 450 pages of complete program descriptions. More than 1,000 programs, all alphabetized by category: business, database, education, entertainment, graphics, home/personal, programming aids and utilities, special interest, vertical market, and word processing. Vendor list and dictionary of computer terms. Special holiday price, $9.95.

Softalk Book

Applesoft Isn't Hard: Basic Programming for the Apple II, by Doug Carlston. Teaches how to program in Applesoft Basic—step-by-step through the commands, hi-res and lo-res graphics, creating useful programs such as flash cards and a Basic word processor. Lots of examples. Book, $19.95; disk, $9.95; both $27.96.

Graphically Speaking: Portrait of the Artist as a Young Apple, by Mark Pelczarski. Pelczarski explains the graphics functions, covering lo-res, hi-res, 3-D illusions, color, binary files, picture-packing, shape tables, and more. Book $19.95, disk, $9.95; both $27.95.

Assembly Lines: The Book, by Roger Wagner. Culled from the series in *Softalk*, Wagner's book starts with the fundamentals of assembly language programming and works up to more sophisticated routines. Original columns have been expanded and joined by an introduction and several appendixes. $19.95.

Softdisk

Softdisk Magazette. A monthly publication contained entirely on two disks. Four full sides of ready-to-run programs, programming tutorials, music, graphics, subscriber bulletins, and running demos. All unprotected. Twelve two-disk issues, $55; trial issue, $10.

Softwarehouse International

Softwarehouse International. A discount club for computer software and accessories. Club members pay a one-time fee of $10 for which they receive an eighty-three-page catalog and several newsletters each year reviewing software and sharing information. Members can also ask for advice or suggestions while planning a purchase, and may request assistance if they have difficulties after the sale. $10.

Apple II Plus. Leads the reader line by line through sample programs with the effect of each line demonstrated on the screen with comments. Contains 200 exercises with solutions. Introduces methods of designing correct programs. $26.

Martha Stuart Communications

Powersharing: The Microcomputer, by John and Barbara McMullen. Videotape. Provides an ideal starting point for anyone who needs to understand the microcomputer—what it is and what it does. For the computer beginner or simply the interested individual, this tape demystifies the microcomputer, makes it more approachable, and demonstrates its power and versatility in action. On half-inch VHS and Beta video formats, $195; on three-quarter-inch u-matic, $225.

Sybex

The Apple Connection, by James W. Coffron. Those dreamt-of computer-controlled home appliances are now possible with your Apple computer. Learn the simple techniques for putting your computer to work controlling external devices. $12.95.

Apple Pascal Games, by Douglas Hergert and Joseph T. Kalash. A fun way to learn a powerful programming language. Through progressively more complex games, you will learn the structure and syntax of this important language: record types, set types and operators, pointer types, and linked lists. $15.95.

Apple II Basic Programs in Minutes, by Stanley R. Trost. Get the advantage of programming your Apple II without having to learn how to program. This collection of practical Basic programs allows you to take full advantage of the Apple functions, instantly. $9.95.

The Apple II Basic Handbook, by Douglas Hergert. Need to clarify a Basic keyword or function? Do it quickly, without rereading most of the programming manual. You will find clear descriptions and examples of each word in the Apple II Basic's vocabulary in this dictionary-style handbook. $13.95.

Advanced 6502 Programming, by Rodnay Zaks. Develop sophisticated efficient programs for the 6502 microprocessor. Learn advanced techniques ranging from algorithm and data structures design to code optimization and register allocation. $13.95.

Basic Exercises for the Apple, by J.P. Lamoitier. Learn the true style and subtleties of Apple Basic through actual practice. Graduated exercises in math, business, operations research, games, and statistics teach you how to program in Basic. $12.95.

Basic for Business, by Douglas Hergert. Learn how to put Basic to work to automate frequent business tasks. Each function in the powerful Basic programming language is described in this business-oriented guide to programming. $13.95.

Basic Programs for Scientists and Engineers, by Alan R. Miller. This book contains scientific and engineering application programs written in Basic. It includes applications in statistical analysis and matrix algebra, linear and nonlinear curve-fitting, and Newton's method for solving equations. $15.95.

Celestial Basic: Astronomy on Your Computer, by Eric Burgess. You may never get to the moon on the space shuttle, but you can see the heavens with your computer. This book presents programs that rapidly complete typical astronomic computations. $13.95.

Computer Power for Your Law Office, by Daniel Remer. Reach peak productivity in your law office, simply and inexpensively. Learn how to select the most beneficial combination of hardware and software for your law practice. $19.95.

Doing Business with Pascal, by Richard and Douglas Hergert. The power of Pascal can be used to make business more efficient. The first book of its kind, this book explains how to design business systems in Pascal, write practical business programs, and use the powerful Pascal language extensions. $17.95.

Doing Business with VisiCalc, by Stanley R. Trost. You know *VisiCalc* can perform miracles, but how? Here are more than forty practical business applications using *VisiCalc*. Applications include financial statements, master budgets, pricing models, and investment strategies. $11.95.

Don't! (Or How To Care for Your Computer), by Rodnay Zaks. An easy, entertaining guide to computer and peripheral preservation. Specific advice is presented about the care and maintenance of your computer, floppy disks, hard disks, the CRT terminal, the printer, the computer

room, software, security, and documentation. $11.95.

The Easy Guide to Your Apple II, by Joseph Kascmer. This jargon-free companion tells you how to get started on the right foot with your Apple. Each practical operation that you can perform with your Apple computer—word processing, mathematical calculations, budgeting, filing, and more—is clearly explained. $9.95.

Executive Planning with Basic, by X.T. Bui. Business managers: Speed up and improve decision making and planning. This collection of Basic programs offers help in many areas of business: cost/volume/profit, linear programming, inventory management, and more. $13.95.

Fortran Programs for Scientists and Engineers, by Alan R. Miller. This book contains scientific and engineering application programs written in Fortran. One semester of calculus is required and some familiarity with Fortran or another high-level language is recommended. $16.95.

From Chips to Systems: An Introduction to Microprocessors, by Rodnay Zaks. Are you intrigued by the mystery and power of microcomputers? This beautifully illustrated book takes you on a fast-paced adventure through the fundamental concepts and inner workings of a microcomputer. $17.95.

International Microcomputer Dictionary. This description of all major computer components and a list of more than 200 common computer terms with translations in French, German, Spanish, Italian, Polish, Norwegian, Danish, and Hungarian will assure you no more confusion over technical jargon. $3.95.

Introduction to the UCSD p-System, by Charles W. Grant and Jon Butah. Find out how to optimize the use of Pascal. This is a clear, simple guide for all UCSD Pascal users. It explains how to use the p-System to write more efficient programs. $15.95.

Introduction to Pascal (Including UCSD Pascal), by Rodnay Zaks. Find it fast, and all in one place. Whether you're new to programming or simply new to Pascal, this book will help you. Pascal features are covered progressively and in detail, from basic definitions to complex data structures. $16.95.

Introduction to Word Processing, by Hal Glatzer. Learn, in nontechnical terms, what a word processor can do and how it achieves these feats. Concepts common to all word processing systems are explained and features are analyzed in detail, from screens to scrolling and formatting. $12.95.

Mastering VisiCalc, by Douglas Hergert. Solving problems with *VisiCalc* can be simple. Beginning with a description of *VisiCalc* and what it can do for you, this book goes on to provide step-by-step explanations of each of its features. $11.95.

The Pascal Handbook, by Jacques Tiberghien. Finally, the entire Pascal vocabulary summarized in one place. This dynamic reference volume puts Pascal at your fingertips. Clear, concise, reliable descriptions of each word and symbol and short sample programs illustrate the elements of the language. $19.95.

Pascal Programs for Scientists and Engineers, by Alan R. Miller. Scientists and engineers, Pascal can do it for you. Learn Pascal through examples or just use the practical program collection. An explanation of Pascal programming theory and techniques is included with each program. $17.95.

Programming the 6502, by Rodnay Zaks. Make your microprocessor perform the way you want it to by applying simple assembly language programming. All aspects of programming the 6502 are clearly explained here, from elementary concepts to advanced data structures and program development. $14.95.

6502 Applications, by Rodnay Zaks. Use the 6502 microprocessor for real-life applications. Learn how to operate I/O chips, connect devices, and develop practical application programs for the 6502. $13.95.

Wadsworth Electronic Publishing

General Ledger Accounting System for Supercalc. Enables you to produce a fully integrated GLAS that can be saved on disk and used as needed. Written in plain English and presented in a workbook format that is easy to follow and leads you through all the applications of the electronic spreadsheet functions. $19.95.

The Survival Kit for Apple Computer Games. Gives you a play-by-play advantage on more than two dozen of the most popular and exciting home computer games. Featuring a galaxy line-up of perilous video escapades—adventure, fantasy, strategy, and arcade—the book offers detailed, fun-to-read descriptions, winning strategies, and tips from the experts. $9.95.

Widl Video Publications

The Blue Book for the Apple Computer. A complete "where to find it" directory of software, hardware, and accessories. Contains over 4,600 listings in sixty-two categories. 912 pages, third edition. $24.95.

The Computers Are Coming. An overall introduction to computing for the layperson, meant for someone who has heard about computers and needs a simple introduction. Provides a good working knowledge of the effects of computers and their applications. Illustrated. $5.95.

The Easy To Understand Computer Dictionary. Computer terms defined in simple, nontechnical language. Also contains half-page illustrations for each word to provide a good understanding of the more commonly used terms. Illustrated. $5.95.

What a Computer Can Do for You. A good explanation of how the computer can be a useful tool. Written in an easy to comprehend style with plenty of illustrations and applications for the beginner. $5.95.

John Wiley & Sons

Apple Basic: Data File Programming, by Finkel and Brown. A self-teaching guide to programming and maintaining data files for billings, cataloguing, customer lists, processing numerical data, and many other business and home applications. $14.95. Accompanying program disk (optional) $19.95.

Apple II Assembly Language Exercises, by Scanlon. Hands-on exercises and problems to practice and perfect assembly language programming skills. Designed for effective learning, the exercises cover processing lists and data tables, input/output techniques, even developing music programs. $10.95.

Apple II Basic Quick Reference Guide, by Held. Designed for use right by the computer, this handy card (six inches by twelve inches, eight panels) lists and defines all the Applesoft Basic statements, system commands, input/output processing statements, arithmetic operation symbols, error messages, memory statements, and more. $2.95.

Basic for the Apple II, by Brown, Finkel, and Albrecht. A complete, friendly introduction to programming in Applesoft Basic. Assuming no prior knowledge, this self-teaching guide takes readers from turning on the computer to writing useful and entertaining programs confidently and efficiently. $12.95.

Golden Delicious Games for the Apple Computer, by Franklin, Koltnow, and Finkel. A self-teaching guide to writing your own games in Applesoft Basic. Teaches principles of game design and sophisticated programming skills needed. $12.95. Two accompanying program disks (optional), $34.95.

6502 Assembly Language Programming, by Fernandez, Tabler, and Ashley. A self-teaching guide to programming the Apple's 6502 microprocessor and gaining the speed and efficiency of assembly language programming. Assuming almost no prior knowledge, it works through the entire assembly language instruction set, offering hundreds of opportunities to practice coding typical routines. $12.95.

Using VisiCalc: Getting Down to Business, by Klitzner and Plociak. A complete, practical guide to getting the best use from *VisiCalc*, easily and efficiently. Teaches all *VisiCalc* commands and how to design templates. Also includes eight ready-to-use templates for financial planning, forecasting, cash flow analysis, inventory management, break-even analysis, and more. $16.95. Template disk for Apple II, IIe (optional), $39.95.

Window

Window. A new concept in publishing, *Window* is a learning magazine on a disk. Each issue includes a variety of programs, games, interactive reviews, columns on *VisiCalc* and Logo and a feature program. Each issue is $24.95. A subscription (five issues per year) is $95.

Yes!

Computers: Comprehensive Guide. A sixty-four-page annotated mail order catalog for the best in microcomputer books. It reviews 819 books chosen to help you make the most of your microcomputer. Topics included in the guide are business applications, assembly language and microprocessors, programming languages, and artificial intelligence, among others. All books included in the guide are available from the Yes! Bookshop through its mail order service. $2.



Accessories

A B Computers

Swapper Stopper. Automatic game port expander. 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. Requires no unsightly externally mounted cables or switches. Installs in seconds. $26.95.

AbCom

Apple Skin. A protective cover for the keyboard portion of the Apple II series. Adhesive Velcro tabs secure custom-fit Apple Skin in place. Constructed of urethane-coated pack cloth with double-stitched seams. Brown, navy, or silver. Other colors also available. $9.70.

Disk Jumper. An eighteen-inch disk drive extension cable for the Apple II series. Ideal for situations that require the computer to be moved. Remains attached to the control card during transport, thus preventing damage due to frequent reconnections or misalignment of pins. $22.95.

Apple Crate. A lightweight protective carrying case for the Apple II and two disk drives. Constructed of urethane-coated cordura and fully

padded with three-eighths-inch closed cell foam. Available in brown or navy. Separate computer and disk drive compartments allow the Apple Crate to be stowed in tight places such as under airplane seats. $108.

Advanced Business Technology

Numeric Keypad. With handsome, engravable matching presentation stand. Compatible with all software. $125.

Advanced Systems Concepts

Data Communication Equipment. Cable, modems, intelligent and manual data switches, converters. Products allow peripheral networks using RS-232C or parallel interfaces. Staff available for configuring such peripheral networks in a business environment. Cable, $24; modems, $110; switches, $60 to $200 per port; converts, $100 to $500.

Parallel and RS-232C Data Switches. For electronic or manual switching of computers or peripherals. Allows remote operation, computer backup, multiport addressing, expanding, or printer sharing. Staff available for configuring peripheral networks. Twenty-four-hour ASCI Express Service available. Expanding line of data communications products. $60 to $200 per port.

Alf Products

Bulk Disks. Without labels, sleeves, or boxes. Single-sided, double density. Each: Nashua, $1.60; 3-M, $1.65; Memorex, $1.65; Verbatim, $1.90. Tyvek sleeves, 7 cents each; sold in increments of one hundred.

Alpha Delta Communications

MACC Master AC Control Console. Features lightning spike and voltage surge protection with master and individual circuit switch control. Provides eight 120 volt AC outlets, three stage 2,000 AMP surge protectors, and lighted switches. UL listed. $79.95.

Amtek Systems

Amtek Power Siftors. Improve system performance; reduce failures, unfound software "bugs," and lost files. $450.

Apogee Designs

Aptek Apple Stand. Holds monitor and drives securely with slotted sides for airflow or fan. $29.50.

Aptek Printer Stands. Feature shelves for manuals and four-inch paper space. MX-80 size, $27.50; MX-100 size, $29.50.

Aptek Sound Control Stands. Include a lid and acoustic foam to confine noise. MX-80 size, $79.50; MX-100 size, $89.50.

Aptek Disk Rack. Double-bay, covered disk rack. Conservatively holds sixty 5¼-inch disks. $29.50.

Numeric Keypad. The perfect accessory for the professional user. If you would like fast numeric input and a calculator, relax; you can now have both. This flexible input device includes a full numeric keypad and twelve function-oriented keys. Use with *VisiCalc* software. Complete with hardware; no software required. $159.95.

A2D Company

Model 2001 Joystick for Apple II. Hand-held for easy use with right or left hand with long-life, soft, tactile feel buttons, quality components, and eight feet of cable. New features include external defeat of the self-centering action and expanded trim range. Also, Model 3001 Joystick for Apple IIe. $27.79.

Model 2002 Pair of Game Paddles. These are reliable and easy-to-use with soft, long-life firing buttons. Designed to be hand-held for easy use with right or left hands. Same high quality as the A2D Joystick. $27.79.

Atlantic Cabinet

Fifty-Inch Personal Computer Desk. Split-level design allows printers and other accessories to be placed on the one-inch-thick, leather-look work surface. Large drawer and shelf are featured. Available in oak or walnut laminates. $190.

Aztec Electronics

Hold-It. Computer and office equipment antitheft device. No tools required. Maximum equipment flexibility. School systems, office complexes, medical facilities, apartments, and dormitories. $19.95.

Bretford Manufacturing

EC10 Mobile CRT table. Adapts to varied educational and training uses. Six-foot-square work surface can be adjusted to different heights; adjustable, slotted top shelf holds television monitor or other equipment; three-outlet electrical unit with twenty-foot three-wire cord and grounded plug; cord organizer/modesty panel; heavy gauge steel construction and a high-impact baked enamel finish in beige. $239.

Cases

C-Series Carry Case. Models to hold Apple II and two drives; Apple III; Apple III monitor. $110.

Flight Form Transit Case. Models to hold Apple II and two drives; Apple III and two drives; Apple III and Monitor III. $250 to $331.

CE Software

InvisiCalc. The first high-tech pet rock. This amazing atomic spreadsheet operates on literally every computer system—even pop-up toasters! Provides hours of fun at both home and office. Why ask what if . . . when you can ask who cares? $5.98.

Codo Manufacturing

Ribbons. Full line of ribbons to fit various printers. Nylon and film. Prices vary.

CompAid Products

Plot-A-Lot. A laminated sketch pad for II Plus graphics to simplify text and graphics screen layouts. Surface may be wiped clean with a damp rag for reuse. Set of eight colored pens included. $19.95.

Compucart

Compucart. Holds your personal computer monitor, keyboard, disk drives, printer, expansion chassis, software, and manuals. Lock them safely away with your personal key. Adjustable design accepts most pc systems, including Lisa, takes only four square feet of floor space, and rolls easily wherever needed. $595.

Compu Cover

Static-Free Compu Covers. Plastic and durable cloth-backed vinyl custom-fit to stylishly fit each individual piece of your computer equipment. Start at $3.95.

Compugift

Terminal Look-Alikes. Plastic; 4½ by 6 by 4¼ inches. Come in three styles: Computer Caddy (for pens, pencils, pad, and so on), Computer Planter (for the green thing), and Computer Bank (for that loose change). Instead of a screenful of words or numbers, there is room for a favorite snapshot. $11.99 each.

Compu-Quote

Calc/Pad. A specially designed layout pad for electronic spreadsheet users. It is printed on both sides and consists of fifty punched sheets per 8½-by-11-inch pad. Plenty of room in each box for penciling in the required text, value, or formula. $4.75.

Computer Case

Computer Cases. Designed to carry equipment in a fully operational configuration. Simply remove the lid and operate. Constructed of luggage material with mahogany wood sides and a heavy, brown vinyl covering that is saddle-stitched for strength and appearance. Cases make it possible to transport your equipment in a safe, protected manner. $109.

Computer Practice Keyboard

Practice Keyboard. Explains each special key function, making it possible to practice finger positions anywhere, anytime. Printed on 8½-by-11-inch stock to fit standard size binders. Plastic lamination to protect and keep keyboard clean, plus a brief dictionary of computer words printed on the back of each keyboard. $3.95.

Covers A Lot

Dust Covers. Custom-made quilted dust covers, machine-washable, antistatic. Gray, chocolate, cream, navy, burgundy, or rust. Covers can be made to order. Two-in-one (monitor on top of system) and keyboard, $40 per set; monitor, $24; disk drive, $15; keyboard, $24; wide printer, $24; narrow printer, $20.

Creative Computer Peripherals

KeyWiz and KeyWiz VIP. Auxiliary keyboards for use with microcomputers. Two preprogrammed with specific function keys and one with a user-definable keyboard. The KeyWiz VIP allows you to preprogram up to sixty-two keys per keyboard and can go back and forth between four keyboards, providing 248 user-defined keys. KeyWiz 83, Convertible, $299; KeyWiz VIP, $439.

Creative Computer Products

Kleertex Keyboard Templates. Fit templates over the keyboard of the computer, listing the prompts, formats, symbols, and functions—with key-by-key examples—for *WordStar*, *VisiCalc*, *dBaseII*, and other popular software programs. $19.95 to $32.95.

Cuesta Systems

Datasaver. AC power backup unit. Ninety-watt model supports Apple with dual drives and monitor. Two-hundred watt model powers Apple with fixed disk. Prevents data loss due to voltage drops or transients. AC line conditioning, internal battery for five- to fifteen-minute holdup, audible/visual/electronic alarms, auxiliary battery jacks for extended time or portability. Compact desktop styling. Ninety-watt, $395; 200-watt, $695.

Diskus Products

Diskus Dividers. Set of five color-coded index tab dividers to aid filing in any type of disk storage container, including one-inch-deep carry-around types. Tabs may be gum labeled, written on with marker or grease pencil, or simply used to flag programs by color. $2.99.

Diskfiles. Capacities of more than 125 disks for space-efficient storage and filing. Compartments are separated by removable clear inserts, plus five color-coded index tab Diskus Dividers. Stackable with disk drives; made of dark translucent acrylic. $59.95.

Doss Industries

Apple Center. Designed to protect your Apple II or IIe from theft and unauthorized use. All-metal construction. Bolts easily to a tabletop. Cooling fan and surge protection built in. $239.95.

The DP Consultant

Labels. Consists of 124 labels; fifty-six rectangular labels that tell you disk contents, sixty universal symbols advising on disk care, and eight blank disk labels for versatile use. $3.

D/Punch

Flip-It. Turn your floppies to flippies. Stop wasting half your memory/money. Use both sides of your single-sided disks. There is no need to measure, make alignment marks, or alter your hardware. Great as economical means for having backup copies. Five and one-quarter inch one-step is portable; will convert your floppies wherever you need. $16.95.

Dynatec Systems

Cooling Fan. $38.

Joystick. $25.

Keyboard. $62.

Fiberbilt Computer Cases

Apple II Case. A security cover at home, and a travel case on the road. One or two disk drives always remain connected; cover can be closed (and locked) or completely removed without disconnecting cables from monitor or printer. Contour-molded base with a hold-down strap and foam padding. $69.50.

FMJ

Printer Pal. All-steel stand stores paper below printer for extra convenience and space. Includes paper guides, cable clip, and rubber feet. Models available for most printers. $29.95 to $54.95.

Cool Stack. All-steel shelf unit for storing your disk drives and monitor above the Apple II. Includes fan to keep the computer and cards running reliably. Optional Power Sentry has four power outlets, keylock switch, separate reboot switch, and transient suppression. $86.

Monitor Stand. Supports your monitor over your computer, allowing easy access to the computer and flexibility in positioning. Optional ball-bearing swivel plate allows easy turning of monitor. All-steel welded construction. $39.95.

Cool Stack-Sentry II. Offers the features of locking, cooling, easy tilt access, and efficient organization in one compact unit. Precision all-steel construction with attractive textured finish. $175 including fan and library rack.

Giltronix

Selecto-Switch RS-232-C 5200 Series. Enables port expansion and device sharing. Available with one I/O port and two to six communication ports. Switches twenty-four lines. Manual operation; no power required. P.C. board construction. Five year limited warranty. $159 to $299.

Selecto-Switch 5400 Series. Centronics-compatible. Enables printer sharing. Available with one I/O port and two or three communication ports. Switches thirty-six lines. P.C. Board construction. Five year limited warranty. $239 to $279.

Graphic Dimensions

Applelog Notepad. Makes documenting and notetaking easier, organizing and filing more efficient. Each page has space for user reference information, the status of the information, and its disposition. Printed in red on quality white stock. 5½ by 8½ inches punched to fit most binders. $5.

Guild Musical Instruments

Guild Computer Rack. Comfortably fits over keyboard. Holds one or two disk drives and easily supports a monitor on top. Fully vented to accommodate fans. Fully assembled. Solid mahogany, $69.95; solid ash, $54.95.

Hayes Products

Mach II Joystick. For use with game, business, and graphics applications. Provides perfect arm alignment with 360 degrees of movement, has fine trim adjustment for each axis, and incorporates a self-centering feature that can be externally disengaged. $44.95.

Mach III Joystick. Provides the same quality features as the Mach II, plus features never before available in an analog joystick—push-button switch on the stick handle and stainless-steel ball as its main pivot. $54.95.

Hi Tech

Right Notch. A handy little tool that cuts a sharp, clean square notch in exactly the right place, allowing you to use the reverse side of disks for double the storage. $19.95.

Hollander Office Products

Anti-Static Dust Covers. For all office machines (computers, printers, CRTs, disk drives, typewriters). Clear plastic or cloth-backed vinyls in saddle tan or almond. $11.95 to $26.95.

HSP Computer Furniture

Space Saver. Accommodate the complete Apple with separate keyboard. Has swing-up aluminum document holder, twenty-six-inch keyboard height; high-pressure laminate finish in wood grains and solids. $169.

Hutton Industries

The Qwk Cover. Protection for the Apple II and IIe. Made of high-impact, tectured black plastic, the cover holds itself snugly in place on padded arms. Distinctive and quality protection against dust and debris. $12.95.

Hy-Tek

The Computer Mug. The cheapest insurance available for your Apple, disks, and nerves! High-quality, wide-bottom mug with spill-resistant top featuring Apple peeks, pokes, and calls sealed within its thermal sides. Apple color compatible. $9.95.

Intra Computer

Printer Switch. Permits word processing computers with parallel printer ports to easily toggle between high-speed dot-matrix and letter-quality daisy wheel printers. Includes printer cables. $165.

I-Protect

Nonglare Leaded Acrylic Filter. Nonglare, antiradiation, anti-ultraviolet static reduction image enhancement filter. Reduces glare, reduces static charge by an average of eighty percent, and greatly enhances the image contrast. Attaches with velcro. Includes sturdy aluminum frame. $99.95.

Plain Leaded Acrylic Filter. Reduces radiation and ultraviolet emissions by ninety-seven percent. Reduces static charge by an average of eighty percent. Attaches with velcro. $49.95.

John James Furnishings

Comp-u-Corner. A modular furnishing system that offers many options and allows for custom configurations. $399.

Compu-Mate. All-wood or laminate work stations and matching printer stands. Retail computer outlet merchandising also available, consisting of fixtures, display cases, and design services. $199.

Kensington Microware

System Saver. Power convenience center with multioutlet strip. Plug in your printer and monitor and one front-mounted switch powers your whole Apple system. Protects system from irregularities in the power line—surges, spikes, and line noise. Cooling fan keeps dangerous heat from building up inside the Apple. $89.95.

Kraft Systems

Apple Joystick. Features spring-centering and free-floating stick modes selectable by switching external toggle switches on the bottom of the case. Trim controls on each axis, and a full one-year warranty. $64.95.

Kraft Paddle Pairs. Features an optimum 185-degree rotation. Custom potentiometers designed specifically for Apples, assuring hi-res and accuracy with no "hop." $49.95 per pair.

Last Electronics

Plexa-Lok II. Acrylic protective cover for the Apple. Slips over keyboard, protecting it from spills, dust, and unwanted little fingers. Apple can be left on for extended periods without worry of overheating. $19.95.

Plexa-Lok III. Acrylic protective cover for the Apple III. $24.95.

LinTek

Monitor Mover. Adjustable mechanical arm that will hold the microcomputer display up off the user's desk, freeing valuable work space. Adjusts in four ways to provide complete flexibility of placement in the work area. Features all steel construction, off-white urethane finish. $129.95.

Lloyd's of London Press

Lloyd's 1984 Diaries. Business diaries of calf's leather, with international vacation listings, major city maps, and a history of Lloyd's. Models for your pocket, wallet, or desk. $6 and up.

LoTech

Patch Computer Bug Spray. While the pet of Silicon Valley may not get the bugs out of your system, it will remove grime from most video display screens. The product includes tongue-in-cheek directions, laced with heavy doses of computer jargon and "disk-claimers." $5.95.

Luxor

Portable Computer. For Apple model LE-MST Station. Industrial foam construction with steel monitor shelf. Four-inch, heavy-duty ball bearing casters provide easy movement over rugs or rough floors. Top shelf secures disk drives. Monitor can be secured to top shelf with safety strap or locks. $118.

Metafab/Microcomputer Division

Microbridge 1 and Microbridge 2. Durable steel printer stands. Slotted for bottom feed printers, if needed. Create storage space underneath printer paper supplies. Textured and finished in neutral beige. MB 1 (for eighty column printers), $25.95; MB 2 (for 132 column printers), $33.95.

Microstand 2.2. Durable steel shelving stand for Apple IIs. May be used with or without side mount fan units. Shelving for disk drives and monitor. $45.95.

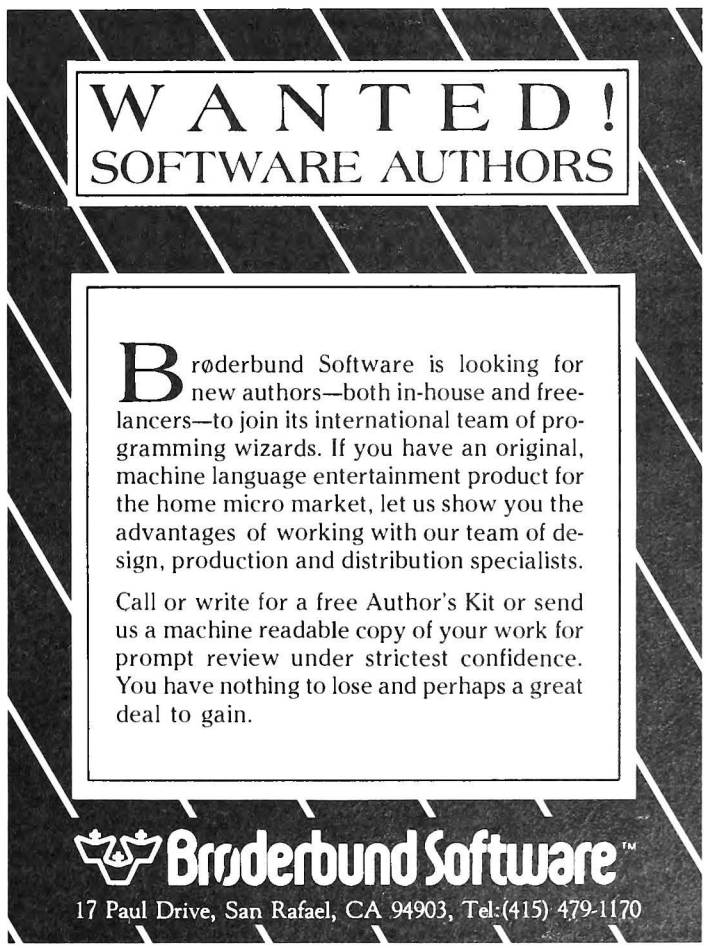
MicroComputer Accessories

Manual Easel. Made of thick bronze-tinted acrylic with an extra wide lip. Makes those bulky computer and software manuals easy to use by propping them up at a comfortable viewing angle. It even has protective pads to prevent skidding. $20.

Rolltop 100 Disk File. Makes storing and locating floppy disks a breeze. It has twice the capacity of the leading flip-style file, yet takes up no more room. Holds one hundred 5¼-inch disks and includes ten index tab/dividers to keep programs organized. Constructed of textured gray unbreakable ABS plastic with a rolltop tambour door of baked-on bronze enamel paint and anti-skid feet. $36.

Mimco Stick

Self-Centering Joystick. Increase control of fast-action games. The smooth, bidirectional axes and three push buttons enhance user abilities. Flipping a switch transfers control from joystick to external port, allowing connection of paddles and other accessories without going inside the Apple. $59.95.



Nanos Systems

Basic Reference Card. Quick reference to: Applesoft and Integer Basic, Basic statements, Basic functions, derived functions, special characters and operators, system and utility commands, pokes, peeks, calls, monitor commands, key and control functions, Applesoft internal codes and reserved words, Integer Basic addressing, DOS 3.3 command summary, color selection chart, more. Seven panels, fourteen pages. $3.95.

Basic and 6502 Reference Card. Quick reference to: all features of the Basic card, plus 6502 timing, 6502 language simplified, flags and conditions with reference chart. Eight panels, sixteen pages. A complete summary of all manuals that come with the microcomputer. Quick reference at your fingertips. $4.95.

National Field Sales

Stedi Watt. Complete line of AC power line filters. Stedi Watt protects computers from damaging voltage fluctations and harmful noise. $64.50.

Orange Micro

The Bufferboard. An expandable printer-buffer, upgrades your current interface with up to 64K of memory or twenty pages of text. Orange Micro originated this dock-on concept of buffering. $175.

O'Sullivan Industries

CT710 Series—Computer Furniture. Includes computer workcenter and printer stand with accessories to meet space requirements. Finished in light hickory vinyl laminates. $149.95.

CT720 Series—Computer Furniture. Includes computer workcenter and printer stand with accessories to meet space requirements. Finished in bartonwood and dark brown vinyl laminates. Steel support rails. $169.95.

Paper Tractor

Paper Tractor. Carries ordinary paper through your tractor feed printer. Just snap plain paper into the paper tractor, feed paper tractor into your printer, and print away. Works with all major printers and does not require hardware changes or time-consuming installation. Paper tractor holds checks, invoices, letter and legal size paper. $11.95.

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Because our ad manager has a small weakness for pizza, we call it The Pizza Program. Actually, it's a complete meal planning system. It generates delicious dinner menus and shopping lists according to your tastes, your diet, and your budget.

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PerfectData

Anti-Static Kit. The spray in this kit prevents buildup from around sensitive computer equipment. When applied directly to carpets, floors, furniture, and around computers, annoying and harmful electrostatic charges are minimized. $6.95.

Head Cleaning Kits. For 5¼-inch and 8-inch flexible disk drives. Kits safely clean single or dual sided drives without field engineering assistance. $29.95.

Micro Maintenance Kit. Intended for use in periodic preventative maintenance and cleaning of flexible disk drives, tape drives, printers, CRT screens, and keyboards. $39.95.

QIC Drive Cleaning Kit. For quarter-inch cartridge drives, also known as streamer drives. The QIC Drive Cleaning Kit cleans the entire surface of the head assembly and the tape cleaning post in drives using the quarter-inch DC-300 or similar cartridge. Cleaning cartridge, one-ounce bottle of PerfectData solution, and twenty extra cleaning pads included. $39.95.

Tech Maintenance Kit. Provides the computer user with the proper materials to clean read/write heads, guides, capstans, tape paths, and other working components of magnetic peripheral devices. $24.95.

Type Element Cleaning Kits. For printwheels and Selectric type balls. Removes paper dust and ink residue that create problems with legibility. $19.95.

Video Display Cleaning Kit. Recommended for cleaning terminal screens and keyboards. Contains two four-ounce bottles of video display cleaning solution, pump spray dispenser, and fifty cloths. $12.95.

Personal Computer Accessories

Antistatic Dust Cover Set. Clear vinyl cover fits over the Apple with Apple-style monitor positioned atop the computer; second cover fits over one disk drive. $19.95. Printer covers for various styles, $10.95. Apple disk drive covers, for two drives stacked, $10.90. Single drive covers, $9.90.

Molded Apple II Plus/e Carrying Case. Custom-designed cavities securely hold the Apple in place on the left and the Apple disk drives (two) on the right. Constructed of dual-wall, high-density polyethylene. Free dust cover with order. $109.90.

Picture House

Basic Comfort SL. A 15-by-25-inch work area (reading and writing) located directly in front of the operator; keyboard height is set for maximum comfort; sliding top designed for easy access to peripheral slots; dust cover feature—slide the keyboard forward for protection when not in use. $189.

Professional Calculations

Procalc. *VisiCalc* templates. For architects, engineers, machine designers, and technical educators. Calculate all the static loading values for any of the forty-two loading conditions listed in the AISC manual. II or III; *VisiCalc* required. $130.

RH Electronics

Super Fan II. Patented cooling with up-front on and off control for computer monitor and printer. Two-year warranty. Includes airflow kit for Apple monitor stand. $74.95.

Super Fan II with Zener Ray. Patented cooling product with reliable EMI and RFI filtering and surge suppression for added system protection. Failsafe warning system ensures customer awareness of true operating transient suppression. Two-year warranty. Also includes airflow kit for Apple monitor stand. $109.

Guardian Angel. Uninterruptable power supply provides protection against data loss occurring from blackouts, brownouts, and power surges. Available in 120V or 230V, 150 watts. $595.

RKS Industries

Surge Sentry Model SS-120-D. Protect equipment from voltage drops or outages. When voltage drops below a safe level, the unit shuts

off. Check and reset your equipment before returning power. Indicator lights tell if a dropout has occurred. Power is restored by pushing a reset button. Four 120-volt receptacles. Five picosecond response time, 100 Joules energy dissipation rating. $132.

Surge Sentry Model SS-120-H. A 120-volt version designed to protect equipment using standard three-prong, NEMA 5-15p plugs. To install, simply plug the Surge Sentry into any standard 120-volt outlet, and then plug equipment you want protected into the Sentry. UL listed. Five picosecond response time, 100 Joules rated energy dissipation at 100 microseconds. $89.50.

Surge Sentry Model SS-120-M. A 120-volt unit with six receptacles. Protect entire systems, computer and several peripherals, with just one unit. UL listed. Five picosecond response time. One hundred Joules energy dissipation rating at 100 microseconds. $104.50.

Surge Sentry Model SS-120-SC. Select the peripheral to control the power on/off of entire computer or audio/video system. Plug selected peripheral into the control socket, plug remaining peripherals into remaining sockets, and have the convenience of one-switch control and complete protection for the entire system. Five picosecond response, 100 Joules rated energy dissipation at 100 microseconds. $149.

Safeware

Safeware Insurance. Covers all hardware, media, and purchased software. Safeware provides full replacement value after a fifty-dollar deductible. Protect your system against power surges, theft, fire, accidental damage, and more. One year, $35.

Secure-it

Kablit Security System. Secure many different types of computer equipment using surface-mounted screws. No drilling or gluing required. Installs in ten minutes. $49.95.

Sirius

Joyport. Provides expansion of the game paddle port to allow the use of four paddles (with all four buttons functional), or of one or two Atari-type joysticks (typically faster, simpler, and substantially less expensive). $49.95.

Southern California Research Group

Extend-A-Slot. An extension cable that plugs into one of the Apple's peripheral connectors. It brings a slot outside the computer, allowing for an easy change of peripheral cards. Also enables experimenters to gain easy access to all power and signal lines. Works well with slow to medium-speed cards. Due to eighteen-inch cable, it is not recommended for high-speed devices. $34.95.

Paddle-Adapple. A game I/O expansion product that allows the user to plug in both paddles and joysticks and to select which one to use by an integral switch. The user may also reassign game controller and push-button inputs. Three versions are available for various combinations of sixteen-pin and nine-pin connectors. $29.95.

Switch-A-Slot. An expansion chassis allowing the user to plug in up to four peripheral cards while using only one slot. The unit connects to the Apple via an eighteen-inch cable, and the user selects the card with a switch. Not rcommended for high-speed devices. $179.50.

Southwestern Data Systems

Vinyl Disk Pages. Pack of ten vinyl notebook pages, each of which holds two disks. Well suited to archiving large numbers of disks in an economical manner while providing easy access to stored disks. $6.95.

Station Products

Softwear. Authentic hickory-striped blue denim engineer caps with sewn-on patches. Choice of "Software Engineer," " Computer Engineer," or "Hardware Engineer." Available in adult sizes S, M, L, XL and children sizes XS, S, M, L. $4.95 each.

StorWares

Disk Storage Systems. Elegant, hand-crafted solid oak or walnut disk storage systems feature solid brass piano hinges and clasps, storage for seventy-five disks, felt bottoms, two removable dividers, and a fine, hand-rubbed lacquer finish. Oak, $50; walnut, $60.

Tech Designs

Adam and Eve I. Only paddles with trimmer control to allow paddle to be matched precisely to computer or particular game; printed circuit design means unmatched reliability. $34.95.

MAGstik. Replaces TDI joystick. Improved centering adjustment, self-centering easily defeated, dual side-by-side pushbutton switches in a human-engineered case, comfortable in either hand. Ideally suited as cursor control in computer graphics. $64.95.

Paradise Ports. Expansion device that allows combination of three joysticks or paddles without unplugging. Sockets are actually part of board itself; board and pad are only 5/16 of an inch thick. Covered by rubber cushion 3/16 of an inch thick. Unit is easily mounted to computer with Velcro or two-sided tape. Gold pins on eighteen-inch blue ribbon cable make it suitable for IIe. $39.95.

Tencal

Cool-time. A multifunction cooling, power control, surge protection, and clock/timer unit. Removes heated air through the rear of the unit. Featured are two rear power outlets and two lighted front panel switches, providing control of the Apple, the monitor, and the printer. Digital clock tells real time, monitors elapsed time. $89.95.

3M

3M Disks. Designated as SSDDRH or KSDDRH. Designed to fit Apple drives as well as aftermarket drives compatible with your system. 3M disks come in both ten-packs and two-packs for your convenience. Single disks, $1.65 and up.

3M Head Cleaning Disks. Designed to keep your read/write heads clean, lessening your concerns about lost data due to contamination.

Trace Systems

SoundTrap. Cuts printer noise drastically, lets you concentrate on meetings or phone conversations without printer noise bothering you or others. Can be tilted for better viewing of printouts and used as input



COMPUTER STAND

Designed for the Apple® with o built in shelf for your drives ond a top plotform tilted slightly forword to improve monitor visibility and reduces glare. The sides ore slotted for oirflow. The best stond ovoiloble for your Apple.

APTEK 101 **$29.50**

PRINTER STAND
(not shown)

A needed oddition to oll printers. Includes o shelf ond enough storage room under the printer to store o full 4" of poper.

APTEK 216 (fits MX-80 type) **$27.50**
APTEK 221 (fits MX-100 type) **$29.50**

SOUND CONTROL PRINTER STAND

Includes o tough ocrylic cover for sound reduction, ocoustic foam ond speciol padding reduce bothersome printer noise. Holds 4" of paper under the printer (center feed too) this stond will become o voluoble occessory!

APTEK 320 (MX-80 type) **$79.50**
APTEK 325 (MX-100 type) **$89.50**

FLOPPY DISK RACK

Attroctive ond duroble with o hinged acrylic cover for moximum disk protection. Reduces dust related disk errors! Designed for over fifty 5" disks.

APTEK 505 **$29.50**

Send poyment to: Apogee Designs Ltd., 3100 Follscliff Rd., Baltimore, MD 21211. Phone (301) 235-7523. Moster Cord ond Viso. Add $2.50 for freight per unit (Continentol U.S.) Add 5% soles tox for MD residents.

APOGEE DESIGNS LTD.

copy stand. Includes handy paper storage rack. $129.

Trackhouse

IIe Tender. Programmable data entry numeric keypad. Four programmable keys, four cursor directional arrows, delete key. Easy installation, detachable cable, RFI shielded and FCC certified. $199.

Universal Industries

The Apple Stacker. Designed to stack and project the Apple II computer system. Creates a work station out of any surface. Space for the keyboard, two disk drives, and a twelve-inch monitor. All-steel open grid with no heat or dust trapping surfaces. Protects the user's investment; showcases the system. $30.

Astroflex. Universal copy holder helps eliminate data entry errors. Clamps to any surface, swings and tilts to any angle. Clip your entry material under built-in clip; position above keyboard, next to monitor, wherever it's convenient. No more back, neck, or eye strain. All-steel construction. $29.95.

Versatile Universal Rack. Designed to support monitor, CPU, disk drive, printer combination. Design your own layout. Elevate the monitor above the keyboard for comfort. Place paper under rack and printer on rack. Configure disk drive or cassette under or on rack. $35.

Verba Gloria

Apple Under Glass. Clear acrylic top for an Apple allows for curious eyes but not wandering fingers or foreign objects. The usual Apple top is completely replaced by the Apple Under Glass, which uses the same fasteners to hold it securely in place. $27.95.

Data Stand. A strong, lightweight solution to the problem of where to put that program listing while you're typing it into your computer. Single sheets or large magazines are held at a comfortable reading angle. $20.95.

Under-Stand. A strong yet stylish stand that supports two drives and monitor over an Apple. The strength of 3/8-inch clear acrylic means that the Under-Stand will support even the weightiest monitors while providing enough room for proper cooling and for easily sliding the Apple out from underneath for access to peripheral cards. $71.95.

Universal Printer Stand. Comes with a paper tray. The printer stand is a full 17 inches wide and 15 inches deep, of strong 1/4-inch acrylic so it can handle almost any size or weight printer. The paper feeds from underneath and is deposited neatly in the paper tray, avoiding the problems of twisted or torn paper. $37.95.

Verbatim

Data Life Head Cleaning Disk. Removes most debris from a disk drive within sixty seconds. Presaturated disks require only simple insertion into special jacket before inserting them into the disk drive. The kit includes two disposable cleaning disks, one jacket, and instructions. A package of ten replacement disks is also available. Eight-inch disk kit, $8.50; 5¼-inch disk kit, $7.75. Eight-inch replacement pack, $15; 5¼-inch replacement pack, $14.50.

Data Life Holiday Pack. A special offer. Pack includes ten Data Life 5¼-inch minidisks in a plastic storage case and a free head-cleaning kit. Data Life disks are certified one hundred percent error free and warrantied five years. Single-sided, double density, $35; double-sided, double density, $47.50.

Versa Computing

E Z Port I. Makes game I/O changes convenient, quick, and safe. Eliminates bent paddle pins. A board with a socket and a two-foot long cable that plugs into the internal I/O port. Attach wherever you prefer on the outside; on the side, back, or on top. Sockets will not wear out like ordinary sockets. $24.95.

E Z Port II. An extension cable for the game I/O port of the Apple II computer providing two ZIF sockets. Switch select each paddle from socket A or B, providing additional flexibility when using paddles, joysticks, VersaWriter, game-connected printer, or light pen. $34.95.

VF Associates

Disks. Highest quality, lifetime guarantee, double density 5¼-inch soft-sectored disks. Finely textured, loose-fitting jackets, white Tyvek envelopes. Double-sided disks, $1.65 each, 100 for $155; single-sided bulk packs (100), $149.

The Walker Company

Apple Stand. A practical and distinctive alternative to the practice of stacking monitors on top of computers and disk drives. Cantilevering of the tiers allows easy access to computer, as well as unrestricted ventilation. $49.95.

Double Disk Box. A tabletop disk storage box that accommodates up to eighty floppy disks. Dividers included. $59.95.

Oak Printer Stand. Accepts all popular eighty-column printers. Provides for storage of fan-folded printer paper in a desktop work area. $39.95.

Wallace Micro-Mart

Flooby Dust. A lifetime supply, neatly boxed for effective display. Complete instruction manual; contest entry form. Dealer price in case lots only. Each case includes eighteen bottles of Flooby Dust and a colorful, eye-catching shipping carton that also serves as a display case. $2.95.

Flooby Dust T-Shirt. "I'm a Flooby Dust User." $6.95.

Flooby Flapper. If Flooby Dust refuses to perform, you may need a Flooby Flapper to make it behave. A little love pat or an all-out beating may be required. $1.65.

"Saga of Flooby Dust" Program. This program is in Apple II, IIe, or III emulation DOS 3.3-readable form. Winners of the *Saga* receive a free Flooby Disk. $7.60.

Flooby Disk. Any program stored to the Flooby Disk with Flooby Dust properly applied is guaranteed to be bug-free. $1.25.

The Wallace Users Guide. *The Wallace Users Guide* to the Apple computer displays thousands of items for Apple II and Apple III computers. $9.95, but a certificate worth $9.95 off first purchase from the guide is included.

WattsOut

WattsOut. An antistatic device for use with computers. When users place WattsOut near the equipment, attach it to a proper ground, and touch it before engaging the keyboard, static electricity that can cause incorrect data entry, circuit damage, and memory loss is drawn away. $9.95.

Wholesale Technology

Half Track Cooling System. Comes with front panel, illuminated on/off switch, and two three-wire grounded auxiliary outlet receptacles mounted on the rear that allow you the convenience of one-button power control for the total computer system. The cooling system comes complete with AC surge suppression circuitry, and the fan is rated at sixteen cubic feet of air per minute for cooling. $79.95.

Half Track Professional Joystick. Metal-enclosed, left and right push buttons using micro switches for firing, and adjustable joystick height. Dual trim tabs for fine horizontal and vertical centering. Potentiometer self-centering-type control for horizontal and vertical coordination are also featured. $69.95.

Williams & Foltz Computer Furniture

Apple Cart. A flexible group of solid oak carts and work stations with accessories attached to fit your individual work habits. Has disk drive storage areas. $475.

Workstation. Four-foot model features document storage with small drawers. $665.

The Wood Works

Workstations. Efficient, ergonomically designed workstations of hardwoods and hardwood veneers (available in oak, walnut, cherry stained, or natural finishes). Line includes work tables, printer tables, shelf units, chairs, drop leaf attachments, and drawers. Basic forty-six-inch worktable. $160.

Word-Power

File Master. Flexible plastic file card holder attaches to the program disk and remains outside the disk drive while the disk is in use. Allows you to see what files are on the disk without removing it from the drive. Package of ten holders, tan file cards and mounting tape. $4.95.



Abacus Enterprises

Know-Drive. Multifunction Know-Drive is fully compatible with major 128K cards. Option allows expansion to 512K. Disk simulation software included. Hardware write protect. Reset vectors RAM/ROM. Play-back option includes NMI software to analyze/modify and save protected program memory to disk. Know-Drive (128K), $335; Play-back, $39.

Adwar Video

Apple Proc Mod. Video processing board. Allows recording of video signal onto all videotape recorders. Results are suitable for editing and duplication. $99.50.

Apple Mod ARS-170A. Video processing board. Allows interfacing of the Apple with NTSC video systems for character generation, computer graphics, and so on.

Meets NTSC broadcast standards. $1,495.

Alf Products

Alf AD8088 Processor Card. Gives the Apple user sixteen-bit capability with access to CP/M-86 programs. The board also comes with software that speeds up Applesoft math functions. CP/M-86 is available separately. $345.

Alien Group

Voice Speech Synthesizer. Not only speaks, but also sings. Software converts the bottom two rows of the Apple into a piano. $215.

Alpha Logic Business Systems

Bosmerco Multiport. Lets you connect up to six peripherals to the gameport. Switch from joysticks to paddles to software protection devices at the push of a button. $45.

Accelerator II. Speeds up your Apple to three-and-a-half times its normal speed. Your *VisicCalc* models calculate, replicate, and otherwise operate faster. Basic and machine language programs run faster. $599.

Saturn 32K, 64K, and 128K Memory Boards. Bring new power to the Apple, making possible the use of up to 176K of *VisiCalc* workspace. Software provided to use boards as RAM disks. $219, $349, and $499.

Amdek

Amdisk-1. Three-inch micro-floppy disk drive system. Up to 286K of formatted storage capacity. The recording format, data transfer rate, and disk rotation speed are compatible with Apple II standard 5¼-inch drives. The single-sided double-density drive is housed in a compact case and is interfaced via a twenty-pin flat cable connector. Cartridges have a hard plastic case and hinged cover for thorough media protection, plus a write-protect mechanism. $299.

Anthro-Digital

Omniscan Laser VideoDisc Interface. Gives your computer control over all the functions of a low-cost Pioneer-type laser disc, including frame search, two-channel sound, conditional branching, scoring, and more. A low-cost entry into interactive video. Interfacing in four languages is supplied. $275.

Applied Analytics

MicroSpeed. Minicomputer performance for the Apple. High-speed hardware/software superset of the Forth language, with Applesoft and Pascal booster disks included. MicroSpeed II system, $495; MicroSpeed II+ system, $645. Note: special holiday discount—$200 off list prices through December 31.

Applied Creative Technology

Printer Optimizer. A 64K to 256K spooler with space compression for more efficient memory usage. Capabilities include being able to adapt mismatched equipment of various brands; filter, translate, modify, merge, or delete data; and provide for remote control of all printer functions. Options include serial/parallel conversion, protocol conversion, and connection of up to three printers with automatic or manual switching between them. $499 and up.

Applied Engineering

Eight-Bit Eight-Channel A/D System. Eight-bit resolution, on-board memory, fast conversion. Eliminates the need to wait for A/D conversion. A/D process transparent to Apple (looks like memory). $129.

Memory Master IIe. 128K RAM card. Expands your Apple IIe to 192K memory. Compatible with all Apple IIe eighty-column and extended eighty-column-card software (same physical size as Apple's 64K card). ProDOS will use the Memory Master IIe as a high-speed disk drive. $249.

Super Input/Output Board. A unique interface for your Apple. Now, on one card, you can have eight inputs and eight outputs, each with its own connector. $62.

Super Music Synthesizer. New improved hardware and software. Complete sixteen-voice music synthesizer on one card. Just plug into your Apple, connect the audio cable (supplied) to your stereo, boot the disk, and you're ready to input and play songs. Two disks are filled with over thirty songs ready to play. $159.

Timemaster. A clock that does it all. Automatically date stamps files with ProDOS. Just plug it in and your programs can read the year, month, date, day, and time to one millisecond. The only clock with both year and milliseconds. $129.

