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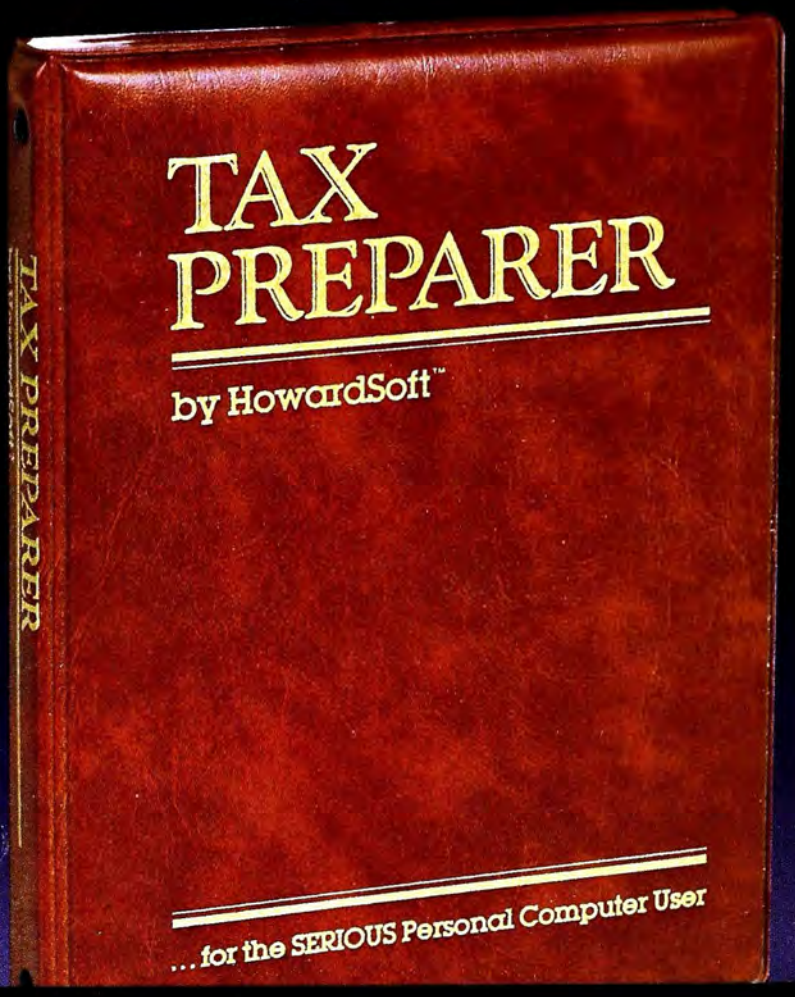


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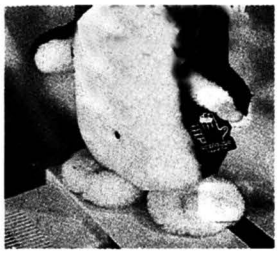
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SOFTALK



It's Here: The New Apple IIe

Clandestinely, Apple stopped making Pluses last October; the new Apple is a near twin on the surface. 118



Exec Penguin: A Chilly Visit to Tuxedo Junction

What do you know of penguins? Did you know that their closest relative is the cuckoo? Or that they're good-hearted, funny, lovable, clever, and creative? Read and learn.

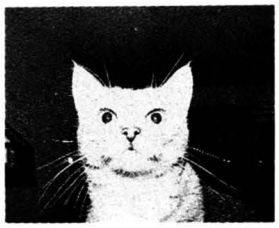
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Valentine's Day special. A bulletin board turned heartline, Dial-Your-Match lets singles in computerdom meet without leaving their screens.

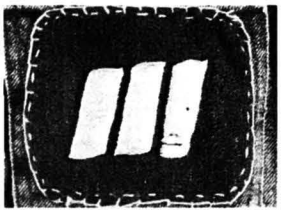
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The Cat That's the Apple's Meow

What one Connecticut man's done for his cat with an Apple is almost indescribable. He's got his whole house Appleized, too.

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Patching Apple III Pascal

Dr. Jeppson wanted Pascal on his ProFile—all of it. And the fact that Apple Inc. didn't provide for that didn't stop him. He shows you how.