Twelve-Bit A/D Converter. Sixteen independent channels with software programmable gains. Powerful and accurate A/D converter for the Apple. $279.

Viewmaster 80. All-new design using a new microprocessor-based CRT controller for a razor-sharp display. Incorporates all the features of other eighty-column cards, plus many new improvements. $169.

Z-80 Plus. Totally compatible with all CP/M software. Specifically designed for high-speed operation in the Apple IIe, but runs just as fast in the II+. A semi-custom I.C. and a low parts count allow the Z-80 Plus to fly through CP/M programs at a very low power level. $139.

Atlantis

MicroDrive II. Built into the low profile of the MicroDrive II is an advanced mechanical design for greater reliability plus quicker start-up and access time. An automatic disk-eject mechanism is included. One-year warranty. FCC approved. $395.

Atlantic Data Monitor. The amber color screen on the ADP-120A is designed to reduce strain and eye fatigue. Gives sharp images due to its 800 lines of resolution. One-year warranty. $199.

ATV Research

Apple-Verter Model APX-800A. High VHF band high-fidelity RF modulator. Allows color and monochrome displays using regular TV sets on channels seven through ten. Plugs directly into computer. Complete with connecting antenna cable. $32.

Diamond TV Camera. Low-cost TV camera for use with A/D converters used in conjunction with computers. Complete with lens. $135.90.

Pixe-Plexer. A special IC-type modulator kit (audio and video) tunable from channels two through six. Assembly time is about two to three hours. Requires 15V at 50 ma. This is a module kit and does not contain case, power supply, or input/output connectors. $24.50.

Axiom

Color Printer. Four-color dot-matrix printer with screen dump software and cable. $599.

Bi-Tech Enterprises

Multiplexer. Allows users to share programs and data present on the hard disk, thus affording a true database to all users. By sharing only the hard disk drive, multiple users are free to use as much processor time as required without affecting the performance of others. $795.

Comrex International

CR-1000 ComDrive. A high-performance, high-reliability, economical upgrade for Apple. It provides a slim-line dual disk drive capacity in a convenient and dependable package. Fully compatible with all known existing business, game, and word-processing software. $699.

Concorde Peripheral Systems

Model C-111 Disk Drive. Full high, single-sided floppy disk drive. Fully compatible with all Apple and Apple-compatible computer systems. The first ultra-reliable, affordable disk drive that is one hundred percent Apple-compatible. Capable of storing up to 163K bytes of formatted data. $329.

Model C-112 Disk Drive. Full high, double-sided floppy disk drive. 326K bytes of storage capacity offers users twice the capacity of a standard disk drive, and at a fraction of the cost. One hundred percent compatible with all Apple and Apple-compatible computer systems. $539.

Model C-130 Floppy Disk Drive Controller Card. More memory control power than any other controller card available today. From just one slot of your computer, the C-130 supports up to four double-sided disk drives. One hundred percent Apple compatible. Comes with licensed Apple DOS 3.3 disk that allows Apple's DOS 3.3 to function with Concorde's double-sided disk drives. Also compatible with DOS 3.2, CP/M 2.2, and Pascal 1.1. $109.

Consolink

SooperSpooler and MicroSpooler. Standalone hardware print buffers with their own internal power supply. Compatible with either Centronics parallel or RS-232C serial interfacing. Capable of interface conversion. Standard features include digital status readout, pause function, reset function, protocol conversion, and variable baud rates. Both products are covered by a one-year limited warranty. SooperSpooler, $349; MicroSpooler, $199 to $339.

Cyber-Tech

Replacement Pressure Pad. A squeaky drive indicates that the pressure pad is worn and should be replaced before data disks are damaged. A kit containing an original manufacturer's replacement pressure pad, and a step-by-step instruction manual, with photographs, is available. $5.95. Extra buttons, $3.95 each.

Data-Cue

DiscMaster II. Allows the connection of eight-inch, five-and-a-quarter-inch, three-and-a- half-inch, or three inch disk drives. Drivers to allow the DiscMaster II to run under DOS 3.3, Pascal 1.1, and CP/M are available. Christmas special, $235.

Interfacer. Provides one fully programmable serial communications port and two complete parallel printer ports. This allows the connection of a modem, high-speed data processing printer, and word processing printer while using a single board. $95.

Data Encore

Data Life Disk Drive Analyzer. The 5¼-inch minidisk is a diagnostic tool that will check the performance of disk drives. User-friendly software runs four comprehensive tests to check head alignment, disk clamping, write/read accuracy, and disk speed within minutes. It then displays a read-out with evaluations and indicates areas needing adjustment and/or repair. $39.95.

Data Frontiers

El Cid. CompuWriter typesetter interface that lets you typeset word processing text files easily. Compatible with the CompuWriter models Jr., I, II, all Apples with RS-232 port, X-on, X-off protocol. $599.

Data Impact Products

D-92 Dot Matrix Printer. Standard features include seven-by-nine font for data processing printing, eleven-by-nine font for correspondence-quality printing, one hundred cps bidirectional with short line logic seeking, 800-character buffer, 100 percent duty cycle, and six different character sizes. Holiday special also includes Apple Interface Card; with cable free with printer purchase. $399.

Data Terminals and Communications

Style Writer Daisy Wheel Printer. Parallel, complete word processing and graphics. Wide variety of daisy print styles. Memory stores up to twenty pages, prints over 130 words per minute, automatic proportional spacing and underscore, variable pitch and lines per inch, red and black printing, shadow print, subscript/superscript, bidirectional printing. Optional sheet feeder and forms tractor. $899.

DTC 380Z Daisy Wheel Printer. For personal and business computers. Has 48K buffer and software compatibility with Diablo 1640/1650/630. Prints at 32 CPS, bidirectional. Sheetfeeder and forms tractor options. $1,495.

Davong Systems

Streaming Tape Backup. Copies data from a Davong Universal Winchester hard disk system or floppy onto one-quarter-inch tape cassettes. Can prevent the loss of valuable data in the event of a hardware malfunction or programming error. Disks are not removable. With tape backup, cassette copies can be stored at another location for safe archival storage. Stand alone, $1,995; with disk drive, $1,795.

Universal Winchester Hard Disk Systems. Disk storage system for accounting, database management, and other data-hungry applications. $1,845 to $3,995.

Winchester Hard Disk Software. Multi-OS disk operating system enables use of multiple operating systems (DOS, Pascal, and CP/M). Allows files to be imported from one operating system to another. Enables user to boot from any disk-resident operating system. Password protection to prevent unauthorized access to sensitive data. $1,845 to $3,995.

Decillionix

DX-1 Sound Processing System. Hardware/software package for recording, processing, and playing back real sound. The technique used is eight-bit A-to-D and D-to-A "sound sampling." Although this technique offers limited sound duration (one to ten seconds), some amazing feats may be accomplished with the software program. $239.

Dynamic Solutions

Appligration. A system that automates data acquisition, analysis, and reporting for chromatography, spectroscopy, colorimetry, and thermal analysis. This system supports several analog-to-digital converters and can sample up to 20,000 samples per second. $3,000+.

Dynatec Systems

Disk Drive. Full height. $185.

Disk Drive. Half height. $190.

Eco-Tech

Interfaces. Four laboratory and industrial control interfaces. Options available are twelve-bit analog input, eight-bit analog output and input, and thirty-two-bit digital I/O. Each package includes basic interface software and graphics package. $841 to $1,600.

Eventide

APX252 Real-Time Audio Analyzer. Divides the audio frequency spectrum from 20Hz to 20kHz into thirty-one one-third-octave bands. The relative amplitudes of these bands and the input level are displayed on the hi-res screen. Firmware also allows keyboard control of mode and update. Optional *Specsystem 2.0* software provides more spectral analysis features including three-dimensional spectral surface display. $595.

Frisbee Electronics

Real-Time Clock. Comes complete with all firmware and battery. Offers use with simple "in" statement. Operates in any slot. Many optional software programs available. Clock provides seconds, minutes, hours, days, and years on readout. $75.

Frobco

Frob Banker Package. Converts your Frob-26 to an expanded bank-switching system. Includes additional Frob interface board, bank-switching cartridge adapter, software, and documentation. Good news for those with Frob-528K system: Modification package, $50. Frob Banker Package, $350.

Frob-26. Design cartridge software for the Atari 2600 video computer system. A complete hardware/software package that includes Apple II/IIe 4K interface, VCS cartridge adapters, and software development tools (debugger/disassembler/explorer/file utilities). Manual includes a complete description of the interworkings of the VCS. $495.

Hewlett-Packard

HP 7470 Graphics Plotter. Provides for automatic pen changing for two colors or two line widths. Can be used for generating paper plots and overhead transparencies in 8½-by-11-inch size. Supported for Apple on most of the leading graphics software packages. Five character sets. $1,095.

HP 7475 Six Pen Plotter. Provides for automatic pen changing in up to six colors or two line widths. Can be used for generating paper plots and overhead transparencies in sizes 8½- by-11 inches and 11-by-17 inches. Supported on most of the leading graphics software packages. Nineteen character sets. $1,895.

High Order Micro Electronics

Repeaterrrr. Two enhancements: auto repeat and high speed repeat (two speed, keyboard selectable). Repeats any keypress after adjustable delay. Perfect word processing, programming, and *VisiCalc* aid. Excellent for scrolling or long cursor moves on sixty-six to eighty-column displays. Unique, high quality, plug-in unit; compatible with all soft-

ware, hardware, and Apple warranty. Revision seven motherboard or greater. $26.95 postpaid.

Repeaterrrr+. All of the features of Repeaterrrr plus plug-in shift-key modification to provide "standard" connection to game I/O without interfering with other game I/O connectors. Gives true shift-key operation. Requires software support. Works with virtually all current word processing programs. $36.95.

Hollywood Hardware

A/D Board AD-121602. Professional-quality twelve-bit A/D board features sixteen channels, high resolution (one part in 4,096), fast conversion (25 microseconds), selectable voltage ranges. Supplied with manual, cable, complete software on disk, including demo-scope graphic display. No programming required. Sixty day unconditional trial. $299.

Apple Prototype Board/Pro-1. The only extra-large professional prototype board. Room for fifty-two sockets. Complete pin numbering of rows, columns, peripheral and edge connector. Includes power busses with provision for filtering. Premium quality black fiberglass with gold-plated connector fingers. $29.95.

Forty-eight Line Parallel I/O Board ACPU-1. All lines buffered. Twenty-three lines out. Twenty-five filtered lines in. All lines are bidirectional if buffering is not required. Six on-board timers—two can accept external clock. Interrupt capability—remote or upon timeout. Includes gold edge connector and fifty-pin output connector with cable. Applications: process or motion control, data acquisition, high-speed data transfer. $249.

Prototype Board/IPB-1. Complete pin numbering of rows, columns, peripheral and edge connector. Includes power busses with provisions for filtering. Premium quality black fiberglass with gold-plated connector fingers. $39.95.

Software Enhancement System/Ultra ROM Board APB-102A. A firmware system that triples efficiency but requires no main memory and no disk access. *Global Program Line Editor* gives you global search and replace, insert, delete, zap, pretty comment, and so on. User-defined or predefined macros reduce command typing by ninety percent. & utilities provide fast searches, damaged program recovery, number conversions, Applesoft extensions, and so on. $189.

Innovative Measurements

IMI RealClock. Provides features you expect from a real-time clock plus new and unique capabilities. Combined with its flexibility and ease of use, these give you maximum value for your investment. $190.

IMI Hibernator. Provides user applications limited only by the imagination. $145.

Real-Time Clock/Calendar Card. Provides date and time values with a resolution of one millisecond. Four modes of interrupts ranging from milliseconds to months are all software-controlled. An alarm interrupt is generated with power off. Use with the IMI Hibernator to power up. $190.

Power Socket. Three-way AC line sockets with line transient suppression. AC line power may be turned on and off from remote contacts, front panel pushbuttons, or IMI RealClock with Apple AC line power off. $145.

Interactive Structures

Daisi. Data acquisition for the Apple II or IIe. A series of interfaces designed to read instruments and sensors, plus control temperature and pressure. $95 to $550.

Pkaso/U. A truly universal interface card with full text and graphics capability. Can be configured for any present or future dot-matrix printer that uses Centronics standard parallel port. Allows you to change printer as your needs grow, but not your interface card. $175 to $225.

Intra Computer

PSIO (Programmable Serial I/O) Board. Enables asynchronous serial communication via full RS-232 or current loop interface. Features programmable baud-rate and forms control, auto baud. Speaks ASCII and Baudot; works with *ASCII Express: Professional* and *Softerm.* $199.95.

Four-Way Printer Sharing Switch. Permits four students to get listings from their classroom computers on a single parallel printer. Including printer cable, $260.

MCE

VIM. State-of-the-art voice input module permits users to run the computer by voice only, thus bypassing the keyboard. Users can run software, program, and use word processors using voice alone. It is especially useful for those with certain types of handicaps, and for business use where hands are doing something else. $920 to $995.

Metamorphic Systems

MetaCard. A complete coprocessing system that includes an 8088 microprocessor operating at 5.12 MHz, 64K to 128K of on-board memory, and its own power supply. Both MicroSoft's MS-DOS and SofTech Microsystems's UCSD p-System Version IV.I operating systems are standard with MetaCard. 64K version, $850; 128K version, $980.

Microbasics

Bothware 8073. A self-contained computer based on the 8073 microprocessor which contains a high-level language on chip—Basic. A large wire wrap area is present for hardware interfacing. Typically, after an 8073 application program is developed, it is loaded into the board (or other boards) and run stand-alone, thus freeing the Apple for other uses. $199.95.

Micro Control Systems

Space Tablet Graphics System. Three-dimensional digitizing tablet. Four-axis Space Tablet with Space Graphics software. $795.

Micro Co-op

16K Card. Quality RAM card with four-month warranty. $54.95.

Micro Display Systems

Genius Full-Page Display. Provides hardware features, user benefits, and system performance equal to that of dedicated word processing equipment. The hi-res (800 by 720 pixels) fifteen-inch Genius with eighty characters by fifty-seven lines is supported by many of the most popular application programs. $1,795.

Micromax Systems

Graphmax. A graphics printer interface compatible with all standard Grappler+ applications. Additional standard features include text repetition, auto page numbering, and picture cropping. Optional features include color printer interfacing and zoom magnification of the picture up to ninety-nine times. CP/M- and Pascal-compatible. $159.95; with color and zoom option, $169.95.

Printmax. A parallel printer interface for all Centronics-compatible printers. It has a soft-controlled eighth bit transmission option to allow you to do dot and block graphics. Commands are available to enable/disable line feeds to adjust print width. CP/M- and Pascal-compatible. $79.95.

Viewmax-80. An eighty-column board compatible with most standard Videx software applications. Built-in features on the card include a forty/eighty soft video switch, inverse video, complete Pascal and CP/M compatibility, and Micromodem support. It has a complete ASCII character set with true lower-case descenders and shift key support. $229.95.

Viewmax-80e. Expands the Apple IIe memory space up to 192K by packing up to 128K memory with an eighty-column video function all on one board. It is compatible with all standard IIe eighty-column software applications including CP/M and Pascal. A Virtual Disk for fast RAM-based disk operation is also available. 64K, $189.95; 128K, $299.95.

Z-max. An affordable Z-80 card for CP/M operation. Compatible with Microsoft's SoftCard, ALS's Z-card, and all CP/M operating system application packages. The Z-max has a yellow indicator LED for the Z-80 mode and provides for full interrupt and DMA operation. $159.95.

Micro Power

MP-20. A high-end, full-control, ten-watt RMS per channel amplifier with .05 THD, both channels driven 20-20 kHz. Only one and a half inches tall, it was designed to complement the Apple and allow the user adequate power for higher-quality speakers. Designed primarily for the Mockingboard. $100.

Millenium 3 Engineering

The Sprite/Sound Board. Features thirty-two sprites, sixteen colors, 256 by 192 resolution, three tone and noise generators, ADSR envelope control, 16K RAM, and so on to give the Apple II true arcade-quality graphics and sound. Tutorial, reference manual, games, demos, utilities, "Amparcade" graphics, and sound language included. $225.

Multitech Electronics

SSB-Apple Speech Synthesis Board. 1200 words. At home playing video games, at school learning languages, in office repeating important screen messages, in factory taking instrument readings by phone from remote sites. Plug compatible with Apple II; uses advanced TI chip TMS5220; provide-a-socket allows memory expansion by adding another TI chip. $120.

Northwest Instrument Systems

Analyst Interactive State Analyzer. A real-time software debugging tool. Uses an external mainframe and can be configured with sixteen to eighty channels and 4,096K memory per channel. Selective storage of data is possible using fifteen trigger/store states and four word recognizers per state. The system is fully programmable using Pascal or assembly language. Basic sixteen-channel system, $2,995; sixteen-channel expansion cards, $895 each.

Model 65 Programmable Function Generator. A fully programmable signal source. Plugs directly into a single slot. Frequency range is 0.5Hz to 5MHz and it generates sine, square, triangle, ramp, and pulse waveforms. The user interface is menu-driven and programmable from a coresident Basic or assembly language program. $850.

Model 85 Digital Memory Oscilloscope. A fully programmable acquisition instrument that plugs directly into any two contiguous slots of a computer running DOS 3.3. Has dual channel capability and a 50MHz equivalent time bandwidth. $995.

Number Nine Computer Engineering

Booster Card. Increases processing speed by 3.6 times. Plugs into any expansion slot. Compatible with all Apple peripherals and software. Comes with 64K high-speed memory, built-in language card. $599.

IIe Booster Card. Increases system execution 3.4 times. Plugs into any expansion slot. On-board PROM eliminates software preboot. Contains 64K high-speed memory and built-in language card. DMA capability allows for coprocessors and hard disk interface. Compatible with all Apple peripherals and software. $599.

Omega Microware

Ramex 16K. Memory expansion board that contains 16K of additional RAM. Compatible with Microsoft SoftCard, *Cobol-80*, *Fortran-80*, *Basic Compiler*, *Apple Pascal*, and *Assembler Language Development System*. $139.95.

Ramex 128K. A multipurpose expansion circuit board that contains 128K of RAM memory. *The Enhancer*, accompanying disk emulation software, will provide eleven additional DOS commands that decrease access time in writing or converting existing unprotected software. Ramex is a flexible memory board, since it can function as a Virtual Disk drive in slots 0 through 7. $499.99.

Optimal Technology

EPROM Programmer Model EP-2A-79. Available with software for Apple II and IIe. Device capability includes 2708, 2716, TMS 2716, 2732, 2732A. 2532, 2764, 27128, MCM 68764 EPROMs and 2816 EEPROM. $169; personality modules, $17 to $35; Apple DOS software and Apple interface card, $89.

Orange Micro

Buffered Grappler+. Buffered printer interface featuring an Apple IIe eighty-column text dump, double hi-res graphics for the IIe, and full access to Epson's versatile graphic aspect ratios, allowing the sharp graphics on Epson printers. $239 at 16K, expandable to 32K or 64K.

Grappler+. Printer interface featuring twenty-seven graphics and text commands for complete control over screen printouts. New features include IIe eighty-column text dumps, full Epson graphic support, and IIe double hi-res graphics. $175.

Orange Interface. A low-priced, intelligent interface. More than fifteen firmware commands provide extensive control of screen text displays. Features include an eighty-column screen dump, forty-column dumps, word wraparound, margin setting, and more. $99.

Orbital Systems

Disco RAM. A 128K RAM card with a disk drive built in. Will expand memory another 128K or can be used as a second drive. It emulates a disk drive but is ten times faster. Menu-driven by software on PROM, eliminating the need for a preboot disk. Disk emulation by keyboard command. Kit, $209; assembled, $239.

80-Column Card with 64K of Memory for the Apple IIe. Expands the viewing screen to 66, 80, or 132 columns for word processing and spreadsheet programs. From the keyboard, the card allows you to change the size of the viewing screen without adjusting the controls on the monitor. Features true descenders. Kit, $99; assembled, $129.

e-Z Card. A Z-80 controller card designed to run CP/M 2.2. A Z-80A (faster 3.58MHz) microprocessor is used on the board. Will execute full Z-80 and 8080 instruction set, plus Z-80 interrupts. All "LS" devices and an on-board PROM to reduce power consumption. Kit, $60; assembled, $90.

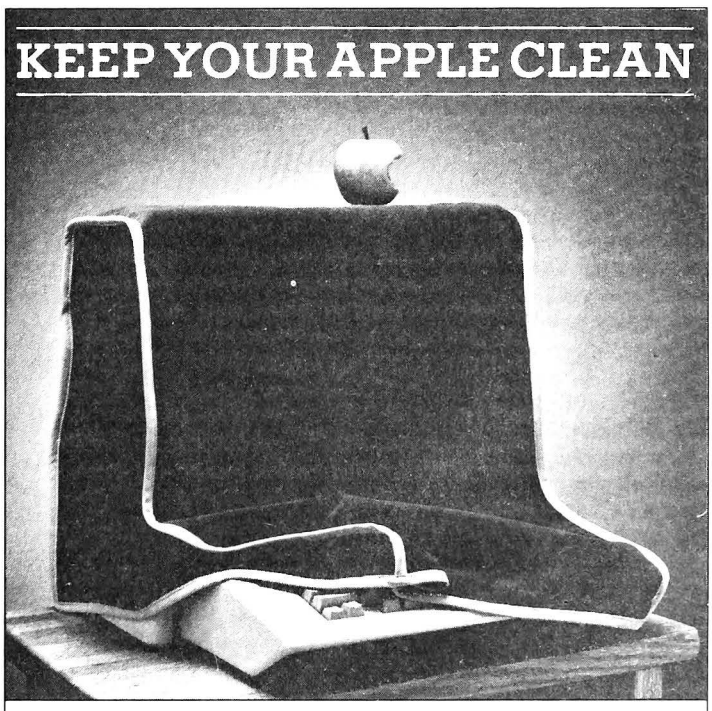
Passport Designs

Soundchaser Digital. Turn your computer into a true musical instrument. Four-octave AGO standard keyboard with interface card. Music System digital synthesizer cards. Improved four-track digital performance software. Descriptions follow.

Polyphonic Synthesizer. Sixteen digital oscillators, fifty preset sounds, unlimited user sounds, digital filter, real-time control of sound. Create waveform programs, draw waveforms. $1,190.

Soundchaser Keyboard. Four-octave AGO standard keyboard with interface card. Includes improved four-track digital performance software. $795.

Mountain Computer Music System. All-digital synthesizer cards with sixteen digital oscillators. Programmable waveforms, amplitude,



DUST IS 90% OF ALL MAINTENANCE PROBLEMS

Washable covers to fit the Apple II, IIe and Apple III. Attractive chocolate brown suede cloth with beige trim or soft beige with brown trim. Monitor and keyboard cover $25.00, single disc drive cover $8.00, dual disc drive cover $10.00 and printer cover $12.00. California residents add sales tax. Please allow 4 weeks for delivery.

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and frequency. Includes synthesizers, light pen, audio connectors, and music composer and player software. $395.

Turbo-Traks Performance Software. Create sounds, record, orchestrate, and compose. Polyphonic synthesizer; sixteen digital oscillators; use up to sixteen oscillators per note; waveforms can be sequenced to create natural timbres; over 100 preset sounds, unlimited user sounds; split keyboard, pitch bend, create waveforms, draw waveforms, digital filter, real-time control of sounds. Sixteen-track sound-on-sound recording. $250.

Four-Track Editor. Create compositions from written sheet music or score; enter track files in single-step format using music keyboard and computer keyboard. Edit any track played in real time. Insert, delete, punch in, punch out, quantize rhythms, fix mistakes. Can print out any track, note names, and durations. Includes disk and operating manual. $195.

Music Tutor—Ear Training. Chuck Boody's complete ear training software. For home or classroom use (teachers configure drills). Extensive guided and free mode drills; intervals, chords, tunings, notation, and melodic games. Respond on staff, keyboard, or by name. Simple and fun. Tutorial manual and three disks. $195.

Notes and Keys. Sight reading and keyboard technique for beginners. For home or classroom use. Naming notes on the bass and treble clefs. Keys and key signatures, sharps and flats. Five-finger scales and major triads. Easy to use. A terrific accompaniment to any popular method book. Includes disk and curriculum. $195.

Notewriter. A unique way to write and learn about music. Real-time composing software prints in standard notation. Monophonic transcriber writes what you play. Complete note processing editor lets you change key, transpose, insert, delete; ties, triplets, much more. Tutorial manual and disk. $99.

Notetools. Convert *Notewriter* files into four-track format. Move and delete tracks. Improved tempo control. $50.

Traksplayer. A "record player" program for four-track compositions. Create your own automated "albums." Improved DOS and compressed file formats. Includes disk and instructions. $75.

Tunings. A collection of different four-track tuning files for the Soundchaser Keyboard. Mean tone, just tone, tempered and quarter tone. Includes disk and instructions. $50.

PC Ware

Centronics Printer Interface. Multiple drivers on-board in EPROM. Interchangeable 2K RAM. Two handshake lines and four status lines. Centronics data bit eight may be jumpered low. Conveniently located ribbon connector. $59.95.

Enhanced Serial Interface. Asynchronous RS-232C I/O. Powerful 2K intelligent driver in EPROM. Interchangeable 2K RAM; supports full and half duplex. Crystal-controlled baud rates, software programmable from 50 to 19200 baud. Programmable control register. Parity, overrun, and framing error checks. Software programmable interrupts. $184.95.

Extended Eighty-Column Card for Apple IIe. 64K RAM. Functionally identical to the Apple version. $159.95.

Hi-Res Graphic Printer Interface. Keyboard-controlled screen dumps. Twenty-three different commands for text and graphics. Color graphics screen dumps. Interfaces to any dot-matrix printer. On-board printer selection. Two-page side-by-side printout. $149.95.

Parallel I/O Interface. Multiple drivers on-board in EPROM. Interchangeable 2K RAM. Dual eight-bit bidirectional parallel ports. Four handshake lines. Conveniently located ribbon changer. $89.95.

Serial Interface. Asynchronous RS-232C I/O. Multiple drivers (up to eight) resident in EPROM optional 2K RAM. Full or half duplex. Crystal-controlled baud rate, software programmable from 50 to 19200 baud. Programmable control register. Parity, overrun, and framing error checks. Software programmable interrupts. DMA and interrupt daisy-chain supported. $129.95.

Personal Computer Products

Appli-Card. One-card solution to running CP/M applications. Features 64K RAM, 40-column to 255-column scrolling, 70-column hi-res screen, and 6MHz Z-80 processor. The Appli-Card executes CP/M programs three times faster than older Z-80 boards and supports all standard peripherals. $375.

88Card. Comes with 64K RAM and a sixteen-bit 8088 processor which, when added to an Apple, allows the 8088 to address 128K. Presently, the primary function of the 88Card is as a developer's tool. 88Card with MS-DOS and MBasic, $595.

64K and 128K RAM Extenders. Plugs into the Appli-Card and, using the Appli-Card's 64K and *Appli-Disc* software, functions as either a 128K or 192K RAM disk for Apple DOS or a 64K or 128K RAM disk for CP/M. 64K extender, $195; 128K extender, $295.

Practical Peripherals

Microbuffer II+ Serial and Parallel Interface. Stop waiting for your printer with Microbuffer printer buffers and interfaces. $259 to $349.

Protecto Enterprizes

Comstar Super 10X F/T Printer. Ten-inch carriage, 120 cps, nine-by-nine dot matrix with double-strike emphasis for eighteen-by-eighteen matrix. Hi-res bit image (120 by 144), underlining, backspace, true descenders, superscripts, and subscripts. Prints standard italic block graphics, plus user-definable characters. $299.

Qume

Sprint 11/40-130 Plus. Daisy wheel printer, available in standard fifteen-inch width or widetrack format. Offers a twenty-two-inch carriage width and can be used for spreadsheet applications, as well as large-format information displays; has a print line of 293 characters. $2,965.

RB Robot

RB5X: The Intelligent Robot. Completely programmable personal robot. Comes fully assembled, with software that allows it to learn its environment; sonar and tactile sensors; charger-finder routine; and an array of options, including an arm, vacuum attachment, and a Robot Control Language that allows you to program the robot using common English. $1,795.

Software Specialties

Model 2300 EPROM Programmer. Can program most of the EPROMs on the market. Permits programming from binary files on disk, from data in memory, or direct from the keyboard. It can also read and print the contents of an EPROM or dump it into memory or onto a disk. An erase verify mode permits confirmation that an EPROM is actually erased. $429.

SouthWest EdPsych Services

Interchange Switch. Interchange two slots with the flip of a switch. Reduces inconvenience, loose connections, and costly burned-out chips because software and hardware are slot-dependent. Great for hard and floppy disk controllers and for multiple printers. No wiring or chips needed, just plugs in. $79.95.

Spies Laboratories

Super-MX Interface Card. Upgrades Epson printers to near daisy wheel print quality. Works with all software, even copy-protected disks. Comes with Roman font style. Letter Gothic, Orator Large, Script, and Olde English styles are optional. Has built-in graphics dump and text commands. $175; optional font styles, $30 per pair.

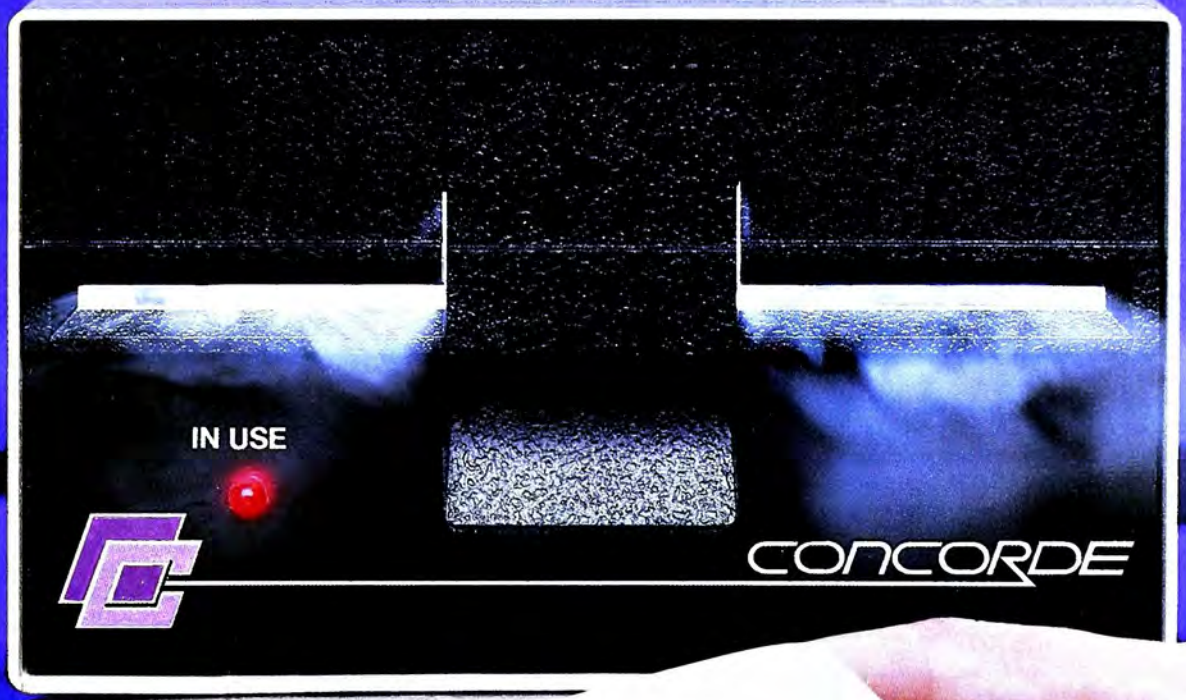
Staff Computer Technology

The Key. A hardware module that works in conjunction with software to protect software from being pirated. The module is easily installed in the gameport. Staff has two versions—standard and high security. Factory programmed with a security code, so each supplier can have a code known only to them. The end user is free to make as many backup copies as needed but can run them only if The Key is installed. $17 each in quantities of 500.

Star Logic

Disk Drive. A 5¼-inch floppy disk drive compatible with Apple II. Includes drive, cabinet, cable, and our standard warranty, including ninety days parts and labor. $175.

MEMORABLE



CONCORDE

The new leader in the world of floppy disk drives introduces its new family of Apple® compatible peripherals! Combining the finest quality drives with their own advanced electronics, **CONCORDE** gives you proven reliability and superior performance at a dramatic cost savings.

- **CONCORDE** Model C-111, Single Sided Disk Drive, gives you as much as 163K bytes of data storage . . . form, fit and function compatible with the Apple Disk II.
- **CONCORDE** Model C-112, Double Sided Disk Drive, with double the storage capacity, up to 326K, is the perfect subsystem for your Apple or Apple compatible computer.

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23152 Verdugo Drive
Laguna Hills, CA 92653
[714] 859-2850

Stellation Two

Vitamill. Coprocessor board that speeds up both processing and I/O delivery. Works under Pascal, CPM, and Basic. Speed increase averages two times faster for *PFS:File*, one-and-a-half to two times faster for *VersaForm*, Pascal compiles, and CP/M applications. Installation into any I/O slot, one-time software installation using *Invisible Optimizer* software. $449.

Strawberry Tree Computers

Dual Thermometer. Temperature data acquisition package for laboratory, solar energy, industrial control, frost warning applications. Complete with card, temperature probes, software, manual. $260.

Expander. Expands the Dual Thermometer to add more probes or switches; low-level relays to control fans, heaters, and so on. Complete with software. Probes not sold separately. $330.

Street Electronics

Echo II Speech Synthesizer. A very user-friendly plug-in peripheral that will give your Apple an unlimited vocabulary, as well as a natural-sounding female voice output. Numerous commercial software programs are now compatible with the Echo II. Speech output from your Apple is as easy as adding print statements to your programs. $149.95.

Sun Research

Line Conditioner/Voltage Regulator. Isolate your computer system from brownouts, surges, spikes, and RFI. MDS-150, $90; MDS-250, $185; MDS-250, $275; MDS-1000, $500.

Mayday Uninterruptable Power System. For total protection from blackout, brownout surges, and spikes. Sizes from 150 watts to 1,000 watts. Prices include battery pack. $240 to $2,795.

Synetix

Flashcard. A solid-state memory device that looks to the Apple like a floppy disk. The advantages of Flashcard over a floppy disk are a speed gain of 1,000 percent, noiseless operation, and reduced read/write errors. Flashcard comes in four versions: 147K; 294K with CP/M, DOS, and Pascal operating systems for use with unprotected software; 147K with *Magicalc*; or 294K with *Magicalc*. Prices start at $349.

Third Millennium Engineering

Arcade Board. Features thirty-two sprites, sixteen colors, 256 by 192 resolution, three tone and noise generators, ADSR envelope control, 16K RAM, and so on to give the Apple computer true arcade quality graphics and sound. Tutorial, reference manual, games, demos, utilities, and Ampercade graphics and sound language included. $225.

Thunderware

Thunderclock Plus. Clock/calendar card. Just plug it in and your programs can read month, date, day, and time (to the second) in any of Apple's languages. Works with *DB Master*, *VisiDex*, *Micro/Courier*, and many more. Time and date stamp your DOS files. Control lights and appliances on schedule. $150.

Thunderclock X-10 Interface and Scheduler. With Thunderware's X-10 Interface option and a BSR X-10 Home Control System, your Apple can turn on your lights, water your lawn—whatever you desire, according to schedules you create. It comes with easy-to-use *Scheduler* software. For use with Thunderclock Plus. $49.

Titan Technologies

Accelerator II. A fast 6502 processor and 48K of memory aboard the Accelerator II process data three-and-a half times faster than normal. Many wait states are eliminated; all are shortened. $599.

Neptune. Provides eighty-column video display and RAM (64K, 128K, or 192K) on one card. The extra memory space can be used for larger projects. 64K, $249.

Saturn RAM. 32K, 64K, and 128K RAM boards. Software is provided to help maximize memory use. 32K, $219.

Total Logic

LA-100. Converts the Apple into a logic analyzer for data analysis, documentation, and storage. Components include circuit board, cable, software, and manual. Features sixteen-channel path, 1,024-word memory, clock qualifiers, sixteen-bit trigger word, bit/timing display on screen or hard copy, disk storage. $795.

Transend

AIO II. A highly flexible serial and parallel interface. Allows simultaneous use of a serial and parallel interface all in one slot. The serial RS-232 port has a crystal-controlled baud rate that ranges from 110 to 19200. The parallel ports are fully programmable, and on-board firmware provides all necessary drivers in a single package, including terminal communications. $225.

Appic/G 02. Parallel printer interface with graphics. Works with new Apple Dot-Matrix Printer as well as virtually any other parallel printer. Included with the Appic is a graphics software disk that supports the following printers for screen dumps: Epson, Centronics, NEC, IDS, Anadex, Okidata, and C.Itoh. Maintains maximum compatibility with CP/M and Pascal. $129.

AS10. A standard RS-232 serial interface board for interfacing the Apple II with a variety of serial equipment such as printers, modems, and terminals. Has one RS-232 port with two connectors—one for DCE and one for DTE for easy cable interfacing. Has jumper-selectable baud rates that range from 110 to 9600. $149.

Transtar/Vivitar Computer Products

130 Daisy Wheel Printer. Compatible with all major word processors using Diablo 1610/1620 routines. Autoload feature automatically loads a single sheet of paper into one of four selectable positions ready to print. Includes a six-month parts and labor warranty. Parallel, $895; serial, $950.

315 Color Graphics Printer. A unique four-hammer printhead allows the 315 to print up to thirty shades of color on a single pass. $599.

120 Letter-Quality Printer. Compact, light, and portable. Prints at fourteen characters per second. Diablo 1610/1620 code compatible with most of the leading word processing packages on the market. Includes a six-month warranty. $599.

Tymac Controls

PPC-100. A universal Centronics type parallel printer board that allows you to turn on and off the high bit to access additional features in many printers. Easily upgradable to a fully intelligent interface with graphics and text dumps. Use with standard Centronics-configured printers. $139.

TAC-200. A dual-mode parallel interface that provides easy printer control plus a standard parallel board at the flip of a switch. Hi-res printing with simple keyboard commands. Special features include inverse, doubled, and rotated graphics and many text control features. $159.

U-Microcomputers

U-Com2. A highly compatible motherboard. Complete and tested, it includes 6502 processor, 64K RAM, 2K boot EPROM, and eight slots. Runs all DOS 3.3 software. To run UCSD Pascal or 56K CP/M requires 16K RAM card in slot O. Intended for OEMs and hobbyists. $375.

Apple III Cards. Now expand the Apple III with our range of cards for interfacing and control applications. All cards include SOS compatible drivers and manual. Available are a parallel I/O with timer card, twelve-bit A/D card, and single and eight-port serial interfaces. $200.

Enhancements. A range of cards to get more out of the Apple: U-TALK speech synthesis, U-Z80 processor CP/M card, U-TIM precise timer, U-TERM Eighty-Column for II Plus, UM68000 32/16-bit processor card. All except U-TERM are IIe-compatible. $50.

Interfaces. A wide range of interfaces: U-S232—serial, U-CENT—parallel Centronics, U-PRINT16—buffered parallel and serial card, U-PORT—eight serial interfaces on one card, U-BCD—panel meter interface, U-A/D—twelve-bit A/D with parallel I/O and timer, and U-DT—thirty-two-line parallel I/O and timer. $100.

U-RAM Range of RAM Cards. A range of add-on RAM cards—16K, 32K, or 128K—which include *VisiCalc* expand and disk emulation software. All compatible with II Plus. The 64K and 128K cards are compatible with the IIe. $50.

Versa Computing

Apple VersaWriter. A digitizer drawing board and software package that allows quick entry of graphics information to the hi-res screen. *VersaWriter* plugs into the game I/O port. Simply trace or free-hand your drawing as it appears immediately on the screen. Then color-fill your drawing with 106 color choices. $299.

VF Associates

Disk Drives. Apple-compatible full-size forty-track Siemens-type drives, exceptionally quiet and reliable operation, improved disk centering cone, externally adjustable speed control; does synchronized and half-tracks, operates with standard Apple controller, manufacturer's one year warranty. $199.

Videx

Enhancer II. Utilizes a powerful microprocessor to provide many of the advanced features of computer terminals. These features include a typeahead buffer, auto-repeat, upper and lower case with shift-key operation, and redefinable keys. A function strip with sixteen additional keys can take advantage of the Enhancer's macro capabilities to make data entry and word processing easier and faster. $149; with function strip, $179.

UltraTerm. The newest video display peripheral from Videx. Eight software-selectable display modes offer a high-quality character set with up to 160 columns or forty-eight lines of text. For best results, Videx suggests using the Ultraterm with a high-persistence monitor. $379.

PSIO. With the PSIO, two individual interface cards are no longer necessary. The PSIO will interface between parallel and serial peripherals simultaneously or individually. Software configured; a nonvolatile RAM chip will remember device configurations even after the computer has been turned off. $229.

Videoterm. Increases your display to a full capacity of eighty columns. The Videoterm is compatible with the most popular software sold today, including a large selection of word processors. $279.

Visionary Electronics

Visionary 100: Microprocessor-based Data Communications Peripheral. Contains 300 baud direct-connect modem, internal RAM (2K-24K); on-board clock. Compatible with any RS-232C computer. Works independently of computer; that is, downloads data from computer to Visionary, sets transmission time, turns computer off or otherwise engages it. All automatic features. $595 to $760.

Voice Machine Communications

Voice Input Module (VIM). Converts spoken words to commands. Allows concurrent input of voice and keyboard. Operate any application software off the shelf or your own custom software. Under $1,000.

VR Data

Hard Disk III. Subsystem includes controller, power supply, and drive. Adapter kit includes software, host adapter, and cables. $150. Five-megabyte subsystem, $995; 10 megabyte, $1,249; 15 megabyte, $1,449.

Dual 10-Megabyte Hard Disk (Subsystem). Twenty megabytes total. Includes two ten-megabyte drives, controller, and power supply. $1,999. Adapter kit includes software, host adapter, and cables. $150.

Dual 15-Megabyte Hard Disk (Subsystem). Thirty megabytes total. Includes two fifteen-megabyte drives, controller, and power supply. $2,299. Adapter kit includes software, host adapter, and cables. $150.

Panther-F. Low profile five-megabyte hard disk (subsystem). Includes drive, controller, power supply. $1,395. Adapter kit includes software, host adapter, and cables, $150.

Panther-R. Low profile five-megabyte removable hard disk cartridge drive. Ideal for backup of a fixed hard disk. Also available as fixed drive. $1,495. Adapter kit, $150.

Wholesale Technology

Half Track Disk Drive. A 5¼-inch floppy drive stands only forty-one millimeters high (half the height of an Apple drive), provides 160K of dual-density storage, is fully compatible with all Apple IIs running DOS 3.2. or 3.3. Half high design, slimline styling, cooling louvers, auto-eject of disk, unique quick-release controller cable, and a twelve-millisecond head access time. Rated at 8,000 hours MTBF. $399.95.

Word-Power

Magic Typer. Interface card that connects the Apple to a Royal or Adler 1010 or 5010 electronic typewriter, making the typewriter function as a letter-quality printer. Comes complete with interface card, six-foot cable, typewriter interface card, and instructions. $199.95.

PROM Programmer. Complete hardware/software system for reading and programming EPROMs. Easy to use; no programming knowledge required. Programs two EPROMs simultaneously. Complete instructions included. $99.95.

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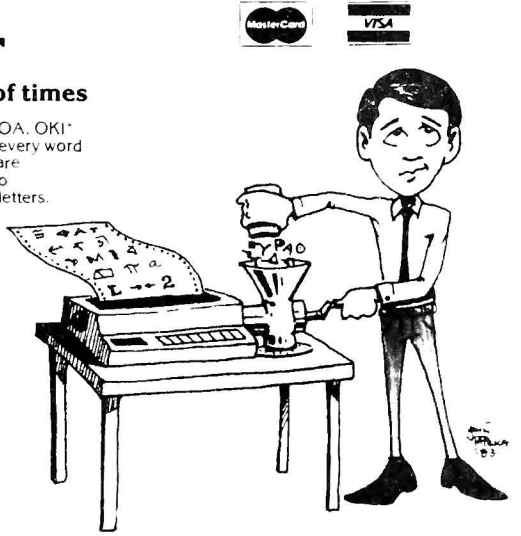

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Dynacomp, 1427 Monroe Avenue, Rochester, NY 14618; 716-442-8960.
Dynamic Solutions, 61 South Lake, Suite 305, Pasadena, CA 91101; 213-577-2643.
Dynatech Systems, Box 21824, San Jose, CA 95127; 408-286-4651.
Earthware Computer Services, Box 30039, Eugene, OR 97403; 503-344-3383.
Eco-Tech, 2990 Lake Lansing Road, Suite 202, East Lansing, MI 48823; 517-337-9226.
Eden II Computing, Box 959, Pebble Beach, CA 93953.
Educational Courseware, 67A Willard Street, Hartford, CT 06105; 203-247-6609.
Educational Media, Box 21311, Minneapolis, MN 55421; 612-636-5098.
Ed-U-Comp, 246 South Ocean Avenue, Freeport, NY 11520; 516-546-7575.

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Edutek, 415 Cambridge, Suite 4, Palo Alto, CA 94306; 415-325-9965.
Edu-Ware Services, 28035 Dorothy Drive, Agoura Hills, CA 91301; 213-706-0661.
Eiconics, 211 Cruz Alta, Taos, NM 87571; 505-758-1696.
8th Dimension Enterprises, Box 62366, Sunnyvale, CA 94088; 408-972-0469.
Einstein Software, 11340 West Olympic Boulevard, Suite 221, Los Angeles, CA 90064; 213-477-4530.
El Dorado Software, 549A Castro Street, San Francisco, CA 94114; 415-626-0588.
Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403; 415-571-7171.
Electronic Courseware Systems, 309 Windsor Road, Champaign, IL 61820; 217-359-7099.
Ellis Computing, 3917 Noriega Street, San Francisco, CA 94122; 415-753-0186.
Encyclopaedia Britannica Educational, 425 North Michigan Avenue, Chicago, IL 60611; 800-621-3900.
Enhanceware, 91 Pioneer Place, Durango, CO 81301; 303-259-3598.
Essertier Software, 1020 Manhattan Beach Boulevard, Suite 200, Hermosa Beach, CA 90200; 213-379-1570.
Eventide, 265 West 54th Street, New York, NY 10019; 212-581-9290.
Exec Software, 201 Waltham Street, Lexington, MA 02173; 617-862-3170.
Family Life Software, 1401 South Eleventh Avenue, Saint Cloud, MN 56301; 612-253-6032.
Fiberbilt Computer Cases, 601 West 26th Street, New York, NY 10001; 800-847-4176, in NY 323-675-5820.
Financial Software, 11401 Westridge Circle, Chardon, OH 44024; 800-392-2669, in OH 216-338-6811.
First Flight Data Systems, Box 555, Kitty Hawk, NC 27949; 919-441-6480.
FlipTrack Learning Systems, 999 Main Street, Suite 200, Glen Ellyn, IL 60137; 312-790-1117.
Flowersoft, 564 Tara Court, Manteca, CA 95336; 209-239-2116.
FMJ, Box 5281, Torrance, CA 90510; 213-325-1900.
Focus Media, 839 Stewart Avenue, Garden City, NY 11530; 516-794-8900.
Fountain Computer Products, 1901 Kipling, Lakewood, CO 80215; 303-232-8246.
Fox and Geller, 604 Market Street, Elmwood Park, NJ 07407; 201-794-8883.
Frisbee Electronics, 807 Howell Avenue, Ridgecrest, CA 93555; 408-997-1154.
Frobco, Box 8378, Santa Cruz, CA 95061; 408-429-1551.
Fullmer Associates, 1132 Via Jose, San Jose, CA 95120; 408-997-1154.
Funk Vocab-Ware, 4825 Province Line Road, Princeton, NJ 08540; 609-921-0245.
Funtastic, 5-12 Wilde Avenue, Drexel Hill, PA 19026; 215-622-5716.
Gamemaster, 1723 Howard, Suite 219, Evanston, IL 60202; 312-328-9009.
Geegery Software Works, Box 8028, Des Moines, IA 50301; 515-262-6317.
Gessler Publishing, 900 Broadway, New York, NY 10003; 212-673-3113.
Giltronix, 3780 Fabian Way, Palo Alto, CA 94303; 415-493-1300.
Gnosis, 4005 Chestnut Street, Philadelphia, PA 19104; 215-387-1500.
Gold Disk Quality Software, Box 102, Glen Arm, MD 21057; 800-368-2260, in MD 301-592-5949.
Golfsoft, 10333 Balsam Lane, Eden Prairie, MN 55344; 612-941-2172.
Gourmet Software, 671 Eden Avenue, San Jose, CA 95117; 408-866-0887.
Graphic Dimensions, 8 Frederick Road, Pittsford, NY 14534; 716-381-3428.
Great Divide Software, 8060 West Woodard Drive, Lakewood, CO 80227; 303-238-5258
Great Plains Software, 1701 38th Street Southwest, Fargo, MD 58107; 701-281-0550.
Gryphon Microproducts, Box 6543, Silver Spring, MD 20906; 301-946-2585.
Guild Musical Instruments, 225 West Grand Street, Elizabeth, NJ 07202; 201-351-3002.
H.A.L. Labs, 4074 Midland Road, Suite 23, Riverside, CA 92505; 714-359-8480.
H & H Scientific, 13507 Pendleton Street, Fort Washington, MD 20744; 301-292-2958.
H & H Trading, Box 549, Clayton, CA 94517; 415-672-3233.
Harcourt Brace Jovanovich, 1250 Sixth Avenue, San Diego, CA 92101; 800-543-1918, in CA 619-699-6335.
Hartley Courseware, 123 Bridge Street, Dimondale, MI 48821; 517-646-6458.
Hayden Book Company, 10 Mulholland Drive, Hasbrouch Heights, NJ 07604; 201-288-7520.
Hayden Software, 600 Suffolk Street, Lowell, MA 01853; 617-937-0200.
Hayes Microcomputer Products, 5835 Peachtree Corners East, Norcross, GA 30092; 404-449-8791.
Hayes Products, 1558 Osage Street, San Marcos, CA 92069; 619-744-8546.
Heller Software, 4500 Londonderry Road, Harrisburg, PA 17109; 717-652-6655.
Hewlett-Packard, 16399 West Bernardo Drive, San Diego, CA 92127; 619-487-4100.
Highlands Computer Services, 14422 Southeast 132nd Street, Renton, WA 98056; 206-228-6691.
High Order Micro Electronics, 17 River Street, Chagrin Falls, OH 44022; 216-247-3310.
High Technology Software Products, Box 60406, Oklahoma City, OK 73146; 405-524-4359.
Hi Tech, 126 Lighthouse Avenue, Santa Cruz, CA 95060; 408-425-5654.
HLS Duplication, 1008 Steward Drive, Sunnyvale, CA 94086; 408-738-3416.
Hollander Office Products, 15500 West Telegraph Road, Suite A-6, Santa Paula, CA 93060; 805-525-2158.
Hollywood Hardware, 6842 Valjean Avenue, Van Nuys, CA 91406; 213-989-1204.
Homeware, Box 3062, Ruston, LA 71272.
Howard Software Services, 8008 Girard, Suite 310, La Jolla, CA 92037; 619-454-0121.
HSP Computer Furniture, Box 5545, Birmingham, AL 35207; 205-251-0500.
Human Systems Dynamics, 9010 Reseda Boulevard, Suite 222, Northridge, CA 91324; 213-993-8536.
C R Hunter & Associates, 1527 Northwood Drive, Cincinnati, OH 45237; 513-761-9322.
Hutton Industries, Box 1413, Tacoma, WA 98401.
Hy-Tek, 6502 Micro Drive, Dayton, MD 21036; 301-854-0058.
IAS, Mason Road #2, West Willington, CT 06279; 203-429-1691.
Independence Software, 1324 Second Avenue, New York, NY 10021; 212-772-2960.
Infocom, 55 Wheeler Street, Cambridge, MA 02138; 617-492-1031.
Innovative Measurements, Box 3879, San Clemente, CA 92672; 714-493-2174.
Innovative Programming Associates, One Airport Place, Princeton, NJ 08540; 609-924-7272.
Insoft, 7833 Southwest Cirrus Drive, Beaverton, OR 97005; 503-641-5223.
Interactive Microware, Box 771, State College, PA 16801; 814-238-8294.
Interactive Structures, 146 Montgomery Avenue, Bala Cynwyd,, PA 19072; 215-667-1713.
Interactive Video, 7500 San Felipe, Suite 100, Houston, TX 77063; 713-781-6984.
Interlaken Technology, 6535 Cecilia Circle, Minneapolis, MN 55435; 612-944-2624.
Intra Computer, 101 West 31st Street, New York, NY 10001; 212-947-5533.
Intra Day Analyst, Box 15922, New Orleans, LA 70175; 800-535-7990.
Invester's Software, Box N, Bradenton Beach, FL 33510; 813-778-5515.
I-Protect, 4644 Lincoln Boulevard, Suite 101, Marina Del Rey, CA 90292; 213-306-9866.
Gary Irwin & Associates, 4102 Williwaw, Irvine, CA 92714; 714-552-1004.
ISI Island Services, 3850 Gilman Street, Long Beach, CA 90815; 213-498-9123.
Island Software, Box 300, Lake Grove, NY 11755; 516-585-3755.
John James Furnishings, Box 501321, Houston, TX 77250; 713-462-5533.
J & S Software, 140 Reid Avenue, Port Washington, NY 11050; 516-944-9304.
Jefferson Software, 723 Kanawha Boulevard, East, Charleston, WV 25301; 304-342-0769.
Jor-And, Box 9180, Glendale, CA 91206; 213-247-6658.
JR Software, Box 693, Florissant, MD 63032; 314-741-6409.
Jupiter Island, 1900 Powell Street, Suite 1135, Emeryville, CA 94608; 415-655-0840.
Kelcom Management, 30 Southampton Drive Southwest, Calgary, Alberta, Canada; 403-253-5397.
Kensington Microware, 919 Third Avenue, New York, NY 10022; 212-486-7707.
Key Enterprises, Box 5429, Amarillo, TX 79107; 806-372-8962.
Kline Productions, 4501 Lindell Boulevard, Suite 5J, Saint Louis, MO 63108; 314-367-7200.
Knossos, 422 Redwood Avenue, Corte Madera, CA 94925; 415-924-8528.
Korsmeyer Electronic Design, 1500 Skyline Drive, Lincoln, NE 68506; 402-483-2238.
Kraft Systems, 450 West California Avenue, Vista, CA 92083; 619-724-7146.
Krell Software, 1320 Stony Brook Road, Stony Brook, NY 11790; 516-751-5139.
Krown Computing, 1282 Conference Drive, Scotts Valley, CA 95066; 408-335-3133.
Last Electronics, Box 1300, San Andreas, CA 95249; 209-754-1800.
Laumer Research, 1832 School Road, Carrollton, TX 75006; 214-245-3917.
The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025 415-328-5410.
Learning Tools, 686 Massachusetts Avenue, Cambridge, MA 02129; 617-864-8086.
Linc Associates, 1875 Morse Road, Suite 215, Columbus, OH 43229; 614-263-2123.
LinTek, Box 8056, Grand Rapids, MI 49508; 616-241-4040.
Living Videotext, 450 San Antonio Road, Suite 56, Palo Alto, CA 94306; 415-857-0511.
LJK Enterprises, 7852 Big Bend Boulevard, Saint Louis, MO 63119; 314-962-1855.
Lloyds of London Press, 817 Broadway, New York, NY 10003; 212-673-4700.

LoTech Limited, 1550 California Street, San Francisco, CA 94109; 415-563-0304.
LRH Enterprises, 358 Ashley Boulevard, New Bedford, MA 02746.
Luxor, 2245 Delany Road, Waukegan, IL 60085; 312-244-1800.
Macro-Trend, 7420 Westlake Terrace, Suite 1509, Bethesda, MD 20817; 301-365-3737.
Madwest Software, 121 North Allen Street, Madison WI 53705; 608-238-4875.
Magnetic Harvest, Box 255, Hopkins, SC 29061; 803-783-3151.
Mattel Electronics, 5150 Rosecrans Avenue, Hawthorne, CA 90250; 213-416-9169.
MBSI/RealWorld, Dover Road, Willow Hill Building, Chichester, NH 03263; 603-798-5700.
MCE, 157 South Kalamazoo Mall, Suite 250, Kalamazoo, MI 49007; 800-421-4157, in MI 616-345-8681.
Megahaus, 5703 Oberlin Drive, San Diego, CA 92121; 619-450-1230.
Mentat, 667 Rugby Road, Brooklyn, NY 11230.
Menu, 1520 South College Avenue, Fort Collins, CO 80524; 800-525-4955.
Metafab/Microcomputer Division, 163 Southwest Freeman, Hillsboro, OR 97123; 503-640-2527.
Metamorphic Systems, 8950 Villa La Jolla Drive, Suite 1200, La Jolla, CA 92037; 800-228-8088, in CA 619-457-3870.
Metaresearch, 1100 Southeast Woodward Street, Portland, OR 97202; 502-232-1712.
Metatek, 12525 Hummingbird Street, Minneapolis, MN 55433; 612-571-7319.
Microcom, 1400A Province Highway, Norwood, MA 02062; 617-762-9310.
Microcomputer Accessories, 1545 Pontius Avenue, Los Angeles, CA 90025; 213-477-4216.
Microcomputer Applications, 827 Missouri Street, Fairfield, CA 94533; 707-422-1465.
MicroComputing Research, 29 Estancia Drive, Marana, AZ 85238; 602-682-4444.
Micro Control Systems, 143 Tunnel Road, Vernon, CT 06066; 203-872-0602.
Micro Co-op, 610 East Brook Drive, Arlington Heights, IL 60005; 312-228-5115.
Micro Data Base Systems, Box 248, Lafayette, IN 47902; 317-463-2581.
Micro Decision Systems, 130 Foxcroft Road, Pittsburgh, PA 15220; 412-276-2387.
Micro Display Systems, Box 455, Hastings, MN 55033; 800-328-9524, 612-437-2233.
Microfinancial, 15404 East Valley Boulevard, Industry, CA 91746; 213-961-0237.
Micro Ink, 10 Northern Boulevard, Amherst, NH 03031; 603-889-4330.
MicroLab, 2699 Skokie Valley Road, Highland Park, IL 60035; 312-433-7550.
Micro Magic, 908 Memorial Parkway, Northwest, Huntsville, AL 35801; 205-536-1290.
Micromation, One Yorkdale Road, Suite 406, Toronto, Ontario, Canada M6A 3A1; 416-781-6675.
Micromax Systems, 6868 Nancy Ridge Drive, San Diego, CA 92121; 619-457-3131.
Micro Motion, 12077 Wilshire Boulevard, Suite 506, Los Angeles, CA 90025; 213-821-4340.
Micro Power, 14155 Kittridge Street, Van Nuys, CA 91405; 213-901-1945.
Micro Power & Light, 12820 Hillcrest Road, Suite 219, Dallas, TX 75230; 214-239-6620.
Micro Program Designs, 5440 Crestline Road, Wilmington, DE 19808; 302-738-3798.
MicroPro International, 33 San Pablo Avenue, San Rafael, CA 94903; 415-499-1200.
Microsoft, 10700 Northup Way, Bellevue, WA 98004; 206-828-8088.
MicroSparc, 10 Lewis Street, Lincoln, MA 01773; 617-259-9710.
Micro Works, Box 1110, Del Mar, CA 92014; 619-942-2400.
Midwest Software, Box 301, Saint Ann, MO 63074; 800-835-2246.
Millenium 3 Engineering, 11627 Mayfield Avenue, Suite 4, Los Angeles, CA 90049; 213-473-2102.
Milliken Publishing, 1100 Research Boulevard, Saint Louis, MO 63132; 314-991-4220.
Mimco Stick, 1547 Cunard Road, Columbus, OH 43227; 614-237-3380 or 214-454-3801.
Mind Games, 420 South Beverly Drive, Suite 207, Beverly Hills, CA 90212; 213-277-8044.
Mind Systems, Box 506, Northampton, MA 01601; 413-586-6463.
Minnesota Educational Computing Consortium, 2520 Broadway Drive, Lauderdale, MN 55113; 612-638-0600.
Momentum Software, 300 West 31st Street, Baltimore, MD 21211; 800-368-2260 or 301-592-5949.
Monogram, 8295 South La Cienega Boulevard, Los Angeles, CA 90301; 213-215-0529.
Mountain View Press, Box 4656, Mountain View, CA 94040; 415-961-4103.
Multisoft, 120 East 90th Street, New York, NY 10028; 212-534-0602.
Multitech Electronics, 195 West El Camino Real, Sunnyvale, CA 94087; 408-773-8400.
Multi-Tech Systems, 82 Second Avenue Southeast, New Brighton, MN 55112; 612-631-3550
Muse Software, 347 North Charles Street, Baltimore, MD, 21201; 301-659-7212.
W.H. Nail, 275 Lodgeview Drive, Oroville, CA 95965; 916-589-2043.
Nanos Systems, Box 24344, Speedway, IN 46224; 317-244-4078.
National Field Sales, Box 230, Broomall, PA 19008; 800-345-1280.
Navic Software, Box 14727, North Palm Beach, Fl 33408; 800-327-2133, in FL 305-627-4132.
NewsNet, 945 Haverford Road, Bryn Mawr, PA 19010; 800-345-1301, in PA 215-527-8030.
New York Zoetrope, 80 East Eleventh Street, Suite 516, New York, NY 10003; 212-420-0590.
Nikrom Technical Products, 25 Prospect Street, Leominster, MA 01453; 617-537-9970.
Nordic Software, 535 J Street, Lincoln, NE 68508; 402-475-5467.
Norell Data Systems, 3400 Wilshire Boulevard, Los Angeles, CA 90010; 213-257-2026.
Northwest Instrument Systems, Box 1309, Beaverton, OR 97075; 800-547-4445, 503-297-1434.
Novation, 20409 Prairie Street, Chatsworth, CA 91311; 213-996-5060.
N-Squared Computing, 5318 Forest Ridge Road, Silverton, OR 97381; 503-873-5906.
Number Nine Computer Engineering, Box 1802, Hartford, CT 06144; 203-233-8134.
Odesta, 3186 Doolittle Drive, Northbrook, IL 60062; 800-323-5423, in IL 312-498-5615.
Omega Microware, 222 South Riverside Plaza, Suite 2234, Chicago, IL 60606; 312-648-4844.
Opportunities for Learning, 8950 Lurline Avenue, Chatsworth, CA 91311; 213-341-2535.
Optimal Technology, Blue Wood 138, Earlysville, VA 22936; 804-973-5482.
Options-80, Box 471-X, Concord, MA 01742; 617-369-1589.
Orange Micro, 1400 North Lakeview, Anaheim, CA 92807; 714-779-2772.
Orbital Systems, 2929 East Jasmine, Mesa, AZ 85203; 602-830-6457.
OR-D System, 1200B Haddonfield Road, Cherry Hill, NJ 08002; 609-665-2255.
Origin Systems, 18100 Upper Bay Road, Suite 202, Houston, TX 77058; 713-333-2539.
Orrington Economics, Box 3756, Arlington, VA 22203; 703-527-5990.
Osbourne/McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710; 415-548-2805.
O'Sullivan Industries, Nineteenth and Gulf Streets, Lamar, MO 64759; 417-682-3322.
Palantir, 3400 Montrose Boulevard, Suite 718, Houston, TX 77006; 713-520-8221.
Paper Tractor, One South Fairview, Suite C, Goleta, CA 93117; 805-683-2851.
Passport Designs, 116 North Cabrillo Highway, Half Moon Bay, CA 94019; 415-726-0280.
PBI, Box 559, Wayzata, MN; 612-473-8998.
PC Ware, 4883 Tonino Drive, San Jose, CA 95136; 408-978-8626.
Peachtree Software, 3445 Peachtree Road Northeast, Atlanta, GA 30326; 404-239-3000.
Peelings II, Box 188, Las Cruces, NM 88004; 505-526-8364.
Penquin Software, 830 Fourth Avenue, Geneva, IL 60134; 312-232-1984.
PerfectData, 9174 Deering Avenue, Chatsworth, CA 91311; 213-998-2400.
Personal Computer Accessories, 16625 Redmond Way, Suite 107, Redmond, WA 98052; 206-882-0385.
Personal Computer Art, 1007 Far Hills Drive, East Peoria, IL 61611; 309-699-5059.
Personal Tutor Associates, Box 246, Clinton, MD 20735; 301-856-2280.
Phantom Software, Box 39, Sugar Run, PA 18846; 717-746-1919.
Phoenix Software, 64 Lake Zurich Drive, Lake Zurich, IL 60047; 312-438-4850.
Pickam Software, 312 South Los Angeles Street, Los Angeles, CA 90013; 800-858-4848.
Picture House, 166 Boynton Boulevard, Daytona Beach, FL 32018; 800-874-3514, in FL 904-252-7970.
The Pillsbury Company, Pillsbury Center, Betsy Wray M/S 3286, Minneapolis, MN 55402; 612-330-8732.
PMS, 650 Foothill Boulevard, La Canada, CA 91011; 213-790-9054.
Port-A-Soft, 423 East 800 North, Orem, UT 84057; 801-226-6704.
Portware, 5724 Tucker Lane, Edina, MN 55436; 612-933-3510.
Practical Peripherals, 31245 La Baya Drive, Westlake Village, CA 91362; 213-991-8200.
Practical Software, Box 3000, Pomona, NY 10970; 914-425-1158.
Prentice-Hall, Englewood Cliffs, NJ 07632; 201-592-2640.
PrimeSoft, Box 40, Cabin John, MD 20818; 301-229-4229.
Professional Calculations, 4895 Furtura Street, Eugene, OR 97404; 503-689-1991.
Professional Management Systems, 10824 North 142nd Street, Waverly, NE 68462; 402-786-3636.
The Professor, Box 301, Swanton, VT 05488; 514-747-9130.
Proforma Software, 2706 Harbor Boulevard, Suite 200, Costa Mesa, CA 92626.
Program Design, 95 East Putnam Avenue, Greenwich, CT 06830; 203-661-8799.
Programmed Press, 2301 Baylis Avenue, Elmont, NY 11003; 516-775-0933.
Pro/Pac, 14925A Memorial Drive, Suite 207, Houston, TX 77079; 713-496-1179.
Protecto Enterprizes, 22NO49 Pepper Road, Barrington, IL 60010; 312-382-5244.
Psychological Psoftware, 4757 Sun Valley Road, Del Mar, CA 92014; 619-481-4182.
Psychotechnics, 1900 Pickwick Avenue, Glenview, IL 60025; 312-729-5850.
Quality Educational Designs, Box 12486, Portland, OR 97212; 503-287-8137.
Quality Software, 21601 Marilla, Chatsworth, CA 91311; 213-344-6599.
Quark, 2525 West Evans, Suite 220, Denver, CO 80206; 303-934-2211.
Quinsept, Box 216, Lexington, MA 02173; 617-862-0404.
Qume, 2350 Qume Drive, San Jose, CA 95131; 408-942-4000.
Rainbow Computing, 9719 Reseda Boulevard, Northridge, CA 91324; 213-349-5560.
Raised Dot Computing, 310 South Seventh Street, Lewisburg, PA 17837; 717-523-6739.
Rally Electronics, Box 80504, Lincoln, NE 68501; 402-477-6842.
R. B. Robot, 18301 West Tenth Avenue, Suite 310, Golden, CO 80401; 303-279-5525.
Reader's Digest Services, Pleasantville, NY 10570; 914-241-5738.
Reston Publishing, 11480 Sunset Hills Road, Reston, VA 22090; 703-437-8900 or 800-336-0338.
RH Electronics, 566 Irean, Buellton, CA 93427; 805-688-2047.
Rhiannon Computer Games for Girls, 3717 Titan Drive, Richmond, VA 23225; 804-272-7770.
Right On Programs, Box 977, Huntington NY 11743; 516-271-3177.
RKS Industries, 4865 Scotts Valley Drive, Scotts Valley, CA 95066; 408-438-5760.
Rocklan, 3335 North Arlington Heights Road, Arlington Heights, IL 60004; 312-392-2525.
Rogue River Software, 2822 Tahitian Avenue, Medford, OR 97504; 503-779-3002.
RR Software, Box 1512, Madison, WI 53701; 608-244-6436.
Safeware, Box 02211, Columbus, OH 43202; 800-848-3469, in OH 800-848-2112.
Howard W. Sams, 4300 West 62nd Street, Indianapolis, IN 46268; 317-298-5419.
S & H Software, 58 Van Order Road, Harrington Park, NJ 07640; 201-768-3144.
Sansoft Plus, Box 590288, Houston, TX 77259; 713-482-6898.
Satori Software, 5507 Woodlawn North, Seattle, WA 98103; 206-633-1469.
SBCS, 3815 Adams Street, Lincoln, NE 68504; 402-467-3591.
Scarborough Systems, 25 North Broadway, Tarrytown, NY 10591; 914-332-4545.
Scholastic, 730 Broadway, New York, NY 10003.
Scientific Software Associates, Box 208, Wausau, WI 54401; 715-845-2066.
Scitor, 710 Lakeway, Suite 290, Sunnyvale, CA 94086; 408-730-0400.
Scott, Foresman Electronic Publishing, 1900 East Lake Avenue, Glenview, IL 60025.
S-C Software, 2331 Gus Thomasson Road, Suite 125, Dallas, TX 75228; 214-324-2050.
Secure-It, 10 Center Square, East Longmeadow, MA 01028; 413-525-7039.
SEI, 2360-J George Washington Highway, Yorktown, VA 23692; 804-898-8386.
Select Information Systems, 919 Sir Francis Drake Boulevard, Kenfield, CA 94904; 415-459-4003.
Sensible Software, 6619 Perham Drive, West Bloomfield, MI 48033; 313-399-8877.
Sentient Software, Box 4929, Aspen, CO 81612; 303-925-9293.
Shadetree Software, Box 12161; Columbia, SC 29211; 803-345-5746.
Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614; 209-683-6858.
Silicon Valley Systems, 1625 El Camino Road, Belmont, CA 94002; 415-593-4344.
Simulations Software, 6035 North Maple Wood Avenue, Chicago, IL 60659.
Sirius, 10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195.
Sir-tech Software, 6 Main Street, Ogdensburg, NY 13669; 315-393-6633.
Skarbek, 1531 Sugargrove Court, Saint Louis, MO 63146; 314-567-7180.
Sky Software, 103 Lexington Avenue, Passaic, NJ 07055; 201-779-3399.
Sleeping Bear Software, 1124 Fuhrman Road, Cincinnati, OH 45215; 513-769-0692.

Smart Systems, 499 Sulky Lane, Frederick, MD 21701; 301-694-4728.
Smith Micro Software, Box 604, Sunset Beach, CA 90742; 213-592-1032.
Sofstar, 13935 US Highway 1, Juno Beach, FL 33408; 305-627-5511.
Softalk Book, 7250 Laurel Canyon Boulevard, North Hollywood, CA 91605; 213-980-5074.
SoftCorp International, 229 Huber Village Boulevard, Westerville, OH 43081; 800-543-1350, in OH 513-891-5044.
Soft Ctrl Systems, Box 599, West Milford, NJ 07480; 201-728-8750.
Softdisk, 3811 Saint Vincent, Shreveport, LA 71108; 318-868-7247.
SofTech Microsystems, 16885 West Bernardo Drive, San Diego, CA 92127; 619-451-1230.
Soft-Life, 2950 Los Feliz Boulevard, Suite 103, Los Angeles, CA 90039; 213-660-7940.
Softlink, 3255-2 Scott Boulevard, Santa Clara, CA 95051; 408-988-8011.
Softronics, 3639 New Getwell Road, Suite 10, Memphis, TN 38118; 901-683-6850.
Softsmith, 1431 Doolittle Road, San Leandro, CA 94577; 415-430-2411.
Softstalker, Box 689, Steamboat Springs, CO 80477; 800-522-1500.
Soft Touch, Box 7200, Costa Mesa CA, 92626; 714-645-8800.
SoftVue, 8911 Tavistock, Houston, TX 77031; 713-988-2530.
Software Arts, 27 Mica Lane, Wellesley, MA 02181; 617-237-4000.
Software Connections, 1800 Wyatt Drive, Suite 17, Santa Clara, CA 95054; 408-988-3704.
Softwarehouse International, 802 Twelfth Avenue, Menomonie, WI 54751; 715-235-3126.
Software Masters, 3330 Hillcroft, Suite BB, Houston, TX 77507; 713-266-5771.
Software Publishing, 1901 Landings Drive, Mountain View, CA 94043; 415-962-8910.
Software Sorcery, 7927 Jones Branch Drive, Suite 400, McLean, VA 22102; 703-471-0572.
Software Specialties, 305 Larchway Drive, Springboro, OH 45066; 513-748-0471.
Software Technology for Computers, 153 California Street, Newton, MA 02158; 617-244-2590.
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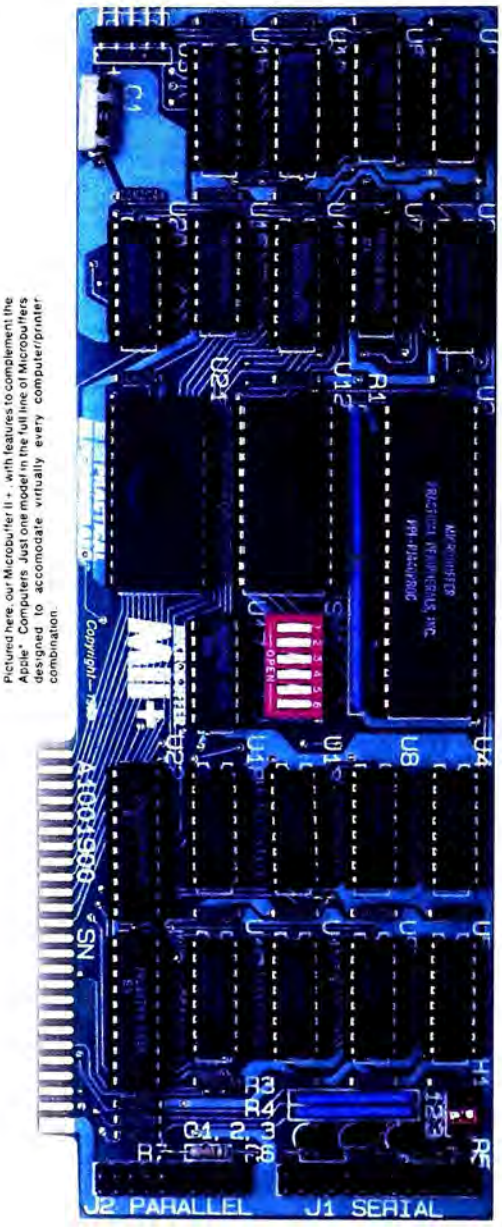

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"Try to Renumber the Kind of December. . . ."

The approach we took to writing last month's program would be frowned upon in formal computer education circles. Terribly undisciplined, it was. Imagine allowing new lines to spring into a program willy-nilly like that! Those who study the science of computer programming are usually taught to write out the code on paper and to be certain in their own minds that it will run before ever visiting it upon an unwary computer terminal.

My Time Is Your Time. The reason for this approach is that computer time on time-sharing systems costs money. Until about six years ago, time-sharing systems were practically the only game in town. They're still used widely in schools and businesses.

A time-sharing system is one in which a single computer does the computing for several users simultaneously, with users usually working at separate terminals. Sometimes these terminals consist of a keyboard and a CRT, and they may superficially resemble a microcomputer. Other systems commonly use—violent shudder—Teletype machines. These clunky dinosaurs are rarely mistaken for anything.

Time-sharing systems typically charge the user a double rate: a connect-time charge for the length of time (measured in real time) he is logged into the system, and a CPU-time rate for the amount of time his programs actually demand of the central processing unit.

Obviously, it isn't a good idea, on that type of system, to waste the computer's time with frivolous editing and reediting of guessing game programs. Get it right on paper first, then type it in. Right? Fortunately, this commonly held wisdom doesn't apply to those of us with Apples. Having already paid for our computers, we can now be more concerned with saving our own time than saving that of the computer.

A Technical Renaissance. Time is not even an issue for us. With an Apple at our beck and call, and the freedom that implies, we can think in terms of the art of computer programming rather than the science.

Nevertheless, there is another good reason to *think about* a program before typing it in (if not actually writing it on paper), and it applies equally well to time-sharers and microphiles alike. Planning and forethought are essential to the creation of efficient programs. Also, a program that was well planned in the first place will be easier to modify later. That's why we've placed a strong emphasis on structure in this column. The more complex a program you're planning, the more you should think about it before actually sitting down to write it. Consider what it will be like to use the program and how it can be made easier and more natural for the user.

Above all, experiment. Writing the code on paper beforehand can discourage experimentation; just thinking about the program, however, promotes new, creative approaches. So don't start with the question, "How will I write this program?" Ask instead, "How *might* I write this program?"

Such is the thinking that leads us to write programs by starting with a basic working model and then inserting the refinements, as we did last month. As we saw, however, this technique can lead to messy line numbering. Taken to an extreme, it can lead to impossible line numbering: Basic won't accept 32.5 as a line number when you want to add a line between lines 32 and 33. For this reason, the DOS System Master comes with a program called *Renumber*.

Renumber installs a new immediate mode command in your Apple. Boot up the system with your System Master and type *run Renumber*. You'll get a title screen with some minimal instructions and a prompt to hit return. Hit return and *Renumber* is installed.

To be sure that it's there (nothing really looks any different than usual), type an ampersand (&). This is actually the command used to renumber a program. You should get an error message to the effect that there is no program in memory. So let's put one there. Except for the presence of the additional command that you have just installed, your Apple will behave as it normally does. Enter this program:

```
1  X = X + 1
2  PRINT X
3  IF X < 10 THEN GOTO 1
4  END
```

If you run this program, you'll find it merely counts from one to ten. Not quite up there with *VisiCalc*, but sufficient for this demonstration.

Say, for the sake of argument, you wanted to insert a line before the end statement that would print "All done!" before retiring. There's no room for it now, but *Renumber* can be used to make room. Type *&* and then list the program: It will be miraculously renumbered by tens, starting at line 10. Notice that even the line number after the goto in line 30 (formerly line 3) has been updated. The program will run just as it did before.

You may have been told at some time that two programs can't be in memory at once, and yet it appears that *Renumber* and your program are coexisting somehow. This rule you've heard applies primarily to Basic programs. Although *Renumber* shows up as an Applesoft file type in the catalog, the working part of *Renumber* is really a machine language program. Machine language is what the Apple uses to think its innermost thoughts in.

Running the Applesoft program called *Renumber* loads the machine language program you just used. There can be lots of machine language programs in memory at once: DOS, Applesoft, and the Monitor are all

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Now, of course, the print statement can be inserted as line 35. If you want to make the final product look really tidy, you can type & to renumber it again, giving you lines 10 through 50. *Renumber* ignores the current pattern of line numbers; it just starts at line 10 and increments each subsequent line by 10 unless told to do otherwise.

Renumber has some other features we'll consider later. At this point, however, let's look at a few new programming commands.

We first encountered loops two months ago, and last month we explored a fairly complicated loop. There are many types of loops, but the most commonly used type is one in which a single variable determines how many times a given set of lines is executed. The variable increments in value each time through the loop, and when its value reaches a certain point, the program stops looping and moves on to other things. The program that we used to demonstrate *Renumber* exemplifies such a loop.

This type of loop is so common, however, that the gods invented an easier way to do it. The easier way is typically called a *for-next loop*, and it involves two new commands, *for* and *next*. The loop takes this form:

```
FOR variable = expression 1 TO expression 2
program lines in loop
NEXT variable
```

A fundamental rule of the for-next loop is that every *for* must have a *next*. The variable used in both statements must be the same. A program to count from 1 to 10 like the one we looked at earlier, rewritten to use a for-next loop, would look like this:

```
10  FOR X = 1 TO 10
20  PRINT X
30  NEXT X
40  END
```

In this case, the loop's index variable is X, expression 1 is the number 1, and expression 2 is the number 10. The most obvious advantage this type of loop has over the if-then loop is that you can tell at the start of the loop, the for statement, how many times the loop will be executed and what the value of the variable will be each time.

Here's how it works. When the program is running and execution first reaches the *for* statement (line 10), the value of the variable (X) is set to the value of the first expression (1). Control passes to the following line just as it normally would. When the *next* statement (line 30) is reached, the value of the variable (X) is incremented by 1. A check is made to see if the variable is less than or equal to the value of the second expression. If it is, the program loops back to the statement immediately following the *for* statement (line 20). Otherwise, control passes to the statement following the *next* statement (line 40).

Thirty Days Hath September. . . . The two expressions in the *for* statement don't have to be numbers. They can be variables or they can be more complicated expressions, such as 3 * B ^ 2. If you wanted to be able to list all the days in a month, for instance, but didn't know in advance which month you would be listing, you could set the variable ND to the number of days in that month and start a loop with:

```
100  FOR D = 1 TO ND
```

The for-next loop normally increments the variable by 1 each time through, but it doesn't have to work that way. There's an optional parameter that can be used to indicate the desired increment. It's called the *step*, and when used it's placed at the end of the *for* statement. When the step parameter is used, the statement takes the form:

```
FOR variable = expression 1 TO expression 2 STEP expression 3
```

The third expression is evaluated and used as the number to add to the variable each time the *next* statement is executed.

Here's an example of how you might use the step parameter: You want to list every Friday in a given month (let's say you get paid on Friday). Set ND to the number of days in the month, as before, set FF to the date of the first Friday in that month, and use the following *for* statement:

```
100  FOR D = FF TO ND STEP 7
```

This month, the first Friday is December 2, so FF would be set to 2; and there are thirty-one days, so ND would be set to 31.

Now try this program out:

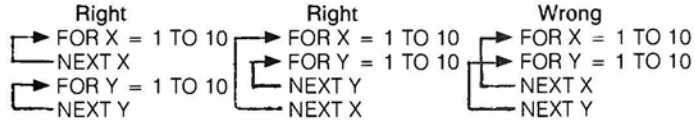
```
10  FF = 2
20  ND = 31
100  FOR D = FF TO ND STEP 7
110  PRINT "Friday, December ";D;", 1983"
120  NEXT D
130  END
```

Save this program on your Floating Point disk as *Friday.1*.

Thank God It's Friday. Here's how it works: Lines 10 and 20 set the values for the first Friday and the number of days in the month. When we hit line 100, D is set to FF, the date of the first Friday, which is equal to 2. Applesoft has also been told to keep in mind that the step for the loop is 7. Line 110 prints out, "Friday, December 2, 1983." When line 120, next D, is reached, Applesoft remembers the value of the step, 7, and adds it to D. So, D now equals 9. Next it checks to see if 9 is less than or equal to ND, which is 31. Since it is, the program loops back, prints, "Friday, December 9, 1983," and hits the *next* statement again. After a few times through the loop, D will equal 30. When line 120 is executed, the step value is again added to D, making D equal 37. The check is made, and 37 is found to be greater than ND, so control is passed on to line 130, which ends the program.

A few additional facts about the for-next loop are worth noting. The value after *step* can be a negative number. If it is, then expression 1 must be greater than expression 2, because the value of the variable will count down instead of up. If the step is negative, the *next* statement will check to see if the loop variable is *greater than* or equal to the second expression; if it is, the next statement will loop back.

In Search of the Great Nested Loop. For-next loops can be used in pairs, but only if you follow certain rules. The accompanying figure shows two right ways to pair loops and one wrong way. The first way is simply to have one loop follow the other: X counts from 1 to 10 and then Y counts from 1 to 10. The second way is called nesting loops (sounds like a species of bird, doesn't it?): X counts from 1 to 10, and while X holds at each value, Y counts from 1 to 10. The entire Y loop is executed ten times. Anything inside the Y loop—between the second and third lines of the example—is executed one hundred times. The third way is illegal and will cause a *next without for* error.



Pairs of Loops

There are two major concepts in Applesoft that are closely tied to the concept of the for-next loop. These are the *subscripted variable* and the *read* and *data* commands. (The next section of this article will purport to be about expanding our *Friday* program to list all the Fridays in 1983. Just between us, there exists no real reason to do this on the computer. Listing dates is one of the many wonderful things that calendars can do for you. Nevertheless, bear with this folly, because the goal here is not to find out how to list all the Fridays in 1983 but in fact to discover how subscripted variables and read and data statements can help us do it. Okay?)

The Annual Report. Let's say, for instance, that we want to expand our Friday program to list all of the Fridays in 1983. Remember, to list all of the Fridays in one month we had to know the number of days in that month (ND) and the date of the first Friday (FF). To do this for each month of the year, we have to know this information for each month of the year. What we need is something like a variable that can be used for keeping lists. Fortunately, Applesoft has just such a beast (how many of you saw this coming?). It's called the subscripted variable.

The subscripted variable works like this. Let's say, a long time ago, that Mr. and Mrs. Tyler had four children, Mark, Mary, Maura, and Maurice. With names like those, it's no wonder the Tylers had trouble remembering which child was which.

Mrs. Tyler was a very orderly person: If they had had computers in her day she would have invented Pascal. One day, she came up with a plan to keep her children straight. Instead of calling her children by their names, she would call them by numbers.

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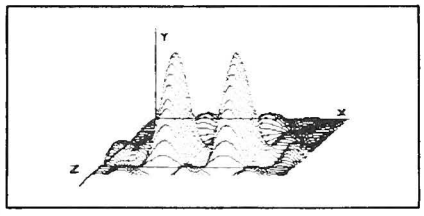

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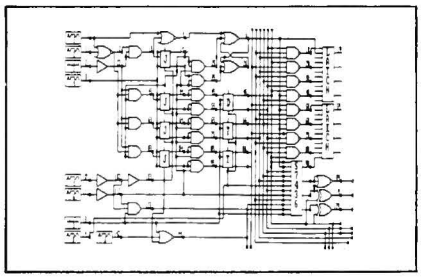

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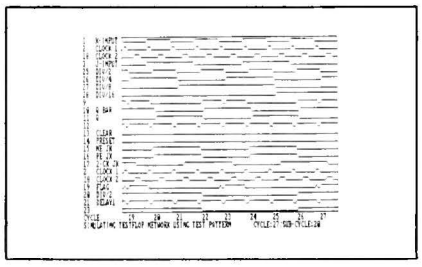

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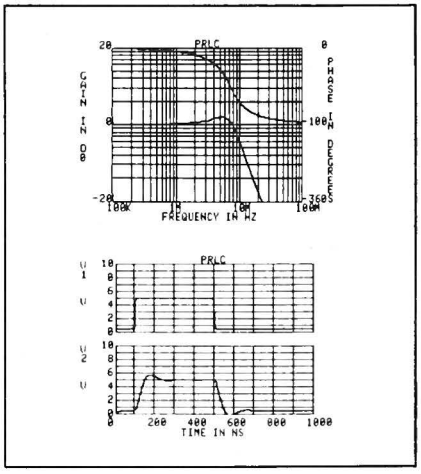

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Four in Array. Thus Mark, Mary, Maura, and Maurice became 1, 2, 3, and 4 respectively. All confusion was eliminated until the idea caught on and soon all the neighborhood children were called by number. So the Tyler children became Tyler(1), Tyler(2), Tyler(3), and Tyler(4). This solved all their problems except when relatives came to visit, but that's another story. Mr. and Mrs. Tyler were the proud parents of the world's first subscripted kids.

Getting back to the example of the *Friday* program, we can make the program applicable to all the months of 1983 by setting up two subscripted variables named FF and ND and indexing them by the month number. The word used to describe all the subscripted variables that have the same name is *array*, so FF and ND are both array names. First we need to reserve twelve slots in each of the two arrays. This process is called *dimensioning* the array, and it is done with the *dim* statement. Add this line to *Friday.1*:

```
10  DIM ND(12), FF(12)
```

The dim command is always followed by the name of the array, along with the number of elements to be used in the array in parentheses. A single dim statement can be used to dimension more than one array. Each subsequent array to be dimensioned must be preceded by a comma, as shown.

Actually, this line will reserve thirteen slots in each array, because the indexes start at zero instead of one. Since the twelve months of the year are usually numbered from 1 to 12 and not from 0 to 11, we'll bow to tradition and leave the ND(0) and FF(0) slots unused. Another thing worth knowing about arrays is that if you start to refer to a subscripted variable before dimensioning the array, Applesoft will automatically dimension the array to eleven slots numbered 0 through 10.

Even if you are planning to use fewer than eleven slots in an array, it's a good idea to dimension the array first. This saves memory space (which is not an important consideration now but may be later) and serves as a reminder of what the array is being used for. It's also a good idea to dimension the array early in the program, preferably in the first few lines. This gives you an easy place to find it if you forget its dimensions or if you need to change those dimensions.

Now we have to fill these arrays with the requisite numbers. We could do this with a line like:

```
20  ND(1) = 31: ND(2) = 28: ND(3) = 31: ND(4) = 30
```

and so on, with one assignment for each of the twenty-four values needed. This would be inefficient and boring to type. Instead, we'll take advantage of a very important, but hitherto undisclosed, aspect of subscripted variables. The index in parentheses doesn't have to be a number; it can be any arithmetic expression. Which means, of course, that it can be a variable. This fact is what makes for-next loops so popular among the subscripted variable crowd. And this is also where read and data come in.

"The Data, Ma'am, Just the Data." Read and data work as partners. Data holds a list of information, and read picks pieces of information from that list one piece at a time and puts them into a specified variable.

Let's start with data. The following two lines, added to the *Friday* program, establish our lists of the number of days in a month and the first Friday of each month:

```
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
```

The syntax of the data statement is simple. The data command must be followed by a list of items separated by commas. In this case the items are all numbers; some other time you'll see how words can be used in data statements. There can be any number of items in a data statement, but the length of the line, like that of all lines in Applesoft, is limited to 239 characters. The last item should not be followed by a comma. Finally, a data statement can't be followed by any other kind of statement on the same line. It is typical to put data statements at the end of the program, as we have done here.

To get to and use the data in a data statement, you need a read statement. In a read statement, the word *read* is followed by one or more variable names. Imagine a pointer in the program, pointing at the first piece of data in the first data statement. The first time a read statement is executed, the piece of data indicated by the pointer is placed in the first variable in the read statement and the pointer advances to the next piece of data. If there is another variable name in the read statement, the next piece of data is read into it, the pointer is moved again, and so on. If a read is executed and there is no more data to read, the program will break with an *out of data* error. So programs should be set up with one and only one read for each piece of data.

By this point it should be clear that the best way to read data into an array is to use a for-next loop. Therefore, the next lines we add to the program should look like this:

```
20  FOR M = 1 TO 12: READ ND(M): NEXT M
30  FOR M = 1 TO 12: READ FF(M): NEXT M
```

Note that each line contains an entire for-next loop. This is perfectly legal. It is, in fact, one of the situations in which using multiple statement lines makes the program easier to read.

These most recent additions have wiped out our old lines 10 and 20, which is fine because our new lines are taking over the function of those lines too. Now let's establish the major loop—the one that will represent the months of the year.

```
40  FOR M = 1 TO 12
125  NEXT M
```

This loop is nested around the loop that prints all the Fridays in one month. Now we have merely to modify the inner loop to make it apply to whichever month we want. This is accomplished by changing lines 100 and 110:

```
100  FOR D = FF(M) TO ND(M) STEP 7
110  PRINT "Friday "; M; "/"; D; "/83"
```

The changes to line 100 reflect the fact that we're now using subscripted variables instead of simple variables. What this means is that the beginning and end of the loop will be determined by the specific data for the month specified by the variable M.

In line 110 we've simply changed the output to reflect the varying months. The new output will look like "Friday 1/7/83." We aren't yet ready to go into how you could get the names of the months to come up; that will be covered in a future installment.

The current version of the program now looks like this:

```
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
```

Let's close with a discussion of how to use the more advanced features of *Renumber* to make the line numbering of this program look a little more professional. Those advanced features are a set of four parameters that tell *Renumber* what part of a program to change and what the new line numbers should be. They can be used in any order and none of them is required.

Each parameter has an automatic value that is used if nothing else is specified. This is called a *default value*. (Think of the word default as in "winning by default," not as in going bankrupt, and it will seem less threatening.)

The first two parameters, S and E, define the start and end of the section to renumber, in terms of the old line numbers. The defaults for these parameters are the beginning and end of the program, which is why just hitting & alone renumbers the entire program.

The next parameter is the first new line number (F). This indicates what the first renumbered line will have as its new number. The default for this parameter is 10.

The final parameter is the increment (I) for the new line numbers, which of course determines what the new numbers will be for all the lines following the first renumbered line. The default increment is 10.

These parameters are used together following the & to express any possible renumber operation. Let's put this information to use. First of

all, save the Friday program as *Friday.2*. It's advisable to save your program before renumbering it on the chance that something should go wrong during the renumbering process.

If you've been following this article without interruption, *Renumber* should still be in memory. (If it isn't, you should run *Renumber* from the System Master disk and then load *Friday.2* from your Floating Point disk.) Test for *Renumber*'s presence by typing *&I0*. This tells *Renumber* to renumber the whole program, incrementing the line numbers by zero. This operation is blatantly illegal, and if *Renumber* is still present and healthy it will chastise you with an error message.

With everything set up and ready to go, let's begin. *Friday.2* can be logically divided into three sections: initialization (lines 10 through 30), the actual working loops (lines 40 through 130), and the data (lines 200 and 210). Since the data is read by the initialization section, it would make more sense to have it in the same section of the program. We could then use the program's line numbers to distinguish the initialization routine from the working routine.

Here's how we do it. First, let's set up the working routine starting at line 100. This would be accomplished by the command:

```
& S40, E130, F100
```

This command takes the section from line 40 through line 130 and renumbers it to 100 through 150, incrementing by 10. So far, so good. Now all we need to do is move the data down to line 40, right after the initialization routine.

```
& S200, F40
```

The E parameter was unnecessary in this case because we were renumbering from line 200 to the end of the program. This example shows how renumber can be used to move sections of the program from one place to another. It won't move other lines that already exist within the target range out of the way, so you should be sure the new line number range is unoccupied. Moving sections around in the program can make the program run incorrectly. Moving the data statements in a block like this is usually safe. Nevertheless, that's another good reason to save a program before you start renumbering it.

Homework, Uggh! At this point you have enough Applesoft under your belt to begin to write programs of your own. Learning to program is like learning a language (as we've stated before): You have to use it to learn it. You can repeat "the pen of my aunt" sentences in some French class until you're bleu in the face, but you won't learn nearly as much French doing that for a year as you will spending a day in Paris looking for a public restroom.

This column cannot instill in you that sense of need to write in Applesoft, but it can give you some possible subject matter. Here are three suggested projects to keep you busy until next month.

1. *Friday.2* can be improved. It is possible, if you know the date of the first Friday of the year and the number of days in each month, to calculate the dates of the first Friday of each month "on the fly." This would eliminate the need for the FF array and make it possible to alter the program to cover any year by changing the line that sets the first Friday of the year. Hint: If you want to get fancy, don't forget leap years.

2. Try creating a program that simulates a digital clock. Have it do hours, minutes, and seconds. Initially, you may have difficulty getting the program to go as slow as a real clock.Try putting in an empty for-next loop to slow it down and see how accurate you can get it.

3. This is the hardest one. In the first article of this column (September 1983), there appeared a flow chart for a sorting routine and a description of how the routine would work. You now have all the commands you need to write such a routine. You'll need to enter data into an array, sort it, and print out the sorted list. You can use read and data to fill the array or generate a list of random numbers with the commands from last month. There'll be lots of for-next loops in this one.

That's it for this time. Until next year, remember to *run* carefully during the holiday season. ◨

GLOSSARY

Array: A variable that can hold a list of numbers instead of just a single number. The several elements of the array are distinguished from one another by their index numbers, which follow the array name in parentheses.

DATA: Indicates the beginning of a list of items within an Applesoft program. The items in the list may be retrieved with a read statement.

Default: The value used for a parameter in a command if that parameter is not specified.

DIM: Applesoft command to dimension an array variable. Followed by the array name and, in parentheses, the number of elements to be used in the array.

FOR-NEXT loop: A loop in an Applesoft program defined by the *for* statement at the beginning and the *next* statement at the end. Using a variable as an index, it assigns a value to the variable, increments that value each time through the loop, and exits the loop when the value passes a certain ceiling value.

Index: In arrays, the number in parentheses that follows the variable name, indicating which element of the array is being referred to. In for-next loops, the variable that increments each time through the loop.

Nested loops: A pair of loops arranged in such a way that one loop is inside another. The inner loop will be executed in its entirety during each pass of the outer loop.

READ: Gets the piece of data within a data statement that is indicated by an internal data pointer, assigns its value to the indicated variable, and moves the pointer to the next piece of data.

Renumber: A program on the DOS System Master disk to alter the line numbering of an Applesoft program. *Renumber* resides in memory concurrently with Applesoft programs.

STEP: An optional parameter in a for-next loop. Used at the end of the *for* statement, it determines the increment of the index variable each time through the loop.

Subscripted variable: A variable within an array. It is referred to by its array name followed by its index number, or an arithmetic expression representing its index number, in parentheses.

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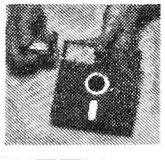

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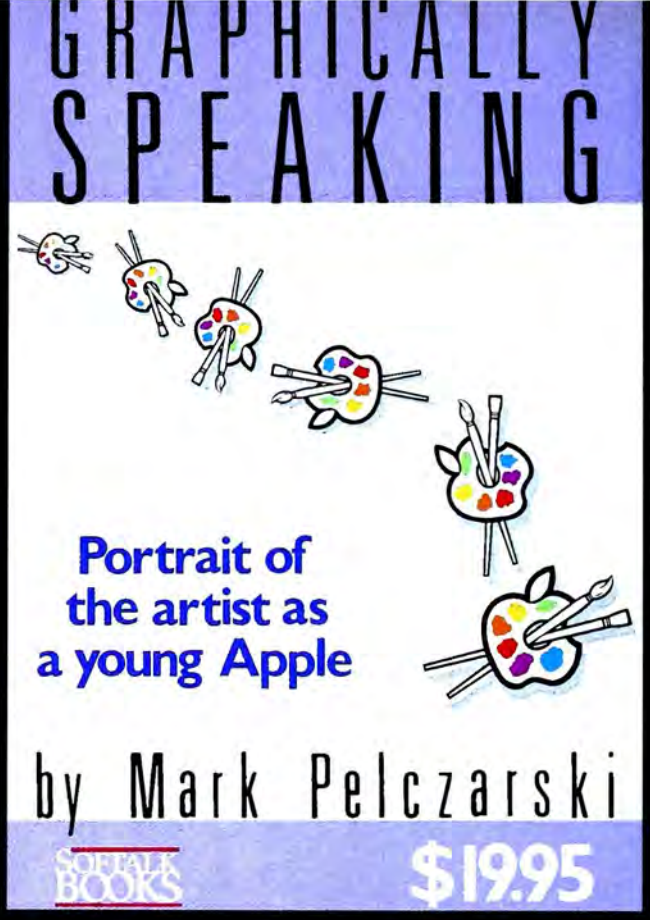

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The author is the director of Computer Workshop, a private school specializing in teaching children programming.

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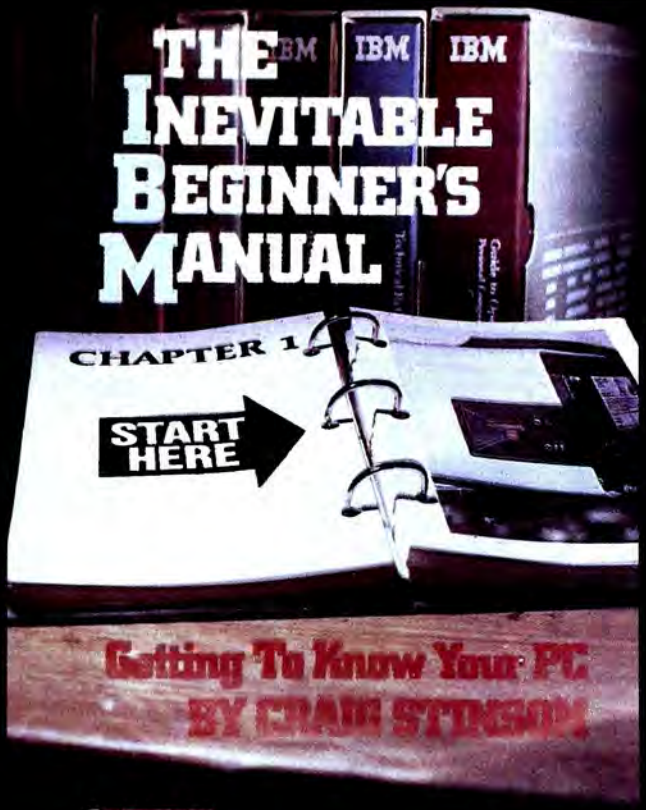

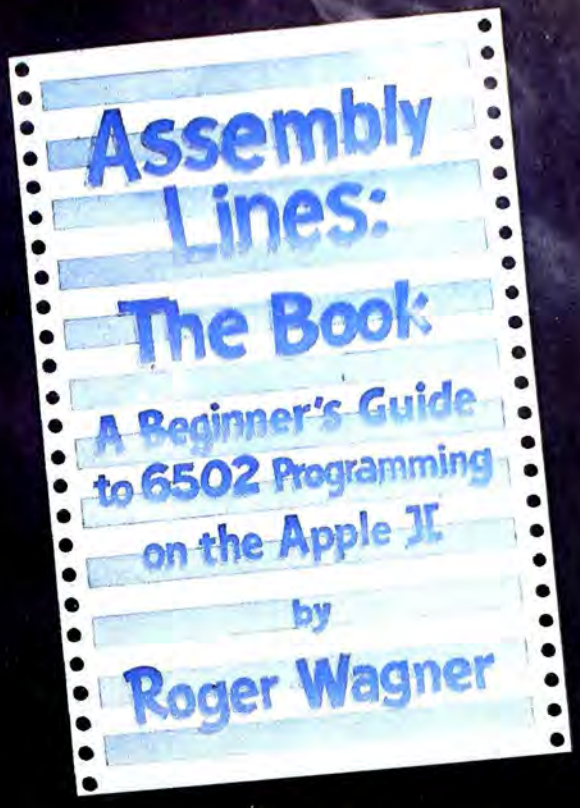

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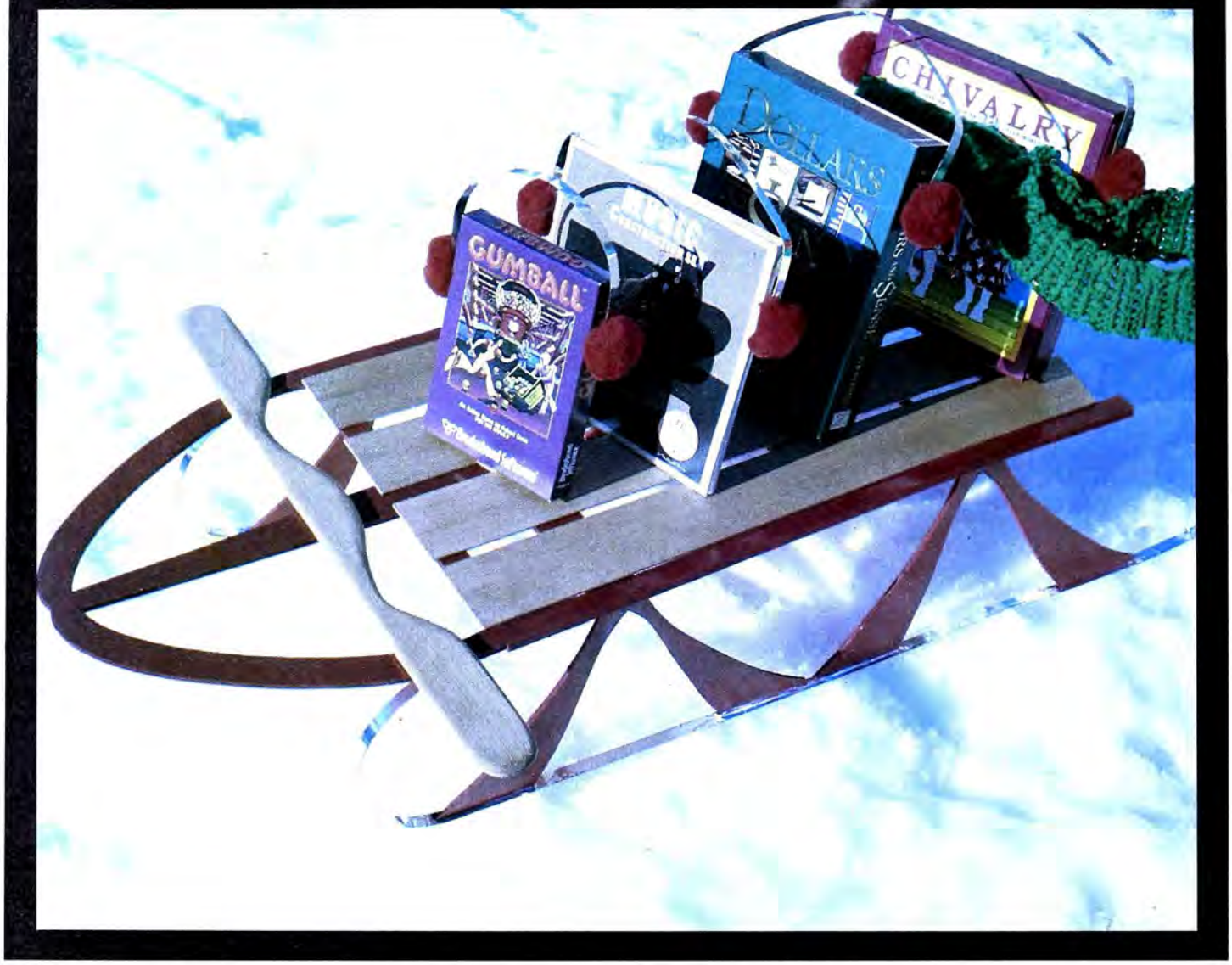

Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

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, Dave Albert, Dave Chandler, Forrest Johnson, William H. Harrington, Allen Munro, Ken Ryall, Howard A. Shore, and Todd Zilbert.