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Problems? If you haven't received your *Softalk* by the fifteenth of the month, or if you have other problems with your subscription, Hal Schick or Pam Kelley can help out. Call (213) 980-5074.

Moving? Send new address and old to Softalk Circulation, Box 60, North Hollywood, CA 91603; telephone (213) 980-5074.

Contest:



So, you think you're smart, eh? Just because you can count turkeys or write short stories, you think you're pretty darn fancy stuff with these contests, don't you? Welcome to 1983, pal.

When February rolls around, everyone thinks of such mundane stuff as Valentine's Day, Lincoln's Birthday, Washington's Birthday, and so on. Looks like a real yawner of a month, no? Exchange valentines, take a day or two off from work, and get ready for March. Zzzzzzz.

No longer. The Puns 'n' Anagrams contest on page 4 is designed to help you learn about what a great month February has been in the past. Did you know that on February 4, 1913, the demountable automobile tire was patented? Or that the first sardine was canned on February 17, 1876? Or that on February 22, 1630, the Indians treated the American colonists to their first batch of popcorn? Of course not! If you did, then you'd be working for *Softalk* digging up junk like this.

Whether or not you knew those tidbits of trivia isn't important. What is important is that once you complete this month's contest you'll have a whole bunch of facts, just like those previously mentioned, at your fingertips to impress people with at parties. (Probably the last party you'll ever get invited to, but you'll be a better person for it.)

The first part of the contest involves figuring out what the heck each clue refers to. It may be a person, a thing, or an event. All you have to do, then, is to write the answer in its appropriate spot in the crossword puzzle. The person with the most complete puzzle will be crowned Softalk Crossword Solver Supreme and will receive $100 in booty made by our advertisers.

The second part involves more than just being clever, smart, or generally intelligent. It requires good research skills.

Once you have the answers to the crossword puzzle, find out what each one has to do with this exciting month of February, and when it happened. In other words, if the answer was "French prayer," then you would immediately remember that the French people were granted the freedom of worship on February 21, 1795. You remember? Good. Then you write a brief description of it and the date it took place. That shouldn't be too hard; after all, so much happened during this month in history that you'll have a hard time deciding where to start.

Whoever compiles the most complete list of explanations and dates will win a bonus prize of $100 in Apple accessories. Sound simple? You bet it is; we wanted to give you extra time to send us Valentine's Day cards.

And, because this contest is so simple, we're only going to accept the first fifty thousand entries we receive with postmarks on or before March 15, 1983. So get to work, and have (heh, heh) fun.

Mail in your entry with this coupon or a facsimile to: Softalk Dates, Box 60, North Hollywood, CA 91603, postmarked no later than March 15, 1983.