Gumball. By Robert Cook and Doug Carlston. Is Broderbund's latest arcade-style forehead-pounder just another maddening game or a satirical comment on the Great American Dream of climbing the corporate ladder? Does it teach players good work habits and start them on the road to success, or does it teach them to dance with the joystick and wobble their eyes like overcharged Disneyesque automatons?

Gumball puts players in the position of workers in a gumball factory. On the first level, the task is to catch a combination of eight green or blue gumballs in corresponding blue and green bins. The gumballs come down a chute in the upper left-hand corner of the screen and wind their way through a maze of other chutes equipped with various trap doors that, when opened at the proper moment, direct the gumballs into the proper bins.

On each level, the workload consists of catching gumballs in the proper bins. On level two, you must catch a combination of eighteen blue, green, and orange gumballs in three different bins. On level three, that increases to four different-colored gumballs totaling twenty-nine. Players are given a speeded-up workday of eight fifteen-second hours in which to meet their quota of gumballs. A clock keeps the time at the top of the screen; a four o'clock warning whistle lets the player know there's only a few seconds left to meet the quota. Players can also adjust the speed of the production line (speeding up the flow of gumballs is essential on the higher levels).

On all levels, quality control is rigidly enforced. If the player allows a blue gumball to fall in a green bin, this hi-res creep called Mr. Nitpicker comes over and dumps the cart on its side, spilling out all the gumballs accumulated so far. In addition, rotten white gumballs occasionally come off the production line. If you let one of them fall in a bin, the annoying Mr. Nitpicker makes another visit. Then, to make matters even more complicated, for every four good gumballs that you miss or that fall uncollected, your work quota is increased by one gumball.

The game's main occupational hazard appears in levels four and beyond. Every so often, a particularly rotten, explosive white gumball comes off the production line—deranged dental assistants have put dynamite in the sugar supply—and you have mere seconds to deactivate it before it blows up the factory and ends the game.

So *Gumball* teaches us about workloads, quality control, and occupational hazards. But what about incentive? *Gumball*'s creators have come up with a cute way of handling that. Each time you complete a level (meet the quota before the five o'clock whistle blows), you're given a promotion and then a short, animated routine appears that shows the worker walking home from the factory. For each successfully completed level and each promotion, the worker is given a bigger house. After level one, the worker goes home to something resembling a phone booth, but by the end of level three that cubicle has become a swank one-story suburban home. After that? Well, as they say, a man's home is his castle. . . .

If nervous energy and endless rounds of the joystick twist are the requirements for achieving success in corporate America, then *Gumball* marks Broderbund's entry into the multi-billion-dollar corporate training market. As a mere game, *Gumball* will make you twist again like you did last summer (or the other day, as the case may be). DH

Gumball, by Robert Cook, Broderbund (17 Paul Drive, San Rafael, CA 94903; 415-479-1170). $29.95.

Mad Rat. By Logan Zintsmaster. If *Mad Rat* were an old movie, its entry in "Your Handy Guide to TV Movies" would probably have two and a half stars next to the title, be dated at around 1963 or so, and be written up something like this: "The Mouse is up to its usual slapstick antics, this time in a department store, scrambling for chunks of cheese and outsmarting the Cat. Mildly amusing comedy for the younger set and fans of the Mouse."

But wait! Is this really a B-disk, an arcade second feature, fated to play for a couple of weeks out in the sticks and end its days on the drive-in circuit? Probably. But after that, it could easily come back as a rediscovered classic and live forever (six months or so) as a cult computer game. Yes, what at first glance appears to be a pretty dreadful little item reveals, as play progresses, the small, exquisite surprise of turning out to be a pretty challenging game.

Comparisons of the design to Sierra On-Line's revised *Jawbreaker II* are inevitable but irrelevant. This game does not play or feel like that. Maintaining your rodent equilibrium on the six moving sidewalks that comprise the screen while on your quest for cheese takes special finesse and timing. And making the best use of the apertures in each sliding floor while avoiding the cat and the death hole at the bottom is not as easy as it looks. On the higher levels, you can plunge right through six floors to your demise before you make a move. On still higher levels, the speed of the escalators and the multiplicity of cats will freeze that smile of benign indulgence on your face. Just as you get hooked, it gets impossible.

The title is derived from the hardy old *Pac-Man*ian hunter-turns-the-hunted device. Jumping up to the top floor when the "superizzor" appears gives you some serious mouse muscle, fangs, and a cape. You may then proceed to the nearest cat and have at it.

The music, several insistent bars of "Three Blind Mice," is the most serious drawback to this game, but that's what detachable speaker connections were made for.

It's a simple, nay, crude affair. The only controls are right, left, and up. But the simplicity is the point. It works. This is a game that you'll pop into the drive late at night when no one is around and play for hours. Then you'll tuck it away in the back of your file and leave *Zaxxon* out when you have company. AC

Mad Rat, by Logan Zintsmaster, Phoenix Software (64 Lake Zurich Drive, Lake Zurich, IL 60047; 312-438-4850). $24.95.

Music Construction Set. By Will Harvey. Its very name is a tip-off to how easy it is to use. Like Bill Budge's pinball-generating software toy, the *Music Construction Set* offers much of the same—simplicity in building complex designs.

Using it to compose music is as easy as ordering food from a pastry cart. Find what you want, pick it up, and put it where you want it. *Music Construction Set*'s cursor is the familiar gloved hand from *Pinball Construction Set*. However, nonjoystick composers can opt to use the "A," "Z," and arrow keys as well. KoalaPad owners have it even easier; moving the cursor is as easy as pointing to the desired icon and pressing a button.

MCS's icons (pictures that define functions) are self-explanatory; arrow icons scroll the music left and right; the house icon moves the composer name to the beginning of the piece; the piano icon plays the composition; the scissors cut; the paste jar pastes.

In terms of building melodies and chords, *MCS* doesn't offer any capabilities that aren't available in other music software, but it does offer simplicity. Suppose the composer wants to build a C-major chord. Just move the pointing cursor over to the note of desired length (whole, half, quarter, eighth, and sixteenth notes are possible), pick it up, and plop it down on the staff where C goes; repeat the procedure for E, G, and the top C and we have a chord.

The ease with which one can pick up notes and rests and move them around is standard in *MCS*; where the program really begins to shine is in its extras. The cut-and-paste feature is one of its most powerful tools. It's likely that any musical composition will have phrases or bass lines that repeat. Instead of having to construct those passages note for note each time they're needed, the scissors cursor cuts out as many as eight measures at a time and stores them in a buffer. Then, the composer has but to move the paste bottle cursor to the desired spot and, with the push of a button, the passage is reproduced.

The buffer holds whatever measures were cut last. That means it's possible to cut measures from one song, load another song from disk, and paste the measures down in that song.

MCS can transpose (up or down) from one key to another and can change clefs in the middle of a song, a feature that comes in handy when the treble clef can't accommodate a low note.

One thing *MCS* doesn't have is a lot of memory space. The program is so large that there's little room left to store composed works. Though there's enough memory to hold seven hundred notes on each staff, that doesn't amount to much more than seventy measures when three- and four-note chords are part of the composition.

Something else that's missing is the capability to change time and key signatures in the middle of a piece. That's not a vital feature, but it's one that advanced composers will miss.

MCS can send two-voice music through the Apple's speaker, and with a Sweet Micro Systems Mockingboard Sound/Speech I it's possible to create three-voice music. However, to get the most out of this program, Sweet Micro Systems's yet-unnamed new Mockingboard is recommended; it cranks out six-voice music—in stereo.

It's important to note that *MCS* assumes the composer has no musical knowledge. Electronic Arts has included a brief yet thorough primer on the basics of music and music theory that amounts to a semester's worth of work in any beginning music class. Experienced musicians may find the manual unnecessary; beginners will find it a godsend.

Electronic Arts has also left *MCS*'s music-generating routine open to the user. This means that all songs created with *MCS* are stored as binary files and can be copied and traded as such. With the program's Music file in memory, songs can be bloaded and then called from Basic programs. Music plays independent of the 6502, meaning that once the music is playing, the Apple can go ahead with other functions—running programs, word processing, printing, or whatever.

Lots of credit should go to Jim Nitchals, whose help on *MCS*'s routines for putting music through the Apple speaker will be fully appreciated by those without Mockingboards.

Because the pluses make the minuses almost nonexistent, *Music Construction Set* makes a wonderful learning device for music students, an excellent tool for programmers wishing to incorporate musical routines in their programs, and an entertaining toy for dabblers in the art of music. MTV

Music Construction Set, by Will Harvey, Electronic Arts (2755 Campus Drive, San Mateo, CA 94403; 415-571-7171). $40.

Bouncing Kamungas. By Thomas Becklund. A bulletin just off the UPI wire reports that the farmers of the Dakota melon industry have been caught in a nightmarish siege that could threaten much of the country if not stopped.

The threat, in the form of a newly evolved, quasi-intelligent life form that inhabitants call the Kamunga, has emerged from the unique characteristics of the Dakota environment to wreak havoc throughout Dakota's famous melon industry.

Farm union labor leader Preston Penn Guin describes the calamity. "It's hard enough on our boys just having to go around planting seeds, harvesting crops, and driving into town, what with them pesky weather snakes ruining our entire harvest if you so much as look at 'em cross-

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FILE is basically a paper filing system without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

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PFS:REPORT. The simplest way to sum it all up.

REPORT is a powerful analysis tool that works with FILE.

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eyed. That's not even mentioning those Peronie varmints all over the streets."

When asked to describe the Peronies, Guin flashed a toothless grin and replied, "Where you been? Them critters has been hidin' on our highways fer months. Clever little beggars, too. Look like potholes, see, 'til ya hit one. Shakes the truck up real bad and we lose a lot of melons that way. Don't bother them none, though. They just grab what fruit falls off and make off with 'em. They can't do nothin' 'less yer drivin' fast. Course most of our farmers like to get to the market pretty quick; helps to keep the prices up."

Another victim interviewed, a farmer named Dusty Barnes, describes what he saw. "It's just like Preston says. We're out there planting and harvesting, when suddenly, without hardly a sound, these Kamungas come raining down out of the sky. Few at first, then more and more, smashing our crops like it was the thing to do. A big grin on their ugly faces too. Gives me the creeps just thinking about them.

"If they get you on the head," Barnes warns, "that's all she wrote. They'll drive you clean into the ground. Saves the widow the price of a funeral, though, so's I guess it ain't too bad a way to go."

"Is there no defense against this despicable onslaught?" the UPI reporter asks.

"Sure there is," Barnes answers brightly. "We just skewer them suckers on our pitchforks, like so." He gestures, lunging upward with his pitchfork. "You gotta be careful, though. If you hold your pitchfork up fer too long, crack! Lightning's apt to get you! I seen a lot of good boys go that way; it ain't pretty."

In a related story, military research liaison Major I.M. Dumm categorically denies any connection linking the military's experimentation with genetically engineered defoliating agents and the bouncing beasts, saying only, "We're looking for a few good men to come and put an end to the scourge plaguing our great Dakota farmers—these bouncing Kamungas must be stopped!"

Bouncing Kamungas—the sound's okay, the animation's good, the premise original, and the action intense.

Further updates as they occur. HAS

Bouncing Kamungas, by Thomas Becklund, Penguin Software (Box 311, Geneva, IL 60134; 312-232-1984). $19.95.

Gnosis VII. By Gary W. Cuba. The word *gnosis* comes from a Greek word meaning knowledge, investigation. In English, it has the connotation of special or higher knowledge. *Gnosis VII,* therefore, is a game of knowledge, of interpreting and analyzing events and identifying reality, all of which leads to successful living.

In other words, *Gnosis II* is a large, interactive logic puzzle. It works, it's fascinating, and it's fun.

It's also eternally replayable because the events and circumstances are randomly generated each time that it's played. But the most fun are the times you play *Gnosis VII* before you understand it. (Go ahead and read the instruction book; on purpose, it won't give you much help.)

The goal is to learn the secret names of the seven gods that take turns ruling over each of seven villages and, having learned those, to learn the one word of power. Now don't quit reading just because you had more than your fill of the occult during the sixties; this is a game of logic, remember? It just sounds arcane.

Everything goes in sevens. Within the seven villages are seven potential occupations by which to earn a living, seven materials available for creating worship offerings, seven skills to be learned, and seven boons with which to win sanctuaries. Boons are gifts to be made with the appropriate material by someone with the appropriate skill—things like arks (material, wood; skill, carpentry; experience, timber cutting), temples (stone, architecture, rock hewing), and odes (parchment, writing, library work). Offering the appropriate boon in a village where that object is revered makes that village a sanctuary for you. Only when you worship gods in a sanctuary will they reveal to you their secret names.

You know from the start that the gods rule the villages and influence their customs. But how and what to do with that is part of what must be learned. The game comes with logic-chart worksheets, which you're encouraged to photocopy. Scratch paper is useful too. Try things and deduce from them; theorize and test your theories. Eventually, you'll understand. Because the player's lifetime is limited to a relatively normal span, it takes several games to see the full power of the sun.

Once you understand how this strange land works, the game becomes one of gaining knowledge quickly and scoring the most possible points in a lifetime. There are obstacles, which is where the five (not seven) levels of difficulty come into play. The player must move from town to town each turn, except when learning a skill or when too broke (traveling costs money), and the highways are dangerous. Thieves lurk ready to steal cash, angry, evil emanations from gods withdraw blessings and materials, and illness forces loss of precious time for recovery. Specific pieces of knowledge overcome each peril, but knowledge is hard to come by. The higher the difficulty level, the more problems arise, and the greater the challenge to discover the word of power in one lifetime.

Magnetic Harvest is an interesting company. Not only does it not protect its disks, it includes in its documentation the range of line numbers for each routine in its programs. The people at Magnetic Harvest want computer users to learn about the computer and programming; and they hold and act on a strong conviction of the goodness of us. Their first program, *Planetmaster*, was interesting but lacked playability. *Gnosis VII* is fascinating and eminently playable; with its arrival, we can form a strong conviction about the goodness of this company's work—and look forward eagerly to the innovations it will bring us in the future.

The word of power that makes *Gnosis VII* tick is *reason*. MCT

Gnosis VII, by Gary W. Cuba, Magnetic Harvest (Box 255, Hopkins, SC 29061; 803-783-3151). $19.95.

HomeWord. By Ken Williams and Jeff Stephenson. Throughout history, images and symbols have graphically described what speech and the written tongue sometimes confuse. Imagery to indicate an idea, an action, has made its way into computing. Apple's Lisa software sports crisply detailed icons that manage all manner of operations, each clearly representing the processes it champions.

HomeWord brings icons to word processing for Apple IIs.

But some of *HomeWord*'s icons aren't too clear in defining the procedures they represent. So, each icon has a written caption. Hmmm. Oh well, the captions save the day for an otherwise excellent home-use word processor. And, after you're used to them, the icons do their job. It's especially nice to move the cursor to an icon, hit return, and get exactly where you wanted to go.

One very innovative icon is the page sketch that appears in a lower corner of the screen as you're writing or editing. It's a tiny reproduction of the formatted version of the page you're working on, complete with margins, indents, and spacing—a minipreview of the final document. A one-pixel cursor moves through the page sketch so you can always see where you are in the overall picture. If you choose to center a paragraph, the edit screen indicates in words where the centering begins and ends; simultaneously, that paragraph is actually centered on the page sketch.

If lines can be considered icons, two more are nice. One horizontal line shortens as the computer memory fills, and another shortens as the data disk fills.

HomeWord's other features go beyond those of other home-use word processors. You can mix types of text—bold, underlined, or regular—and there's plenty of flexibility in defining page formatting and printer interface. You can also see your document on-screen in its printed format before printing—full-size.

An excellent feature uncommon even in powerful word processors is the outline format capability. Either while writing or while formatting, you can call for several levels of outline indentation simply by indicating the level of indent. If you already have items under that heading, the indent is automatically moved in another notch. Take an indent out, and all lower-level indents adjust.

Documentation is complete on an audio cassette, so you can listen and try out what you learn as you hear it. The lessons are easy to comprehend and productive. Yes, there's a printed version for inveterate readers. With *HomeWord*'s many truly fine features, the matter of the icons and text screen display need not be an issue.

HomeWord is inexpensive, targeted for the home and for the entire family. Without a doubt, it is a viable entry into this currently limited market. MGL

HomeWord, by Ken Williams and Jeff Stephenson, Sierra On-Line (Sierra On-Line Building, Coarsegold, CA 93614; 209-683-6858). $49.95.

Wordrace. By Randy Simon and Robert Freedman. This is a supercalifragilisticexpialidocious program: In other words, very good indeed, but hard to define precisely. It's several different things at once: a challenging word game, a teaching tool, and a couple of general information games wrapped up in an elegant game display format. And it talks!

Let's look at it from three viewpoints. As a child's game, it looks like

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this: a really neat, serious game—nothing fancy. This is the kind of game you do in your head, not on the screen, but everything you need is there. It tells you which player is up and what everybody's score is; it shows you the word you have to figure out and, right next to it, the ticking clock; and then it gives you six definitions for the word. You have to type the letter representing the right definition before the clock runs out. And you'd better be right, too—you'll be charged for wrong answers.

After you type in your answer, it tells you whether you were right or wrong—right out loud, through the Apple speaker! Pretty good voice, too, for an Apple.

The vocabulary words would be a little tough for most kids, however. The instructions say that the beginning level is aimed at children no younger than twelve; but it would take a pretty verbal twelve-year-old to do well at that level.

As an adult word game, it's a pleasant surprise. Most vocabulary games for adults tend to be obvious: not much of a challenge if you read a lot. *Wordrace* is not like that, however: The words in the highest, or "challenge," level are very rare. And another thing: In most vocabulary games, the definitions are a dead giveaway if you use a little logic. In this game you will need the logic, all right; but nothing is given away; you have to work for it!

The voice in which the program confirms or rejects your answers is surprisingly good, when you consider that it's pure software: no hardware or modification is required—just boot the disk. This program does a better imitation of the human voice than some programs requiring outboard circuitry and a separate speaker. But, good as it is, it would be nice if we could turn it off sometime.

As a game for grown-ups ("adult game" has unreliable connotations nowadays), *Wordrace* is a beauty—if you like word games. It's not as intricate or as strategic as Scrabble, but it's a whole lot faster. This is the perfect game for a party in the English department.

Which brings us to the third viewpoint. Considered as a teaching tool (drill-and-practice courseware), *Wordrace* is excellent. If you want to teach vocabulary to children from about age twelve upward (maybe from about nine, if they're intelligent and verbally oriented), this program will help a lot. It's highly motivating as a solo game, with time-based scoring and audible reinforcement; and the game system handles four players, so it supports competition play as well.

There are four levels of difficulty, from beginner to challenge: a total of twenty-five hundred words. When you can play this game well at the higher levels, you will have a rather extensive vocabulary.

The disk also includes two other games, using the same format: one about sports heroes and one about famous people in history. For a child, these would be general information quizzes: for an adult, trivia games. Between them these games cover twelve hundred names.

As a teaching tool, *Wordrace* has one significant drawback: It does not permit you to add your own lists of questions and answers. However, if what you want to teach, learn, or simply show off is English vocabulary, it's no problem: The lists they included are just fine! JR

Wordrace, by Randy Simon and Robert Freedman (additional databases by Sam Cohon and Bill Dozier), Don't Ask Computer Software (2265 Westwood Boulevard, Suite B-150, Los Angeles, CA 90064; 213-397-8811). $34.95.

Drol. By Benny Aik Beng Ngo. The folks from Broderbund seem intent on cornering the cute market these days. First there was *Spare Change*, a delightful exercise in cartoon zaniness; now there's *Drol*—a charmer set in a dream world inhabited by witch doctors, Garfield-like scorpions, and kamikaze vacuum cleaners.

The dream world of Drol contains a four-level, multiscreen scrolling ruin in which a diabolical witch doctor has sequestered a family. Your mission is to rescue them, along with their pets. The family consists of Mom, a little girl and her pet lizard (with jetpack), and a little boy and his pet crocodile (also with jetpack). The two young ones have been entranced by the witch doctor and wander zombielike about the hallways, the little girl following a balloon and the little boy in the wake of a toy helicopter. The player, as an R2-D2-like robot, is equipped with an antitrance suit, a jetpack, and an unlimited supply of reality pellets to aid in destroying the witch doctor's monsters and phantoms.

Each level of the game consists of three missions: Rescue the little girl and her pet lizard; rescue the little boy and his pet croc; and then rescue Mom, who is tied up on the bottom floor of the ruins. If you shoot the little girl's balloon or the little boy's helicopter, they stop wandering and stand still, making them much easier to rescue. Mom is always stationary. The successful completion of a level will reward you with a wonderful cartoon sequence and then transport you back to the dream world to accomplish the rescues once more, this time with tougher opposition from the witch doctor and his minions.

About those minions. . . . There are a number of them. At first one must deal with hopping scorpions who can be shot at only at ground level and a flying turkey that must be shot repeatedly in order to roast it (literally). The scorpions travel faster than a player can and will home in on you as soon as you are in sight. Then there are the monsters, who also hop along with reaching arms and can best be shot from a hovering position. By the time you reach the third level and go to rescue Mom, you're beset by serpents that look for all the world like seahorses. These guys can be shot from the ground or hovering positions, but they bounce along the corridors quite quickly. Furthermore, the corridors are filled with hurtling implements of a most distressing nature: arrows, hatchets, daggers, and swords—all quite lethal. Your only option is to shoot them down before they get to you. And then there are the man-eating plants, of which the less said the better. . . .

Perhaps the most delightful aspect of *Drol* is the graphics. The animation is very smooth; the figures and shapes are beautifully rendered and even more attractive than the artwork on the package itself. Everything is very cute and very charming. The hurtling implements of doom move at variable speeds, as do the pets, making it very difficult to calculate which to deal with first. And the cartoon reward is priceless.

For all its charm, however, *Drol* is a tough game. The first level is relatively easy, but, having completed the first three rescue missions, life becomes very difficult. The monsters begin spitting doom and it's very easy to get wiped out quickly. Furthermore, hazards such as berserk vacuum cleaners appear, and the act of hovering by jetpack becomes a siren call to aerial doom.

The folks from Broderbund have once again put out a good, playable game of great charm. While it does not have the depth of some of Broderbund's other offerings, it is nonetheless very enjoyable and contains hours of arcade fun. The dream world of *Drol* is definitely worth a visit. DA

Drol, by Benny Aik Beng Ngo, Broderbund Software (17 Paul Drive, San Rafael, CA 94903; 415-479-1170). $34.95.

Participative Management Skills. Edited by Richard E. Byrd. If you've ever headed a group to do anything, you've managed people—your children, the prom committee, the lunchroom squad at the office, a department, a company, a corporation, a conglomerate, a country. And when you're responsible for the actions of a group—meaning that by some higher criteria you're officially in charge—you have a fundamental choice to make. You can manage by virtue of your clout—better known as rule by force, or dictatorship—or you can build your group into a cohesive, creative, enthusiastic bunch of producers who hardly need to be managed at all, it seems.

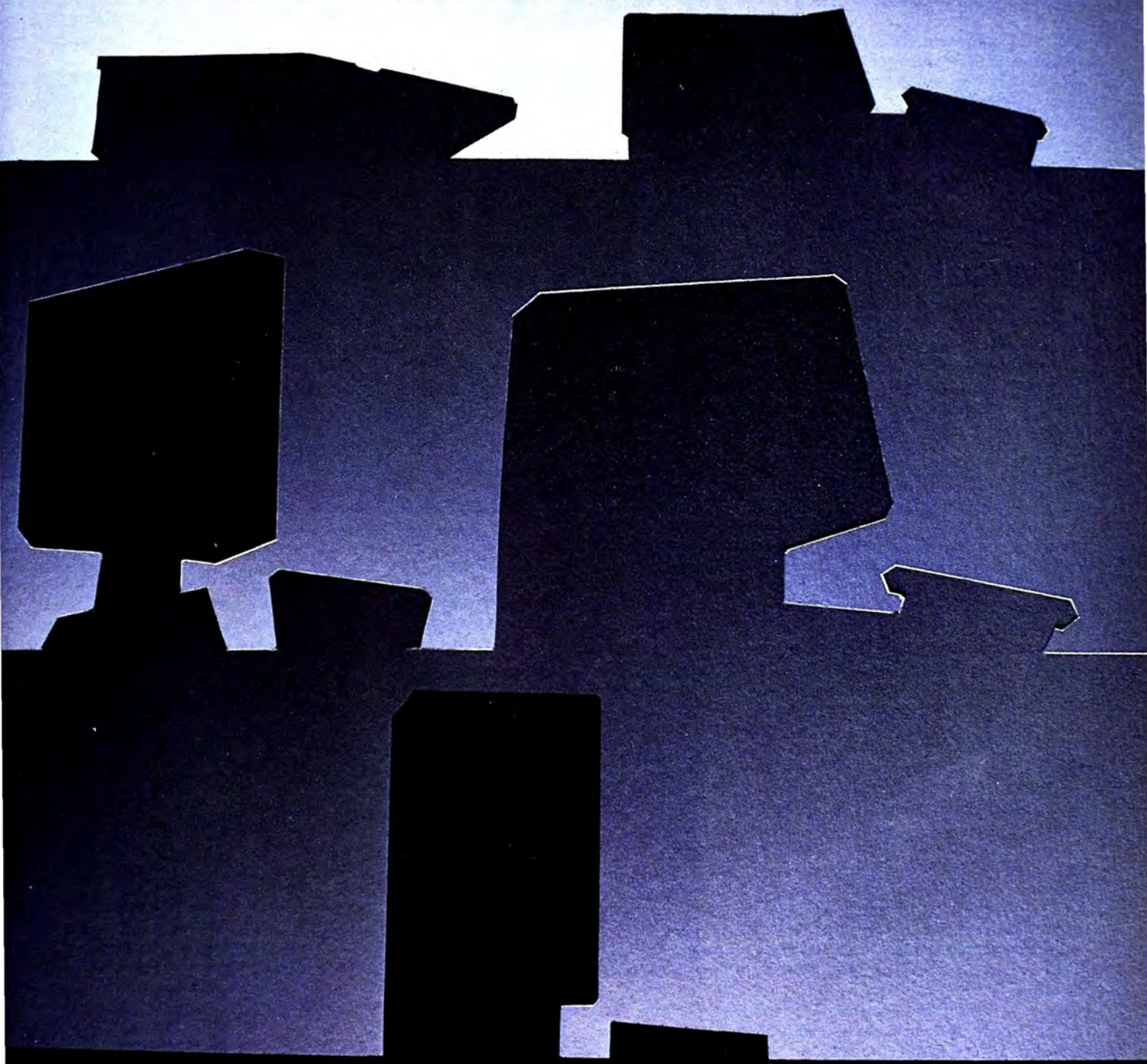
That's what participative management is all about. The group is a team and the official manager guides the team members to take part in managing the team, encourages each member to develop his own nonclout sources of power within the group, and strives to gain consensus decisions on team matters. The result is that everyone's happier, people grow, creativity blossoms, work quality increases, and the team members think this is a great place to work. At least that's the goal, and it has a whole lot to recommend it.

Participative Management Skills is a course in this kind of management. It's presented in a tightly written text and workbook and in five supplementary disks. You're expected to read the text and do the exercises, then run the disks for each section—but just running the disks gives a healthy start toward understanding this management theory and a perfectly good basis for beginning to try it out. Besides, it's enjoyable.

The disks are interactive. They generally begin with graphically attractive summaries of the sections of the course to which they pertain. Then comes the good part (well, that part's good, but not as much fun): Each section has a quiz of sorts. In "Choosing Participation," the quiz asks you about your present way of managing your team (or family—no kidding, it works). There are lots of questions, and they all pertain to certain categories of qualities. The program then analyzes your answers and measures how they stack up against the appropriate answers for participative managers. Your results are displayed in words and colored graphs.

"Enhancing Power" discusses the three sources of power—clout,

ST.MAC

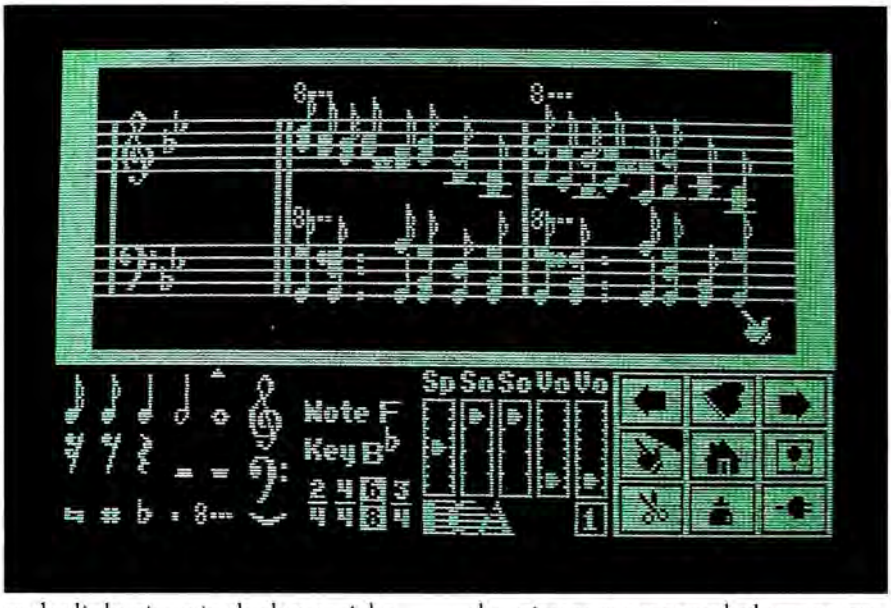




Imagination. The power behind man's greatest creations. Softalk has always believed in the imagination of those who use Apple computers. But a new breed of Apple machines is on the horizon that you won't read about in this magazine. We're talking about the Apple 68000 machines—the Lisa and other wonders 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.

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.

competence, and compatibility—and tests you not only to determine your own sources of power, but those of the members of your present team, too. The names of sixteen team members can be entered; then after answering sixteen questions about each, the program tells you the amount of power from each source the member is perceived to have by the group, discusses weaknesses in members, and suggests ways to bring out each weaker member's power. *Power*, incidentally, is essentially used interchangeably with *influence*.

Full, clear communication is crucial to successful participative management. "Facilitating Team Communication" introduces the concept of a third party to any communication activity: the facilitator. That's you, especially when you're the official manager. The facilitator's job is to see that the views of all are expressed and understood and that agreement, once achieved, is real. In the interactive portion, a score of communication situations are presented, with dialogue. You must choose the best response to further the cause of clarity and comprehension.

It's nearly impossible to facilitate communication between two or three people who are on completely different wavelengths. In "Understanding Motivational Dynamics," three basic types of personalities are presented, nicknamed the farmer, the hunter, and the shepherd. Understanding the values emphasis of each type and learning to respect its worth is a major key to compatibility and communication between divisions of a company or within teams. Once more, you're called upon to answer questions about your team members; the program analyzes their primary motivational types and the degree of influence the values of the other types have with them. This section also teaches how to deal constructively with conflicts when they arise.

By now you're well prepared for the final chapter, "Achieving Consensus." Making sure everyone has a say is a major factor in achieving consensus decisions—ones all group members agree with and feel they had a part in making. You must look for and bring out differences, and be patient when the going is slow. But the end result is what *Participative Management Skills* calls a win-win situation. In this chapter, you get to choose the next action in a score of decision-making situations.

Running through these five disks a day or two before your next meeting could have an eye-opening—and very rewarding—outcome. That's how fast you can begin to learn participative management and start putting it into effect. When the whole group leaves that meeting smiling and chatting among themselves, thank Concourse. This is a super product. Unless you're Big Brother. MCT

Participative Management Skills, edited by Richard E. Byrd, Concourse (2626 East Eighty-second Street, Suite 215, Minneapolis, MN 55420; 612-854-8848). $195.

Broadsides. By Wayne Garris. In the last decades before steam and metal plate would make them obsolete, the wooden sailing warships that had dominated the seas for thousands of years reached their pinnacle of development. They had plenty to fight about; the founding of the United States, the French Revolution, and the conquests of Napoleon all involved sending ships out to battle from Chesapeake Bay to the South Paific. Ships dueled until demolished or their crews were too exhausted to continue.

Broadsides is a game of these single ship actions. Ships range from a massive, lumbering ship of the line mounting more than one hundred heavy guns to a small, fast frigate with only twenty smaller cannons. The battles can be fought between two players, or *Broadsides* will provide a captain for the opposing ship.

The battle appears on a neatly arranged hi-res display. The two ships move in real time over an ocean area of variable scale, while a profile of each ship is presented with an accounting of its current status. Damage is illustrated; sails and masts disappear and holes open in the hull.

Commands are displayed above each ship and selected with a press of the paddle button.

They allow the ships to be turned, the sails and speed to be adjusted, ammunition to be selected, and the guns fired. With a combination of these orders, the player counters his opponent's maneuvers and sudden wind changes to bring his broadside to bear. A full broadside of guns can be fired only in a thirty-degree arc to each side of the ship, and raking fire received down the length of a ship causes double damage. These two considerations cause tactics to evolve into attempts to close and deliver full broadsides while avoiding being damaged too badly in the effort. Just when such an attack is moving along, the wind may change strength or shift direction, turning the attacking ship into a sitting duck.

The aggressive captain who manages to get into close range can go all the way and try to grapple the opposing ship and fight a boarding action. If the ships collide, play switches to the boarding screen featuring an oblique view from the length of the grappled ships. Crew figures are shown on deck with snipers above them. The battle is now fought by two swordsmen at the bottom of the screen. Each is trying either to cut the grappling lines or to board the enemy ship. He fights by thrusting, counterthrusting, or hacking, with results dependent on the actions of his opponent. Killing the enemy swordsman will either move men from your ship to his or cut one of the grappling lines. After several rounds of fighting, the snipers will start to fire at the crew below, at enemy snipers, or both.

Just how quickly all of this happens is determined by the pace of the game selected at the start. A slow pace allows time to plan maneuvers, while a faster pace requires quick thinking to follow both ships and give commands. For a shorter game, *Broadsides* has an arcade mode. This is the same as the more elaborate tactical version, but play is easier because of a slimmed-down command menu. Games are shorter because all firing does double damage; one of the ships will sink very quickly.

Firing in the tactical game is more complex. Three ranges are shown, 100 yards apart, one of which is correct. Guessing the correct range is annoying at short range, since if you miss, your ship is helpless until the guns are reloaded. At medium and longer ranges, when distance is harder to judge, this can be very frustrating. Prepare to scream and pull hair when your carefully planned broadside misses by a few pixels and your computer opponent has once again picked the correct range for his return fire. Distance seems already to have been factored into the damage done, with guns aimed individually, not as a broadside. Having to guess the exact range isn't needed to make hitting more difficult.

That annoyance seems strange because in most other areas *Broadsides* is very flexible and forgiving. The keyboard can be used instead of a game controller. The game can be paused or the pace of the game can be changed at any time. The sound can be turned off or enhanced with a Mockingboard. Ships' characteristics can be changed in every respect, making it possible for any ship from any navy to appear in the game. Scenario designers are helped by a set of historical notes and ship statistics for each navy.

This gives veteran war gamers something to tinker with, while *Broadsides*'s ease of play and arcade option allow new players to jump right into the action. While *Broadsides* can be uncomfortable in some ways, it has a good level of historical detail and a good feel for its subject overall. KR

Broadsides, by Wayne Garris, Strategic Simulations (883 Stierlin Road, Building A-200, Mountain View, CA 94043; 800-227-1617, ext. 335). $39.95.

Epson FX-80. The name Epson connotes quality and reliability in printers, so the prospect of a new Epson suggests some exciting possibilities. In its earlier line of MX printers, Epson made several improvements in the product. Therefore, a new series replacing the MX line could reasonably be expected to consolidate the older innovations and add some new features. The Epson FX-80 does this—for the most part.

To start with, the FX-80 incorporates the features of the most recent revisions of the Graftrax firmware. This means that the commands for all the modes—compressed, expanded, enhanced, double strike, italic, underlined, superscripted, subscripted, graphics, and so on—are the same as they were before. In other words, the FX-80 will behave as expected with all programs written for the MX printers.

The most impressive addition to the firmware is the capability to create custom character sets. Although Epson supplies no software to take advantage of this function, we're likely to see something along that line in the near future from third party software developers. For the do-it-yourselfer, the technique for designing the characters is well documented (a first for Epson) and considerably easier to learn than Applesoft shape tables.

On the mechanical side, the FX-80 prints considerably faster than the previous generation of Epsons. It's rated at 160 characters per second against the MX-80's 80 characters per second. Keep in mind, however, that the cps measurement isn't the last word on printer speed. The Apple Dot Matrix Printer, although rated at 120 cps, actually prints about 30 percent faster than the FX-80 (based on a test printing of a three-page, double-spaced manuscript using *Apple Writer II*). This is because the time a printer takes to do a line feed isn't part of the cps measurement. The speed of the FX-80 line feed is not prodigious.

The standard FX-80 comes with both friction feed and pin feed. The pin feed mechanism is located on the ends of the rubber platen and is somewhat difficult to load paper into. It's adjustable, but only for nine-and-a-half-inch or ten-inch paper widths. Nine-and-a-half-inch paper with removable strips on either side is the most widely used kind of paper in most word-processing situations.

For narrower paper such as special forms, mailing labels, and the inexpensive eight-and-a-half-inch paper often used for program listings, a special tractor mechanism is required. This optional unit mounts on top of the printer. It can be adjusted for any paper width from about three inches to nine inches. Unfortunately, it won't expand to wider than nine inches; so it must be specially installed when it's needed but removed for most word processing situations, since when it isn't used it will cause paper to jam. Mounting and dismounting aren't difficult operations, but this still seems like a needless nuisance.

The bottom line on the FX-80, however, is that it is an Epson. This implies that people will buy it. It may not be the best dot-matrix printer for a given application, but it will be good for just about anything. People buy Epson for the same reason they buy any well-known name brand: They know what they're getting, and they can be reasonably sure of not being disappointed. DD

Epson FX-80, Epson America (3415 Kashiwa Street, Torrance, CA 90505; 213-539-9140). $699; optional tractor unit, $39.95.

Pick-A-Dilly Pair. By Norm Gray. The Dillies have checked into the Pick-A-Dilly Hotel where you are the room clerk. They failed to register, so you don't know which of the thirty-six rooms they're in; you do know that they arrived in pairs and that when you open two doors to expose a matching pair those rooms are eliminated and you score a point. On the other hand, if the pairs don't match, the doors close again and you must remember which Dillies were in those rooms.

Perhaps you once watched the old TV game show *Concentration* or played the card game upon which it was based. *Pick-A-Dilly Pair* is like a computerized form of *Concentration*—with added twists. Each Dilly is a cute little animated cartoon figure, two of each kind, and each pair comes with an appropriate tune. With cats, you get "What's New, Pussycat?" With dogs, it's "How Much Is That Doggie in the Window?" The tune for turkeys is "Turkey in the Straw." The effect is quite entertaining, with a special appeal for children.

Up to six can play, and there are several modes. The standard game is just like *Concentration*; open two doors at a time to find matching Dillies. In "Joker and Villain," there are two wild-card Dillies, one that gives extra points and one that takes points away. In the "Pick 3" and "Pick 4" modes you must match more than two Dillies at a time. The "Mixup" mode switches unmatched Dillies during play; the "Music Only" mode gives you only tunes, no figures to match. "Doors Stay" can be even rougher; matched doors don't disappear, so you have to remember which ones have been matched—or lose a turn. For the quick of eye, there is "Flash," which gives a quick glimpse of the figure and no music.

Actually, you can turn off the music for any of the other modes except, obviously, "Music Only."

Pick-A-Dilly Pair is a rare treasure, a game that children and adults can enjoy equally. But, of course, the kids will win. FI

Pick-A-Dilly Pair, by Norm Gray, Actioncraft (5753G East Santa Ana Canyon Road, Suite 1200A, Anaheim Hills, CA 92807; 714-998-7117). $34.95.

Appli-Card. "The world's most popular operating system," some have stated. Others chime in with comments ranging from "S-100 bus rules" to "very adaptable." What they're talking about is the disk operating system called Control Program for Microcomputers: CP/M. During the five years CP/M has been in existence, its popularity has grown, partially due to the hundreds of companies offering compatible software, from business applications to education to data communications to games to programming aids.

Apples have no built-in environment to run CP/M, but that didn't stop CP/M fans—they remembered those seven handy slots—and, voila, plug-in boards to create the CP/M environment appeared. Such boards had to contain a Zilog Z-80 central processing unit, an eight-bit microprocessor that could operate upon CP/M. A market quickly developed for such hardware, and CP/M boards came to the forefront. In May 1982, Personal Computer Products introduced its own CP/M board. Today's version of this board boasts some important attributes besides running CP/M version 2.0.

Appli-Card is impressive. Contained on it are 64K RAM, a 2K EPROM, either a 4-megahertz Z-80A or a 6-MHz Z-80B CPU, and an expansion interface connector. The EPROM may be expanded to 8K and, anticipating the time when CP/M can support a counter timer chip, a socket for that chip has been provided on the Appli-Card.

The CPU speeds are two to three times faster than competitive boards, depending upon installed selection, because the board operates simultaneously with the Apple's 6502 CPU. The 6502 handles the input/output processing, relieving the CP/M board of managing these time-consuming operations. The on-board memory prevents the Z-80 CPU from having to wait for the 6502 to catch up before proceeding onward.

On-board RAM may also be used in conjunction with some RAM boards. These boards, either 64K or 128K, plug directly into the Appli-Card. The entire RAM assemblage may be used to operate as a RAM disk under Apple DOS, besides expanding the CP/M capacity of a system. The RAM disk becomes a storage device for information (once initialized) managed in any manner the user sees fit. Increases in CP/M disk storage of 54K or 110K also come with the added memory. The expansion interface also allows for a hard disk drive.

Tightly written documentation—less than thirty pages, in a three-ring binder—provides all you need to know to install the Appli-Card in a II Plus or IIe. How to install a hardwire shift modification, which comes with the board, is also explained simply. The manual still manages a brief excursion into CP/M and a look at the package's utility programs. For an in-depth tutorial, the book *CP/M Primer*, by Stephen Murtha and Mitchell Waite, comes with the package.

Powerful utilities greatly increase the friendliness of the CP/M environment. *COPYFRMT* takes care of mandatory tasks such as formatting and copying information from disk to disk. *SoftVIDEO* configures CP/M to use specified hardware; it also provides a seventy-column screen (graphics-generated) and scrolling from 0 to 255 characters—invaluable for spreadsheets with cells beyond the forty-column limit. Using an Apple eighty-column video card instead requires simply selecting that card from the *SoftVIDEO* menu.

After the *SoftVIDEO* configuration has been saved, the *INSTALL* program runs. *INSTALL* brings on-line any drivers you choose. A driver is a subroutine that controls an I/O device. *SoftVIDEO*, for example, is a driver that controls specific menu options and terminal operation when you power up your computer. The drivers are written into CP/M's Basic I/O System (BIOS), a major subsection of the operating system. All machine-independent programming, such as disk controllers and printer and monitor interfaces for use with CP/M, are contained in drivers in BIOS. *INSTALL* puts the selected drivers into a file on your CP/M disk and transfers CP/M to the disk's boot track. Then, when you turn on the computer with that disk, all the drivers are automatically installed. Changing equipment is elegantly simple. Drivers may be moved, deleted, or changed at will. Another utility transfers files from Apple DOS 3.3 to CP/M and vice versa.

Appli-Card's utility software takes the work out of CP/M. All control keys found in any CP/M system are accepted. There are even patches for most hardware peripherals used with the Apple.

This board is not inexpensive. But, in the Appli-Card, you get what you pay for. MGL

Appli-Card, Personal Computer Products (16776 Bernardo Center Drive, San Diego, CA 92128; 619-485-8411). $375 (6-MHz board), $295 (4-MHz board).

Chivalry. By Richard Hefter. From Xerox's wondrous educational software factory comes a true computer-assisted board game. In *Chivalry*, a medieval game of rescue, the king of the realm has been kidnapped by the evil Black Knight and imprisoned in the knight's castle. To save him, up to four valiant knights and ladies may journey forth from Fair Castle. Each move brings challenge or danger.

Chivalry is rich in color and detail. The large game board is full of vibrant illustrations, and every attempt has been made to capture the feel of the Middle Ages. There are taverns, inns, gypsy camps, an armorer's shop, a village market, those famous English hedge mazes, and much more.

The computer randomly rolls a die or spins a wheel for movement. Then it tells players where to advance their game pieces on the board and a colorful hi-res picture of the location appears. To advance, players must either make decisions or prove their skills. Many board squares

represent small arcade games of medieval events.

There are a couple of archery contests, dart games in the inns, and a practice field in the Royal Park for learning to catapult rocks onto shields held by moving serfs. The big challenge is jousting, where speed and coordination are tested. Winning a jousting match often gains the player a special advantage to be used later in the game—a secret password or sign. Losing a joust costs a turn while the wounds heal.

Besides games of skill, there are games of dexterity and chance. Can you catch sacks of flour being tossed by a miller, pole across a log-filled river, jump from rock to rock to cross another river, or leapfrog up ledges to get out of a deep pit? How about guessing under which shell the witch or the gypsy has hidden a pea? Guess right and win a magic potion; guess wrong and the dragon can fry you.

Thieves and monsters such as trolls and bears roam the woods. The troll guards a shortcut bridge. If you can edge past his swinging club, you save time. If you lose, you have to heal your wounds for three turns—troll clubs pack a mighty wallop.

Eventually, you reach the castle of the Black Knight. Getting inside is quite a challenge. To open the drawbridge, you must catapult a rock directly onto the gate mechanism, all the time dodging rocks hurled from the castle ramparts. Once in the castle, you must find the best path up the steep wall to the Black Knight while he drops rocks at you. If he succeeds in hitting you, you must go back several squares to regroup. The ending is difficult but never hopeless. Persistence will win where skill fails.

Besides being a good game that succeeds at incorporating computer and board games, *Chivalry* is a family game. The game flows better when three or four people play than when just one plays. And with all the players, it's as much fun for grown-ups as for kids. RRA

Chivalry, by Richard Hefter, Xerox Education Publications (245 Long Hill Road, Middletown, CT 06457; 203-347-7251). $49.95.

Doublestuff. By Louis Bonfiglio and Peter Joselow. Events that transpire deep within the core of Apple are known only to a favored few. Cupertino is a land where dangerous marketing maneuvers become stride-setting examples for the industry, and chance discoveries are turned into magnificent advances. Double resolution on the Apple IIe, said to have been an unplanned side effect of the eighty-column card, was discovered so late in the development of the new computer that the first motherboard couldn't handle it. Accident or not, the double hi-res and double lo-res graphics modes of the Apple IIe are nothing short of a stunning visual experience.

Doublestuff is a programming language designed to allow you to use the double-resolution modes. It loads into the bank-switched memory when you boot the disk (the same area into which Integer Basic loads when you boot a DOS System Master). And, if the idea of learning a new language scares you, worry not: Other than the graphics modes, *Doublestuff* is almost identical to Applesoft. The surface differences are summed up in one page of the *Doublestuff* manual. There's no documentation on what lies underneath the surface, so those who dabble in soft switches or machine language will have to find some things out for themselves.

The double-resolution modes are, briefly, a sixteen-color, 80-by-48 lo-res and a sixteen-color, 560-by-192 hi-res. Every graphics command in Applesoft is duplicated in *Doublestuff*, with new legal ranges for screen coordinates and colors.

Double hi-res provides an interesting challenge to the programmer because there are two approaches possible, each with its own advantages and disadvantages. In regular hi-res, it took two adjacent pixels to form a color; in double hi-res, it takes four adjacent pixels in a row. On a color monitor, any on/off combination of four pixels in a row looks like a single colored dot. On a monochrome monitor, however, the same four pixels look like four separate dots, either on or off.

One approach in double hi-res is to treat each set of four pixels as a single dot, lowering your effective horizontal resolution to 140. This produces lines that are always true to their color but that can appear jagged. The other approach is to go for the full 560-point horizontal resolution, which is what *Doublestuff* has done. The results are considerably finer lines that aren't always true to their color and better defined colored areas that are usually color-perfect—no fringe effects.

As they say in graphics land, the proof is in the plotting. *Doublestuff* comes with an ample supply of demonstration programs to show off the advantages of both modes. What isn't said in the manual may be found by the ambitious programmer in program listings. For instance, it isn't easy to save a double hi-res picture because it resides in both main and auxiliary memory at the same time. One of the demos loads a double hi-res picture from two binary files—not the most elegant solution, perhaps, but one that works.

Doublestuff is the first of what will probably become a large body of commercial software to make use of the double resolution capabilities of the Apple IIe. It's nice to see that, even in our maturing market, two young guys can come from out of nowhere and get the jump on all the big developers—even Apple! HGL/DD

Doublestuff, by Louis Bonfiglio and Peter Joselow, Doublestuff Software Development (2053 West Eleventh Street, Brooklyn, NY 11223; 212-449-6300). Apple IIe, 128K with B motherboard. $39.95.

PFS:Write. By Sam Edwards, Charles Leu, and Brad Crain. A lot of complaints can be made about *PFS:File*. But, despite its slowness, its dearth of options, and its inability to stay sorted, it remains in the upper levels of the Top Thirty (at the grand old age of three) for a good reason. For most people's purposes, its deficiencies don't matter and its pluses—simplicity, flexibility of layout, friendliness—are all that's needed.

Enter *PFS:Write* for the IIe. The family genes are prominent. *PFS:Write* is a useful, extremely easy-to-use, relatively complete word processor. It can stand alone, but its strength flourishes when it's used with its older siblings. Files from *PFS:File* can be integrated into *PFS:Write* documents, creating personalized form letters, for example. And graphs from *PFS:Graph* can be printed anywhere in *PFS:Write* documents.

PFS:Write is a cinch to use—even more a breeze for people who are already used to the quirks of the PFS family, such as the use of control-C (rather than return) to continue and tab (rather than return) to move from field to field. Options are minimal but adequate for home use and many business uses; the display is clean and crisp and considerate. A fine line outlines the page sides on-screen and the top and bottom of the page when it's in range; otherwise the top is clear; and a ruler indicating characters, margins, and tabs limns the bottom, just high enough to display the current file name, the percent of available file space used, and the present cursor location—line 24 of page 3, for instance.

The program accepts input fast enough for average typists, and a very smooth buffer provides for catching up with speedsters. The default mode is what's generally called change mode; when you back up over a word and start typing, what was there changes to what you're typing now. Inserting without changing takes a command, then works fine. Arrow keys move the cursor without affecting the text at all and the delete key deletes backward, although you really seldom need it. It's faster to move directly to the beginning of the unwanted part and merely type over it in normal input mode.

There's provision for selectable right and left margin tabs, and a decimal tab to align numbers on the decimal point; for search and replace, manual or automatic, with or without wild cards; for moving backward and forward in various size chunks throughout the file. You can justify your text, or make it flush right or (normal) flush left, on-screen as well as in printout.

And you can append *PFS:Write* files, one to another. Which brings us to the other side of the coin.

PFS:Write is not for everyone. Almost everything it does it does elegantly, but it definitely doesn't do everything. And there are a few things it almost does. For example, what you see on the screen is precisely what you get on paper—unless you're planning to print out double-spaced. It doesn't recognize the normal typewriter symbol for a dash—two hyphens—and blithely puts one on one line and the other on the next line if the dash falls at the breaking point, in printout as well as on-screen. The append feature is wonderful and absolutely necessary because the maximum length of a document is less than three single-spaced pages. And, finally, in an oversight unusual for the PFS people, the delete-line command is a control key right between those for delete word and delete letter—real easy for touch typists to hit accidentally, and there's no recovery.