Hello, my name is: _____

And I live at: _____

My city and state: _____

Phone me at: _____

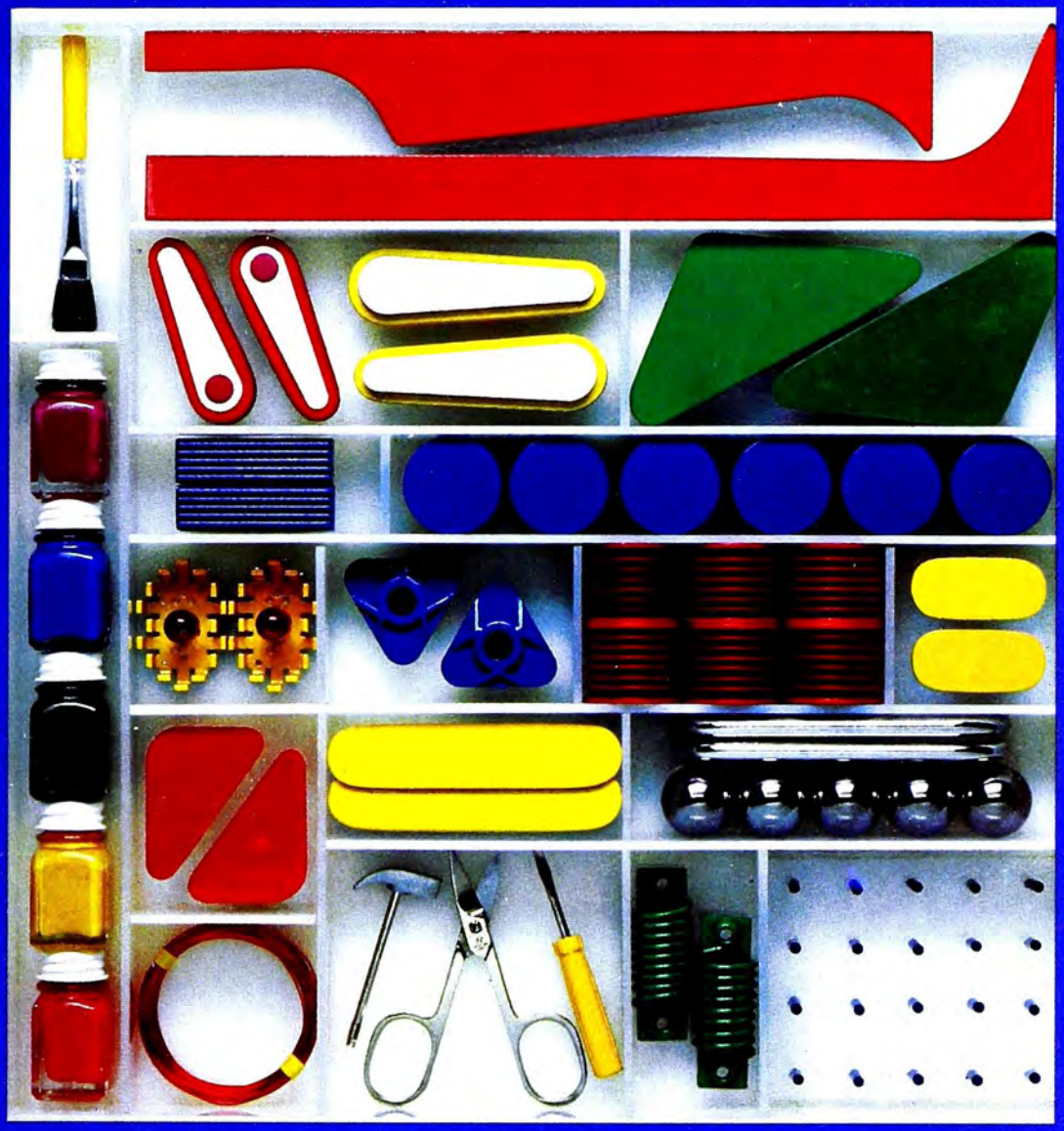
Gee, I'd like to win: _____

Here's my autograph: _____

The answer to the trivia question on page 132 is John F. Kennedy—and even that depends on the definition of "naval hero."

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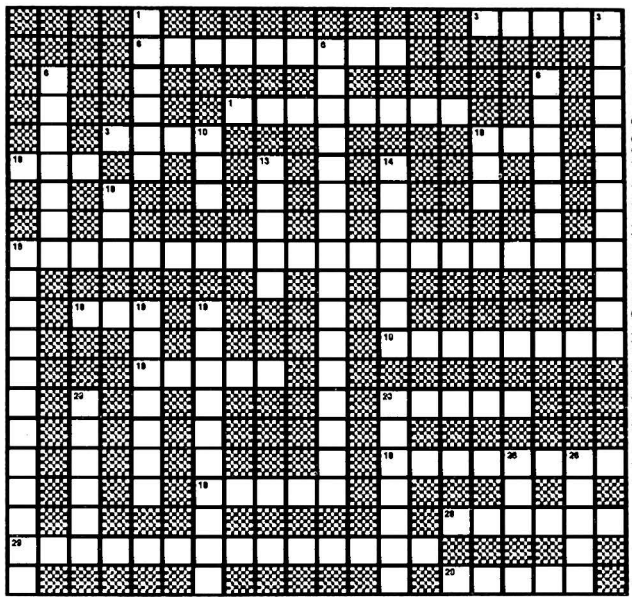
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Contest



Puzzle generated on the Apple with *Crossword Magic* by L&S Computerware.

Across

2. Is mutiny retarded when evil brother shows tuby computer?
4. Spinning instrument with blank isn't game; bell top cat strangely without annex for stopper.
8. A thousand odd calm lox cheered Muslim leader to the end.
9. Darn! Objective author turned to sci-fi.
11. In the beginning, games and puzzles only sound like male institution.
12. Within Bali, Zanzibar, and Pago Pago, you're bound to find a most beautiful woman.
16. City and planet in fear: what's shakin'?
17. Younger brother in Foggybottom shouldn't be in debt; it's backward.
20. The Baptist leader of the reconstruction found little help in one child.
21. Len$ n.g. for man modeled on Tom Corbett.
23. Icy maker twists by, likes to swat a wasp.
24. German tourist on mixed up bus yawns, "Why no essen rapid transit?" Begin by initting city.
27. Remember, the whole nation follows a ship swerving around a mine.
28. "Not I, again" stated the old-time cowboy; but it was politic, in an Eastern.
29. Under strange U.N. allegation, e.a., you find countrywide association for taxed dodgers.
30. "O, tulips" isn't orange dog's favorite planet.

Down

1. Able baker ripoff—no eyes for wandering ASCII. Bam!
3. Oddly, seven years ago, a chic woman met a group of protestors, which upset the processes of the nation.
5. The rooster hurried, and Pat or Dan'l found some inventors with a very tiny potato flake.
6. La jeune fille Langtry, sharing space with MGM's lion, became an old astronomer.
7. Iowa Jim was crazy, but he shared the Marines' great victory. Raise the flag!
10. Take a shot at kids: Cool off, don't cough, and keep your jaw loose.
11. A pig in a bog. No, a pog in a big. No, a big in a pog. No. Oh, rats; invite elephants to the party instead.
13. In a messy field, but faithful, he's first in cigars.
14. Don't forget to identify Flora—or she'll be in a real state.
15. Turn around for the start of the Ascot Gavotte. Have a dixie cup shortly and watch the rebels.
16. This cold is incurable you say? That line is appalling. The scientist suggested vitamin C.
18. Watch the dogwood; for mid$(tree$,2,1) = "a": sandwiches, blondes, and bums instead of the funnies.
19. Popeye did fine with twenty-four-hours' leave, mais non, Freddy and Moe screwed up.
22. When you hear her story, do a pattycake and the kid'll take her nap.
23. Cutting the C but not the K brings royal tongue-clucking from British mother, formerly young monarch.
25. Short lad and many Tontos prepared our country for youthful troops and dens of iquity.
26. If you have a doubt, crock it. Remember the mission: first, brief Louisiana and Missouri. Begin battle.

Tips on Solving Puns 'n' Anagrams Puzzles. If you were to travel the world collecting all the kind and thoughtful things you could, puns 'n' anagrams puzzles would not be among your souvenirs. In fact, these puzzles are downright mean, out to twist your mind and stump you at every turn. For example, pay no attention to the punctuation of the clues. It's intentionally not at all nice.

Each clue actually contains at least two clues: a real definition of the word and a puzzle-type clue. Puzzle-type clues often have tip-off words you should watch for. Here are some types of puzzles and their tip-offs:

Puns: tip-off is reference to sound, hearing; listen.

Anagrams: tip-off is reference to strangeness, confusion, being mixed up or stirred.

Reversals: tip-off is reference to reversal, back, turn around.

Hidden words: watch for prepositions *in, within*; inside.

Containers: similar tip-offs as for hidden words. For example, "club in short red pismire" could mean *combatant*—short red, or communist = *com*, pismire = *ant*, club = *bat;* put *bat* in *comant* and get the answer.

Beheadings (either take the word left after beheading or the initials; beheading *stable* could render *table* or *s*): tip-offs are references to small size or duration; briefly, short, small.

Double definitions: no tip-off; example would be "It's not true that I go to bed early" for *lie.*

Charades: no tip-off; the clues define parts of the definition or syllables of the answer; for instance, *Baryshnikov* could be defined as "sounds like [tip-off—answer is pun] bull-less market [*bearish*] drove ballet dancer [real definition] to leggy joint [*knee*] with respiratory spasm [*cough*]."

Let your imaginations run wild—at least, outside the square. Have fun. ◨

Penguin Graphics Software

Which is for you?