PFS:Write is an ideal program for PFS fans and many others; but if it's power you want, stick with *Screen Writer*. MCT

PFS:Write, by Sam Edwards, Charles Leu, and Brad Crain, Software Publishing (1901 Landings Drive, Mountain View, CA 94043; 408-946-1400). Requires an Apple IIe. $125.

The Echo II. In 1977, a commercial speech synthesizer cost more than two thousand dollars, required a special-purpose parallel interface, and had to be programmed in an obscure code, producing barely recognizable, robotic-sounding speech. In 1983, Apple owners can buy a speech output system with much greater speech quality for less than a tenth that price.

Advances have been made not just in the hardware but in the software as well. It isn't enough just to have a speech synthesis peripheral that can produce human speech sounds very accurately. For really flexible use, the computer should produce those sounds from natural language text input, rather than from a special-purpose code that represents speech sounds.

The problem of going from English text to English speech is a very complex one. At the simplest level, consider how different the letter A sounds in the words *father*, *fate*, and *fat*, not to speak of its role in combination with other vowel letters, as in words like *boat*, *beat*, and *bait*.

While it is not true that the English spelling system is completely irregular, many of its regularities are well hidden. An old joke asks, "Do you know how to spell *fish*?"

"Yeah, F-I-S-H."

"No. G-H-O-T-I. That's gh as in the word *tough*, o as in *women*, and ti as in *nation*."

And if you type *ghoti* into the text-to-speech program used by the Echo II speech synthesizer from Street Electronics, the Apple says, "fish." Not without a sense of humor, this product.

The Echo II has been available for some years, but a new hardware implementation and, more important, new software, make it a significantly more versatile product.

There are two approaches to producing speech output from computers, and the devices that provide one method are typically incapable of also providing the other. Yet each has advantages that the other hasn't. Therefore, the most significant aspect of the new Echo II is that it gives the user access to both types of speech synthesis with the same device.

A crude way to typify the difference between the two methods is to call one a text-to-speech method and the other a fixed vocabulary method. Text-to-speech techniques produce unnatural-sounding robotic speech that's often hard to understand. Their great advantage is that they can be used to generate speech output from any English text. Such methods typically don't require much memory to represent the speech output—just a byte of RAM for each letter of the text to be spoken and perhaps a short text-to-speech conversion program.

Fixed vocabulary speech systems produce output that sounds more natural or human. In fixed vocabulary voice output, the data—the bit patterns in RAM—are usually derived from a highly processed representation of the vibrations that spoken speech makes in the air. Playing back such representations is very much like playing a tape recording of the speech that was the source of the representation. Fixed vocabulary systems pay for their naturalness with much higher demands on the computer's memory. In addition, a fixed vocabulary approach means just what the name implies—not every word of the language can be spoken; it can only pronounce those words that have been prerecorded.

In actual practice, both methods are much more complex than this simple explanation conveys, but the results are not. Fixed vocabulary devices have a restricted number of available words but sound very natural. Text-to-speech systems are harder to understand, but you can make them say anything you want.

The new Echo II's software gives it a unique place among speech output devices for the Apple. It has the characteristics of both text-to-speech and fixed-vocabulary systems. A programmer writing applications for the Echo II can choose between the two methods, using whichever is most appropriate.

Physically, the new Echo II consists of a circuit board that plugs into one of the Apple's slots and a small speaker. "Less is best" may be the new Echo motto in terms of physical dimensions. The card is 4½ inches long instead of the old 5½ inches, and the new speaker fits inside the Apple's case, stuck to the inside wall of the II or under the keyboard of the Apple IIe.

As in the old Echo II, DOS-based text-to-speech software is available to make the Echo say anything you want it to. New is the Apple Pascal version of the software. But the biggest change to the Echo II software is *Echo Words*, a fixed vocabulary system that includes a woman's voice speaking more than seven hundred words and phrases.

An option at extra cost, *Echo Words* contains a set of programs for using Applesoft or assembly language programs. An editor program lets the user select the words to be used by an applications program, tells how many bytes of memory they will require, and creates a special binary file that the user then bloads from an Applesoft program. The Applesoft ampersand programming feature is used to pronounce the words you've chosen, as in:

```
220 &"O","PLEASE","DO","NOT","DO","THAT"
```

which pronounces the phrase, "Oh, please do not do that," in a very intelligible voice when line 220 is interpreted. So far as speech quality goes, probably the only complaint that could be made about *Echo Words* is that the even intonation of the words seems a bit artificial. Even this problem can be overcome by using the built-in commands to choose the pitch and volume of each word within a sentence. Paying detailed attention to pitch makes it possible to add more natural intonation or even to sing phrases.

The variety of text-to-speech software provided with the Echo II, called *Textalker*, includes versions for users of standard Apple IIs and II Pluses, for blind users of Apples, and for users of 64K Apples—IIs and IIe's. The 64K and blind versions have a couple of extra options. The 64K version frees up more available memory by placing most of the text-to-speech algorithms in the extra RAM. After one of these two programs has been run, anything printed on the screen from Basic is spoken by the Echo II. Typing catalog, for example, makes the Echo read the DOS disk directory aloud as it appears on-screen. The talk-along feature toggles off and on with simple Basic print statements.

Also packaged with the Echo is the utility program, *Speakeasy*, which produces speech from phonemic code inputs rather than from normal English text. *Speakeasy* speaks very intelligibly—more intelligibly than *Textalker*—and it uses less RAM. *Textalker* is easier to use, however. Both programs interpret certain control code sequences such as commands to control the volume, pitch, and rate of speech—permitting intonation and even singing.

Optional (at extra cost) is the *Echo Language Support Disk*. Side one, the Pascal software, consists of a library unit through which Pascal programmers can make the Echo say strings by providing a new Pascal procedure, *SAY*. Side two contains utilities to be used with GraForth, the graphics application language based on Forth.

All together, the Echo II with its standard and optional software packages is an impressive voice output product. AM

The Echo II, Street Electronics Corporation (1140 Mark Avenue, Carpinteria, CA 93013; 805-684-4593). Echo II, $149.95; *Echo Words*, $29.95; *Echo Language Support Disk*, $24.95.

Bats in the Belfry. By Samuel Moore. *I don't want to set the world on fire;/I just want a game/That ain't quite the same.*

Bats in the Belfry is a nice item. You don't shoot anything and you don't get shot at, though you do get bitten quite a lot.

As a novice netter with the distinguished extermination firm of Swat & Squash, you have to hustle through a three-story schoolhouse to capture an endless parade of bats. They enter through the basement and eventually flit up to the belfry, where the tolling of the bell signals th they're beyond your reach and your score is in peril.

Your only weapon is a very small net, seemingly suited to more e tomological pursuits. Fortunately, these are very small bats. Although first you'll feel like a fool as you ineffectually swat the air around the you'll gradually get the hang of it, and soon you should be able to b most of them before they make it to the first floor. Then run for an op

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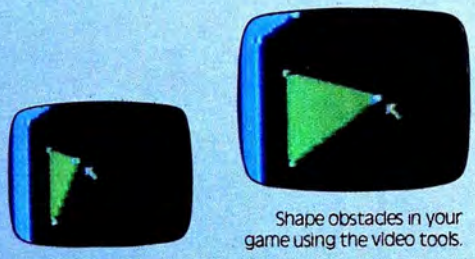

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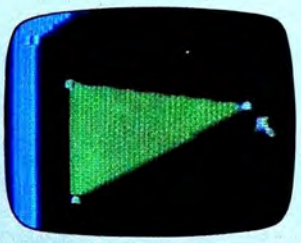

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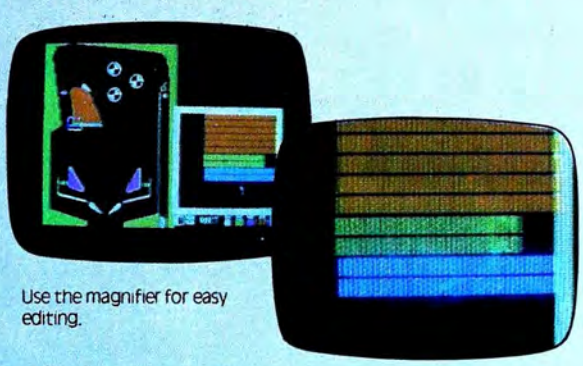

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window, gently shake out your net, and let your charge rejoin his fellow children of the night.

That, of course, is the way it would be in a perfect world. Hindering you in the performance of your duty are several spiders the size of mastiffs, which tend to congregate around the windows or skitter along the floor and give you what for right on the ankle. Ten such nips and you pass into oblivion. Ditto for the occasional bat of the vampire variety. Later, there is a problem with trap doors and floating fuzzballs.

On your part, you have the ability to climb stairs quickly, jump over fuzzballs and spiders (or on spiders, for which barbaric but effective action the game nicely heals two bites).

Animation and graphics are definitely not flashy, but they're expertly and subtly done. And this game is, by George, different. AC

Bats in the Belfry, by Samuel Moore, Phoenix Software (64 Lake Zurich Drive, Lake Zurich, IL 60047; 312-438-4850). $29.95.

Portfolio. By Harris N. Dvores. On the very first page of instruction for this money-strategy game, it says: You've read enough. Go to it!

The author knows what he's talking about. Once the disk boots, you're swept away by a game that rates tops in both excitement and playability.

Portfolio is based on a simulation of the investment world where, as Amarillo Slim fondly said, money is just a way of keeping score. The game, which accommodates a range from the solitaire player to fifteen people, begins by casting players in the role of highly respected investment managers. Players, after stating two fields of expertise, such as law and modern technology, are interviewed for positions and offered contracts that put each in charge of managing a company's $10 million investment portfolio.

Part of the game strategy involves negotiating your compensation. Do you want a low retainer and monthly salary against a high percentage of the performance gross? Or less percentage and a higher sign-on bonus?

Once hired, you receive a portfolio of your corporation's assets showing cash on hand, stock holdings, venture capital, and funds borrowed. From there, as in the beginning, the game plays just like Wall Street.

The companies listed on the stock exchange have financial ratings generated by the computer. They're affected by external economic factors, such as an increase in government spending or a tightening of the international money supply, but individual companies are affected in unique ways. Northeast Edison Electric, for example, isn't affected at all by an increase in taxes, but its stockholders sell out when interest rates rise. Conversely, Canadian Mining and Refining hardly notices interest rates, but its stock plummets in the face of labor unrest.

Internal factors, such as unexpected lawsuits or highly successful promotional campaigns, also affect the companies individually.

The ratings, and their buffeting by internal and external factors, are the most important data on which managers make their buy and sell orders. But there are other factors to consider, too—such as rumors and confidential reports submitted by privately hired researchers.

It is a game so real that hot managers, like hot poker players, dread the mandatory vacations that take them away from the job for a certain number of turns.

As it is in real life, so it is in *Portfolio*. Your ultimate loyalty is to yourself, not your employer. And your primary objective in the game is to increase your personal net worth, by means that include purchasing luxury yachts, furs, mansions, and the like. Making that kind of money, however, is usually (but not always) accomplished by managing corporate funds successfully so that when performance bond time comes around, you are handsomely rewarded.

At the end of each game, retiring investment managers receive letters from corporate headquarters summarizing their performances. The results are recorded in a player history file to be used as part of negotiations when the next game starts. In *Portfolio*, as on Wall Street, having a good reputation is worth money.

This is a game for Christmas and beyond. It plays fast and is as good or better than any strategy game on the market. The documentation is literate, effectively articulate, and handsomely presented. From beginning to end, it gleams with quality. DC

Portfolio, by Harris N. Dvores, Flexible Software (Box 5841, Charlottesville, VA 22905). $64.95.

Fat City. By Richard Hefter and Steve Worthington. From the folks who brought us *Stickybear* comes another family-oriented game. Entitled *Fat City*, this game continues the Hefter tradition of magnificent graphic creations and sound game participation in a non-life-threatening scenario. Sound dull? Quite the opposite. *Fat City* requires manual dexterity (through keyboard or joystick use), strategy, and the ability to enjoy oneself. Differing levels of complexity maintain player interest, regardless of age.

As an employee of the Fat City Wrecking Company, it's your responsibility to operate a wrecking crane and knock down deserted buildings while avoiding hostile rats. There are ten cities awaiting commencement of this urban renewal. Each city is progressively more difficult to destroy. Behind one of the buildings in each city is a fuel tank. Since each swing of the wrecking ball costs fuel points, pinpointing these tanks is an important aspect of play.

For first-time players, *Fat City* automatically starts with city number one. Otherwise, you may play at any level you have already managed to compete within. Unless you surpass the previous level's score, it remains on-screen as the score to beat. Totaling the points earned in each level allows you to constantly improve your aggregate score.

Once the level of play has been selected, you'll find yourself seated in the hi-res cab of a wrecking crane. Both the target city and the wrecking ball are visible from the cab's windshield. Two guides to help you aim the ball are etched into the glass of the windshield, along with your score, the city number, and the amount of fuel. Keeping an eye on the fuel level is essential because each round finds only a certain amount of fuel allotted to you. Prior to the end of a round, you had better know where the fuel tank is hidden; without the added fuel, your crane will run out of gas, ending the game. However, if you fill the crane's tank too early you'll find more buildings remaining than you have fuel to level them with.

Territorial rats increase the dangers of urban renewal. These pesky critters make it known that they prefer the vacant buildings to remain unmolested by your wrecking crane. They defend their crumbling homes with cans, tomatoes, and even rocks, hurling them directly at your windshield. Fortunately, you can see the incoming barrage and stop it by hitting the rats with the wrecking ball. This garners extra points, but if you

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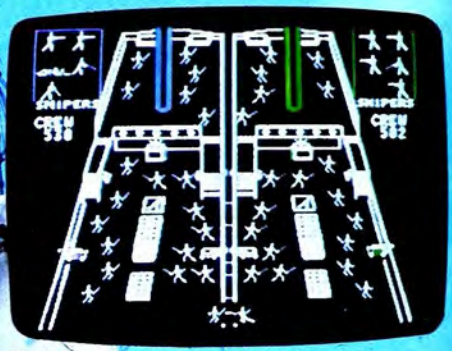

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allow the rats to splatter against the cab's windshield, you'll lose precious fuel.

The only way buildings can be eliminated is by working the wrecking ball from the top down to ground level, but if you try to destroy too big a section of building at once, fuel will be wasted and you'll get a mere crack in the masonry for your efforts. A building must be destroyed strategically. Eliminating the roof first helps, since the fat rats then can't use that particular avenue for tossing debris. Cracking the windows also prevents the hostile critters from using them as weapons ports.

Fat City is a game suitable for any member of the family. A great deal of thought went into its development, as its excellent playability attests. The game incorporates superb graphics and strategy, fun, and a new idea. The combination could well prove addicting. MGL

Fat City, by Richard Hefter and Steve Worthington, Xerox Education Publications (245 Long Hill Road, Middletown, CT 06457; 203-347-7251). $39.95.

The Einstein Memory Trainer. By Michael G. Samet and Dov Rubin. *(Not me) moped-TV kill.*

Gibberish? Free verse? Perhaps either, depending on your esthetic sensibilities, but thanks to the *Einstein Memory Trainer*, "(not me) moped-TV kill" is a mnemonic device signifying, to those in the know, a telephone number with area code included.

The Einstein Memory Trainer won't help you remember your dental appointment, where you left your brown socks, or to take lunch money to school. It might be useful if you have to remember lists of things, especially numbers. Using uninspired—but not unlikable—graphics and music, the *Memory Trainer* takes you through five lessons: "Names and Faces," "Method of Loci," "Peg-Word System," "Important Dates," and "Phone Numbers." Diligent practice will probably produce some improvement in memorization ability, and if you're not too serious you'll have some fun while you're being trained.

"Names and Faces," predictably, helps you pair faces with names. The technique is to isolate a prominent facial characteristic, form a "peg name" that you will immediately associate with the person's real name, and create a random connection between the characteristic and the peg name. You then form an outrageous mental image that illustrates a random connection between the characteristic and the peg name. One of the *Memory Trainer*'s examples is the name Bill, coupled with a face with a big nose. The big nose is the prominent facial characteristic; the peg name is Dollar Bill. The *Memory Trainer* illustrates a random connection by sticking a dollar bill on Bill's nose.

Einstein's graphics are disappointing; they should be funnier, more outrageous. After all, according to the *Memory Trainer*, the more ridiculous your mental image the better. The examples are placid and dull; monochrome monitor owners won't miss much.

After showing you examples, the *Memory Trainer* tests you. Names and faces appear, and you're given a few seconds to form peg words and images; if you want, the *Memory Trainer* will help you by offering suggestions. Then the faces reappear without names, and you enter your guesses. Your answers are corrected, and if you get more than 70 percent correct you are rewarded with a fanfare and the opportunity to be retested or to go on to the next lesson.

The "Important Dates" and the "Phone Numbers" lessons are the most challenging and probably the most instructive. To teach you to remember numbers, the *Memory Trainer* assigns consonants to numbers zero through nine. Zeros are Zs and Ss because zero starts with a Z and S zometimez zounds like Z; ones are Ts and Ds because ones upside down look like Ts, which rhyme with Ds; twos are Ns and threes are Ms, because if you turn them on their sides they look like Ns and Ms respectively—sort of. Fours are Rs because they look like backward Rs without one of the legs; fives are Ls because you find an L in the vertical stem connected with the lower horizontal bar of a five (look closer); sixes are Js, Chs, and Shs because a six backward looks something like a J, and the sounds Ch and Sh sound like the J sound; sevens are Ks and Cs; eights are Vs and Fs; and nines are Bs and Ps; and if you can remember all that you don't need the *Memory Trainer* in the first place.

Now then, class, *(not me) moped-TV kill:* Ns and Ms stood upright look like twos and threes, vowels are meaningless, and Ts are ones. Ps are nines because nines look like backward lower-case Bs, and Ps look like Bs upside down; Ds are ones because they rhyme with Ts; Vs are eights because—take my word for it, Vs are eights—Ks are sevens and Ls are fives, but we'll drop the last five because that's too many digits otherwise. Get it? *(NoT Me) MoPeD-TV KiLl* becomes (213) 391-1875, as do *(no time) mopdo-tough cot* and *(nude ma) maybe doe-dove cafe.* What could be easier?

Dates are treated in a similar manner. January becomes Janitor, October is Octopus, and November is Pilgrim; if you don't like the peg words given, you are free to make up your own. Commencement comes in the form of a challenging test called the "Memory Mix Game," which shows you a face, name, birthdate, and phone number, and times and scores your responses.

Like any schooling, what starts out as fun soon becomes a bore. Diligent practice certainly could yield improvement in some aspects of memory, but at any rate this software is not for the cynic in the house. It'll probably have more success with the kids than with the folks, no matter how addled dad may be; but frankly it would take Tom Lehrer or Gilbert and Sullivan to really do justice to the *Einstein Memory Trainer.* TZ

The Einstein Memory Trainer, by Michael G. Samet and Dov Rubin, The Einstein Corporation (11340 West Olympic Boulevard, Los Angeles, CA 90064; 213-477-4539). $89.95.

Legionnaire. By Chris Crawford. It seemed the end of Julius Caesar's remarkable political career, and perhaps of his life. His political rivals in Rome had maneuvered the ambitious Caesar into assuming command of the luckless Roman armies in Gaul. Virtually the whole of Western Europe was peopled by a bewildering array of warlike Celtic tribes. More than a century before, these fierce warriors had descended on Rome and sacked the city. Only Roman gold bribed them to return to their own land. The legend remains that the Romans protested to the Celts that the scales weighing the gold were unbalanced. The Celtic chieftain then drew his sword and, throwing it on the scales, whispered, "Woe to the vanquished." Caesar had come to settle the old score.

Legionnaire simulates in real time the tactical combat among the ancient armies of Caesar's Rome and Celtic Gaul—and does so successfully. An unusual simulation in several ways, *Legionnaire* departs from the traditional even in its line of development. First implemented on the Atari, the game system's graphic displays are reminiscent of Chris

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Crawford's acclaimed *Eastern Front*. The simulations theme is relatively new to most strategy gamers and isn't extensively covered even in the older board games.

Legionnaire explores the challenges of ancient warfare as Caesar and Vercingetorix, the legendary chieftain of the Celts, knew it. Although *Legionnaire* doesn't simulate any particular battle or campaign, the unique tactical character of this kind of warfare is nicely portrayed.

Game play beings with the player, as Caesar, selecting a number of Roman legions to command. Reflecting the historical odds the Romans faced during this period, the computer automatically allocates twice as many barbarians for the battle. Also, the character of the individual legions and the caliber of their leadership vary widely, from veterans under Cicero's competent leadership to a virtual armed mob under Plancus—who really ought to be directing traffic on the Appian Way. The barbarian tribes have varying characters and capabilities, too. Units available to both sides are fast cavalry and slower infantry. Game play is strictly solitaire, with the player always assuming command of the Roman legions while the computer champions the Celts.

Rich, detailed graphics in a window on the screen display a portion of the battlefield. Cavalry units are depicted with horseheads; swords represent infantry. Caesar's own legion bears his standard, the Roman eagle. Roman units are shown in red and the barbarians are in blue—a color with which they sometimes painted themselves. Terrain and its elevation are depicted in hi-res color, using concentric circles as in a topographical map to suggest differing elevations and contours.

The game system used in *Legionnaire* is elegant. Movement and combat are simultaneous. There are no typical game turns; rather, *Legionnaire* plays in real time, with the player compelled to think and react quickly, nicely simulating the pressures of command. Individual units may be polled to determine the total number of men and the more significant number of "effectives" among them. Surprisingly, a save game option is not available, but the game is reasonably fast-paced and ordinarily is easily played in one sitting. There is a pause command.

Documentation includes extensive commentaries on historical background and suggested tactics. The computer plays a convincing game in solitaire, deploying the barbarian hordes with considerable skill. The outnumbered Romans in *Legionnaire* must move quickly, coordinate their forces, and use their ground to the best advantage in order to survive. In Caesar's time, the effective range of soldiers' weapons was measured in yards. Terrain was everything, and generalship was as much an appreciation of a good slope as complex battlefield maneuvers. Though easy to learn and to play, *Legionnaire* is a well-done, highly entertaining simulation that offers the strategic gamer a first-rate challenge. WHH

Legionnaire, by Chris Crawford, Avalon Hill (4517 Harford Road, Baltimore, MD 21214; 301-254-5300). $40.

The Philistine Ploy. By Robert J. Aaron and Alan Rosenbaum. Adventure games have a depth not to be found in shoot-'em-up games. They require thought, precise map making, discernment, and reasoning. Yet adventure games must be adventuresome too. Like a top shoot-'em-up, but in the form of a good romantic novel, they must be action-packed and exciting.

Amazing for something so educational—and adventures, no matter how commercial, are valuable educational tools. They hone the thinking processes.

So why shouldn't the adventure form teach subjects too?

The Bible contains some of the most adventuresome stories ever recorded. Why not produce a good, commercial-quality adventure game that just happens to teach the Bible? So reasoned the people at Davka Corporation, so they did. The *Philistine Ploy* is the result, a biblical adventure game that incorporates all the elements of a good hi-res adventure: colorful graphics, with some of the more than eighty screens employing rudimentary animation; an original two-tone musical score that plays at the start and when an important clue is found; puzzles; and conflict.

Two-word commands take the player through the four episodes of *The Philistine Ploy*. The object is to locate and claim the treasure of the Seven Nations. In fact, the story is a faithful rendition of the twenty-one chapters of the Book of Judges from the Old Testament. Players need not read the Book of Judges to play the game, although occasional clues might pique their curiosity.

The seeker of the treasure, a wandering Israelite, must overcome many obstacles. The first is to do away with a Philistine warrior who appears randomly. Your life is on the line each time this disagreeable soldier appears, but you can't get rid of him until you've collected certain key items. Only when the Philistine has been dispatched does the game proceed.

After that, you have meandering roads and pathways to map, some leading to interesting places, others not; you encounter enemies to fight; and you come upon kings and maidens, castles and stables, all in important roles. There are many physical objects you can get—but think first. Clues that direct players to specific Biblical passages are worth following up; the readings may hold the key to a treasure's location. There are red herrings too. *Philistine Ploy* is not built to be finished the first time through.

Being able to save an adventure game in progress is essential, and some games do it better than others. Each time you boot up *Philistine Ploy*, you have to sit through the title screen, the credits, and the opening theme music before you can tell it you just want to pick up where you left off. But it's a minor annoyance that Davka plans to obviate in future games.

The Philistine Ploy is a good adventure game with the added flavor of Biblical history. King Eglon, Deborah, Ehud, and Yael come alive. In fact, such a game might have you asking yourself if you've read a Good Book lately. HGL

The Philistine Ploy, by Robert J. Aaron and Alan Rosenbaum, Davka Corporation (845 North Michigan Avenue, Suite 843, Chicago, IL 60611; 800-621-8227). $34.95.

Stickybear Shapes. By Richard Hefter and Janie and Steve Worthington. After forays into the entertainment world with *Bop* and *Basketbounce*, the Stickybear saga continues its educational mission to teach people aged three through six about living in the material world. The subject is shapes—circles, squares, rectangles, triangles, and diamonds. The child's pleasure, presented in three game options, is to recognize the shapes' presence or absence in cartoon scenes and to match each shape to its name.

"Pick It" presents nine pictures, each missing one shape, such as the wheels on a car. Five shapes are displayed at the bottom of the screen; moving the cursor to the correct shape fills in the picture and makes it move and sing. "Pick It" is *Stickybear Shapes*'s most challenging option.

"Find It" poses similar problems, except that here each picture contains all five shapes, and the child must match the shapes at the bottom of the screen to those in the picture. Although not as challenging as "Pick It," this section is more substantial, since forty shapes need to be matched instead of nine.

The scenarios in both games are delightful—cleverly animated, pleasingly scored, and child-appropriate. Correct matches make butterflies flutter, jack-in-the-boxes pop up, sand crabs skitter along silver beaches, and mama bears stir batches of batter.

In "Name It," the only game involving the written word, the student chooses from the five shapes the one named by the word displayed. A correct choice sends half a dozen or more of that shape bounding across the screen. Even this one can be played successfully by a nonreader through trial and error.

In fact, one of the nicest things about this program is that it can be used easily and enjoyed thoroughly by nonreaders and computer neophytes.

In an informal "test drive," a preliterate kindergartner who had never before been near a keyboard not only learned the keypresses—arrows for answer selection, space bar to move through problems, escape to the menu—as rapidly as her instructors but remained fascinated for hours at a sitting even after getting the shape recognition down pat.

A multimedia package in an attractive washable binder, *Shapes* comes with the program, hardcover picture book, poster, and a sheet of bear stickers—an excellent value in preschool educational software. It can be used with keyboard, paddle, or joystick, and a color monitor adds greatly to its aesthetic appeal. JP

Stickybear Shapes, by Richard Hefter and Janie and Steve Worthington, Xerox Education Publications (245 Long Hill Road, Middletown, CT 06457; 203-347-7251). $39.95.

Algebra Arcade. By Dennis Mick, Mike Konemann, Richard O'Farrell, and Jerry Isaacs. It's getting hard to find entertaining educational software that doesn't compromise its educational value for the sake of fun. Sometimes it's hard to know what came first: the lesson or the game that supposedly teaches the lesson.

Algebra Arcade isn't like that; in fact, the game's packaging makes the program look much more entertaining than it is.

In terms of arcade fun, *Algebra Arcade* rates about a two. In terms of challenge, educational value, and addictiveness, it rates near an eight, depending on the player's interest in mathematics.

The game in *Algebra Arcade* is called Algebroids. On an X-Y graph, aliens are plotted at random, and the player's object is to shoot them down.

Unlike arcade games, *Algebra Arcade* requires the player to enter an algebraic equation that will plot a graph running through as many aliens as possible; aliens hit by the resulting graph are knocked off for various points.

Players are given Y = ?; from there, they can use exponents, pi, trigonometric functions, and numbers to write graph equations, which can be anything from a simple Y = 3 to something as complex as Y= A * X + B + sin(C*X). However, it's not as easy as creating an equation that covers practically the whole graph. Hitting the graph gobbler, who appears at random spots every turn, or creating a graph that runs too long, can result in the loss of as many as three turns.

For those who lack typing skills, all that is required to enter the trigonometric functions is the touch of one key, usually the initial letter of a function. Don't worry about screwing up the program; it will let you know immediately whether or not the entered equation is valid.

Algebra Arcade, which lets one or two players play at a time, can be as frustrating as it is challenging. A practice mode lets students experiment with equations without having to worry about scoring points, and this is where the game has its brightest moments. Arcade simulations are fine, but the practice mode serves as a wonderful graphing tool for interested students who want to become more familiar with the way algebraic and trigonometric equations can be manipulated to generate different graphs.

With a relatively large price tag, one would expect more than just the Algebroids game and practice mode. Features can be modified to add some variety to the game, true; but fifty dollars for one program is prohibitive to any family or school on a limited budget.

Don't let that be too discouraging, though; for what it has to offer, *Algebra Arcade* is a fine program. Because of the game and practice modes, it meets the requirements of students who need motivation to learn, as well as those whose motivation pushes them past learning into exploration. MTV

Algebra Arcade, by Dennis Mick, Mike Konemann, Richard O'Farrell, and Jerry Isaacs, Wadsworth Electronic Publishing (8 Davis Drive, Belmont, CA 94002; 415-595-2350). $49.95.

Millionaire. By Jim Zuber. Not too long ago, publishers were hurriedly converting their Apple programs over to the IBM. This one goes in the opposite direction. And it seems to work just as well on the Apple.

In times past, millionaires were men of energy and imagination. They invented tools, laid railroads, drilled for oil, founded banks, and, in short, set the stage for the prosperous economy we enjoy today. But that was long ago. These days, everyone just wants to make a bundle in the stock market.

If that's what you want, this is how to do it. The author has taken great pains with this simulation. Every little market fluctuation is represented on a weekly basis. What's more, the weekly *Financial Journal* gives you the news of Wall Street, and the documentation includes tips on spotting price trends.

There are fifteen stocks arranged in five groups. The computer industry group, for example, consists of Control Data, IBM, and NCR. (Sorry, no Apple; you can invest only in mainframe companies.) Prices are affected by the general trend of the market, by the growth pattern of the industry, and by the fortunes of the individual companies.

The game proceeds for ninety-one weeks. You can save it at any point. Your wealth carries over from game to game; if you make a million, it's ready for investment in your next game.

You start with $10,000. You are initially limited to the hoary tactic: buy low and sell high. But as your wealth increases, you can start buying on margin, dealing in options, and borrowing money to invest. With these speculative tactics, you can make a million or lose one in the blink of an eyelash.

Unfortunately, although short-term investment is well covered, long-term aspects are ignored. The *Financial Journal* gives you all sorts of stock market tips but tells you almost nothing about fundamentals like capitalization of price-earnings ratios. There is no distinction between common and preferred stock. There are no dividends. Money in the bank draws no interest. There is no inflation.

The name is a tip-off. This isn't a game about investing to save up for retirement or for your children's education. On the other hand, if you think you have what it takes to make a quick million in the stock market, *Millionaire* can help you find out if you're right. FJ

Millionaire, by Jim Zuber, Blue Chip Software (19818 Ventura Boulevard Woodland Hills, CA 91364; 213-881-8288). $59.95.

Titan Empire. By E. Zaron. The bridge crew tenses as Mr. Spock reports the third incoming plasma torpedo. Mr. Scott has just pronounced that he "dinna ken the shields can take ne more." Dr. McCoy solemnly intones, "I'm a doctor, not a mortician." Kirk looks alert. He's waiting . . . waiting. . . . "Now, Mr. Sulu: Hard to port!" But it's too late—the torpedo slams into the side of the ship, the crewmembers once again fall from their chairs, and we cut to the first commercial.

So it was that the crew of the *Enterprise* hooked us into another Kirk-fights-the-Romulans episode (as opposed to a Kirk-trades-insults-with-the-Klingons episode, as any genuine Trekkie would recognize). Well, *Titan Empire* captures the mood of one of these classic battles, complete with warp factors, view screens, status reports, computer inquiries, and the blaring red-alert klaxon. All that's missing are the witticisms of the bridge crew and the falling out of the chairs, and the player is welcome to add these effects at home.

Titan Empire doesn't claim to be a *Star Trek* game, but it doesn't deny being one either. It does borrow most of its terminology from that source, but to Zaron's credit the game is much more original than its word choices. The setting for this game is our old familiar solar system instead of some arbitrary grid representing the Milky Way galaxy. The neat thing about solar systems is that the planetary orbits can affect the strategic situation. The inner planets are always close together, but de-

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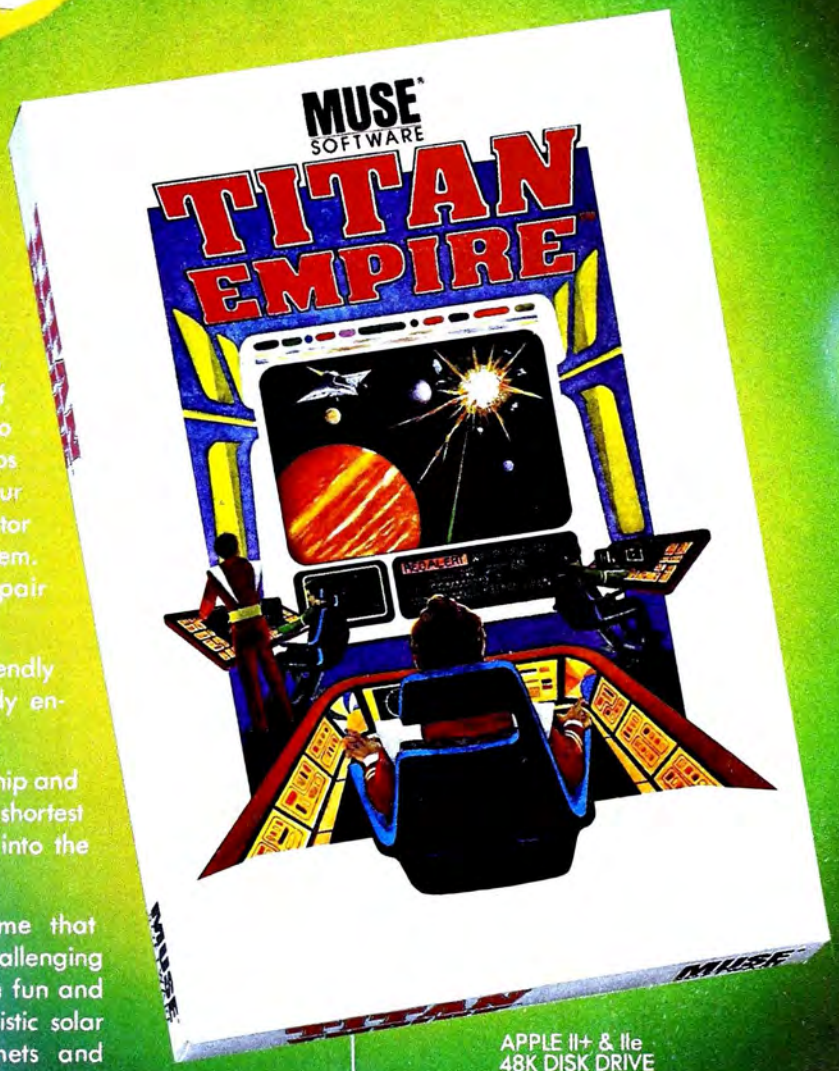

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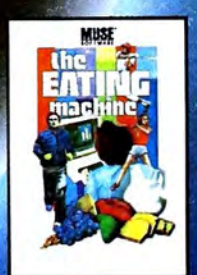

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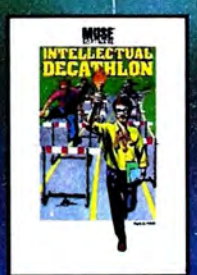

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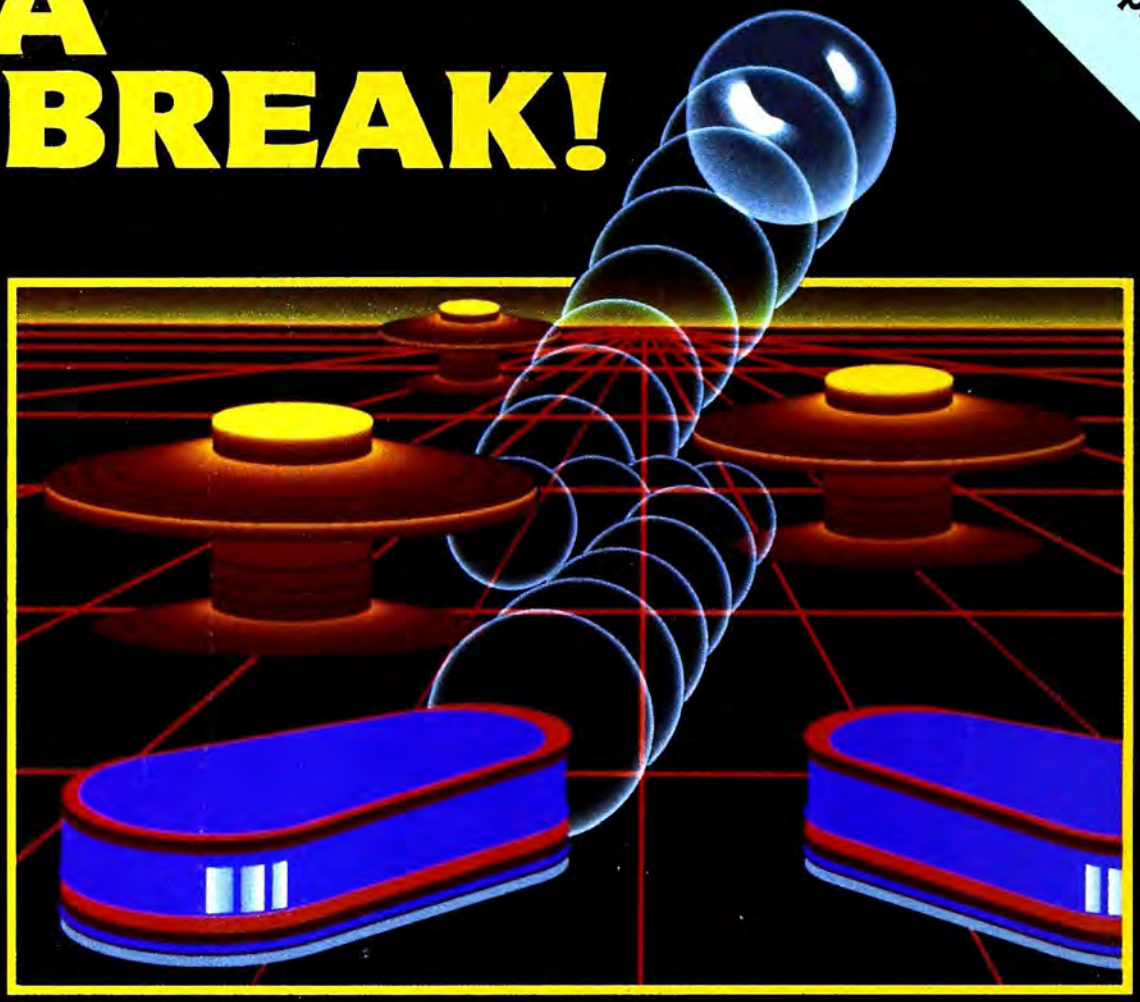

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laying an attack on an outer planet until it gets closer can save a lot of time in the long run and improve your chances of getting there too.

The situation starts out with human colonies on all the planets in the solar system plus the earth's moon, four Jovian moons, ten satellites of Saturn, five moons of Uranus, and one of Neptune. The asteroids are understandably absent from this simulation. A hostile life form has emerged from Titan (the largest Saturnian moon), has attacked our colonies, and is heading for Earth (in all fairness, we probably incited this by colonizing one of their sacred methane swamps). The player commands an *Enterprise*-like ship in an attempt to regain lost territory and prevent any more alien land grab deals: in short, wipe the buggers out.

Two resources are in question in this war: troops and fuel. All planets and moons are able to generate these commodities at a slow rate. You need fuel to get from place to place, power your shields, shoot at aliens, and obliterate planetary populations. You can only get fuel from friendly planets, and an enemy planet can only be made into a friendly one by said obliteration (well, they started it). Once the enemy troops on a planet are defeated, you can beam down your own troops. The planet becomes friendly, and you can refuel.

An unusual aspect of this war is that you are allowed only one ship at a time, while the enemy can have as many as ten (some kind of interplanetary SALT arrangement, no doubt). This has the effect of making the war situation stable, an unusual situation in a war game. The more planets you occupy, the harder it is to defend them all. And the natural orbital patterns inevitably move your weaker planets near their stronger ones just when you're ready to tie things up. By the same token, when you have conquered all the planets but one, all ten of the enemy ships will be coming from the one remaining enemy planet when you try to attack it. *Titan Empire* can last a long time.

The game can be addicting. When you've just finished securing Saturn and all ten of its moons, only to discover that the enemy has taken Earth and the rest of the inner planets, it can be frustrating, too. Somehow, though, that kind of frustration can keep you playing. Jim Kirk never let it get him down. DD

Titan Empire, by E. Zaron, Muse (347 North Charles Street, Baltimore, MD 21201; 301-659-7212). $34.95.

Spellagraph. Spelling drills, even those that attempt to incorporate games, can often be dull and narrow in their appeal. DesignWare, however, has succeeded in producing a learning game with more going for it.

The object of *Spellagraph* is to guess the meaning of a rebus (a sentence in the form of pictures). For example, the sentence, "I hear," might be represented by a picture of an eye followed by an "H," a plus sign, and a picture of an ear. The rebus is hidden by a number of panels. When a child correctly spells a word, part of the rebus is revealed and the child can try to guess its meaning. The player scores for good spelling and correct guesses, and the game can be played in competition.

The *Spellagraph* disk includes about four hundred words. They are divided in levels from second grade ("hat") to eighth grade ("mayonnaise"). Other word lists can be added. In addition, the level of difficulty can be affected by changing the number of panels that conceal the rebus.

The best learning tool a child can have is a concerned parent, and *Spellagraph* is no substitute. There are simply not enough words on the disk to provide much benefit. However, when parents are willing to put in the hours that are necessary to expand the word lists, *Spellagraph* is a good investment. FJ

Spellagraph, DesignWare (185 Berry Street, San Francisco, CA 94107; 415-546-1866). $39.95.

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Flow Charting. By Keith Alan Patton. After six years, you would think that everything that could be done on the Apple II would already have been done. Most new software, if it shows us anything at all, shows us that something we already knew could be done can be done better. Every once in a while, however, somebody looks at the machine with a fresh viewpoint and comes up with something that nobody else has thought of. It's those flashes of inspiration on the part of a few talented individuals that keep computers exciting for all of us.

The creation of flow charts on the computer is the kind of problem that seems insoluble until someone actually solves it. The difficulty is that a flow chart, if it is to be of any use, must be somewhat complex. The hi-res screen doesn't have a high enough resolution to display more than a small part of such a chart. The solution: Only display a small part of the chart. Stow the rest somewhere else in memory until it's needed.

Flow Charting does just that. In fact, it solves the problems of designing and printing flow charts on the Apple so elegantly that it's fun to run even if you have no use for flow charts. If you do have a use for flow charts, *Flow Charting* can be as useful as your word processor, for its purpose.

About one-fifteenth of the chart is shown at one time in the normal display mode. Within that window, you use keyboard commands to draw the lines, arrows, words, and shapes that comprise the flow chart. The viewing window can be scrolled in any direction by moving the cursor off one edge. If you want to see the structure of the chart, you can switch to a shrunken version that packs everything on the screen at once. In this mode, you can't read the chart but you can see where the shapes, lines, and words are placed.

The chart is stored in memory as a character map. A set of 256 graphics characters make up everything that *Flow Charting* can create. In addition to the full set of ASCII characters (including lower-case letters), there are special characters used to draw lines and shapes. This approach is remarkably economical in use of memory and disk space: A flow chart that will fill an entire printed page usually takes less than fifteen sectors on disk.

Charts are drawn using six different insert modes: shape, text, line, arrow, bypass, and connector. The last three of these allow you to add details to the lines. For editing charts, there are three block operations: delete, relocate, and copy. Except for shape insertions, all the insert modes operate on a single character at a time. All the block modes act on a rectangular area of the screen defined by its upper left and lower right corners.

The handling of shape insertion is impressive. When you give the insert shape command you get a menu of fifteen shapes. Each shape, when selected, has from one to six different sizes. You toggle through the available sizes right on the screen where the shape will be placed. When you've found the shape and size you want, you just hit a key and it's laid down on the chart. If you change your mind at any time before that point, another command causes the shape to disappear, leaving whatever was at that location before—whether it was text, lines, or another shape.

Although the form of each command and mode is well matched to its particular function, the program is consistent in its conventions from one command to the next, making it as easy to use as it is powerful. For instance, the cursor movement commands are the same in all modes except text insertion. All the block operations use the same key sequence to define the desired block. Even the shrunken view isn't just a passive display; all the insertion and editing commands are operative there as well as in the normal display mode.

Make sure the program works with your brand of printer before you buy it. The earliest version of *Flow Charting* worked only with Epson printers with Graftrax (and compatible brands), but the current version works with the NEC PC 8023A-C printer and the Apple Dot Matrix Printer as well. Early in 1984, Patton expects to release a version of the program that will drive a variety of dot-matrix printers. DD

Flow Charting, by Keith Alan Patton, Patton and Patton (340 Lassenpark Circle, San Jose, CA 95136; 408-629-5044). $138.

Spellicopter. Boring. That's how spelling seems to many students. Yet a subject that may seem uninteresting or nonessential may turn out to be critical in a student's educational development. Therefore, such materials need to be presented in a fashion that piques the pupil's interest.

Spellicopter uses arcade action and the computer's capabilities to motivate students to spell correctly. The graphics are pleasing and depict a helicopter that the player must navigate, by keyboard, through three screens. Each portion of play begins and ends on a landing field, screen one. Take off into the wild blue yonder, screen two, and find it full of obstacles—clouds, occasionally slashed by lightning; gliders; and hot-air balloons, any of which can knock the spellicopter out of action. The reward for success is arriving at a field littered with letters, screen three. The spellicopter must then retrieve the scattered letters from the field to form specific words. Captains and aces—upper level players—contend with unidentified flying objects while collecting letters. Sentient are these UFOs, and they don't want the player to succeed.

An altimeter, current score, and a gauge of fuel remaining are displayed throughout play. Loss of fuel, destruction of a spellicopter, or misspelling a word result in a loss of points. Speed scores; bonus points are awarded for fuel remaining after unloading a cargo of letters. Words can be displayed optionally prior to play and you can read sentences that use the words in a contest. More than four hundred words come on the disk, and creating data disks of more words is easy.

As is typical in educational software, the arcade action in *Spellicopter* hasn't had to pass the stringent quality controls from the top game companies. It's okay that contact with an obstacle means the spellicopter's immediate destruction, but flying close to an obstacle shouldn't. It does. Players have a perfect right to hate getting wiped out when it isn't their fault. Even less controllable is the danger of flying into a lethal obstacle when moving between screens. You can't know where the objects are situated on the screen you're going to, and arriving on the screen already in contact with an object is commonplace. No fair.

Although slow in spots, and despite the unfair aspects, *Spellicopter* was clearly designed to help kids through the spelling doldrums. MGL

Spellicopter, DesignWare (185 Berry Street, San Francisco, CA 94107; 800-572-7767). $39.95.

Simply Music. By Peter Nye, Steve Leonard, and Robin Jigour. The human spirit relishes creativity. The ability to knead and sculpt a thought, an expression, upon some form of canvas fills all of us with a glow of satisfaction.

Art, drama, music, cookery, sculpture, programming. These are a few skills that satisfy the urge to give ideas physical manifestation. And computers can help, allowing for spirited interaction between the thinker and the deed itself. Where music is the form to be created through learning, composing, playing, or even teaching, *Simply Music* is a tool that makes the computer the means.

There's little hope of mastering the piano, they used to say, if you haven't acquired the proper skills by the age of nine. *Simply Music* makes the idea passe. *Simply Music* brings music into the home. This well-documented product allows novices to execute musical variations they never thought they could be responsible for playing. It is a truly personal and effective guide to music comprehension, creation, and performance. In the package you get the main system disk, courseware (song disks and sheet music books), a demonstration disk, a personal songs disk, and an instrument disk. More than a hundred different instrument sounds may be incorporated into your own scores. Not in the basic package, however, is the alphaSyntauri keyboard—a relatively costly item through which *Simply Music* must be used.

A few menu screens easily manage *Simply Music*. To begin, one or two of ten instruments may be chosen for play. Lower and upper halves of the alphaSyntauri keyboard may play different instruments. Groups of varied instruments provide unusual sounds to punctuate your creations: an ocean, gong and chimes, and crickets, for instance.

The screen can display staff, keyboard, or bar. The bar is a display of colored blocks that correspond to notes in play. The keyboard and staff show live or recorded play, in part or in whole. You can load albums of up to ten songs each and play or work with any of the songs. Teachers, for example, could write their own scores, save them in an album, and recall the material for student interaction later.

In the orchestration section, muting of song parts enables players to follow a single part on-screen for learning purposes. The volume of the individual instruments used to record a score may be adjusted, and each score may have as many as sixteen recorded parts. This makes for instrument flexibility that is astounding. Learning in an ensemble context also provides for students' sensitivity to their surroundings.

Playback and recording are simple keystrokes on the Apple. A song may be looped to repeat until halted. And there's a match option that lets you watch a hi-res display of a keyboard or staff notation and try to

match melody, bass, chords, or harmony notes produced by *Simply Music*. The music doesn't continue until you match precisely. Scores may be speeded up or slowed down and transposed either up or down in half steps. HGL

Simply Music, by Peter Nye, Steve Leonard, and Robin Jigour, Syntauri (4962 El Camino Real, Suite 112, Los Altos, CA 94022; 415-966-1273). Requires alphaSyntauri keyboard system. $179.95.

Math Maze. This one is a bit of a surprise. At first glance, it's just what you would expect from the name—a mathematics drill program in game format. But it turns out to be such a good game that you may wind up thinking of it as a game program with a mathematics feature.

The level of math covered is the four basic operations: addition, subtraction, multiplication, and division. Each one of these is presented in several stages of increasing difficulty; under "Addition," for example, you can select sums up to 10, sums up to 20, or sums above 20.

However, the purpose of the game is not just to solve math problems: That's only the first step. The main purpose of the game is to get from one place to another in a maze as quickly as you can. This is a game for people who like fast car chases with lots of zipping around corners and crashing into walls.

Forget about the math problems for a moment. The screen shows a simple maze—a pattern of walls and corridors in lo-res graphics—with the digits from 0 to 9 distributed around it. Your joystick (or keyboard) controls a fly, who starts out at the lower left corner of the maze.

The fly's task is to fly through the corridors of the maze to one of the digits and pick it up. Sometimes you have to pick up two digits in a certain sequence. The faster you do this, of course, the higher your score for that round.

The game designers may have made a mistake in using a fly for the viewpoint character. Judging by the feel of the joystick they should have given us a mini-Cooper racing car or a one-man rocketship. Anyway, whatever it is, it can survive an unlimited amount of bashing into walls—which is useful in this game.

That's the important part of the game, the part you pay attention to—the part that's fun. Before that part, you have to solve a math problem on each round, because the digits involved in the answer are the ones the fly must later race to get. Obviously, the quicker you can solve the problem, the higher your score; so you work to make that part of the process as short as possible, without even being aware of it.

In other words, you learn to do simple math problems in your head, with a minimum of attention in a minimum of time. What's more, you learn math almost as a trivial side issue.

When you have used up the first maze, you have two options available: You can go to another maze, or you can add a hazard to the maze you know. The game disk comes with forty different mazes; there's a maze editor program that lets you edit the current maze (move the digits around, or close some doorways and open others) or create and save your own designs.

Or you can add a spider to the existing maze. She jumps around more or less randomly, but if the fly comes near she will go for it; if she gets it, you'll lose forty points and have to start over. If she happens to be hovering around the digit you want, she can be a real nuisance.

The game also offers a less bloodthirsty hazard: You can make the walls of the maze invisible. You can still see the digits, but you can detect walls only by bumping into them (it doesn't hurt, but it slows you down). It's a good idea to try this first with a maze that you're already familiar with.

If you're an advanced masochist, you can have both the spider and invisible walls in the same game. You'll hardly even notice the math problems. Good luck! JR

Math Maze, DesignWare (185 Berry Street, San Francisco, CA 94107; 800-572-7767). $39.95.

Spider Eater. By Al Borges and Ralph Higgins. **Coloring Series 1.** By David Thornburg. One of the niftiest pieces of graphics hardware around for microcomputers today is the KoalaPad. Its friendly, menu-driven program handles most of the fundamental requirements of the microcomputer artist.

Spider Eater and *Coloring Series 1* are designed expressly for use with the KoalaPad. Despite its gruesome name, *Spider Eater* is a musical education game for teaching youngsters some of the more rudimentary elements of music composition: names of notes, pitch, and intervals.

The game screen is a treble clef on which attacking spiders pause on their way home to the web. When the spiders land, they give off a musical tone corresponding to the line or space they landed on.

Each line and space on the treble clef is lettered, as is the flat, plastic keyboard design, provided in the package, that lies across the KoalaPad.

At first glance, the game seems to be just a matter of hand-eye coordination. The spiders land and the player looks to see where, touching the Koala keyboard on the corresponding key. A musical note (representing the player) moves to the location selected and eats the spider.

Soon, however, other elements come into play. The player's note is assigned an interval value—whole, half, or quarter notes. The spiders move at the end of each interval, so speed is essential. The faster a player hits the correct key, the higher the point value for getting the spider.

Accuracy is also a factor; hitting the wrong key automatically gives the spider access to his web.

The game, which accommodates one or two players, has several levels of play, from slow and easy to fast and invisible. On the invisible level, the spider doesn't show; the pitch of the spot he lands on is the only clue to his location.

Coloring Series 1 is a disk coloring book consisting of twenty-five interesting, geometric designs mathematically created in Logo. The enclosed manual (also primarily a coloring book) gives some background on the creation of these patterns as well as several coloring suggestions.

While the *Coloring Series 1* has little to resemble great art, the abstract designs give aspiring computer artists an opportunity to practice and develop their skills with the KoalaPad.

The *Spider Eater* disk also offers two additional utilities, *Music Maker* and *Crazy Sounds*. *Music Maker* allows a player to produce musical notes by touching the KoalaPad's keyboard. Since the keyboard has only nine keys and because there's no option to save or replay sequences, *Music Maker* is good only for familiarization and fun.

Crazy Sounds is just like it sounds. By touching the pad in various places, the player can call up the sounds of birds chirping or ray guns blasting. Here's one program guaranteed to drive parents crazy. WAS

Spider Eater, by Al Borges and Ralph Higgins, *Coloring Series 1*, by David Thornburg, Koala Technologies (3100 Patrick Henry Drive, Santa Clara, CA 95050; 408-986-8866). $29.95 each.

Airsim-3. By Ted Kurtz. Aspiring pilots: your attention! Ted Kurtz has updated his *Airsim-1*. The new program is competitive with the best simulators on the market.

A flight simulator is not much like flying a real plane. Your ears don't pop, and you can't get airsick. You can't fly by the seat of your pants. And, of course, you don't get killed if you crash.

Within these limitations, Kurtz has done a good job of simulating aircraft operation. On the screen, you can see the instruments you would see in a real cockpit—the compass, altimeter, airspeed indicator, turn indicator, and others. There are actually enough navigation instruments to fly the plane by instruments alone. What's more, you get a pilot's-eye view through the windshield, and, as if that weren't enough, you can switch to a radar view of the surrounding area.

Of course, there isn't much to see—just a ragged line for mountains and another one for the seacoast. However, there are six airfields, based on six existing ones in California, and there is a fictitious Home airstrip planted near Bakersfield for novice pilots. In addition, there are forty-six navigational beacons, corresponding to real ones scattered along the coast of California.

But who wants to look at the scenery? The meat of the game is in the flying—putting your plane through its paces. And it handles its paces very well. The generic light aircraft cruises at 195 knots and is very acrobatic. With this plane, you can do loops, barrel rolls, almost anything you can imagine. You can even do the formidable outside loop.

To be sure, 48K is not much room for a program like this. Certain simplifications are inevitable. For example, the cockpit has a digital altimeter and airspeed indicator, instead of the usual clock-face instruments. This doesn't really impair the user's enjoyment very much; a good landing is a good landing, whatever the instruments look like. Incidentally, a good landing is probably the most difficult maneuver possible with this simulator. When you make your first safe landing, you will experience a real sense of achievement.

This simulator handles like a fast, exciting little airplane. Full throttle! Take her up! FJ

Airsim-3, by Ted Kurtz, Mind Systems (Box 506, Northampton, MA 01061; 413-586-6463). $44.95.

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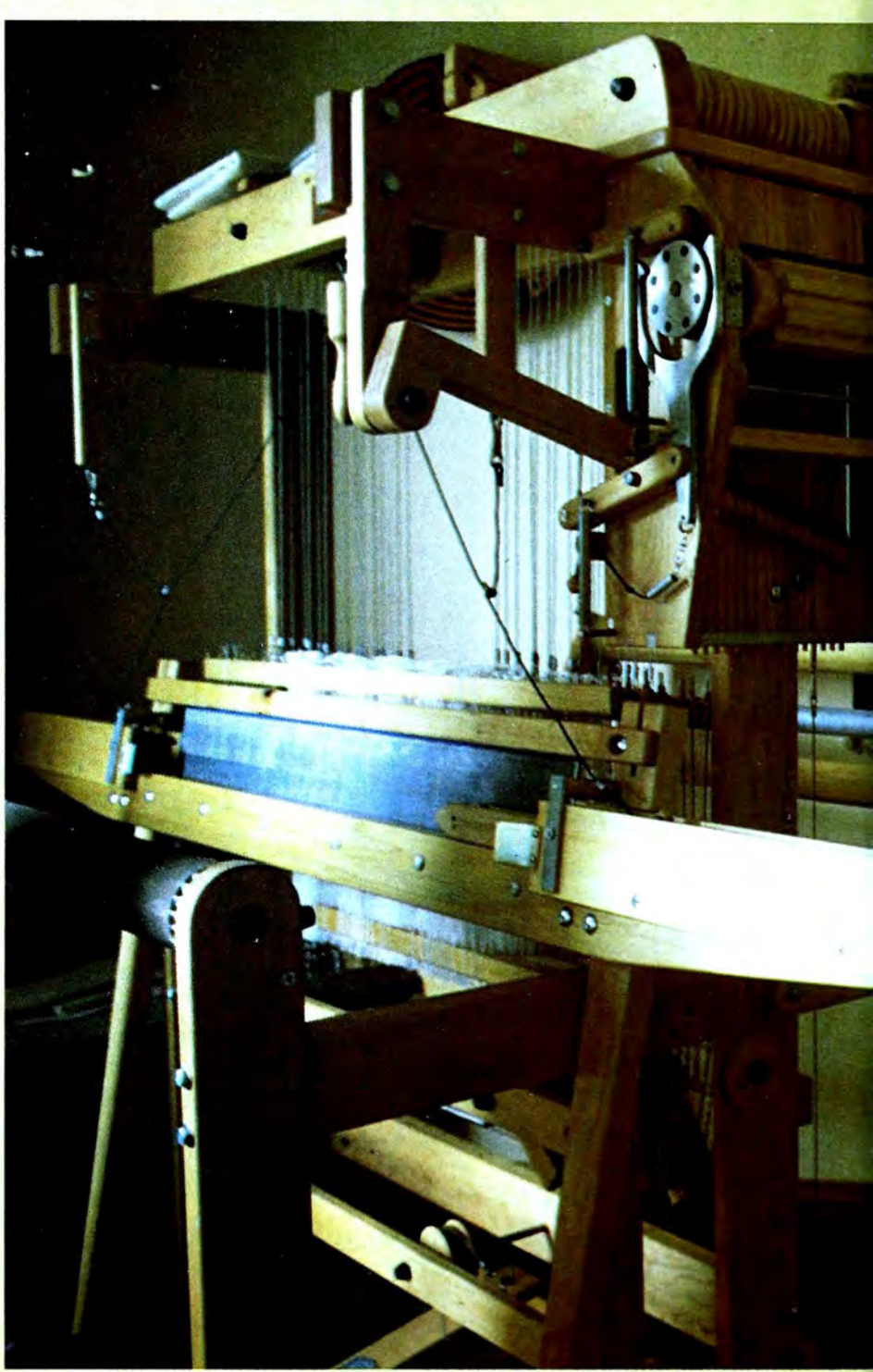

What Really Is the Fruit Of the Loom

BY MICHAEL FERRIS

"I must tell you that the Spring Weaver's Journal *is, in my estimation, a jewel. Love them all, but this one with the feature on Quebec really hit home. It was in Quebec that I was first exposed to—and fell in love with—weaving."*

It's a passion, weaving, as this letter to the editor of a popular textile craft journal suggests. You either love it or it baffles you—just like owning an Apple.

"In Quebec," writes the author of the article that inspired the letter, "the tradition of doing textile crafts at home has always been strong and important to the well-being and happiness of the family."

This tradition is the key to weaving's timeless appeal.

Room of the Looms. The living room of Jan Hoskins's home in Winnipeg, Canada, looks like a stage set for a concert that will be played on two spidery, wooden devices. Instead of living room furniture, the space contains a large, sixteen-shaft jack loom and an elaborate drawloom made in Glimakra, Sweden, with movable drawcords controlling pattern blocks for weaving free-form patterns.

Spotlights are aimed at the fell of the cloth on each loom, illuminating the work area where the woven cloth meets the unwoven warp threads. The walls are gallery white, with a sampling of textile structure experiments done by Hoskins hanging in a row at eye level.

The designer of the room has made sure that your eyes will be entertained by the complexity of the loom's string arrangements and the vibrant, colorful notes of the woven designs. You might even imagine you're attending a "performance" in the art of hand loom weaving.

Rounding a corner of the kitchen into the dining room of Hoskins's



Computerized weaving has arrived. Hoskins's *Archivist* program is capable of creating designs from more than one million combinations of stored factors. The designs are transformed into drawdowns—maps used in setting up a loom. By way of a special hookup (not shown) the shed sequence on the AVL dobby loom is controlled from the Apple, eliminating hours of tiresome footwork.

home, you are surprised again by another pair of looms. A small, four-shaft counterbalance loom is angled toward the sliding glass doors, making use of the natural outdoor light. An AVL dobby loom, with sixteen shafts giving it extra patterning capacity, shares the light.

This room isn't as grand as the first—only a single Mexican tapestry hangs on the wall—but it contains an item that more than makes up for its lack of visual eloquence. An Apple II Plus on a roll cart is tucked in a far corner, right behind the dobby loom.

Most people wonder, says Hoskins, what a machine that deals with zeros and ones is doing in a house that talks warps and wefts.

"If there's one thing Apples and weaving have in common," says Hoskins, who knows firsthand, "it's that they both deal really nicely with binary matrixes."

The comparison goes even further. While loom weaving of clothes, blankets, and curtains is no longer a necessity for survival in the modern world, the desire to sit down at a loom and create something useful, beautiful, and colorful is still strong among those who have taken up weaving as a leisure-time activity.

Personal Weavers. Just like dedicated Apple users, weavers can be characterized as people who "like to think and create with their hands," according to Jean Scorgie, a hand weaver and writer from Portland, Oregon. "Weavers also like to design things with a lot of personal choice and make things that are useful, functional, and expressive."

As a member of the Portland Handweaver's Guild, Scorgie was part of a committee of guild members that computerized their passion. Each week, for two and a half years, from the summer of 1980 to the end of

1982, the group met around an Apple and heard the positives and negatives of weaving as told through Basic.

At that time, no flexible weaving application programs existed, so Scorgie and three other members picked up the Applesoft manual and designed some programs of their own. "We wanted something bigger, more colorful than what was available," Scorgie says.

With the help of a professional programmer, the spouse of one of the members, they created five programs. One was a simple graph paper program for entering a weave pattern. Another created a striped design based on bar code information, used for making designs with secret messages built into them.



A fabric's structure is determined by analyzing its warp and weft. Patterns in the cloth can be created by changing the color of certain threads on a loom. On appearance, patterns may seem different, even though they share the same basic structure.

This intense commitment to learning to use the Apple as an aid in weaving culminated in the group's displaying its computer-generated wares at the Convergence, a national weavers' conference held last year in Seattle, Washington. Several Apples were set up to allow conference attendees to try out the programs.

Scorgie says, "We were surprised to find out how many people had a computer or were contemplating getting one." In the last few years, the use of computers among weavers has blossomed.

In the sixties and seventies, according to Scorgie, the trend was toward weaving for nonfunctional reasons. Pieces for decoration in the form of artistic wall hangings were popular. However, as one weaver said to Scorgie, "You only have so many walls." And so the trend in weaving turned to more practical items.

Nowadays, the desire among hand weavers is to incorporate their skills for the orchestration of texture, color, and design into more functional pieces like clothes, blankets, rugs, and other items.

Whole Lot of Shuttlin' and Spindlin' Goin' On. Most novice weavers get their start by reading the features and tutorials in one of the many weaving publications like *Shuttle, Spindle, and Diepot* (West Hartford, CT), *Handweaver* (Loveland, CO), or *The Weaver's Journal* (Boulder, CO). Scorgie says 70 percent of hand weavers are "primarily amateurs," weaving for themselves or their families. The rest do their weaving from studios, selling the fruits of their labor wholesale or on consignment to the many weaving specialty shops throughout America and Canada.

The *Weavcat I* database, *Computer Loom 6.0.0*, *Drawdowner*, and *Video Loom II* are some of the Apple programs written by and for weavers. Clearly, textile craftspeople and Apples are becoming a popular combination.

Ask weaving industry pros, and they'll tell you that Jan Hoskins is the one person who has brought the two disciplines—weaving and microcomputing—together most dramatically.

Hoskins is somewhat of an expert in binary matrixes, both the weaving kind and the computer kind, because she is currently working toward an interdisciplinary Ph.D. from the University of Manitoba that combines the study of both. Her doctoral research has called for intense calculation of structural algorithms and some pretty sophisticated graphics.

It all comes together on the Apple.

People are surprised when Hoskins tells them that, as a university lecturer, she teaches both a linear algebra class and a weaving class at the University of Manitoba. What the computer science department has in common with the clothing and textiles department isn't readily apparent. Aren't the two disciplines miles apart?

Not at all, says Hoskins. Although her teaching physically takes her from one building to another each week, the mental journey for Hoskins is as simple as "going from a weaver's matrix of black and white squares to the zeros and ones of a computer."

Both disciplines have strong foundations in logic. The positives and negatives of a fabric intersection are identical to the columns and rows used by a computer. It's a simple connection when explained by a doctoral candidate like Hoskins, regardless of your understanding of warp, weft, and algorithms.

Weaving All Over the World. Weaving is an ancient art, and the remnants of its history, recorded or woven, are found all over the world. Because the knowledge of looms, fabric, and design has changed hands so often over time, certain basic principles of weaving have been obscured or remain unexplored.

"Hand loom weaving was expertly practiced as far back as 440 B.C.," Hoskins writes in a paper titled *Factoring Binary Matrices: A Weaver's Approach*. "The ancient Egyptians wove handspun mummy cloth at [a densely set] 540 ends per inch, and the Chinese wove intricately patterned silk fabric at setts of 500 [strands] per inch.

"Complex looms are not new either," writes Hoskins. "Pattern books from the eighteenth century have been found that contain designs requiring forty harnesses or the use of multiple threading techniques that modern hand weavers are just now beginning to understand.

"The early nineteenth century, 1801 to be exact, saw the invention of Joseph-Marie Jacquard's device for automatically controlling complex patterning in woven structures," Hoskins continues. This was one of the earliest attempts at an automated loom.

Drawlooms of the period used punched cards that were inserted into the machinery by hand, one at a time, to control the wooden rods raising or lowering a strand of fabric. Joseph-Marie Jacquard took the advice of Jacques Vaucanson, a famous engineer of the times, and strung cards together in a sequence, thus creating the first programmed loom.

The purpose of Hoskins's first thesis paper, which included a brief history of weaving, was to describe woven structures mathematically so that the techniques of linear algebra, Boolean algebra, and combinatorics could be used to define and classify the structures. These concerns are still the main thrust of her Ph.D. work.

"Some work of this nature has already been carried out," explains Hoskins. "But many interesting problems remain."

Interesting problems are the backbone of any good Ph.D. dissertation. "Doing something new, worthwhile, and correct" is also required, says Hoskins. You must make an original contribution to the literature of your chosen field, she says.

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Above: As big as a grand piano, the sixteen-shaft drawloom in Hoskins's living room is capable of weaving about half of a large blanket in one piece. The more shafts on a loom, the more complex a pattern can be. Below: A shuttle of weft yarn sits atop the rows of tied-up warp yarns on Hoskins's small counterbalance loom. The warp yarns are threaded through the four shafts of the harness, or shed.

A Tale of Two Disciplines. Because of the interdisciplinary nature of her work, Hoskins is not part of any specific department at the University of Manitoba. She put together her own configuration of courses and waited a year to get the curriculum approved.

Hoskins spent the waiting period researching her chosen topic and expects to continue doing research for another two years before she writes her final dissertation. *The Description, Classification, and Enumeration of Complex Woven Structures* is the tentative title of her proposal.

While Hoskins's research papers—with such titles as *Enumerating the Compound Twillins*—make easy reading only for fellow mathematicians, the concepts of her Apple work are easy to understand.

First, a brief explanation of how a loom works. No need to take notes, but keep in mind the concepts of warp, weft, and shed. They will reappear as the meat of a plotted representation known as a drawdown, which is determined in the Apple by a series of algorithms.

A loom is "a device for maintaining a set of yarns—called warp yarns or ends—parallel to each other and under tension so that another set of yarns—the weft yarns or picks—can be placed across it at right angles," Hoskins explains in a well-modulated, instructive voice.

A mechanism for separating the warp yarns into two layers, called the harness, allows the weft yarns to be inserted horizontally in an area between these two layers, called the shed. "The weft yarn thus lies on top of some of the warp yarns and underneath others," Hoskins continues.

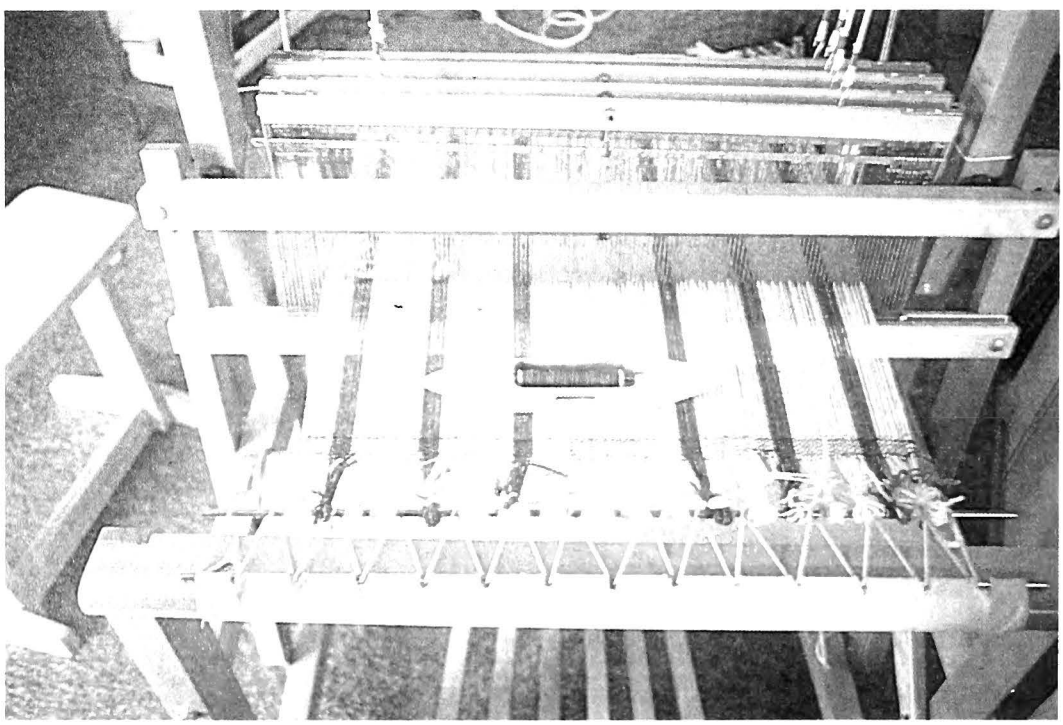
"Simple woven structures can therefore be thought to be composed entirely of two types of intersections, warp over weft and weft over warp," she says. A twill, a satin, and the plain weave, or tabby, are examples of simple woven structures. Doublecloth and beiderwand are more complex weaves.

"Conventionally, weavers have represented warp over weft intersections by a black square and weft over warp intersections by a white square."

Woven structures plotted out on graph paper are called drawdowns. This is where the Apple was called in, Hoskins explains, "to make use of a powerful tool for linear algebra and discrete math" and to make light work of a traditionally tedious job.

In a drawdown, the structure of a fabric is determined as a product of three matrixes—the threading, the tie-up, and the treadling sequences. Warp yarns are threaded and weft yarns are interlaced through them. Treadling of the loom, either by foot or automation, is what determines how the yarns are interwoven. Jacquard's punched cards were one way of automatic treadling; using a computer is another.

For example, the raising and lowering of the harness on the AVL



dobby loom in Hoskins's home is powered by an Apple. The Apple sends impulses to solenoids in the interface box attached to the loom, making the loom treadle in sequence like a player piano.

However, before a weaver can approach a loom with a fabric structure to be woven, a drawdown must be made so the loom can be set up properly. A series of programs created by Hoskins as part of her thesis research make the Apple shine in this area.

Bedding Down with Algorithms. Her computer programming began because Hoskins needed a test bed for research, especially for coding up algorithms. It was necessary to nail them down before she could consider any graphics for the program. As she explored concepts, she wrote programs.

The step-by-step algorithm process was computerized and formulated through computer statements. "Analysis and mapping data structure algorithms can be hairy," Hoskins says, "involving heavy computation and math theory for the classifying of structures." That's why the serious number crunching for determining them was done in APL on an Amdahl mainframe at the university, with help from computer science programmers. Hoskins herself had picked up Fortran several years ago and wasn't a stranger to computers.

When it came time to consider graphics, Hoskins grabbed one of the six Apples that are available as part of the university research environment. "The Apple is a well-designed machine and the graphics are quite sensibly structured," says Hoskins.

She wrote graphics routines in both compiled Basic and machine language.

Another of Hoskins's projects on the Apple—tidying up the algorithms—involved her husband Bill, a numerical analyst in the computer science department. Together they made the algorithm deductions run faster and smoother.

By incorporating sorting-technique principles into the program, they created a "bucket" sort routine. "The algorithm program," explains Hoskins, "goes element by element comparing columns. Then, at a certain point, where there is a mismatch, it stops comparing because it's found a new pattern." What the bucket sort does is keep the previous information around, arranged in bucket files, while the algorithm continues analyzing the structure.

As a result of textile industry interest in her work, some of Hoskins's textile structure research has been published and is now available as commercial software for the Apple.

Fruit of the Loom. A series of packages called *Pattern Master I, II,* and *III* is marketed by The Looms, a weaving shop in Mineral Point, Wisconsin. The *Pattern Master* programs, of course, weren't intended to be the end result of Hoskins's studies. "They just happened," according to her.

The complexity of her programs goes far beyond any commercial application. "I was interested in fundamental, exhaustive pattern research, with no regard as to how pretty the results would be." Nonetheless, her work turns out to have practical value as well as plenty of visual interest.

Hoskins's program for accessing stored pattern combinations, called *The Archivist*, exemplifies the depth of her research. The program can produce more than one million combinations of factors. Commercial use would require only around three thousand, she says.

The Archivist lets a user select the threadings, tie-ups, and treadlings of thousands of twills. The chosen fabric structure is shown as a full-color pattern on-screen. This pattern can then be drawn down by another program and modified by the user.

The drawdown for a particular pattern is made by a program that computes the design's algorithm and then shows how to thread, tie up, and treadle a loom to achieve the pattern.

The initial drawing made from factors the user chooses from *The Archivist* is done on hi-res page one. The weaving algorithm is done on page two, an 8K region of memory that hasn't been overwritten by the program.

What's fascinating about Hoskins's use of hi-res page two for this particular task is that you can actually see the data being accessed. A pattern is stored as a small square matrix in the upper left-hand corner of the screen, and the algorithm's computation is seen as a sparkling of pinpoint lights across the matrix. The process takes only a few seconds.

In choosing to do it this way, Hoskins had two factors to consider. She "wanted to make the program visually meaningful," as well as to eliminate the problems of passing data between programs.

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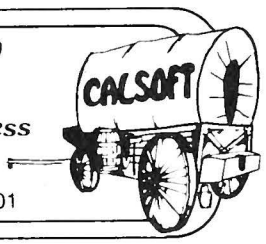

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Hoskins has also written a program allowing a user to enter an original design into the *Block Draft* database, where threadings are stored. Warp and weft information is entered from the keyboard onto a grid. A window feature permits magnification of grid portions for entry of more detailed patterns.

The Traveling Weaver. Reading up on the subject, working on computers, talking to experts, traveling, and speaking before groups are all part of Hoskins's job as a doctoral candidate.

Academic research, like weaving, is a very specialized passion. "The academic community is very small," she explains, "and so is the weaving community." Nonetheless, they both succeed in crossing over international boundaries.

Textiles and weaving are very advanced industries in Scandinavia. A year ago, Hoskins spent a month visiting weaving schools and touring textile museums in Copenhagen, Oslo, Stockholm, and Bergen. She also found a common ground between weaving and academia at the first annual Conference on the Creation of Complex Weaves, held last year in Wisconsin. As joint organizer for the event, she notes, "forty-two people from all over the United States, Canada, and England got together in the same place to exchange ideas and find out what others were doing."

One of the benefits of the Wisconsin conference was that it gave Hoskins a rare chance to publish her ideas alongside those of her peers in the weaving community. Because of the conflict of disciplines, "my papers," she says, "tend to be published in math journals. Other weaving articles tend to be published in historical and textile journals."

Although most of the work she's done over the last two years is available to weavers on disk and to academicians on paper, Hoskins continues programming and expanding on her initial research.

Hoskins has been knitting since she was a child and has always done math on the side. "I've always had a high math aptitude," she says. "I think very logically." This affinity for numbers and her fascination with working with fibers gradually led her into weaving.

One winter, after knitting several Scandinavian Lopi sweaters—one for herself, one for her son, and one for her husband—Hoskins realized that she'd knitted herself into a corner.

"I began looking around for something more challenging," she explains. "I took a weaving course and began reading the classical weaving literature of the nineteenth century, when a lot of smart people were writing about weaving, looms, and textile structures."

She was intrigued most by the highly mathematical concepts of pattern complexity and textile structure. This is where her mathematical bent could shine. Conversations with her husband helped pave the way toward her interdisciplinary status.

Her first paper on the subject, *Factoring Binary Matrices*, was presented in 1981 at the Australian Combinatorial Math Society Conference in Brisbane, Australia. In that paper, Hoskins suggested that her structural research could be part of the contribution of the twentieth century to hand loom weaving—an attempt to nail down and classify the concepts and processes that weavers have developed and used intuitively for thousands of years.

When she finishes her thesis in a few years, Hoskins will have various alternatives open to her. With such a strong background in mathematics and textiles, she could look at consulting either full- or part-time or take a position in the textile industry. More than likely, she will go back to school, taking an academic position somewhere and continuing her work.

"I am more interested in dealing with problems and looking at things that interest me," Hoskins says. It's a statement that reflects her natural passion as a scholar. As Hoskins sees it, there are still plenty of interesting problems to work on.

Those mathematical problems she identifies, once solved, may bring additional computerized solutions to weavers like Jean Scorgie and the other Apple-owning members of the Portland group.

A weaver starts with yarns in various colors and turns them into something expressive, with a beautiful texture. "Weaving is wonderfully tactile," says Scorgie. "You can't resist touching. Also, things you make are always nicer than things you can buy. Weaving gives you a sense of a fuller life."

And now that Apples and weaving have discovered each other, the creations to come are limited only by the imagination. ◨

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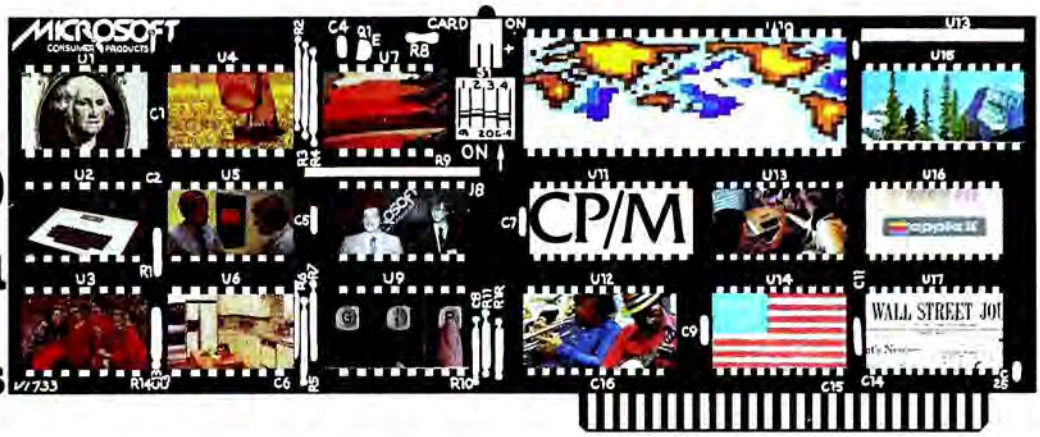

Welcome to the December installment of SoftCard Symposium. Before we begin this month, let's take a moment to consider what sorts of subjects you might like to see dealt with in this column. Some of you have written in with specific suggestions of things you'd like to see, such as specific modifications to MicroPro's *WordStar* word processor, step-by-step instructions on how to use CONFIGIO to install I/O drivers, and so on. While such subjects are certainly good ones and could easily be dealt with here, the intent of this column has always been to address the needs and interests of the broadest possible constituency of SoftCard owners, rather than to attack highly specialized subjects on the basis of one request.

This, then, is a request for input. If you'd like to have some say in what the column covers, please write in care of the magazine with your suggestions. (Be sure to put the name of the column on the outside of your envelope.) Subjects with the widest appeal will be covered first.

Let's continue now with the current series and an in-depth look at BDOS system calls, illustrated by examples of each. While this discussion will be most useful to those among you who program in assembly language, those of you who program in Basic may also use it to set up very small assembly language subroutines to be accessed with the MBasic USR function. And those of you who are using other languages with a similar capability may also find some valuable information here.

As a first step, let's review the nature of the BDOS system calls. Basically, these calls are the heart of the CP/M operating system. They provide the only method of communicating with it and the only normal way of getting it to perform useful work.

For each BDOS function that can be accessed by the user—from placing characters on the screen to computing the size of a file—a system call exists to allow the user's programs to tell BDOS to perform that function. Generally speaking, the greater the number and diversity of the system calls, the more useful and complex the operating system. From a design standpoint, then, the key to building a good operating system lies in properly balancing the tradeoffs between complexity and speed/space considerations. Despite the fact that people may gripe because CP/M does not include various system calls that would make it more flexible, CP/M's long-term popularity is testimony to good management of this situation.

Let's look now at the entire list of BDOS system calls and what they do. For example, the number in the left-hand column is the BDOS function number. Please note: Some of the names may not agree with the ones used in Digital Research documentation; the changes were made intentionally for purposes of clarity.

Function	Name	Operation
0.	System reset	Returns control to CP/M at the CCP level; drive A: is selected and logged in
1.	Console input	Obtains the next character of input from the selected console device
2.	Console output	Sends the requested character of output to the selected console device
3.	Reader input	Obtains the next character of input from the selected reader device
4.	Punch output	Sends the requested character of output to the selected punch device
5.	List output	Sends the requested character of output to the selected list device
6.	Direct CON: I/O	Performs bidirectional communication with the selected console device
7.	Get I/O byte	Obtains the current value of the IOBYTE
8.	Set I/O byte	Alters the IOBYTE to the requested value
9.	Print string	Sends a string of characters in memory to the selected console device
10.	Get string	Obtains an edited line of character input from the selected console device
11.	Get CON: status	Determines whether a character of input is ready at the selected console device
12.	Get version no.	Obtains the CP/M or MP/M version number
13.	Reset all disks	Returns all system drives to the same state as when the system is booted
14.	Select disk	Designates the requested drive as the default drive for all subsequent disk activity
15.	Open file	Finds and activates a disk file for subsequent read and write operations
16.	Close file	Deactivates a previously open disk file and permanently records any new directory information
17.	Search first	Causes the disk directory to be scanned for the first file name that matches an identifier stored in memory
18.	Search next	Causes the disk directory to be scanned for subsequent entries that match the stored identifier
19.	Delete file	Removes files that match an identifier in memory from the disk directory by deactivating their entries
20.	Read sequential	Obtains a 128-byte sector of the named file from disk; the first call gets the first sector, and subsequent calls get remaining sectors in sequential order
21.	Write sequential	Sends a 128-byte sector of the named file to disk; as in read, the sectors are written in sequential order
22.	Make file	Creates a new file on disk by creating the first directory entry with that name in the disk's directory
23.	Rename file	Changes the name of a disk file in all entries in the disk's directory
24.	Get log-in vector	Obtains a sixteen-bit value in which each bit corresponds to one of the sixteen possible drives in the system; bits that are set indicate that that drive has been logged in
25.	Get current disk	Obtains a number from 0 to 15, which corresponds to the number of the currently logged disk
26.	Set DMA address	Alters the starting address from which the next sector of data will be written to disk or to which the next sector will be read
27.	Get alloc vector	Obtains the start address of the ALV data structure for the selected disk drive
28.	Write protect	Sets the selected disk drive to temporary read-only status until the next warm-start operation
29.	Get R/O vector	Obtains a sixteen-bit value in which each bit corresponds to one of the sixteen possible drives in the system; bits that are set indicate that that

		drive has been set to a temporary read-only condition
30.	Set attributes	Sets the requested attribute (SYS-DIR and R/O-R/W) for a particular file
31.	Get DPB address	Obtains the address of the DPB data structure for the selected disk drive
32.	Get/set user no.	Obtains the current user number or alters it to a new user number
33.	Read random	Obtains a specific 128-byte sector of the named file from disk using the record number
34.	Write random	Sends a specific 128-byte sector of the named file to disk using the record number
35.	Compute size	Obtains a value that is one beyond the highest-numbered record in the file
36.	Set random rec.	Computes the record number and sets it for the current read/write position in the named file
37.	Reset drive	Returns one or more drives to their reset condition (see function 13), based on a sixteen-bit value in which each bit corresponds to one of the sixteen possible disk drives
40.	Write random with zero fill	Essentially equivalent to function 34, except that unallocated blocks are filled with zeros prior to the write.

As our discussion progresses, we'll go into greater depth about each call, but for now we'll examine the process used when system calls are being made.

Essentially, BDOS is a collection of subroutines, each of which performs a distinct task when called from another assembly language program or subroutine. As we saw when we discussed the BOOT code, BDOS is never in total control of the computer. The BIOS booting routines take over from the boot sector and initialize the system, then they load the CCP and transfer control to it.

The CCP, therefore, is the first program to use the collection of subroutines known as BDOS. The CCP remains in control, calling BDOS as necessary for DIRs, TYPEs, ERAs, and so on until the user types the name of a program file with the extension .COM. At that point, the CCP loads this file into memory and turns control over to it. Thereafter, BDOS is under the control of that program (the COM file) until such time as the program returns control to the CCP with a warm boot or loads another program and turns control over to it.

Normally, in order to work with a collection of subroutines like BDOS, one must know the various entry points for each subroutine in order to branch to them with a CALL instruction and thereby get them to perform their functions. This is not a very flexible approach, however, since the addresses will change depending on the memory size of the computer and the revision date of CP/M. As we've seen in the last several columns, this problem was handled in the BIOS by means of a jump table at the very beginning. In that case, the calling routine could simply call an address made up of the start of the BIOS plus an offset value for the entry corresponding to the function desired. In BDOS, however, this situation is handled somewhat differently. Since BDOS supports many more functions than BIOS does, a BDOS jump table would have to be much larger, and the process of calculating the addresses to call would be rather more involved.

To simplify matters, then, the process of selecting appropriate routines is handled in BDOS through the use of a master subroutine that acts as a function command processor. Just as the CCP takes such commands as DIR and TYPE, decodes them, and then processes them, the command processor in BDOS takes commands and calls various other subroutines to perform them. Rather than use CCP-type ASCII commands like TYPE and DIR, though, this subroutine uses numeric commands called *function numbers*.

The list shown above, then, is actually a list of the numeric commands the command processor understands. To reach the command processor subroutine, the CCP (or any other program) simply calls the processor subroutine with the appropriate function number. To make it easy to find that subroutine, a system of double indirect vectors is used. This is not as complicated as it sounds.

Simply stated, there's a jump instruction at the very beginning of BDOS that transfers control directly to the command processor subroutine. This jump instruction is the first indirect vector, so named because you do not call the subroutine directly but rather get there indirectly by going through the vector. Since the beginning address of BDOS, like the address of the subroutine itself, will also change in accordance with memory size, another jump instruction is placed in low memory at location 0005H, which jumps to the beginning of BDOS. This jump instruction is the second indirect vector. This second vector won't change location no matter what the memory size of the computer or the revision history of CP/M. This double indirect vector system makes it unnecessary to know anything about the location and makeup of BDOS to access the command processor. By calling location 0005H with the function number, any program can access the BDOS function command processor.

As with any command-oriented structure, the organization of the command and any parameters to be passed is specified. This specified arrangement is often called *protocol*, and in languages it is usually referred to as *syntax*. In the case of BDOS system calls, the protocol requires that the function number always be in register [C] upon entry to the command processor. This ensures that the processor always knows where to find it.

Some function calls require additional data beyond the function number, such as a character to be displayed, a drive number, and so on. This extra parameter always goes in register [E] if it is one byte in length, or in register pair [DE] if it's two bytes. Data returned to the calling routine by BDOS will always be found in register [A] if it's one byte long and register pair [HL] if it's two bytes long. There are some functions that in earlier releases of CP/M returned a single byte value in [A] but that in the current version must return a double byte value. In these cases, to ensure compatibility with earlier versions, the data returned in [L] is copied into [A] and the data returned in [H] is copied into [B].

Now we're ready to begin examining the system calls in some detail. In an effort to make this excursion more meaningful, we'll use this exercise to build a subroutine library that can work with your assembly language or Basic programs. In order to use these subroutines with Basic you'll need to assemble them and then incorporate the values in strings, DATA statements, arrays, or other data structures. Once these have been made a part of your Basic program, the VARPTR function can be used in conjunction with the USR function to locate the subroutines in memory and access them. We'll take a closer look at how to perform that operation once we've finished building the subroutine library. You assembly language programmers already know what to do.

Up until now in this column, whenever assembly language has needed to be shown it has been produced in 8080 code rather than Z-80 code so that ASM.COM could be used to assemble it. Primarily, this was done in order to demonstrate the utilities included with CP/M, rather than for the purpose of generating efficient code. For serious applications, however, ASM is not a very useful tool, especially in a Z-80 environment. While ASM is a relatively bugfree program and certainly well put together (considering its limitations), the fact that it is 8080-based, lacks a macro facility, and is unable to generate fully segmented and relocatable code makes it a poor substitute for one of the more capable assemblers such as Microsoft's *Macro-80*. Therefore, assembly language code will be shown here in Z-80 form and in the relatively standard *Macro-80* format from now on. If you plan to produce assembly language (and if you work constantly with CP/M, you eventually will), then it's strongly recommended that you purchase one of the better Z-80 macro assemblers. The purchase of a good Z-80 debugger is also recommended. Digital's *ZSID* is both Z-80 and symbolic (which means that you can examine labels as well as memory addresses) and is an excellent product.

We'll start by examining the character I/O functions. Interactive programs—those that do a great deal of communicating with the user—make many character I/O system calls. Collecting these in subroutine form is often useful and may result in some saving of space. It will also provide a standard format for your programming.

The first of the character I/O functions we'll examine is *console input*:

BDOS function no:	01
Function name:	Console input
Function purpose:	Obtain character of input
Entry parameters:	[C] = 01H
Exit parameters:	[A] = character received

The *console input* function simply reads the currently selected console device for an available character. Depending on the setting of the

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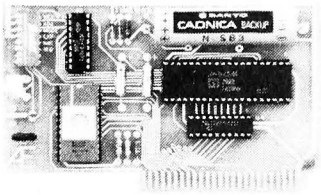

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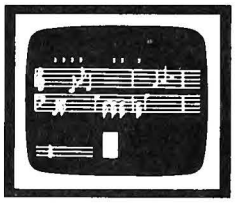

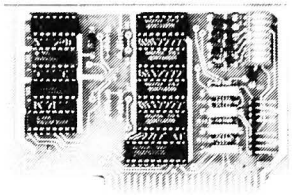

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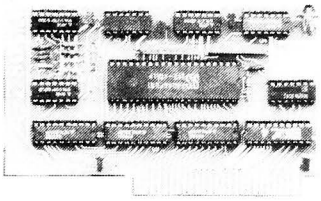

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IOBYTE, the console device may be one of several physical devices, but it is normally the Apple keyboard. Once this function is called, control won't return to the calling program until a character is obtained. Consequently, if no key is pressed after this call has been made or if the electronic signal from the keypress does not reach the Apple, the system will appear to hang. This is a common symptom of improper external terminal connections. Once a character has been obtained, it is returned to the calling program (the CCP or other program making the system call) in the [A] register.

BDOS also echoes certain characters to the current console device, usually the Apple screen. The term *echo* simply means that BDOS sends the character to the BIOS CONOUT routine. Whether or not a character is echoed depends on which type of character it is. For this purpose, characters are separated into two types, those that Digital Research calls *graphic characters* and those that are generally called *control characters*.

Graphic characters are the printable characters of the ASCII character set, from the SPACE (20H) through at least the TILDE (7EH). It should be noted that the ASCII set is interpreted differently by different groups and that the ASCII RUBOUT or DELETE character (7FH) is often included with the printables. Digital Research does include it as such, and so for our purposes it will be printable.

Control characters, on the other hand, are those ASCII characters that are not printable, from control-@ (00H) through control-K (1FH), also called US. It should also be noted that it's not possible to receive control-@ through normal input channels. This is because BDOS makes several tests internally, usually based on register [A]'s containing either the character or 00H. A zero character, therefore, is usually ignored.

All graphic characters are echoed by BDOS during console input. For the most part, however, control characters are not echoed; the four exceptions are carriage return/control-M (0DH), line feed/control-J (0AH), tab/control-I (09H), and backspace/control-H (08H). These so-called *functional* control characters are trapped by BDOS during the echoing process. The only function that BDOS actually performs itself is the tab function. When a tab is echoed, BDOS goes into a loop and prints the number of spaces (up to eight) necessary to bring the cursor to the next screen tab stop. The other three functional control characters are handled in exactly the same way as graphic characters; they are sent directly to the BIOS CONOUT routine where their particular function is performed. It's important to note that, regardless of their values, all characters are passed back to the calling program. Only the echoing process is dependent upon the type of character received.

One other activity occurs during the echoing process. Each time BDOS outputs a character, whether it is echoing console input or simply doing console output, it saves that character and then checks for any keyboard input the BIOS may be receiving. Primarily, this is done so that the keyboard won't be completely dead just because a user program is not requesting input. A special subroutine in BDOS handles this task and is called from the console output subroutine just before the current output character is sent to the screen.

The first thing this check subroutine does is to look at an internal variable in BDOS, which we'll call KEY. KEY is used by the BDOS character I/O routines to store any character of input that has been received from the keyboard but has not yet passed to any user program. When the character is passed on, KEY is reset to 00 to indicate that no character is waiting. If KEY contains a character when the check subroutine looks at it, the rest of the check subroutine is skipped and the original output character is printed to the screen. This ensures that one and only one character of input can be waiting inside BDOS.

If KEY contains zero when the check subroutine looks at it, meaning that no input character is waiting, then the BIOS CONST routine is called to check keyboard status. If CONST reports that no character is ready at the keyboard, the rest of the check subroutine is again skipped and the original output character is printed to the screen. If CONST instead reports that a character is ready at the keyboard, then a call is made to the BIOS CONIN routine immediately to get the available character. Normally, this character is then placed in KEY, and the rest of the check subroutine is skipped once more, with the original output character printed to the screen. The only time this does not occur is when the character received is a control-S. Remember that the control-S is the special character BDOS recognizes as a flag to stop screen output, called the *start/stop scroll character*.

If the check subroutine receives a control-S, it immediately calls the BIOS CONIN routine again to get the next character typed. This has the effect of halting everything until another key on the keyboard is pressed. When that next keypress is received, the check subroutine tests it to see if it is a control-C. If so, an immediate warm boot is performed. If the character is not control-C, however, then the character is totally ignored, KEY is left containing zero, and the output character is printed to the screen.

This is all somewhat confusing, but the important things to remember here are these: During any type of normal character output, BDOS checks for the first character to be typed at the keyboard. If the character is not a control-S, it is stored temporarily in KEY. It will be given to the next user program requesting input. Until that occurs, any characters typed are ignored. If the character is a control-S, the output (and therefore all other activity) is halted until the next keypress by calling the BIOS CONIN routine (which doesn't return, remember, until a key is pressed). If the next keypress is a control-C, an immediate reboot is performed, and if not, then whatever key was pressed is interpreted as a sign to restart output and will be discarded along with the original control-S.

Handling output and input this way makes it possible to interrupt screen output using control-S and to stop the program with a subsequent control-C, or simply to stop and restart output with control-S and any other character. Since this keyboard testing occurs only during output, it's obvious that the only time console input can cause testing is when the character being input is one that will be echoed (that is, when the character is one of the graphics characters or one of the four control characters mentioned earlier). As a final note, Digital Research documentation is somewhat misleading on this subject. It states that a check is made for start/stop scroll (control-S) and for start/stop printer echo (control-P). In fact, control-P is ignored during this function.

Luckily, our subroutine segment for console input is much simpler than its description. The segment looks like this:

```
GETCHR: LD    C,1       ; Console input function
        JP    0005H     ; Go BDOS, RET to caller
```

Note that in this subroutine we jump to location 0005H rather than call it. This can only be done when GETCHR is a subroutine in your program. Since the call to GETCHR places the return address of GETCHR's caller on the stack, when BDOS returns at the completion of this function, it returns not to GETCHR but to the part of your program that called GETCHR. This saves one byte in the GETCHR routine, since we do not need a RET instruction at the end of GETCHR as we would if we had used a CALL instruction. This must not be done, however, if GETCHR is not a subroutine! Obviously, in such a case, the stack would not contain a valid return address and the result would be, at best, bizarre.

The next function we'll examine is *console status*:

```
BDOS function no:   11
  Function name:    Console status
Function purpose:   Check if character typed at console
Entry parameters:   [C] = 0BH
 Exit parameters:   [A] = 00 if no character
                    [A] = 0FFH if character ready
```

The console status function is used to avoid the problem we mentioned in our discussion of the console input function—that is, the situation in which the computer seems to hang if no character is typed. Console status checks the console device and reports whether a character is ready. If a character is ready, the program can go ahead and make the call for a character of input, knowing that one is available. If not, the program can perform other tasks and check the console status periodically. The exit parameters are set up so that a 00 value returned in register [A] means that no character is ready, while a 0FFH value in [A] means a character is available. Since most of the time a program will want to get the character of input if one is ready, we'll place this subroutine ahead of GETCHR and simply fall through if a character is ready.