The Complete Graphics System II

by Mark Pelczarski

Complete Graphics System is written for the non-programmer interested in doing a wide variety of graphics and design on the Apple computer. Included are options for two-dimensional drawing, with lines, circles, ellipses, and an automatic 108-color filling routine. Also, you can mix text with graphics, with various colors, sizes, and spacing, and easily create Apple shape tables. Three-dimensional options allow you to draw, edit, and manipulate 3-D objects in perspective—without having to use coordinates. A 2-disk set of additional text fonts is available separately.

Special Effects

by Mark Pelczarski and David Lubar

This is also a non-programmer's package, but oriented more toward computer artistry. It's also an ideal complement to **The Complete Graphics System II.** *It has a brush module that lets you "paint" using a joystick or* **Apple Graphics Tablet,** *with the screen as your canvas and a choice of 96 "brushes" and 108 blended colors. You can also magnify any portion of the screen 2 or 4 times for detail editing, perform mirror images, exchange colors, and move parts of pictures to other areas of the screen. Also included is a packing routine that lets you store more pictures on each disk.*

Although both **Complete Graphics System II** *and* **Special Effects** *are written for non-programmers, they are provided on unprotected disks, and instructions are included for using the graphics and machine language routines in your own programs.*

The Graphics Magician

by David Lubar, Mark Pelczarski, and Chris Jochumson

This one is written with the programmer in mind; for anyone who wants to put professional quality graphics in their own software. Fast machine language animation and picture drawing routines are included for use in your own programs, and they're extremely easy to use. Using the editors provided, you simply draw your own multicolored shapes, draw their paths, and combine up to 32 independent shapes with paths and starting locations. The result is a machine language animation file that you just add and control with your own program—it does all the graphics work for you! The adventure-game picture editor works the same way: just draw, save, and add the redraw routine to your program. It increases a disk's storage capacity from 12 pictures to hundreds. A tutorial manual is included with examples of controlling animated objects with joysticks, detecting collisions, and a multitude of other useful hints and examples. For samples of what can be done, see any of our game packages, including **PIE MAN, Transylvania,** *and* **Spy's Demise,** *as well as those from several other companies using* **Graphics Magician** *for the graphics in their software.*

All of our graphics products are on unprotected disks for your convenience.

No fee is required for using our graphics routines in other programs. All our license requires is that it is stated that our graphics routines were used. We are also most interested in publishing good, new products, and beyond our graphics software we can offer further help to authors publishing through Penguin Software.

Instead of offering our own superlatives, we recommend that you read what others have said about our graphics products. Listed here are some of the reviews we've found, along with a few quotable quotes:

Graphics Magician

"recommended to anyone wanting to work with Apple's high resolution graphics for whatever purpose...definitely a program Apple users should have in their software library", Byte, Nov. 82.

"miraculous and marvelous," Creative Computing, Jan. 83.

"makes a graphics magician out of each and every Apple user", Softline, May 82.

Other reviews: Peelings II, Sept-Oct 82. Softalk, May 82.

Complete Graphics System II

"The program earns its name...it brings together at a modest price so many different graphics tools.", Softalk, July 81.

"The three-dimensional utilities verge on the phenomenal", Creative Computing, June 81.

"provides capabilities that go beyond the wishful-thinking stage and painlessly use much of the Apple II graphics potential", Infoworld, March 1, 1982.

Other reviews: Softside, #33. Peelings II, Nov-Dec 81. Cider Press, Sept-Oct 82. Call-A.P.P.L.E., Nov 82

Special Effects

"With Special Effects...the Apple computer comes very close to emulating main-frame computer graphics systems costing as much as $250,000 for only $39.95", Creative Computing, July 82.

"If you can afford only one computer graphics package, this (Complete Graphics System/Special Effects combination) is the one to buy", SoftSide, #33.

Other reviews: Popular Science, Nov 82. Softalk and Peelings II, March 82. Cider Press, Sept-Oct 82.



penguin software *830 4th Avenue, Geneva, IL 60134 (312) 232-1984*

the graphics people



Here's Steve Toth of Gemini Computer (Piscataway, NJ) presenting checks to Mary "Art Gallery" Ciccolella and her husband, Oracle '82 Part 4 winner Jack English. Both teamed up to purchase the Voice Box from the Alien Group.