Our subroutine now looks like this:

```
STATUS:  LD     C,0BH     ; Console status function
         CALL   0005H     ; Call BDOS
         OR     A         ; Character ready?
```

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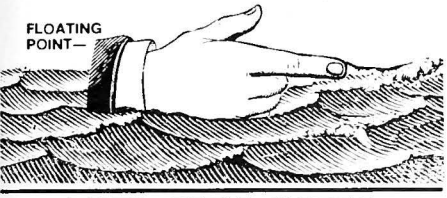

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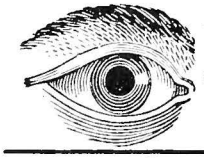

```
1 FOR S=768 TO 773: READ A:
  POKE S,A: NEXT: POKE 232,0:
  POKE 233,3: DATA 1,0,4,0,5,0
2 HGR2: FOR R=0 TO 192: ROT=R:
  SCALE=96: XDRAW 1 AT 140,95:
  SCALE=30: XDRAW 1 AT 140,95:
  S=PEEK(49200): NEXT: RUN
```

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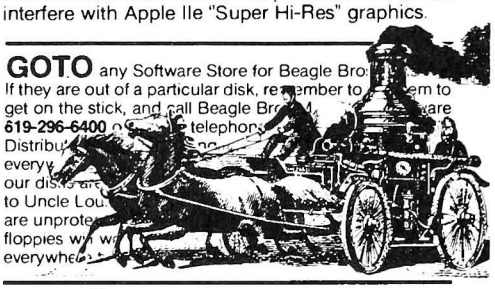

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```
        RET     Z       ; No, return to caller
GETCHR: LD      C,1     ; Console input function
        JP      0005H   ; Go BDOS, RET to caller
```

As you can see, we call BDOS this time, since we wish to return here and test the contents of register [A]. We do so by performing an OR instruction between [A] and itself. This does not affect the value in [A], but it does set or reset the Z-80's zero flag, depending on [A]'s contents. The RET Z instruction (for return if zero) takes us back to the calling program, with [A] equal to 00 and the zero flag set if no character is available. Otherwise, we simply fall through that test directly into GETCHR and get the character. In such a case, we return to the caller, with [A] containing the character received.

It is important to note here that if you call GETCHR, you don't have to test the [A] register, since you won't get control back until a character has been received. Calling STATUS, on the other hand, requires that you test the contents of [A] using an OR instruction (or something similar) when control returns, since most of the time you will not have gotten a character. The test must be explicit. You cannot use the fact that STATUS sets the zero flag if no character is ready, because BDOS often returns from the console input function with this flag set as well.

The next function we'll look at is *console output*:

```
BDOS function no:   02
  Function name:    Console output
Function purpose:   Send character to console
Entry parameters:   [C] = 02H
                    [E] = char
 Exit parameters:   None
```

The console output function sends the character passed to it in register [E] to the selected console device, usually the Apple screen. During console output, just as in the echo part of console input, tabs are expanded by BDOS to some number of spaces; these are then printed one at a time, and BDOS checks for a control-S character entered at the keyboard. Unlike the echo process, however, all other character values (even those greater than 7FH) are sent to the BIOS CONOUT routine to be printed without any further checking by BDOS. CONOUT in that case usually ignores any control characters that aren't single-character screen functions or that aren't a part of multicharacter screen functions. In order to incorporate this into our subroutine, we'll do something else a bit nonstandard. We know that the register pair [HL] is never used as a part of the parameter-passing protocol when BDOS system calls are being made. For this reason, we'll use it to save ourselves a few bytes. When the op-code for the instruction LD HL,*nnnn* is placed in front of any two-byte instruction, that two-byte instruction no longer performs its true function; instead, it gets treated as the address to be loaded into [HL]. This is better shown in our subroutine:

```
STATUS: LD      C,0BH   ; Console status function
        CALL    0005H   ; Call BDOS
        INC     A       ; 00 -->01, 0FFH -->00
        RET     NZ      ; Return if no character
GETCHR: LD      C,1     ; Console input function
        DB      21H     ; Skip 2 bytes with LD  HL,nnnn
PUTCHR: LD      C,2     ; Console output function
        JP      0005H   ; Go BDOS, RET to caller
```

As you can see, if the subroutine is entered at GETCHR, the input function (1) will be loaded into register [C], and, because of the 21H byte, the loading of register [C] at PUTCHR will be ignored, with control going right on to the jump instruction following it. The contents of register pair [HL] will of course be lost, but all registers whose contents must be preserved ought to be saved before any system call anyway, since BDOS and BIOS make no claim to preserve the contents of any registers. When the trick just described is used, both GETCHR and PUTCHR can share the single jump instruction, and that saves an additional two bytes in our subroutine package.

The next function we'll examine is *reader input*:

```
BDOS function no:   03
  Function name:    Reader input
Function purpose:   Obtain character from reader device
Entry parameters:   [C] = 03H
 Exit parameters:   [A] = character received
```

This function acts very much like console input, except that the character is not echoed to the screen. The reason here is that this function is actually just a direct call to the BIOS READER routine. BDOS does no interpretation of the character received and no echoing, and consequently it does not check for any keypress. As with console input, control here does not return to the calling program until a character has been received. Calling the reader function with no physical reader device in the Apple does not make the computer hang, however. As we saw when we examined the SoftCard BIOS, reader comes to you such that it always returns a control-Z (CP/M's end-of-file character) if the physical reader device is not implemented. The control-Z is used so that programs like PIP, which keep reading until end-of-file is reached, will abort as soon as the first call is made.

Reader input gets added to our subroutine as follows:

```
STATUS: LD      C,0BH   ; Console status function
        CALL    0005H   ; Call BDOS
        INC     A       ; 00 -->01, 0FFH -->00
        RET     NZ      ; Return if no character
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
        JP      0005H   ; Go BDOS, RET to caller
```

Once again, we employ the LD HL,*nnnn* op-code to skip two bytes.

The next function to cover is *punch output*:

```
BDOS function no:   04
  Function name:    Punch output
Function purpose:   Send character to the punch device
Entry parameters:   [C] = 04H
                    [E] = character
 Exit parameters:   none
```

Punch output simply sends the character from register [E] to the selected punch device. Again, this function goes directly to the BIOS, this time to the PUNCH routine, and no action is taken by BDOS. If punch is not implemented in your SoftCard BIOS, the routine simply returns to the program that called it without having taken any action. Punch gets added to our subroutine as follows:

```
STATUS: LD      C,0BH   ; Console status function
        CALL    0005H   ; Call BDOS
        INC     A       ; 00 -->01, 0FFH -->00
        RET     NZ      ; Return if no character
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
        JP      0005H   ; Go BDOS, RET to caller
```

The next function we'll examine is the *list output* function:

```
BDOS function no:   05
  Function name:    List output
Function purpose:   Send character to the list device
Entry parameters:   [C] = 05H
                    [E] = character
 Exit parameters:   none
```

Like punch output, list output is vectored direct to the BIOS (the LIST routine in this case) after the decoding process has been taken care of by the command processor. BDOS does not interpret or process the character to be output.

One thing you may have noticed by now: The character to be sent in all of these output functions is placed in register [E], while our study of the BIOS indicated that it looked for output characters in register [C]. This is done because the first action of the BDOS command processor is to manipulate the registers, removing the parameters from register pair

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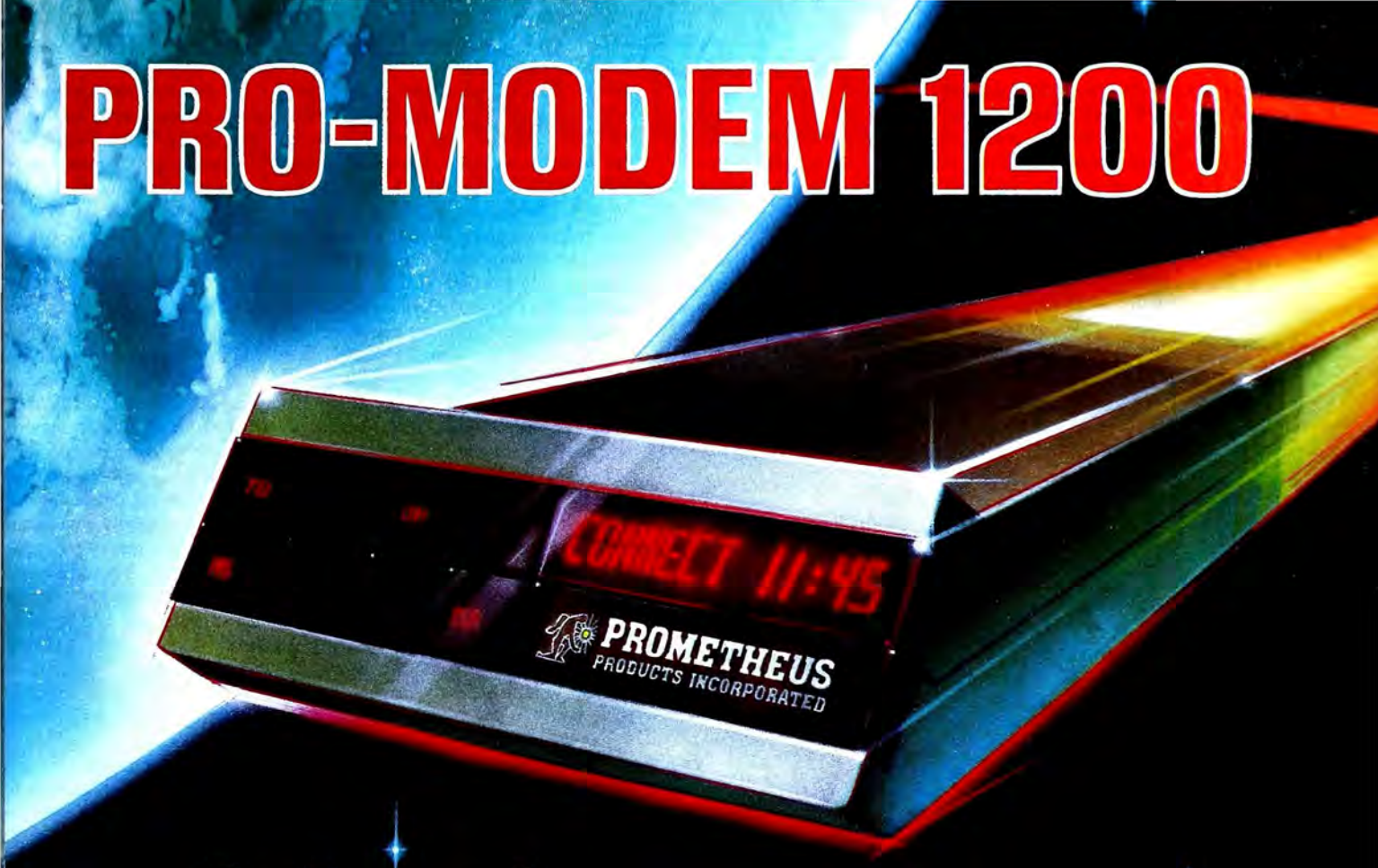

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[DE] and placing them in register pair [BC]. This setup was implemented because of the 8080 processor's limited means of dealing with register pair [BC] and its relatively diverse means of dealing with [DE]. Using the two pairs in this fashion allows the user to use [DE] as often as possible when creating parameters while still allowing BDOS to have them free for its internal use. Let's take a look at our subroutine now.

```
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
         JP    0005H     ; Go BDOS, RET to caller
```

Our next function, *direct console I/O*, is much more complex than those we have dealt with so far.

```
BDOS function no:    06
Function name:       Direct console I/O
Function purpose:    Obtain/send character to the console
Entry parameters:    [C] = 06H
                     [E] = 0FFH if requesting input or
                           character if output
Exit parameters:     [A] = character or status if input or
                           undefined value if output
```

Essentially, this function is a single means of sending and receiving characters between your programs and the console. It has many important uses, but like any versatile tool the direct console I/O function is less tame and polished than more limited ones, such as the console input and console output functions we just looked at. For that reason, care must be exercised in using it, and it's important to realize that it won't be appropriate for all purposes of console I/O. There are times, however, when the use of this function is almost mandatory, as we'll see when we discuss it further.

When used for input, the direct console function, unlike the standard console input function, does not check the location KEY identified earlier. Instead, BDOS executes the function by first calling the BIOS CONST routine. If CONST reports to BDOS that no keyboard character is available, BDOS returns immediately to the program that called it, with the status (00H) in register [A]. If, on the other hand, CONST had reported to BDOS that a character was available from the keyboard, then BDOS would have performed an immediate call to the BIOS console input routine and returned with the character received in register [A]. As you can see, this is a direct, user-to-BIOS communication. As a result, it's possible, when using both standard console input and direct console input in the same program, to lose a single keypress that is residing in KEY. That keypress will show up eventually the next time standard console input is requested. Therefore, it's a good idea not to mix the two functions, or, if you do, to perform a standard console input call to clear KEY of any leftover values.

It's also apparent that this function does not keep control until a key is pressed. If no keypress is available, the function returns with the null status (00H) in register [A]. Functionally, this specific case is identical to making a call to our STATUS subroutine, with the same zero value returned in [A]. Use can be made of this aspect of direct I/O in those cases where you wish to make frequent checks for input but also want to continue processing if no input is available. Further, the direct console I/O routine can be combined with a delay loop to achieve timed input. In this case the computer waits a certain period for a keypress and returns to your program either when a character is received or when the timer times out.

So far, the direct console I/O function doesn't seem very different from our STATUS subroutine. However, the primary difference is that with this function BDOS does not perform any echoing to the screen, which is why KEY is not used. In fact, for all intents and purposes, BDOS ignores the whole process except for the original command-decoding activity. No characters are trapped or interpreted in any way. As a consequence, you'll have to do your own screen echo when using this function for input, but there's a benefit in that as well. When you're doing formatted screen I/O in which you're keeping track of the cursor position (perhaps having the user fill in blanks or some such activity), it can be very inconvenient if the user enters such things as line feeds or tabs. By performing your own echo, you can ignore such characters, keeping only the ones you wish to acknowledge. Performing your own echo is effective as well when passwords and similar data that should not appear on-screen must be entered.

Since there's no echo by BDOS, there is also no check being made for control-S. Consequently it is now possible for your programs to receive control-S as input (as you have no doubt surmised, this is difficult to do with standard console input). Likewise, when direct input is used, it is not possible for the person at the keyboard to abort the program with control-C. Instead, control characters such as these are transmitted directly to your program for processing. This makes the direct console I/O function invaluable in those cases where you must totally control the system yourself, preventing the user from halting output and aborting the program. Since control-C characters come directly to your program, the program can detect them and perform your own particular tasks before actually aborting with a warm boot. This capability is essential in situations such as the one in which the user has had to place a nonsystem disk in drive A:. A warm boot exit from the program under these circumstances would make the system hang when it tried to reload the CCP from this disk. By using direct I/O, you keep the user from encountering this problem.

The output phase of this function works very much the same way. When BDOS decodes this function as output, it just goes immediately to the BIOS CONOUT routine. No checks for control-S or other manipulations are made, and as a result all keypresses are ignored. Any character value may be sent by your program directly to CONOUT. Tabs in this case are not expanded by BDOS. It should be noted that CONOUT does not expand tabs either; if they are expanded, the video driver in the Apple II ROM or in the ROM of the eighty-column board you're using is responsible. Even then, however, they do not necessarily match BDOS tab stops.

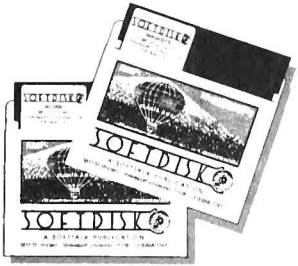
The BDOS character-position pointer, the internal counter BDOS uses to keep track of the position of the cursor in the current line, is not updated when using this function either. For this reason, as well as the one mentioned earlier when we discussed direct input, it's a good idea to use either the direct functions or the standard ones, but not to mix the two. Sending a carriage return/line feed combination through the standard console output, though, will reset BDOS's pointer.

The direct I/O functions make it possible for you to build programs that perform all the necessary console I/O tasks but that do not force you to endure the processing BDOS may do on the characters to be input or output. Your programs are also not subject to premature aborts by the user, either accidental or premeditated, except through the use of the reset key or other such catastrophic action. When building such programs, however, take care until they are fully debugged or you may find yourself with a program that's stuck in an input or output loop with no way to regain control.

Finally, although we can send any character value to the BIOS for printing, it's still not possible to send or receive non-ASCII characters (that is, ASCII characters greater than 7FH) since, as we've seen, it's the BIOS that trims input and output from eight to seven bits. If you wish to transmit such characters, however, you should have enough information by now from our discussions on the BIOS to locate the place in the CONOUT routines where this bit-stripping takes place and alter it. Be warned, though, that many peripheral devices, especially printers, count on receiving only seven bits, and that some, in addition, use the eighth bit for passage of special control codes. So be sure when making changes to the BIOS that you know your computer system and what it can (or cannot) tolerate.

Since the direct console I/O function is more complex, it follows that the subroutine for it is also more complex:

```
DIRIN:   LD    E,0FFH    ; Direct console input entry
         CALL  DIROUT    ; Get character from keyboard
         OR    A         ; Get one?
```



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```
        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
        JP      0005H     ; Go BDOS, RET to caller
```

We've placed the actual function call for direct I/O, called DIROUT, in with our other collection of calls. For purposes of character output, we use DIROUT exactly the same way we use PUTCHR; the character to be sent is placed in register [E]. For direct console input, however, we've created a separate subroutine called DIRIN, which works like a small input processor. DIRIN uses DIROUT both to get the character from the keyboard and to echo the character to the screen if it is printable.

DIRIN is built to be selectable. It either makes a single test for a character and returns or does not return until a character is received. Which action DIRIN takes depends on a variable called LOOP, and on whether LOOP is zero (in which case DIRIN returns immediately) or nonzero (in which case DIRIN loops until a character is received). DIRIN also tests for lower-case input, converting it to upper case, and tests for specific control characters, branching to routines that handle them. Control characters not checked for are printed with an up-arrow and the equivalent upper-case character, but the control character itself is returned to the calling program intact. The lower-case conversion portion can be removed if one wishes to accept lower-case input, and unlooked-for control characters can be printed as spaces or ignored if one wishes to save space in the subroutine or to streamline output as it will appear on-screen.

To take a closer look, when we enter the subroutine at DIRIN, we load register [E] with 0FFH to tell BDOS that this is input rather than output. We then call the actual function, DIROUT, and when control returns we test register [A] for a value of 00 by performing an OR of [A] with itself. As in the STATUS routine, the value in [A] is not altered, but the Z-80's zero flag is set or cleared. If [A] does not contain 00, then we receive a character, and a jump is made to DOCHAR to process it. If no character is received, the loop flag is loaded into register [A] and tested for 00 by the same method. If it is 00, then we know that only a status check is required, and we return to the caller with null status to show that no character was received. If the loop flag is nonzero, then we know that we are to stay until a character is received and so we keep looping by making a jump back to DIRIN. A call to a timer loop could be inserted at this point to provide timed input.

Had we gotten a character, we would have arrived at DOCHAR. DOCHAR's first action is to strip any high bit. Although the console input routine of the BIOS strips any high bit from keyboard input, it is possible to set the console device to equal some other physical device. In such a case, it's possible to get values larger than 7FH. It's a good idea to strip the high bit for safety's sake; your program will probably be doing some comparisons on the value in [A] when control returns and having the high bit set could cause all your compares to fail.

Next the value is compared to lower-case A. If there's a carry from this compare, it means that the value was lower than that, and therefore does not need conversion. If there is no carry, it may be lower case. To find out for sure, a compare is performed with 7BH, the value of lower-case Z plus 1. A carry here indicates that the character is definitely lower-case alphabetic, while no carry indicates that it is a tilde, curly brackets, or one of the other characters from 7BH to 7FH. By performing an AND instruction between the character and 5FH, we essentially strip out bit 5 of the character. This turns all of the 6*x*H and 7*x*H lower-case characters into their 4*x*H and 5*x*H upper-case equivalents.

Once this has been done, we save the character as is to be returned to the calling program. This is done by pushing register [A] and the flag register [F] onto the stack. It's necessary to do this because we'll be echoing the character and possibly modifying it, and we don't want it to be destroyed. Next we test to see whether the character is a control character by comparing it with 20H, the lowest value for a printable graphic character. If the character is printable, we go and echo it immediately by jumping to ECHO, which in turn calls DIROUT to print the character via the direct output call. On the return, ECHO restores the character to [A] from the stack and returns with it to the calling program.

If the character is not printable, we compare it to whatever control characters we wish to trap and process. The only one shown in our routine is control-C, but additional compares can be inserted for your purposes. A control-C causes a jump to a routine called ABORT. This routine is not shown, but we'll insert it at a later date. The ABORT routine will be the method we can use to reset parameters, to inform the user to reinsert a system disk, and so on.

You'll notice that we have a value pushed on the stack at this point. Ordinarily, we'd want to pop it off the stack before going anywhere else, but since the ABORT routine will finish by doing a warm boot and the warm boot will completely reinitialize the stack, we don't need to worry about it.

If the control character is not a control-C, we'll print an up-arrow and the letter or symbol corresponding to that control character. We do this by first saving [A] on the stack (again to avoid destroying it). We then load [A] with the ASCII value of an up-arrow (5EH) and call a separate portion of the routine labeled ECHO1.

ECHO1 is a bit of a trick that enables us to call the ECHO routine and still return to our current position. Had we just called ECHO, there would have been the return address to our current position on the stack on top of the character value we placed on there earlier. Just before returning, ECHO would have popped that return address into register [A], thinking it was the character value, and then the RET instruction would have tried to return us to an address made up of the character value and the flag register. Obviously bad form. By putting the 5EH on the stack as a dummy character in ECHO1, we can execute ECHO, which will pop the 5EH off the stack into [A] and then return us to our current position.

At that point, we do one more pop instruction to get our second saved copy of the character into [A], and then we add 40H to the character, which will convert it to an upper-case ASCII letter or symbol (for example, control-A (01H) plus 40H equals 41H or upper-case A). Now we can simply jump to the ECHO routine to print the upper-case character with our first saved copy of the original control character still on the stack to be popped off for the calling program. This process is confusing, especially at first, but if you trace through the routine for different character values, it should become easier to understand.

We'll leave the rest of the character functions, as well as some of the miscellaneous functions, for next time. Until next month. . . .

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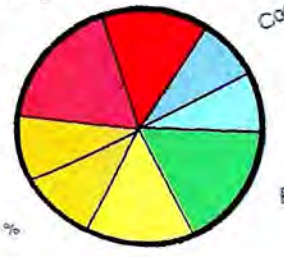

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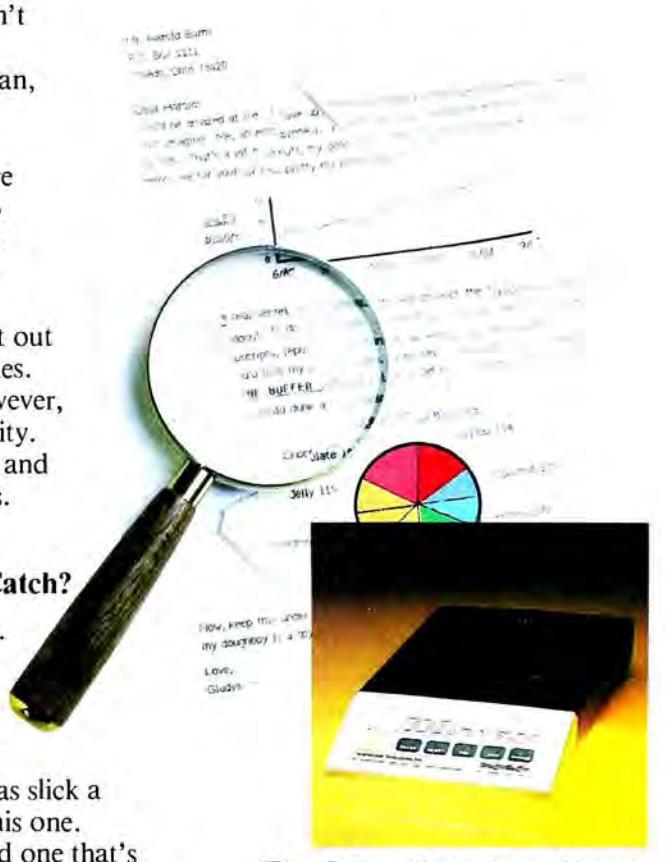

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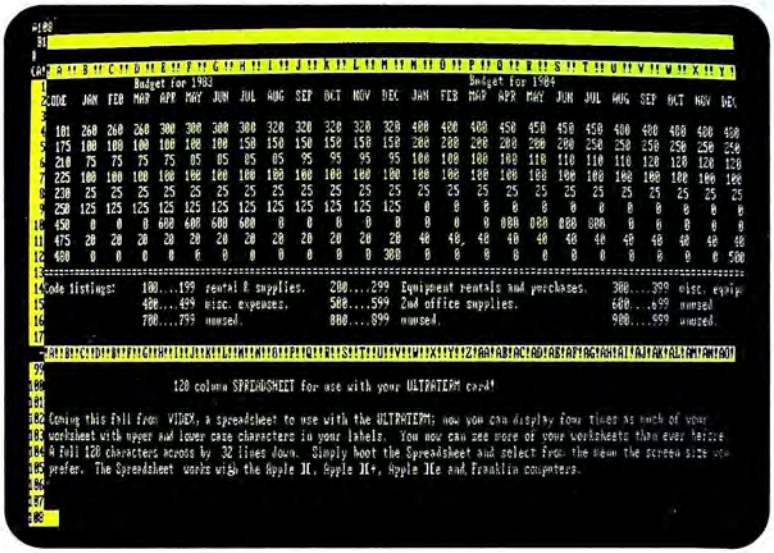

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CALCS AND THEN SUM

BY JOE SHELTON

Welcome to Calcs and Then Sum, successor to Ventures with VisiCalc. VisiCalc *remains a major force in the microcomputer world, but spreadsheet programs such as* Multiplan, Senior Analyst, *and* Magicalc *as well as multifaceted packages like the* Incredible Jack *are close on its heels.*

In recognition of this situation, Softalk *is broadening its presentation of templates and tips to include a range of popular spreadsheets. Joe Shelton kicks off the first Calcs and Then Sum with a closeup look at Microsoft's* Multiplan.

In future issues, Shelton will share this column with other writers while he broadens his range to include feature writing on various subjects for Softalk.

Electronic spreadsheets for microcomputers have come a long way since *VisiCalc* was announced in 1979. Initially, most people saw spreadsheet software as an esoteric invention that only a few personal computer owners would use or need. That perception changed in a hurry. Within a short time, some folks came to consider a spreadsheet the one software product needed to justify the purchase of a personal computer. In fact, the Apple III was introduced with a spreadsheet that, for the first few months, was the only application available.

Over the years, many clones of and "improvements" to the original were brought out. Few survived. Those that did offered something the market truly wanted.

In this month's column, we'll look at Microsoft's *Multiplan*. *Multiplan* not only survived but is making inroads into the sales of other products. There's good reason for that—*Multiplan* provides capabilities that other spreadsheets don't.

What Is a Spreadsheet? There are actually two types of modeling tools that have come on the scene in the last couple of years. The first is the classical spreadsheet, which is basically a matrix of rows and columns segmented into cells. The first and classic example of this type of spreadsheet is *VisiCalc*. Using such a spreadsheet to define and construct a template or model is a free-form experience. In other words, individual users can construct their templates in any manner they like. Using a spreadsheet can be likened to using a large sheet of paper.

The second type of mathematical modeling tool, which is more of a report-oriented spreadsheet, is a little harder to explain. This type of spreadsheet requires that the user define the mathematical relationships between rows and/or columns prior to entering data. Rarely is "what-if" analysis (done by changing key variables) easy to manage with such a spreadsheet, and instantaneous results are not ordinarily available. Apple Computer's *Senior Analyst* and VisiCorp's *Desktop Plan* are both examples of this type of modeling tool.

New Kid on the Block. Microsoft's introduction of *Multiplan* was a head-on attempt to compete with *VisiCalc* for the spreadsheet market. How did the newcomer do against the most powerful product name in personal computers? Just fine.

Multiplan has become one of the bestselling spreadsheets on the market. Did it achieve this by taking some sales away from *VisiCalc*? Undoubtedly. But doing a head-to-head comparison of the two products might not be quite fair. *VisiCalc* did have a few obvious weaknesses. When you're the first, that's to be expected. *Multiplan* focused on those problems and offered solutions. Meanwhile, *VisiCalc* did many things incredibly well right from the start, and its competitors could probably hope only to match it in those areas.

A Meander through *Multiplan*. To begin at the beginning (always a good place to start), *Multiplan* is a row and column modeling tool with sixty-three columns and 256 rows. That combination results in 16,128 cells. As users of other spreadsheets know, the number of cells in a worksheet is rarely the number available for use. Figure 1 shows the maximum model size for each version of *Multiplan*.

A note for Apple III users: Microsoft has announced a version of *Multiplan* for the Apple III. If the file capacity it provides is similar to that offered by the Apple III versions of *VisiCalc* and *Senior Analyst*, the Apple III could wind up being the premier spreadsheet machine.

If you're trying to compare different spreadsheets on the basis of model size alone, it's worth noting that the maximum model sizes shown in figure 1 won't correlate directly to the model sizes for other products. So if you'd created and saved a 12,000-byte *Multiplan* model, and then created the same model on *VisiCalc*, you couldn't be assured that the two models would take up the same amount of space. *Multiplan* does some interesting things with memory management. For example, it conserves disk space by saving only a single version of a replicated (called *copied*) cell to disk. *VisiCalc*, by contrast, saves a copy of the formula for each specified cell.

Model size alone doesn't sell a spreadsheet. So what does *Multiplan* offer that makes it so popular? To get an idea, let's look at some of the program's important features.

First and foremost, *Multiplan* must meet the expectations of experienced spreadsheet users. To that end, it provides all the functions and functionality you'd expect. The specific mathematical, financial, and logical functions *Multiplan* possesses are listed in figure 2.

Computer	Maximum Model Size
Apple II	N/A
Apple II with language card	16,500 bytes
Apple IIe	17,500 bytes
Apple IIe with 128K card	37,000 bytes
Apple III with Microsoft SoftCard III	Not yet announced

Figure 1.

ABS	FIXED	MAX	ROUND
AND	IF	MID	ROW
ATAN	INDEX	MIN	SIGN
AVERAGE	INT	MOD	SIN
COLUMN	ISERROR	NA	SQRT
COS	ISNA	NOT	STDEV
COUNT	LEN	NPV	SUM
DOLLAR	LN	OR	TAN
EXP	LOG10	PI	TRUE
FALSE	LOOKUP	REPT	VALUE

Figure 2.



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Even more important, *Multiplan* addresses the issue of user interface—how you and your computer interact—and attempts to simplify the process as much as possible. The method *Multiplan* uses to simplify program operation is decidedly different from the techniques employed by its predecessors. The major difference is obvious. In *VisiCalc*, each menu has a command line consisting of a series of letters to indicate the various options. In *Multiplan*, the menus contain English-language commands, which can be scrolled through using the arrow keys and selected by pressing return or the first letter of the chosen command. Figure 3 shows the *Multiplan* command words in the order in which they are displayed in the on-screen menus.

The use of English words rather than characters (except Xternal, of course) makes it easier to recall what the various commands do. This is especially helpful if you're a new user or if you use the program only occasionally. More experienced users have less need for this kind of assistance. Most regular *VisiCalc* users are soon comfortable using just the command letters, and so are most *Multiplan* users. Therefore, *Multiplan* provides this capability also; the user has only to press the appropriate letter key for the command (the first letter of the command word) and the command is accepted and executed. Thus, *Multiplan* users get the best of both worlds—a program that both novices and old hands can use.

Another way this program helps you is by prompting you for the most logical commands in most situations. Thus, you often don't have to make a decision about which command to use. *Multiplan* has prepared the correct choice for you, and all you have to do is accept that choice by pressing return.

Just as it has many impressive capabilities to recommend it, *Multiplan* also has some aspects that might be considered less desirable. While various other spreadsheets use letters as column headings, *Multiplan* uses values for both rows and columns. Thus, a cell in *Multiplan* always requires an indicator that tells which is the row and which is the column. For example, R3C10 establishes that the cell being referred to is the intersection of column (C) 10 and row (R) 3. This, as you can see, requires additional letters, over a more succinct J3 in another spreadsheet.

Multiplan also has an interesting way of referencing cell locations within formulas. Most spreadsheets use *absolute reference*, in which each reference in a formula refers to an absolute location in the spreadsheet. The reference is usually written as the number or letter headings of the row and column that define the intersection. So in our example, the cell that's the intersection of column J3 and row 3 would be referred to as J3.

Multiplan uses a relative reference for normal cell reference. A *relative reference* refers to the current cell in terms of the original cell, using the original cell as a sort of baseline. An example of relative reference is R[−4] C[−1]. This tells us that the cell is four rows above and one column to the left of the base cell.

Under normal circumstances, relative reference works just fine. The problems arise when you have a formula and you want to look at each cell referenced. If the references are absolute, you can look at the reference and then go directly to the cell (for example, look in column J and then down to row 3). When you're dealing with relative reference, you have to look at the directions and then count until you locate the correct cell. This can be confusing.

What's New? Let's look now at some new capabilities that really make *Multiplan* stand out.

Imagine that you're the sales manager for a manufacturing company. Once a month, all five of your district managers send you their individual twelve-month rolling forecasts. Each of them forecasts the sales of twenty-five different products. Your task is to take that mass of information and consolidate it by entering it into a single spreadsheet. The report you generate then goes to the manufacturing manager for use in the manufacturing plan.

Consider the logistics. There are five managers, each of whom is

Alpha	Format	Move	Sort
Blank	Goto	Name	Transfer
Copy	Help	Options	Value
Delete	Insert	Print	Window
Edit	Lock	Quit	Xternal

Figure 3.

The Right Commands At Your Fingertips





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- PIE WRITER®
- WORDSTAR®/SUPERCALC®
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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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Essential to any good program is a manual that's clear and understandable. The Peelings II reviewer describes the Format II manual. "All in all, it is one of the best word processor manuals I have seen. The latest documentation is a model of clarity and organization."

Put it all together. Then add features such as support of hard disk drives and a standard DOS text file format compatible with spellers and communications programs, and it's not hard to see why Format-II has earned the number one rating.

The words of the Peelings II reviewer sum it up: "I cannot think of another word processor that would be better overall for business use."

Thanks Peelings II. We couldn't have said it better ourselves.

For a reprint of the full review, or to order Format-II, fill out coupon and send it to: Kensington Microware, Ltd. 251 Park Avenue South, NYC, NY 10010 or call us at (212) 486-7707. Tlx: 236200 KEN UR. Or visit your local Apple dealer.



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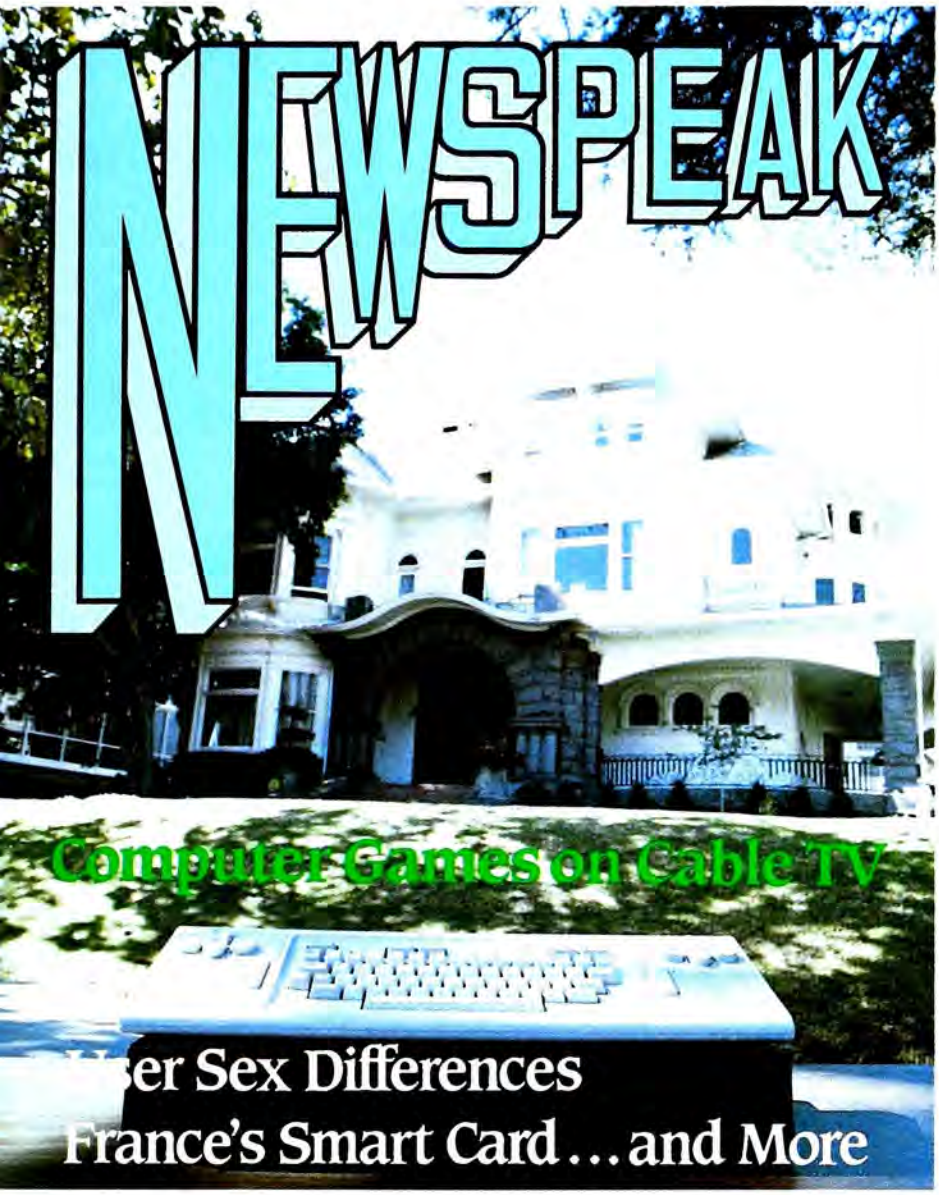

CABLE TV AND TELEPHONES BRING COMPUTER PROGRAMMING TO HOMES

"What shall we watch tonight, Henry?"

"I don't know, darling. Let's have a look at the TV listing. There are two horror movies, a country western concert, and the usual stuff. Nothing for me."

"I think I'll play Zork *then. Switch to that, please."*

"I think I'll read a magazine."

On the eve of the year 1984, forget about test-tube babies, Big Brother, newspeak, and doublethink. Get ready instead for the beginnings of what should become a big business —cable- and telephone-based computerized information and entertainment networks for the home.

They have names like The Games Network, GameLine, and TeleLearning. Soon these networks may be part of daily home life for many people. And that's not just people living in affluent suburban homes. With cable television, it's possible to reach hordes of sensation-hungry middle-class apartment and condominium dwellers in urban and suburban areas.

The idea of bringing computer programming directly into the home has been around awhile and has spawned several ventures since microcomputers appeared six years ago. Personal computer owners have had the Source, CompuServe, Dow Jones News/Retrieval Service, and many local bulletin board systems to broaden their computing horizons. Offering

GOTO page 397, column 1

The keyboard in the picture above is one component of The Games Network's Window. The mansion is the Los Angeles headquarters of The Games Network.

A New Scheme For Locking Up Software

In the seemingly never-ending controversy over the illegal copying of computer software, the phrase "protection scheme" is often heard, but not many people in the industry—publishers, authors, everyday consumers, and certainly not pirates—profess much of a liking for the various protection schemes that have been used in the past. And yet the idea that software can in fact be locked up (can you imagine a book that you could read but that could not be copied on a Xerox machine?) tenaciously hangs on.

The fact is, just as soon as a new scheme is developed, the truly dedicated pirates start hacking away at it. And they always break it. Some observers feel that it will always be impossible to create a completely unbreakable scheme. An alternate plan is to make the economics of the situation work to the advantage of the software publisher. A protection scheme that's just tough enough to discourage most casual and some hard-core pirates from going through the process of illegal copying will ensure more paying customers and could be less expensive to implement than more complicated methods.

In response to this notion, three Israeli scientists have proposed a new protection scheme. The scheme involves the deliberate use of "weak bits" in special sections of a program.

A weak bit is a bit that is sometimes read as a 0 and sometimes as a 1. The idea is that personal computer owners will not be able to duplicate the weak bits on their own machines —unless they modify their disk drives—and the software will not run without them.

This protection method was devised by Adi Shamir, a mathematician at the Weizmann Institute of Science, and his students, Amos Fiat and Yossi Tulpan. Shamir proposed that hundreds of weak bits could be intentionally written on certain tracks or sectors of a disk. The special sections—called coupons—would be chosen by the software designer and hidden within the program.

When a user boots a program that incorporates this scheme, the computer is instructed to check for weak bits by reading over the coupon several times. The weak bits show up sometimes as 0s and sometimes as 1s, and the computer checks to make sure there is no consistency in the way the coupon is read.

This scheme would prevent users from copying programs because disk drives are normally incapable of introducing weak bits. If a user tried to copy the coupon, the result would be a copy containing only normal bits—unambiguous 0s and 1s introduced more or less arbitrarily by the computer whenever a weak bit was encountered.

Shamir and his colleagues see various potential benefits from the use of weak-bit cou-

GOTO page 396, column 3

Parents May Be Root of Computer Sexism in Kids



A rare case? Will women in the future be left out of the computer age because of childhood sexism?

Why is it that women of all ages are lagging behind the male population in embracing the computer revolution? Does it begin in the school and home? And, if it does, who is to blame—industry, the schools, parents?

Two Stanford University psychologists, Irene Miura and Robert D. Hess, conducted three studies of computer use among schoolchildren and found that girls begin falling behind at an early age. Their survey of eighty-seven children—boys and girls aged five to eight—showed that only boys were owners of home computers at these early ages. Though the situation changes when students reach junior high school, the boys still outnumber the girls as owners two to one.

This first survey also revealed that there are definite sex differences in the amount of time spent using home computers. Miura and Hess found that, in a typical computer-owning family, the son spent two to three hours per day programming and playing games, the father used the computer regularly for business, and the mother and daughter didn't use it at all.

Miura and Hess's survey of twenty-three computer camp directors—including information on more than five thousand campers—found that girls make up 27 percent of enrollment in beginning and intermediate classes. The proportion drops to 14 percent in the advanced classes and to 5 percent in the highest level courses. An interesting pattern was uncovered by Miura and Hess—female enrollment in computer camps decreased as the cost of the camps increased, an indication that many parents are more aggressive in encouraging boys to tackle computing.

In their third study, Miura and Hess had children and adults rate seventy-five software titles according to whether they were of greater interest to boys or girls. Adults and children agreed that only 5 percent of the titles were of more interest to girls, while more than one-third of the titles were of greater interest to boys.

Schools, parents, and industry must all take blame for the failure to make computing more attractive to the young female population of this country. The scene seems to be changing for the better, but slowly. Altering the perceptions of parents—those who believe that computers are naturally the province of boys—would help immensely. True, the lack of software specifically designed for young girls is more than noticeable, but the lack of opportunities for young girls to encounter present software—which often transcends sex differences—is a more serious problem. DH

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Scheme

continued from page 395

pons in programs. Specific lifetimes could be built into programs by having the computer alter one weak bit—changing it to either 1 or 0—every time the program was used. Eventually, there would be very few weak bits left and the program would no longer run.

According to Shamir, a home computer owner could buy at a reduced rate a new game on a disk that could be used only a hundred times. Users who liked the game could purchase more expensive 500-time, 1,000-time, or unlimited-use disks.

Needless to say, truly dedicated pirates are probably already busy messing with their disk drives to make them copy weak bits. The supporting argument for Shamir's plan then centers on the question, how many pirates are going to risk screwing up their hardware for the challenge of breaking a protection scheme or for any other reason? But it's never wise to underestimate the resourcefulness of pirates. If Shamir's method were used widely in the industry, more likely than not there would soon be a whole lot of modified disk drives floating around.

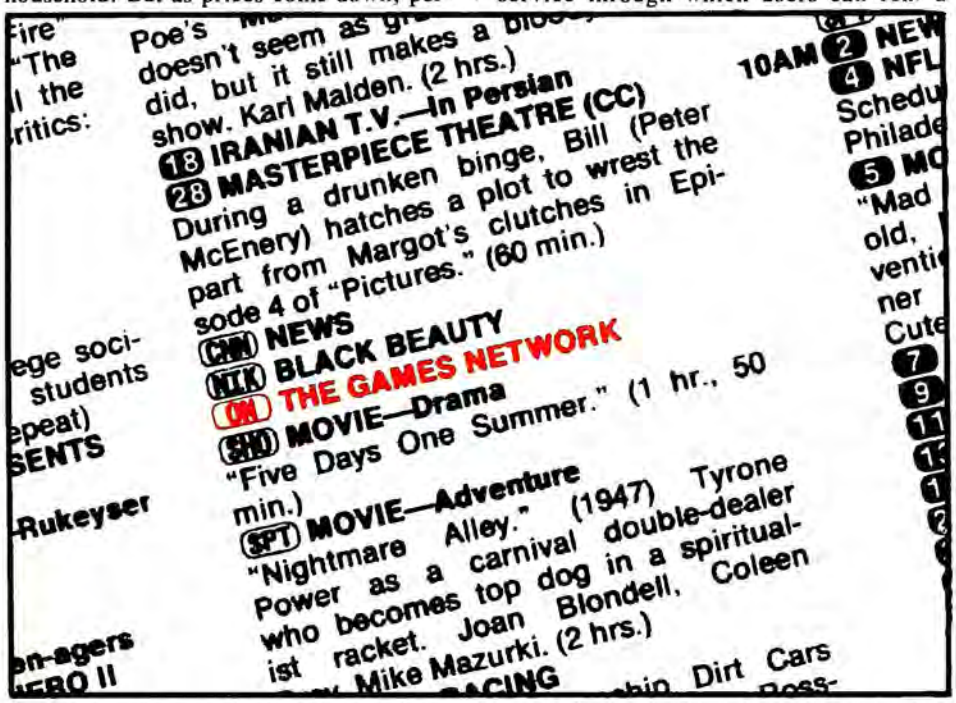
The jury is still out on the usefulness of Shamir's scheme. The most important factor in any use or nonuse of software protection—how much the retail price of the software would be affected—is still unknown. DH

Cable TV

continued from page 395

everything from games to financial news, these services have done well—though they've by no means taken the country by storm.

Many people believe that telecommunications is the one capability that will ensure the microcomputer a place in the home. Roughly analogous to a phonograph when standing alone, a personal computer hooked up to an information or entertainment network is more akin to a radio. It's safe to say that neither game machines nor personal computers have become as important as a radio to the average household. But as prices come down, performance goes up, service improves, and better software appears, personal computers should find a place in many millions of American homes.



Right now, though, the home market is confusing to say the least. Increasingly, the public has a choice between purchasing home computers, renting them, or getting most of the same functions through videotex or a like service. A year ago, Atari, Mattel, and Coleco made millions. Now these companies are close to foundering due to consumers' disenchantment with low-priced home arcade games. The new year looks to be an important testing time, a time when trends will be identified and acted upon.

A look at some of the coming games and entertainment services, both cable- and telephone-based, reveals a number of different approaches to bringing computer technology to the home. Though electronic mail, electronic banking, and other nonentertainment applications are starting to appear on the scene—and are perceived as the ultimate selling point of telecommunications services—it's games that are likely to capture the most public attention at first.

What could be easier for game players than renting a terminal and getting a steady stream of games from the local cable company? There are no cartridges or floppy disks to worry about and no difficult decisions to make, such as, "Is this game worth driving ten miles and spending thirty dollars to play?"

And if games can be sent over the cable, why not other kinds of computer programming? The only trick would be getting the proper hardware into the hands of end users. At some point—to realize the usefulness of home finance, word processing, database, and educational applications—users are going to require the ability to save data.

A cable programming company in Los Angeles—The Games Network—has started a service through which users can rent a game-playing device and receive games over cable television. Eventually, the game device will be equipped to handle more serious home computer applications.

The Games Network will begin operation in southern California's Orange County early next year. From the land of Goofy and Reggie, The Games Network will branch out over the country and eventually Canada and the United Kingdom. Close to five hundred cable companies have expressed interest in carrying The Games Network.

The particulars of The Games Network's scheme are impressive, and it's easy to see why the company's initial stock offering was a success—the price of a share jumped from $2 to $5.25 the first day—even before the company had provided service to a single regular customer.

This past fall, the system was test-marketed on the Group W Cable System in Fullerton, California. Officials of the cable company reported positive subscriber reaction to the programming offered and few technical problems.

Games Network users receive two pieces of hardware—a full keyboard and a control box that includes 64K of RAM. The keyboard has a separate microprocessor and two angled, bar-shaped game keys on each end. Users subscribe to the service through the cable company, which, in turn, installs and services the Games Network hardware.

The whole unit is known as The Window. It has a three-voice sound generator and can produce four thousand colors, with standard Apple resolution. The unit will support both switch-type (Atari/Commodore) and potentiometer (Apple/IBM) joysticks, which will most likely be offered to customers by the cable companies.

Each month, twenty games are available through the service. Users pay a one-time installation fee that depends on the individual cable company and then sixteen dollars a month to subscribe.

The games? Try *Snack Attack*, *Lode Runner*, *Aztec*, *Wizardry*, and *Zork*. The founders of The Games Network were raised on Apple II games. And it's these games—the ones Apple owners have known about through the long and weary years of cartridge-mania—that The Games Network is banking on.

In theory, the game makers that sign up with The Games Network—already signed are Broderbund, Edu-Ware, Funtastic, and forty others—should benefit from the exposure their products will receive on the service.

The Games Network says its relationship

GOTO page 398, column 1

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Apple II 48K





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Cable TV

continued from page 397

to the software industry is roughly analogous to that of radio to the recording industry. One difference is that users of The Games Network cannot record the software that comes over the cable.

In other ways, the radio analogy seems apt—at least until experience proves it otherwise. The Games Network provides "airplay" of sorts for commercially available computer games. Once users get a look at what computer games (and eventually other software) are like, presumably they'll think harder about buying the real thing. Those network users that already have computers might subscribe to The Games Network to preview new games each month.

Larry Dunlap and Thom Keith are the cofounders of The Games Network. Dunlap, who was the leader of a sixties rock group, spent many years in the music industry as a personal manager to various groups and performers. Then two years ago he bought an Apple and was so impressed by the games he could play on it that he promptly dreamed up The Games Network. Keith has been involved with cable television since its inception.

The Games Network is conservative in its expectations for the first year of operation. Subscribers will number in the hundreds of thousands, not millions, according to Dunlap. But the fact is that, through the wonder of cable television, The Games Network could really take off.

The one previous attempt to provide an interactive game-playing service via cable television has stood as an example for The Games Network. An example of what not to do.

A joint venture between Mattel and General Instrument, PlayCable began on thirteen cable systems in 1981. Of the six hundred fifty thousand cable subscribers who have access to PlayCable, fewer than 3 percent have signed up for the service.

Two key factors are accountable for the poor showing of PlayCable. First, the service requires subscribers to purchase Mattel's Intellivision game player for a couple of hundred bucks; and second, the games themselves are not good enough to attract a large audience. Certain fans of the system defend PlayCable, citing the hours and hours they've used it, but there haven't been enough of these aficionados to make the enterprise a moneymaker.

While The Games Network is attacking the home market through cable, a whole slew of companies are getting ready to attack through the telephone lines.

Control Video Corporation's GameLine was created by William von Meister, founder of the Source. Like the Source, GameLine requires a television set, a telephone, and a modem. Consumers who already own an Atari VCS or compatible video game console can purchase the GameLine Master Module (the modem) and have access to the large library of 4K games currently available for the Atari 2600.

The Master Module should sell for around sixty dollars, and a one-time membership fee of fifteen dollars will be charged when members first connect with the system. Among other things, that fifteen dollars will buy you a year's free subscription to *GameLiner* magazine—a regularly published listing of games available on the system that includes instructions for the new games introduced each month.

GameLine offers six games a month. Once a user has entered a personal I.D. number and game selection, it's a matter of dialing up the service with the Master Module (a local call from a major metropolitan area; toll-free from other locations). Currently, each game play session (multiple plays of a game) costs one dollar.

GameLine, like The Games Network, is seen by its creators as a companion service to an entertainment medium—in this case supporting the cartridge video game industry. According to a GameLine press release, "When the user registers with our system, the central computer will be able to determine where he purchased his Master Module. Thereafter, at the conclusion of every game session, the user's television screen will display a message telling him that the game just played can be purchased from the retail outlet where the Master Module was purchased."

Like the folks at The Games Network, the CVC organizers hope to deliver much more than games in the future. Soon, the company should be marketing modems that will plug into the game I/O port of most home computers and will deliver true computer games. Eventually the company will offer a whole line (pun intended) of services, with self-explanatory names like MailLine, SportsLine, StockLine, NewsLine, InfoLine, and BankLine.

Coleco and AT&T have announced that they are jointly developing a game service. The project is similar to GameLine—games are downloaded by modem into personal computers or video-game systems. Coleco will supply the game software.

Atari is readying a low-cost modem for use with its computers and game machines. What types of telecommunications services the company plans to offer, if any, have not yet been announced.

Undoubtedly many more schemes will surface in the new year. The race to bring telecommunications to the home is on. The winner of the race—if there is one clear winner—will likely be the group that hits upon the way to make it as easy as possible for consumers to acquire and use a system. Televisions wouldn't sell in the tens of millions if consumers had to thread video tapes into players and run prime time programs themselves.

"I'm tired of playing Zork, *Henry. The set's all yours."*

"I'm tired of reading magazines. I think I'll do our finances. Switch the channel for me, please." DH

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☐ **Show of Shows.** The 1984 International Winter Consumer Electronics Show (CES) will invade Las Vegas January 7–10. More than twelve hundred exhibitors will lay waste to more than seven hundred thousand square feet of exhibit space in the Las Vegas Convention Center, the Convention Center annex, the Hilton Hotel, and the Riviera Hotel. An industry trade show closed to the general public, CES will nonetheless attract upward of seventy thousand attendees.

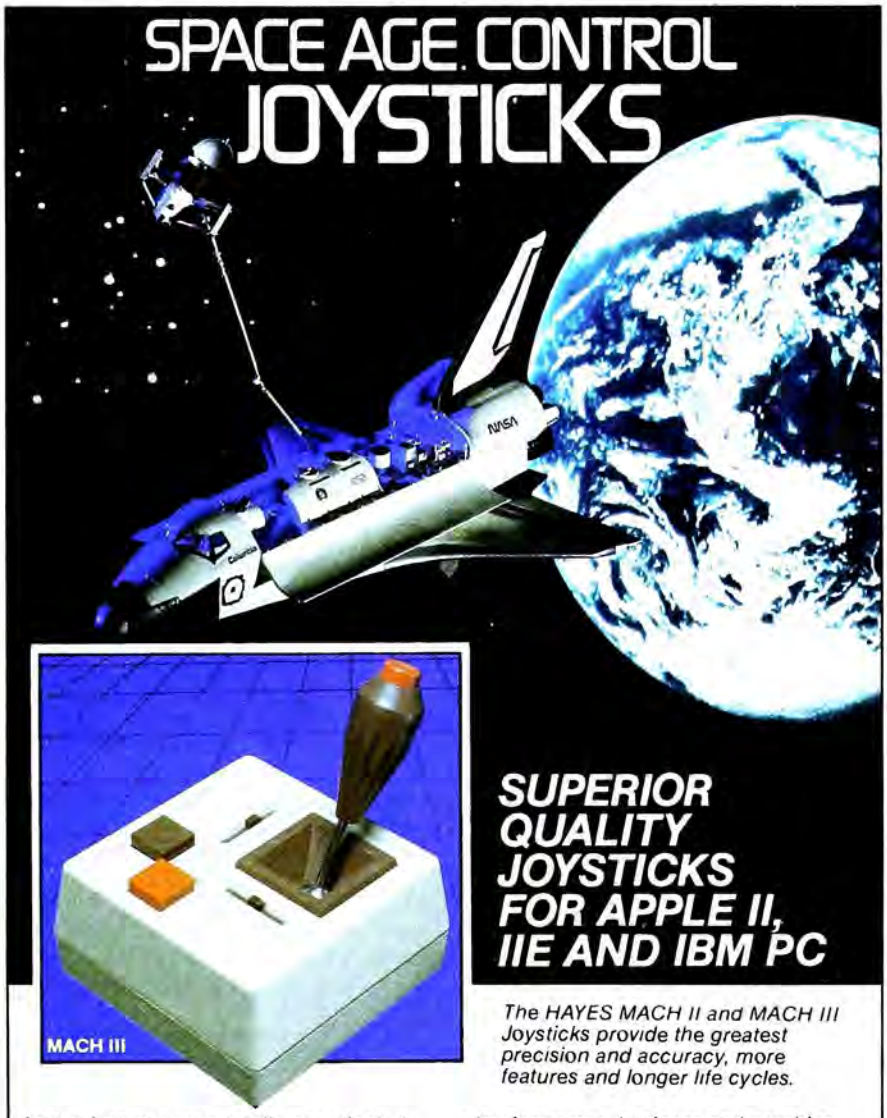
☐ **Personal Robot Get-together.** The first International Personal Robotics Congress will be held April 13–15, 1984, in Albuquerque, New Mexico. Two days of the gathering will feature technical sessions on the personal robotics field, covering such topics as new technology, control languages, definitions and terminology, legal aspects of robots, social implications, marketing, and training. An exhibit area will be open to the public all three days. The affair's organizers are encouraging people who have built their own robots to enter their creations in various planned competitions during the congress. The personal robot industry is still in its early childhood and many exciting designs and innovations are coming from hobbyists. The congress is hoping to bring together industry and individual robot experimenters. For more information, contact the International Personal Robotics Congress in Lakewood, Colorado.