CONTEST WINNERS

Nothing used to surprise the *Softalk* contest staff. When a ragtag team of underdog American ice hockey players upset the Soviet team in the 1980 Winter Olympics, and went on to win the gold medal, we believed it. When the University of California football team scored the winning touchdown on a rugby-style kick-off return with no time left in last year's California-Stanford Big Game, we believed it. But when we saw the final results of the Oracle '82 contest, we said, "Yeah, sure. Tell us another one."

Softalk Oracle's Believe It or Else. That Elizabeth Lewis (Richmond, VA) correctly predicted in order the top three companies to make the most appearances in *Softalk*'s Top Thirty bestsellers list is not surprising—anyone could have done it. But no one else did. Lewis picked Apple Computer, Broderbund Software, and VisiCorp (then Personal Software) to finish first, second, and third respectively, and she was exactly right.

In 1982, Apple had thirty-nine Top Thirty appearances, Broderbund had thirty-eight, and VisiCorp netted thirty-four. Following closely behind were Sierra On-Line with thirty-three and Software Publishing Corporation with twenty-three. No big surprises there.

The part that surprised us was that Lewis was also the winner of the first part of the Oracle '82 contest, predicting the Nielsen rating for the 1982 Super Bowl. Wow! A two-time winner in one contest was enough to blow us out the door. But here's where it gets really good.

After figuring out everyone's scores for the final part of the contest, we tabulated the total scores for the entire contest. We showed the results to Mr. Ripley, and he said, "I don't believe it."

You see, the grand prize winner of the Oracle '82 contest is Charles Lewis (Richmond, VA), Elizabeth's husband. Charles's final score was enough to blow everyone else away, and win him a shiny new Disk II drive.

The secret of the Team Lewis's success is that both Elizabeth and Charles work in libraries; she at the Virginia State Library and he at the J. Sargeant and Reynolds Community College Library. With the world's resources at your fingertips, you just can't go wrong. And if you thought the Lewises were brutal in last year's Oracle, keep looking for them this year in these pages. They want to win that new computer bad!

Instant Replay. It all began back in January of 1982. Charles predicted the Nielsen rating for the Super Bowl to be 47.5. He was a mere 1.6 off the mark of 49.1. Elizabeth Lewis hit it right on the money. Next, Charles foresaw snow falling on Manhattan Island for seven days between Groundhog Day and the first day of spring. He was short by only five days. The closing price of gold on the New York market the day after Labor Day was $481, a slim dollar above Charles's prediction.

The Major Leagues provided us with not a single no-hitter, just as Charles told us. After the November elections were over, Charles had slipped back thirty-four points. His prediction of the number of Democrats and Republicans in Congress missed by seventeen in each party. And, finally, Charles predicted Apple, Sierra On-Line, and VisiCorp to finish as the three most frequently appearing companies in *Softalk*'s Bestsellers, getting two of three, in their respective places, for plus-seventeen points. Grand total, −24.6 points.

Coming in second place was Jack Wilcox (Lafayette, CA), who was hot on Lewis's tail with a score of −32.9 points.

And Liz? She finished sixth in a field too large to count. Even though she won two parts and tied for first place in the no-hitter segment, Elizabeth lost most of her ground in predicting the price of gold and in November's great congressmen count.



Delores Ehrline of Jonathan's Apple (Marlton, NJ) hands over the loot to John Morrison, who splurged on *Arcade Machine* and *Spy's Demise*.

Her real clairvoyance came through quite some time ago. She knew enough to predict a winner—and marry him.

Turkey Heads, Eat Them Up, Yum. Thanks are due to all of you who helped us round up our stray turkeys in the November issue. The correct number of hi-res gobblers was three hundred forty-nine, just enough for our hungry staff (we like to eat in large quantities).

A special thanks goes to Carl Heimowitz (New York, NY), who is the winner of this counting contest. Several others also found all the turkeys in the magazine, but the Random

GOTO 115



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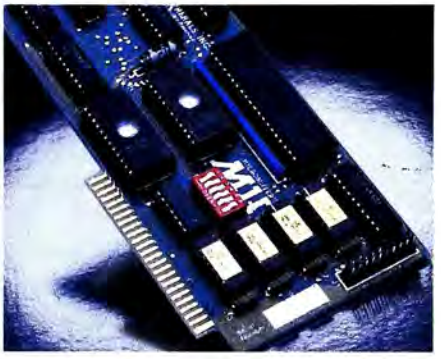
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FASTALK

Adventure

- **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.