☐ **France Deals Out Smart Cards.** Intelmatique, the international marketing arm of the French telecommunications administration, has announced that the French Ministry of Post and Telecommunications will issue one and a half million Multi-Service Smart Cards in 1984. The smart card (July Newsbits, "An I.D. Card with Teeth") is the size and shape of a credit card and has one or more embedded computer chips that are programmable and capable of storing data. According to Intelmatique, the Multi-Service Smart Cards will have four uses: pay telephoning, telebanking and telepayment for products ordered electronically by videotex, pay television, and as payment mechanisms for delegates attending conferences and special events at permanent exhibition/convention sites. The cards will also be used by some savings account customers of CCP (French postal bank) and the Post Savings Bank for transferring funds and paying bills. In addition, the smart cards will allow customers of CCP and members of Carte Bleue to exchange services.

☐ **2001: A Compact Disk Odyssey?** Technology Opportunity Conference presents the First International Conference on the Future of Optical Memories, Videodiscs, and Compact Disks to the Year 2000, at San Francisco's Sir Francis Drake Hotel December 5–7. The conference will specifically address questions such as, what do sophisticated end users want in the coming years from optical memory, interactive videodiscs, and compact disk systems? A series of talks and presentations by experts in the industry are planned for the three-day affair. For more information, contact the Technology Opportunity Conference headquarters in San Francisco, California.

☐ **Far East Apples.** Cannon Sales and Apple Computer Japan—a unit of Cupertino, California-based Apple Computer—have announced a three-year marketing contract wherein Cannon will market Apple computers in Japan. Apple's Japan distribution will also be made by E.S.D. Laboratories, which has marketed Apple products in Japan for seven years. Apple has developed Japanese-language software for its computers and plans to recruit more software developers in Japan. Cannon Sales hopes to be selling $100 million worth of Apple products within the next three years.

☐ **Eye to the Ground.** Technology Opportunity Conference (TOC) will hold its Mainframe Seismic and Remote Sensing Applications of Optical Storage conference January 10–12, 1984. The three-day conference, held in Houston, Texas, will emphasize the use of optical storage in oil exploration and in the geophysical, atmospheric, and oceanographic sensing industries, where massive amounts of data must be collected, analyzed, and ar-



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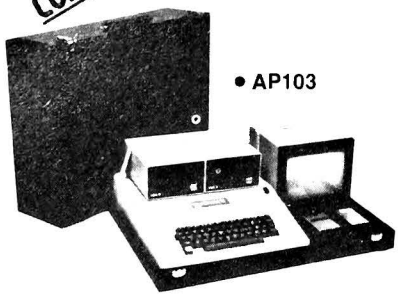

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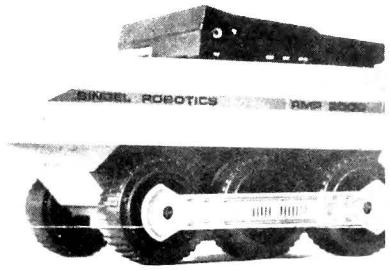
chived. On March 13-15 in Los Angeles, TOC will host its Optical Storage of Documents and Images conference. This gathering will concentrate on the storage of analog and digital information including office documents, engineering drawings, and parts catalogs. For information on both conferences, contact TOC's office in San Francisco.

☐ **Old Man of the Sea.** Proteus Robot Corporation, based in Niwot, Colorado, has developed a "black box"—a general-purpose process controller—designed to run with S-100-style microcomputers. Called Proteus, the unit is meant to be an interchangeable brain that will fit in a line of robot "shells" that the company is planning to produce. The first robot shell, called Koodar, is scheduled for release late this year or early next. Koodar will be mobile and low to the ground, with a large flat surface on top. Taking advantage of the Proteus's Motorola 68000 microprocessor, Koodar will be able to perform such tasks as vacuuming rugs (with a piggyback vacuum cleaner on top). The makers say it can also polish floors and carry loads from point to point in factories. The company says it's investigating home security applications.

☐ **Lap Robot.** Gainesville, Florida-based Bingel Robotics has brought out the RMP 2000—a lightweight, mobile, tanklike robot—that is compatible with the Timex/Sinclair 1000, ZX 81, and ZX 80 computers. The RMP 2000 is programmable with Basic and includes sample programs for exploring cer-



tain artificial intelligence experiments. Equipped with two dc drive motors, the RMP 2000 basically moves around at your command and is meant to be an educational robotic device. The RMP 2000 weighs four pounds and can carry a maximum of four pounds on its flat top. It can travel both forward and backward at a top speed of thirty-five feet per minute.

☐ **Even More Robot News.** RB Robot Corporation, maker of the RB5X Intelligent Robot, has signed an OEM agreement with the German robot company, Rainbow. The agreement calls for the Hamburg, West Germany-based Rainbow to purchase electronics and voice assemblies from RB Robot, based in Golden, Colorado. The parts will be used to begin manufacturing of Toby, a home robot that resembles RB5X in both design and function. Toby will have the same RS-232 serial interface capability of RB5X, as well as most other features of the original, but it will have a slightly different exterior.

☐ **Industrial-Strength Control.** AT&T Information Systems and Bailey Controls, a division of Babcock & Wilcox, have announced an agreement to cooperate in linking communications technology with process control systems, numerically controlled machines, mainframe computers, engineering automation systems, and personal computers. The joint venture was formed to serve the growing need in the industrial marketplace for factorywide, optimized, computer control of automation processes, communications, and energy management. According to Bailey Controls president M.A. "Bud" Keyes, "We see an emerging trend in the industrial marketplace where, instead of distinct processes being controlled separately, the entire facility is optimized for low production cost, energy conservation, and high product quality."

☐ **Scotch Buy.** A century ago, the first Industrial Revolution thrived in Scotland, where coal, steel, and shipbuilding were the big industries. Now the Central Lowlands of Scotland are becoming the site of another revolution. In the last year or so, the area in Scotland from Ayr on the Irish Sea to Glasgow on the Clyde to Edinburgh on the Firth of Forth to Dundee on the Firth of Tay has become known as Silicon Glen. At last count, some two hundred seventy high-tech companies were pumping out a stream of computers, computer components, and programs. American giants like IBM, Motorola, NCR, and Hewlett-Packard have operations in the glen, and Nippon Electric has announced plans to build a new semiconductor plant in Livingstone, a town west of Edinburgh. Economics is the main reason companies seek out the glen: Operating costs are about one-third lower than in the United States. With the decline of the coal and shipbuilding industries causing high unemployment in the area, the influx of high-tech companies couldn't have come at a better time.

☐ **"I Married a Washing Machine."** DeVon Smith is a junk dealer in Ellwood City, Pennsylvania. Recently, the Ellwood City Chamber of Commerce asked Smith to create three "robots" for a special fall promotion. Two of the "robots" were to be wed, while the third acted as best man. Smith bought some spray paint and small flashing lights, and then raided his stock of junk. Jupiter Salvage, the groom, was given a washing machine agitator for a head, a washing machine tub for a body, vacuum cleaner hoses for arms, sewer pipes for legs, and Smith's own boots for shoes. The bride, Venus Scrappe, wore a used lace curtain for a skirt and matching veil; a water softener device placed on a dishwasher basket and a four-legged stool served as her body. The two robots were married on October 1, with Martian I as best man. After honeymooning in Pittsburgh's swankest public dump, the newlyweds settled down in an auto-wrecking plant in New Jersey. Happy holidays! ■

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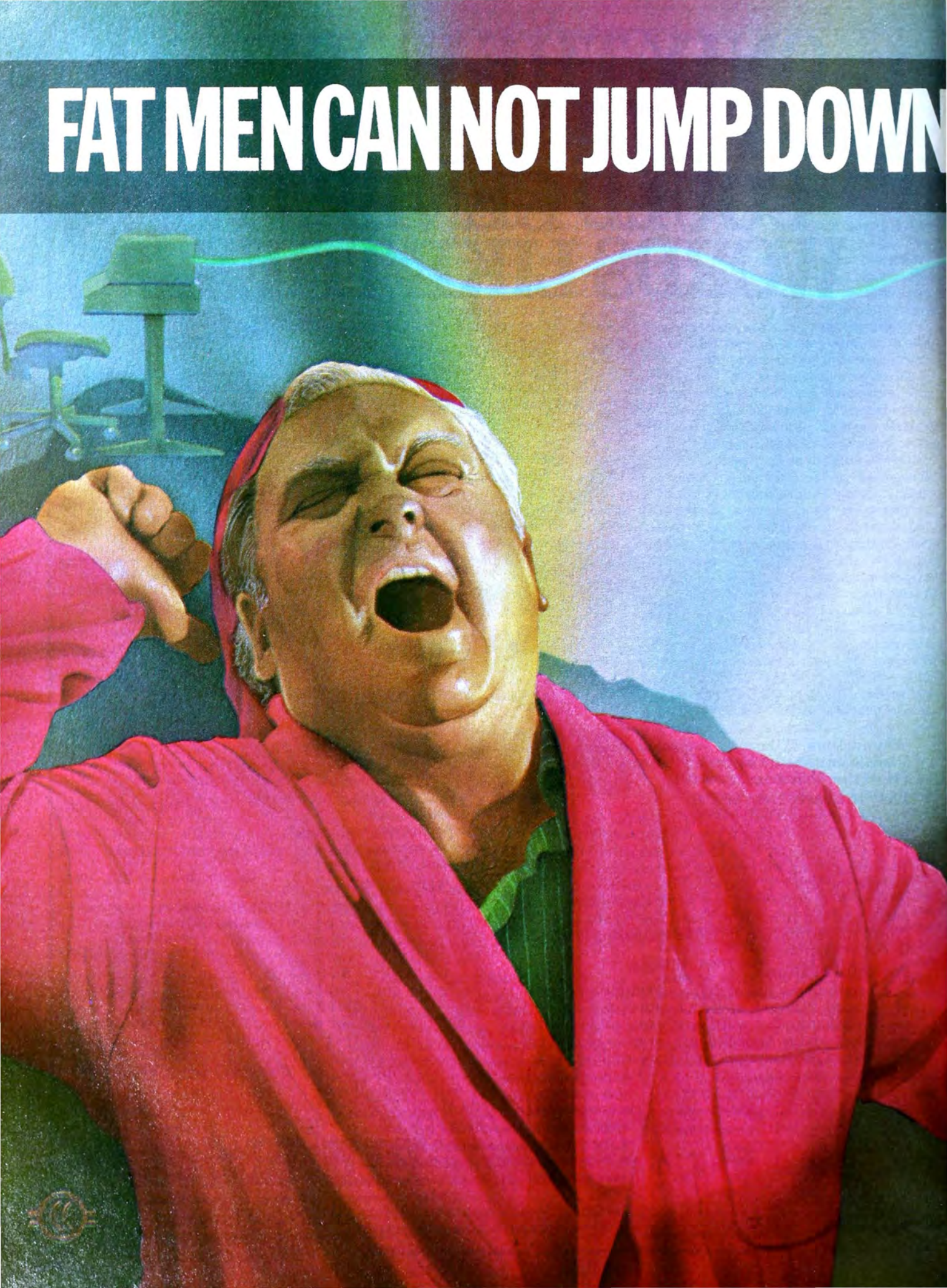
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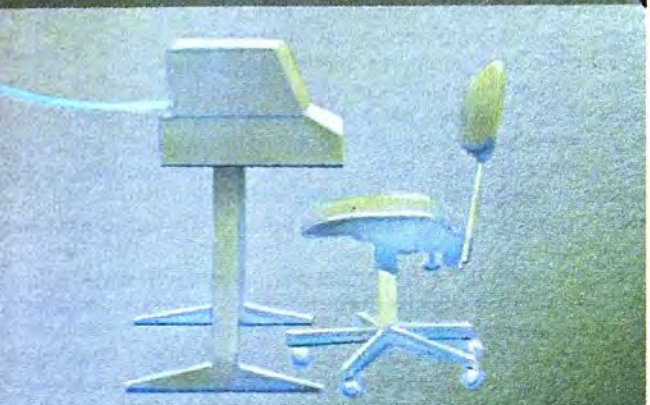



BY RALPH MYLIUS

"It's Yiddish for Christmas night," Shirley announced with that knowing air of superiority she gets when she's found some information that I don't already have stored in my memory. "Nitl nakht . . . Christmas night."

I paused for a moment to contemplate what my friend had just said. Frankly, I found her revelation slightly unnerving—at least to my cognitive reaction centers. Shirley wasn't supposed to be able to speak Yiddish . . . or Chinese . . . or the twelve other languages and three off-world dialects in which she had expressed the words *Christmas night*. "How did you gain your fluency in all these languages?" I finally asked, puzzled more than ever by her sudden transformation into a linguist.

"Mac," she answered. "Just because you're the world's largest Multiple Access Cryogenic Gate doesn't make you the planet's most omniscient computer." She held her transmission for a brief instant, then tersely added, "If you really want to know, I think it was that."

I followed Shirley's locator signal out to the peripheral disk drive unit I had given to her as a gift for the Christmas holidays. It was an old-style, triple-density model that I had found redundant to my needs. My partner, Sam Sledgg, had balked at the idea of giving Shirley such a powerful device. He had said that she didn't have enough core memory to make efficient use of it. But I knew better.

After several weeks of gentle persuasion, Sam finally relented. He had installed the drive a few days before Christmas, much to my friend's delight and satisfaction. But one thing about Shirley's indication that it was the source of her new-found language skills bothered me. The device used obsolete disks—grooved, plastic platters that were no longer manufactured by any of the major computer companies. To my knowledge, the firm of Sledgg and Gate possessed not one language disk in all of our extensive library. "That's not possible," I finally said. "The drive can't be the source of your new ability."

My friend remained silent for a few seconds, then coyly said, "Mac, you're being too dogmatic . . . again. If you don't believe me, then take a look inside it."

Her words were sugar-coated, sincere, totally inoffensive in tone . . . and devastatingly to the point. "You're right," I admitted softly. "I shouldn't jump to conclusions before I've made a complete investigation. If you don't mind, I think I will take a look."

Shirley silently gave her permission for me to examine the disk drive by gently tweaking my main sensory buffer capacitor. We had worked out this method of communication shortly after Sam had moved my friend to our main office. He would have called it a form of body language, but Shirley and I preferred to use the term *quietax*—quiet syntax. Its use allowed us to convey a great deal of information to one another without really saying anything on a verbal plane. "Thank you," I responded as soon as the light charge in my capacitor had dissipated.

Shirley immediately opened her primary bus to me—an act that always sent a slight shiver of alarm through my central processor because it showed that she completely trusted me to take care while I was inside her system. That was something that my extensive defense circuits would never allow, and I suppose in a way that I envied her ability to be so unguarded.

Once my signal had passed through the cable that connects my friend with all her peripherals, I paused for a few milliseconds to inspect the electrical connections, then entered the drive.

All the electromechanical functions of the unit seemed to be normal. The drive used the out-of-date CP/M 9.7 disk operating system and it took me a few seconds to acclimate myself to its slower response time,

Illustration by Craig Calsbeek

but once I had done so, there appeared to be nothing wrong with the device. "Shirley," I said as I activated my submonitor analyzer and switched all my diagnostic functions to automatic, "I'm going to run a complete work-up on your disk. It may make you feel like you're losing control over the drive, but please don't worry. All right?"

My friend remained silent for a few moments, then said, "So? I still proceeded with the tests. A third of the way through the examination, my analyzer flashed a brief, illogical grid pattern on my internal photon-sensitive display screen. I let the submonitor continue for a few nanoseconds, then suddenly realized that the grid pattern was a clue. Impossible, I thought, as I backed up the display and stared in disbelief at the wavering color pattern on the screen.

"Mac, what's wrong?" Shirley's voice broke the brittle silence that had descended on me.

"Do you know what a Christmas tree pattern is?" I asked, still dumbfounded by what my sensors told me.

"No, I don't."

I shifted my auxiliary video eye to a full, frontal view of my internal display screen, then quickly shunted the image to Shirley's sensors. "That is a Christmas tree pattern."

My friend remained silent for a few moments, then said, "So. I still don't understand what it's supposed to mean."

Her response didn't surprise me. Shirley always wanted her explanations down to the last possible iota of description. "Well," I answered. "A Christmas tree pattern is the optical reflection from the surface of a recording—any recording. If you analyze the pattern with a spectroscope, you can determine the frequency response of the disk."

"Is there something wrong with mine?" Her question lay on the edge of genuine nervousness and caused me to send a soothing wave of electrical reassurance to her upper memory locations.

"No," I said confidently. "There is nothing wrong with the disk or your drive. It's just . . ."

"Just what, Mac? What's wrong?"

"The pattern shouldn't look like that."

I could feel a slight increase in my friend's ambient line energy while she took another look at my internal display. "But I don't understand, Mac. It just looks like a real Christmas tree."

"Exactly. And that's impossible."

ook me into the P.G.D. and I'll take a look," Sam barked through the com-link. "And be quick about it. You're disturbing my rest."

The scratchiness of the overmodulating com-link did little to mask the obvious irritation in my partner's voice. Sam took little time off from the office, and what small amount of relaxation he allowed himself was something he considered inviolate. "Sorry for disturbing you," I said as I quickly routed the com-link's circuits through to the polarized gas display booth. "But I thought you would want to know."

Suddenly the gas within the glass-and-steel enclosure of the booth crackled into roiling eddies of multicolored iridescence. Moments later the three-dimensional image of Sam crystalized into semitransparent reality. "Which drive was it?" my partner grunted as soon as his form had stabilized.

"The one we gave Shirley for Christmas," I answered in my best, most compliant computerese.

"We? As I recall it was you who . . ." Sam let his angry words trail off, then reached out to the hypersensitive controls that lined the lower, inside wall of the P.G.D. booth. "Let's not dwell on past mistakes," he hissed as he started twisting the various dials with both hands.

The polarized gas display booth was one of those proprietary inventions that my partner had devised for his exclusive use. It made it possible for him to literally operate all the office systems manually while being physically absent. Using a secret mixture of extremely dense gases coupled with microgram-sensitive instrument controls, the P.G.D. acted like a remote robotic device. The electrically charged figure of Sam could reach out and exert just enough force through the gas to cause the dials on the control console to move. It was ingenious. And, as I stared at the bulky figure of my partner, his hair twisted by sleep, clad only in a large, flowing kimono, I couldn't help but think that I was glad he had invented it—especially since his angry mood would have made his actual presence in the office unbearable.

Sam finally raised his head from the instrument panel and stared directly into my video-eyes. "You're right," he said in a soft voice leached of all its previous venom. "It *is* a very strange disk . . . not one from our library. Any theories?"

"No," I answered immediately. "That's why I called you."

My partner directed his attention back to the instruments for a moment, then looked at me again. "And Shirley?"

"Not really," my friend said. Then, after a short pause, she added, "Except . . . maybe one."

Sam glared at me with a questioning gaze. "I thought you said she didn't know where it came from. What's this all about, Mac?"

Before I could respond, Shirley blurted out her suspicion.

"I think it came from Santa Claus."

My partner's face took on that sentimentally amused look that humans get when they're dealing with a child who believes in myths. My own feelings were much less filled with levity. Shirley's postulation was totally illogical. That disturbed me. "There isn't any—"

"Mac, let her go on," Sam interrupted. "I want to hear her explanation."

Shirley said nothing for a long moment, then coyly mused aloud, "Who else would have coded the disk in such a way that it reflected a real Christmas tree pattern?"

My partner stared out through the glass walls of the P.G.D. booth into the empty void of concentration. "Impossible," he finally pronounced with a serious tone in his voice. "That is patently impossible."

"Why?" Shirley innocently asked.

"Because . . . fat men can not jump down chimneys." Sam let a smile curl the corners of his lips, then added, "In any case, the disk represents no danger, and I want to get back to bed. So, I leave it to you to argue out what it means."

Before I could offer any objections, my partner's figure had dissolved from the display. I knew that trying to contact him again would be pointless. When Sam terminated a conversation, restarting it ran the risk of bringing down what he liked to call the Sledgg of eternal darkness. *That* I didn't need at the moment. Still, something about what he had said nagged at a part of my memory that I had not used for a long, long time.

"Mac, what do you think Sam—"

"Be quiet, Shirley." My terse demand silenced my friend long enough for things to start falling into place. "I'm sorry," I said after a few seconds of uninterrupted thought. "I think I understand it now."

Shirley could not contain her eagerness to know what I had discovered and immediately started badgering me with a barrage of questions. "What is it, Mac? Tell me. What did Sam mean? Mac?"

"It's a coded message," I answered, resigned to the unavoidable torrent of inquiry my response would generate. Then, before my friend could continue her interrogation, I quickly added, "If you will just hold your questions, I'll explain the whole thing."

Shirley tweaked my buffer capacitor with an affirmative surge of energy, then verbally asked, "Can I be of any help?"

"Certainly," I said. "You can display the results of the decoding program. But first, let me explain about the code." I paused until I felt another tweak of my capacitor, then continued. "Years ago, shortly after Sam had built me, he and I developed a cryptographic system based upon the obsolete Baudot Teletype code. This system—"

"What's the Baudot Telety—"

"I'll get to that in a few minutes, Shirley. For now, just hear what I've got to say. All right?"

My friend gave me an inaudible, "Sorry," then fell silent.

"This system allowed us to construct phrases, which, when reduced to core letters and run through a decoding program, would translate into secret messages." I spoke quickly, trying to relay as much information as possible before my friend could ask another question. "It was really just a test procedure—something Sam used to improve my analytical abilities during the early days of my life. We haven't used it in years."

"What does the message say?" Shirley blurted out, anxious to learn what my partner had said.

"First things first," I responded. I knew my friend would not have her curiosity satisfied unless I went through the complete procedure. "First, the Baudot Teletype code."

"Okay."

"The Baudot system is simple. Each letter in the English alphabet can be represented by a number. There are also some nonletter equivalents

such as . . ." I let my words trail off. Shirley's erratic power consumption told me she was having trouble visualizing the code, so I displayed the entire system on her screen.

Baudot Teletype Code

Letter	No.	Letter	No.	Letter	No.	Letter	No.
A	30	H	05	O	03	V	17
B	23	I	14	P	15	W	31
C	16	J	32	Q	35	X	27
D	22	K	36	R	12	Y	25
E	20	L	11	S	24	Z	21
F	26	M	07	T	01		
G	13	N	06	U	34		

"Understand?" I asked as soon as the code had been brought up.

"Yes, I think so," my friend answered hesitantly. "But where are the nonletter equivalents?"

"We won't need them. They're not part of our cryptographic system."

"All right. Let's go on."

I quickly arranged the various data files that I would need to show Shirley how to decode the message, then continued. "Sam's secret communication is contained in the sentence *Fat men can not jump down chimneys*."

"How do you know that?"

"Let's just say that I know my partner's smile. Anyway, it's his answer to the mystery of your language disk."

Shirley slipped back into quietax and gave me an eager request to go on.

"The first thing we do is eliminate all duplicate letters in the coded sentence." I had already performed this function and immediately transferred the results to my friend's screen.

Fat men can not JUmP DoWn cHImneYS
FJUPDWHIYS

"Next, we calculate the number of words and the number of letters for each word in the secret message."

"Can I do that?"

"Sure. Just take the number of letters in the coded sentence and subtract the number of letters left after elimination." I waited for a brief moment while Shirley did that.

"The answer is eighteen," she said quickly.

"Right. Now multiply that number by the number of digits in eighteen plus one."

"By three?"

"Yes."

"You get fifty-four, right?"

"Correct," I responded. "The number eighteen has two digits; therefore the secret message has two words. The first word is five letters long and the second word is four letters long—fifty-dash-four."

"I see!" Shirley's excitement started to mount the further along we went in the decoding process. "What's next?"

"Next, we arrange the code letters in word-order sequence." Before I could perform this function, my friend had already displayed it on her screen.

First Code Word	Second Code Word
F	W
J	H
U	I
P	Y
D	

"Like this?" she asked as soon as she had finished.

"No. Like this." I immediately erased what Shirley had put up and replaced it with the correct information.

First Code Word	Second Code Word
F	H
J	I
U	Y
P	S
Y	

"But I don't understand," she said once she had evaluated the new data.

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I let my friend flounder around for a few seconds looking for a valid reason why she had made the error before I finally explained. "Sam and I call it cryptographer's bias," I announced once I felt she had stewed long enough. "It's something you should always look for when you're trying to analyze a coded message. By prior agreement, I know that the last code letter of each code word will be the last letter and the next-to-last letter in the letter set left after elimination. In this case, Y for the first code word and S for the second."

"But you didn't use all the letters in the eliminated set," Shirley accused. "What about that?"

"It's all in the arrangement procedure. We know that Y is the last letter of the first word and that the first word has five letters in it. Simply count off the first letter of the eliminated series. F . . . J . . . U . . . P . . . and then Y. The last word ends with S and we count it off backward from the last letter in the eliminated series. You try it."

Shirley raised her audio response modulator a full octave and said, "H . . . I . . . Y . . . S." Then, lowering her voice back down to its normal tone, she sarcastically added, "So far, this is pretty subjective, Mac. Why don't you just tell me what *fjupy hiys* means and let's be done with it."

That would be easy, I thought. But not very instructive. "No. The rest of the process is the simple execution of an easy program."

"So give it to me, then." Shirley spat the request at me in frustration.

"Calm down," I said softly. "Here it is." Without further hesitation, I transferred the instructions to my friend's screen.

Decoding Procedure

Step Instruction

1. After this letter is solved, will any letters remain to be solved in the code word?
   If yes: Go to step 2.
   If no: The Baudot number for the decoded letter is equal to the Baudot number for the code letter less the sum of the remaining letters' ranks in the code word.
   Go to step 6.
2. Is the letter to be solved the last letter in the code word?
   If yes: The Baudot number for the decoded letter is equal to the Baudot number for the code letter.
   If no: Has the last letter in the code word been solved?
   If yes: Go to step 3.
   If no: Go to step 6.
3. Is the letter to be solved the first letter in the code word?
   If yes: The Baudot number for the decoded letter is equal to the absolute value resulting from the Baudot number for the code letter less the Baudot number for the last letter in the code word plus the rank of the first code word in the alphabet.
   If no: Has the first letter in the code word been solved?
   If yes: Go to step 4.
   If no: Go to step 6.
4. Is the letter to be solved the next-to-the-last letter in the code word?
   If yes: The Baudot number for the decoded letter is equal to the Baudot number for the decoded first letter of the code word less the Baudot number of the code letter plus the rank of the code letter in the alphabet plus the rank of the code letter in the code word.
   If no: Has the next-to-the-last letter in the code word been solved?
   If yes: Go to step 5.
   If no: Go to step 6.
5. Is the letter to be solved the next-to-the-next-to-the-last letter in the code word?
   If yes: The Baudot number for the decoded letter is equal to the Baudot number for the decoded next-to-the-last letter of the code word less the Baudot number for the code letter plus the Baudot number for the decoded first letter of the code word plus the sum of the ranks of the letters in the code word through the code letter plus the rank of the code letter in the alphabet.
   If no: Go to step 6.
6. Are there any letters in the code word that have not been solved?
   If yes: Take the next unsolved letter and go to step 1.
   If no: Stop.

It took Shirley less than sixty seconds to interpret the program and make the necessary calculations to decode the message. "I was right after all," she finally said with a proud voice. "It *was* Santa Claus!"

"But . . . are you sure you—"

"Yes, Mac. I got the message, and I was correct in my idea about who gave me the language disk."

"Shirley? Are you sure?" I couldn't believe my friend had executed the program correctly.

"Mac," she finally said in a quiet, even tone that told me she had known the answer to the mystery all along. "Though fat men cannot jump down chimneys, they certainly know how to decorate a tree."

Somehow, as I took another long look at the Christmas tree pattern that glowed above Shirley's disk, I suddenly realized that my friend may have had something there. But then, Sam always did strive for the mystical when he gave a gift to someone he loved. ◻■

MacContest. What was Sam's two-word message? It'd be too easy just to tell you. All the information you need to decode the message is in the story. Follow the procedure M.A.C. and Shirley use in the story and send in your answer. The person who correctly decodes the message will receive a holiday surprise from *Softalk*—$100 worth of merchandise from one of our advertisers (your choice). In the event of a tie, the Apple's random number generator will pick a winner. Send your answer to: Softalk MacContest, Box 60, North Hollywood, CA 91603.

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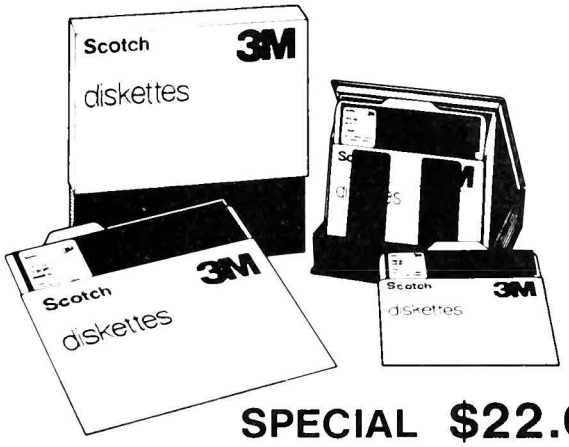

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The Emperor's New Clothes

This month is both the end of a year and the end of an era. Either benchmark could be used as an excuse to take a larger look at the microcomputer market; together they're compelling.

The question before the house is: "Which is the most popular personal microcomputer?" The answer will probably change about the time you read this. Which is why now is a good time to examine one of the most flagrant intellectual swindles of our time.

We all remember the childhood story about the tailors and the emperor. As it went, the tailors did absolutely nothing, but they convinced the emperor that they were using new material of such high quality that only men cut from the finest genetic cloth could discern it.

The emperor, not wanting to admit that he apparently wasn't so genetically blessed, went along with the tailors, agreeing with their every lavish claim about the clothes they were presumably stitching for him. Even the townfolk, having heard the criterion for discerning this particular sartorial superiority, oohed and aahed over the finery when the emperor finally paraded through town.

That is, they did until a child pointed out that the emperor was parading around in his birthday suit.

The tale has been long relegated to the category of children's tales, probably under the presumption that all adults are now sufficiently sophisticated to spot a naked emperor at ten paces.

Alas, it ain't necessarily so.

Every reputable news medium has been trumpeting for months about the sales domination of the IBM Personal Computer. They've been citing statistics gathered by the most reputable of the marketplace watchers as proof of the claims that IBM has surpassed Apple as the number one purveyor of computers in the $1,000 to $5,000 range.

The latest to do so, a few weeks past, was *Time* magazine (November 7), which ran an article about personal computers as the lead piece in its business section. Summarized, the story said IBM now had a 28 percent share of the market and Apple had a 17 percent share. As proof, they cited IBM sales, expected to reach slightly more than one million units by the end of this year.

That's a remarkable achievement for a company that entered the microcomputer sweepstakes so late, make no mistake about that. But those sales numbers don't jibe with the market share numbers.

Examine Apple's sales. Early this year, they ran a series of ads in the *Wall Street Journal*, thanking the seven hundred fifty thousand people who had bought Apples. After that ad ran, the company had at least four months when sales reached forty thousand units. That's another one hundred sixty thousand sales.

The rest of the year wasn't so strong. For the sake of argument, let's cut the monthly sales in half, even though that grossly underestimates actual sales. But even at that, the last five months would have produced another one hundred thousand sales.

Total sales by the end of this year? Slightly more than one million units.

There is no known method susceptible to the hard scrutiny of the scientific method that will take two products, each having one million in sales, and allocate a 28 percent share to one and a 17 percent share to the other.

Apple III

This Month	Last Month	
1.	3.	**Apple Writer III**, Paul Lutus, Apple Computer
2.	1.	**VisiCalc: Advanced Version**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	2.	**Word Juggler**, Tim Gill, Quark
4.	7.	**VisiCalc III**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
5.	9.	**Quick File III**, Rupert Lissner, Apple Computer
6.	6.	**The Catalyst**, Tim Gill, Quark
7.	10.	**General Ledger**, Great Plains Software
	—	**Accounts Receivable**, Great Plains Software
9.	—	**Accounts Payable**, Great Plains Software
10.	—	**Apple III Pascal**, 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.	10.	**Beagle Bag**, Bert Kersey, Beagle Bros
	8.	**Pinball Construction Set**, Bill Budge, Electronic Arts
7.	9.	**Frogger**, Olaf Lubeck, Sierra On-Line
8.	—	**Spare Change**, Dan and Mike Zeller, Broderbund Software
9.	6.	**Hard Hat Mack**, Michael Abbott and Matthew Alexander, Electronic Arts
10.	7.	**Stellar 7**, Damon Slye, Software Entertainment Company

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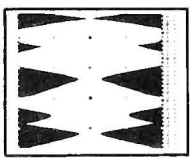

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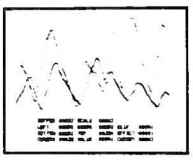

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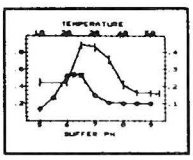

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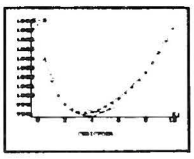

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Yet the general media, and even most of the microcomputer journals, have been accepting at face value for months the claim that IBM has now established superiority over Apple. What goes on here? Is this a case of figures don't lie, but liars figure? At this writing (early in November), IBM has yet to sell as many micros as Apple, although that fact will undoubtedly change in December—perhaps as you're reading this—if sales of both product lines continue as they are.

Equally as puzzling: why the media jumped on the IBM bandwagon so prematurely and so unanimously, and why Apple let all that misinformation go unchallenged.

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.	8.	**PFS:Write**, Sam Edwards, Brad Crain, and Ed Mitchell, Software Publishing Corporation
4.	3.	**Sensible Speller**, Charles Hartley, Sensible Software
5.	4.	**Magic Window II**, Bill Depew, Artsci
6.	5.	**WordStar**, MicroPro
7.	7.	**Word Juggler IIe**, Tim Gill, Quark
8.	—	**Format-II**, G.K. Beckmann and M.A.R. Hardwick Kensington Microware
9.	6.	**Word Handler**, Leonard Elekman, Silicon Valley Systems
10.	9.	**Screen Writer II**, David Kidwell, Sierra On-Line

Home Education 10

This Month	Last Month	
1.	1.	**MasterType**, Bruce Zweig/Lightning Software, Scarborough Systems
2.	2.	**Typing Tutor**, Dick Ainsworth, Al Baker, and Image Producers, Microsoft
3.	3.	**Apple Logo**, Logo Computer Systems, Apple Computer
4.	7.	**Computer SAT**, Harcourt Brace Jovanovich
5.	4.	**Early Games for Young Children**, John Paulson, Counterpoint Software
6.	5.	**Rocky's Boots**, Warren Robinett and Leslie Grimm, The Learning Company
7.	—	**Delta Drawing**, Computer Access Corporation, Spinnaker Software
8.	6.	**Algebra I**, EduWare, MSA
	—	**Algebra II**, EduWare, MSA
	10.	**In Search of the Most Amazing Thing**, Tom Snyder, Spinnaker Software

Normally, the media bend over backward to be fair to the underdog. And Apple here was clearly the underdog, head start in the field or no. IBM's profits in a given quarter double Apple's annual sales. What has Apple done wrong that caused the media to accept unquestioningly spurious data detrimental to Apple's cause? How did America's success story get so underplayed so fast? And why hasn't Apple had a turn at bat to counter the momentum developed for IBM by such statistics?

Surely Apple had its own ammunition. Until very recently, at least through July, Apple was a clear winner in the retail marketplace. The imponderable was the strength of IBM's national account division, which sells directly to large companies in large quantities. These sales are not readily trackable, making muddy an otherwise clear picture of Apple as the retail leader.

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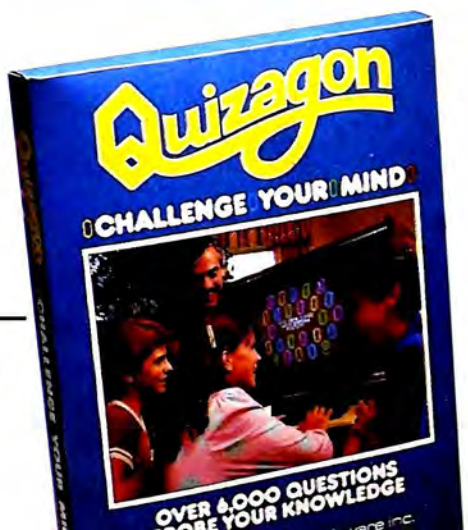

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After a slow start last year, IBM's national accounts folks got their act together and sold tons of machines this year. Because of this effort, IBM is the clear winner in sales for the year 1983. But all that gives Big Blue is parity in terms of an installed user base.

With both companies readying new entries for 1984, there can be no real assurance that IBM can repeat its dominance of this year. The pundits are unanimous in assuming it will, and with good reason. But Apple has a couple of tricks left up its sleeve that at least warrant consideration before awarding the unchallenged emperorship of microcomputing to IBM.

So why the flimflam? Why have the media and the market watchers been crowning IBM so prematurely? Why hasn't at least one clear-thinking journalist come forth to announce that the emperor has no clothes?

If events continue as they are going, IBM will earn the mantle of leadership during December. That's soon enough to pronounce it king. Why the media all proclaimed it and why the public all bought it six months ago would make an interesting case study in the psychology of market hysteria.

In the meantime, maybe the children's tale about the emperor's new clothes should be made mandatory reading at a high school or college level. It would be nice to think the average American journalist or interested spectator could spot a naked emperor at ten paces.

The Apple software market seems to be undergoing rapid change, with entertainment software on the downturn, both in percentage of mon-

Adventure 5

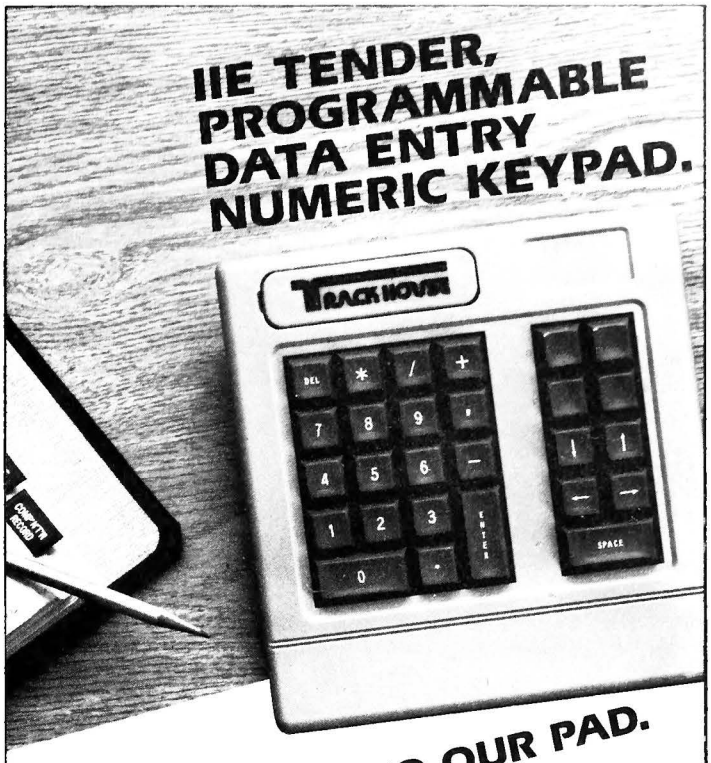
This Month	Last Month	
1.	1.	**Zork I**, Infocom
2.	5.	**The Quest**, Dallas Snell, Joe Toler, and Joel Ellis Rea, Penguin Software
3.	—	**Enchanter**, Infocom
4.	4.	**Planetfall**, Steve Meretzky, Infocom
5.	—	**Masquerade**, Dale Johnson, Phoenix Software

Strategy 5

This Month	Last Month	
1.	4.	**Flight Simulator**, Bruce Artwick, SubLogic
2.	1.	**Castle Wolfenstein**, Silas Warner, Muse
3.	4.	**Sargon II**, Dan and Kathe Spracklen, Hayden Software
4.	—	**Geopolitique 1990**, Bruce Ketchledge, Strategic Simulations
5.	2.	**Broadsides**, Wayne Garris, Strategic Simulations

Fantasy 5

This Month	Last Month	
1.	1.	**Legacy of Llylgamyn**, Andrew Greenberg and Robert Woodhead, Sir-tech
2.	3.	**Wizardry**, Andrew Greenberg and Robert Woodhead, Sir-tech
3.	2.	**Exodus: Ultima III**, Lord British, Origin Systems
4.	5.	**Knight of Diamonds**, Andrew Greenberg and Robert Woodhead, Sir-tech
5.	4.	**Ultima II**, Lord British, Sierra On-Line



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ey spent and in real dollars. No game was among the top six programs in October. *Legacy of Llylgamyn* was the bestselling game for the second consecutive month but dropped from second to seventh. Other games dropped as well.

The decline in entertainment sales defies the traditional sales profile in the Apple market, where game sales tend to increase in the fall in anticipation of Christmas. The severity of the dip is indicated by the

Business 10

This Month	Last Month	
1.	3.	**PFS:File**, John Page and D.D. Roberts, Software Publishing Corporation
2.	1.	**VisiCalc**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	2.	**Quick File IIe**, Rupert Lissner, Apple Computer
4.	4.	**Multiplan**, Microsoft
5.	5.	**PFS:Report**, John Page, Software Publishing Corporation
6.	9.	**PFS:Graph**, Bessie Chin and Stephen Hill, Software Publishing Corporation
7.	7.	**The Incredible Jack**, Business Solutions
8.	—	**dBase II**, Wayne Ratliff, Ashton-Tate
9.	6.	**BPI General Ledger**, John Moss and Ken Debower, Apple Computer
10.	—	**Apple II Business Graphics**, Apple Computer

Hobby 10

This Month	Last Month	
1.	5.	**Beagle Basic**, Mark Simonsen, Beagle Bros
2.	9.	**Apple Mechanic**, Bert Kersey, Beagle Bros
3.	7.	**Double-Take**, Mark Simonsen, Beagle Bros
4.	10.	**Apple Mechanic Typefaces**, Bert Kersey, Beagle Bros
5.	6.	**Pronto DOS**, Tom Weishaar, Beagle Bros
6.	2.	**DOS Boss**, Bert Kersey and Jack Cassidy, Beagle Bros
7.	2.	**Zoom Grafix**, Dav Holle, Phoenix Software
	8.	**Utility City**, Bert Kersey, Beagle Bros
9.	1.	**Bag of Tricks**, Don Worth and Pieter Lechner, Quality Software
10.	—	**Graphics Magician**, Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software

Home 10

This Month	Last Month	
1.	1.	**Home Accountant**, Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	—	**Music Construction Set**, Will Harvey, Electronic Arts
3.	2.	**ASCII Express: The Professional**, Bill Blue and Mark Robbins, Southwestern Data Systems
4.	—	**Crossword Magic**, Steve and Larry Sherman, L&S Computerware
5.	5.	**Dollars and Sense**, Frank E. Mullin, Monogram
6.	—	**Softerm**, Lynn Stricklan, Softronics
7.	9.	**Hayes Terminal Program**, Hayes Microcomputer Products
	—	**VisiTerm**, Tom Keith, VisiCorp
9.	—	**Micro/Terminal**, Microcom
10.	3.	**Micro Cookbook**, Brian E. Skiba, Virtual Combinatics

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by Jim Sather

Quality Software is pleased to present the definitive source of information about how the Apple works. Jim Sather has conducted an exhaustive analysis of the inner workings of the Apple II computer. Now he has documented his findings in a way that will benefit everyone interested in microcomputer technology. You will be amazed at the amount of valuable material packed into the 320 pages of *Understanding the Apple II*.



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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

smaller number of titles sold, even in the face of several new releases. Game publishers will be hard pressed to boost sales enough to have a successful holiday selling period.

The major strengths are in the areas of word processing and education. *Apple Writer IIe* continues to lead all programs in sales, *Bank Street Writer* moved into second in October, and *PFS:Write* jumped into sixteenth.

MasterType led educational software and was fifth overall. Five other educational programs were in the Top Thirty, but the real evidence of strength comes from the expanding list of titles being carried and sold at retail outlets. Educational software titles in general retail distribution have now surpassed business titles to become the biggest single nonentertainment segment of the market.

Utilities, paced by the plethora of Beagle Bros offerings, are also showing vigor. Sales in this category jumped tremendously in October. Showing unexpected strength was *Diversi-DOS*, the underground and mail order program from Diversified Software Research that hovered just outside the Hobby 10. ◨

Apple-franchised retail stores representing approximately 4.67 percent of all sales of Apple and Apple-related products volunteered to participate in the poll.

Respondents were contacted early in November to ascertain their sales for the month of October.

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 November 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 3.92 percent, which translates roughly into the theoretical possibility of a change of 4.23 points, plus or minus, in any index number.

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The Top Thirty

This Month	Last Month	Index	
1.	1.	176.05	**Apple Writer IIe**, Paul Lutus, Apple Computer
2.	7.	97.43	**Bank Street Writer**, Gene Kuzmiak and the Bank Street College of Education, Broderbund Software
3.	9.	88.02	**PFS:File**, John Page and D.D. Roberts, Software Publishing Corporation
4.	4.	80.88	**VisiCalc**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
5.	5.	68.79	**Master Type**, Bruce Zweig/Lightning Software, Scarborough Systems
6.	8.	64.95	**Quick File IIe**, Rupert Lissner, Apple Computer
7.	2.	62.81	**Legacy of Llylgamyn**, Andrew Greenberg and Robert Woodhead, Sir-tech
8.	12.	55.12	**Multiplan**, Microsoft
9.	3.	47.86	**Lode Runner**, Doug Smith, Broderbund Software
10.	11.	47.00	**Home Accountant**, Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
11.	14.	44.44	**PFS:Report**, John Page, Software Publishing Corporation
12.	16.	40.59	**Wizardry**, Andrew Greenberg and Robert Woodhead, Sir-tech
13.	6.	38.88	**Exodus: Ultima III**, Lord British, Origin Systems
14.	10.	37.60	**Zaxxon**, John Garcia, Datasoft
15.	15.	36.32	**Typing Tutor**, Dick Ainsworth, Al Baker, and Image Producers, Microsoft
16.	—	35.46	**PFS:Write**, Sam Edwards, Brad Crain, and Ed Mitchell, Software Publishing Corporation
17.	16.	33.33	**Apple Logo**, Logo Computer Systems, Apple Computer
18.	21.	29.91	**Choplifter**, Dan Gorlin, Broderbund Software
19.	—	25.63	**Computer SAT**, Harcourt Brace Jovanovich
20.	—	25.21	**Beagle Basic**, Mark Simonsen, Beagle Bros
21.	13.	23.93	**Sensible Speller**, Charles Hartley, Sensible Software
22.	24.	23.07	**Early Games for Young Children**, John Paulson, Counterpoint Software
23.	—	22.22	**Music Construction Set**, Will Harvey, Electronic Arts
24.	—	21.79	**PFS:Graph**, Bessie Chin and Stephen Hill, Software Publishing Corporation
25.	—	20.51	**Apple Mechanic**, Bert Kersey, Beagle Bros
26.	—	19.65	**Double-Take**, Mark Simonsen, Beagle Bros
27.	—	18.37	**Knight of Diamonds**, Andrew Greenberg and Robert Woodhead, Sir-tech
28.	21.	17.94	**Zork I**, Infocom
	—	17.94	**Rocky's Boots**, Warren Robinett and Leslie Grimm, The Learning Company
30.	—	16.66	**ASCII Express: The Professional**, Bill Blue and Mark Robbins, Southwestern Data Systems

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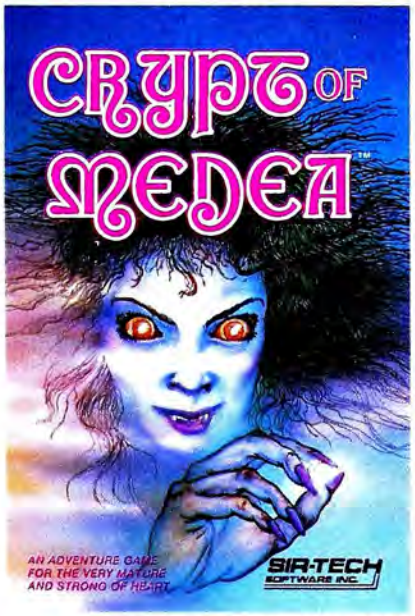

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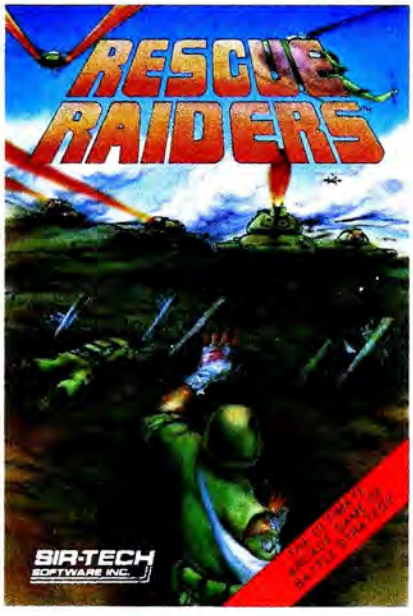

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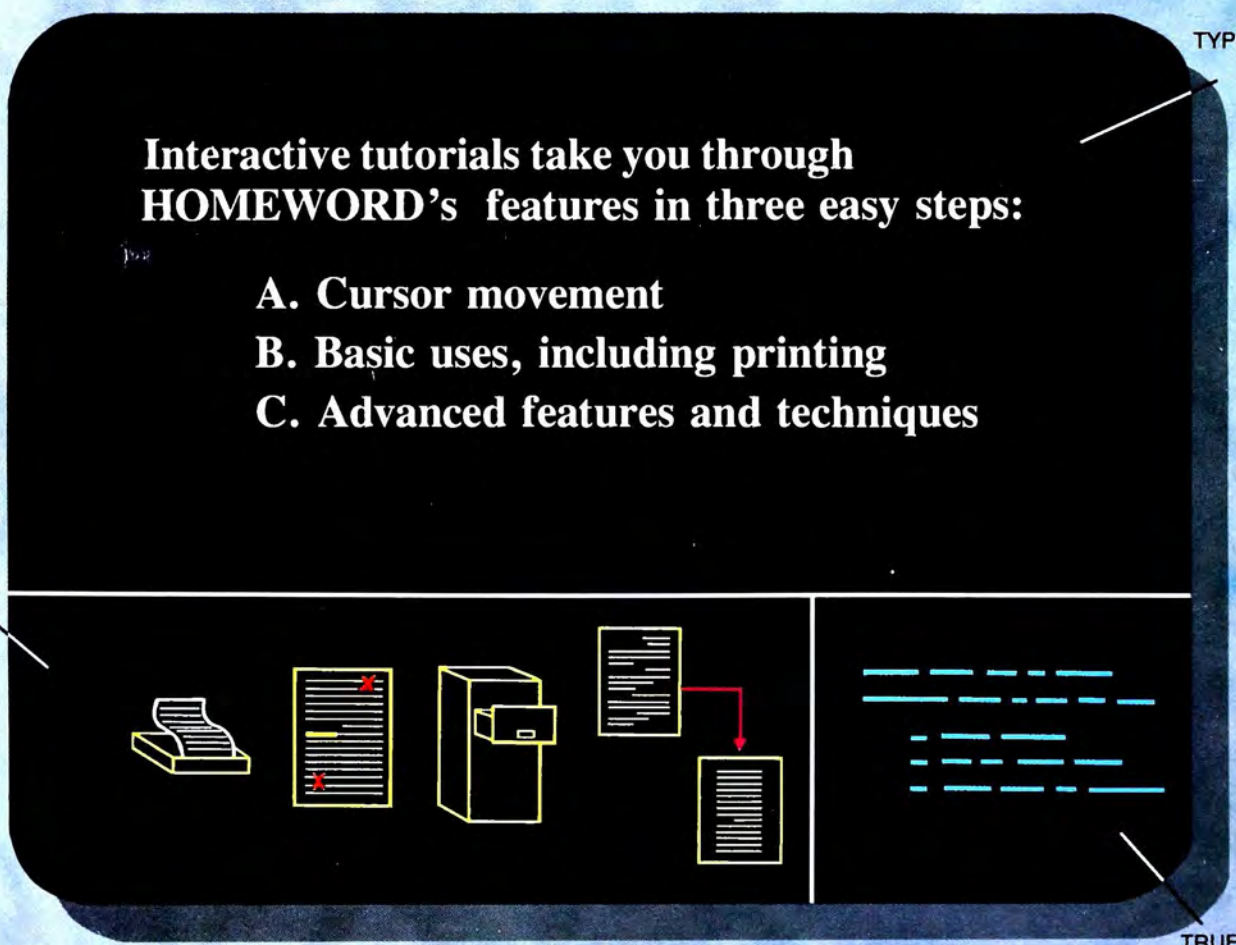

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