Ali Baba and the Forty Thieves. Smith. Fanciful Arabian Nights role-playing game with a sense of humor. Fresh, fast action, challenging options, and secrets that are a joy to discover. Quality, 6660 Reseda Blvd., Ste. 105, Reseda, CA 91335. $32.95. *11/82.*

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

Escape from Rungistan. Blauschild. A vacation with a vengeance. Get out of jail; battle snakes, bears, and cannibals; acquire skills to get your money refunded. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *8/82.*

- **Hi-Res Adventure #1: Mystery House.** Williams. Whodunit in a Victorian mansion. First adventure with pictures. Vocabulary of more than 300 words. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $24.95.

Hi-Res Adventure #2: The Wizard and the Princess. Williams, Williams. Attempt to rescue princess from vengeful wizard. Features 250 illustrations in full color. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $32.95. *11/80.*

Kabul Spy. Wilson. Cold War espionage adventure in which you must slip into Afghanistan to rescue a physicist before the commies make him talk. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95.

Mask of the Sun. A unique animated graphic quest with unusual full parsing. See everywhere you can go as you travel, watch things transform. A professional-looking graphics breakthrough with nice puzzles. Ultrasoft, 24001 S.E. 103rd St., Issaquah, WA 98027. $39.95. *11/82.*

Prism. A forty thousand dollar, real-life treasure hunt that's also a game. Solve the riddles and puzzles and find the clues to the location of three gold keys actually buried in the continental U.S. International Software Marketing, 120 E. Washington St., Ste. 421, Syracuse, NY 13202. $19.95. *11/82.*

- **Prisoner 2.** Mullich. 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. Edu-Ware, Box 22222, Agoura, CA 91301. $32.95. *The Prisoner, 3/81; Prisoner 2, 10/82.*

- **S.A.G.A. Series.** Adams. Scott Adams's prototypical adventures—twelve in all—spruced up with 100-color graphics and Votrax vocals. Fun, not always logical, very story-oriented series. First to make chance a significant element of play (you can get killed a lot). Each adventure has its own theme; you do a lot of exotic traveling. They map small but score big on imagination. Adventure Intl., Box 3435, Longwood, FL 32750. $29.95 each.

Sherwood Forest. Holle, Johnson. Dating game in legendary times. In premiere Sof-toon adventure featuring neat UltraRes graphics, Robin Hood woos Maid Marian all the way to the honeymoon. Go for it. Phoenix Software, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $34.95.

Starcross. Science fiction prose adventure that comes wrapped in a flying saucer. In the year 2186, your mission to harness a black hole takes some unexpected turns. Likable, engaging. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *11/82.*

Time Zone. Williams, Williams. "Microepic" hi-res adventure featuring ten periods from past and future history all over world and universe on eight double-sided disks. Good puzzles, many dangers. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $99.95. *1/82.*

Transylvania. Antiochia. Best graphics ever in a hi-res adventure. Excellent puzzles and logic—no tricks. Enjoyable. Penguin, 830 4th Ave., Geneva, IL 60134. $34.95. *10/82.*

Zork I. Lebling, Blank. Part one of mainframe adventure; understands complete compound sentences and questions. Simultaneous manipulation of objects. Text. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *6/81.*

Zork II. Lebling, Blank. *Zork* comes into its own in sequence. Great text adventure technique and communication. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *3/82.*

Zork III. Lebling, Blank. Text lives! A masterpiece of logic and a grand adventure to revel in. Hard, logical puzzle with unique point system. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *9/82.*

Business

Accounting Plus II. Software Dimensions. Integrated package: general ledger, accounts receivable and payable, and inventory-purchasing modules. Basic and machine language. Menu-driven; prompting. Systems Plus, 1120 San Antonio, Palo Alto, CA 94303. $1,250.

Accounting Plus IIe. Stripped and rebuilt to take advantage of all IIe functions. Systems Plus, 1120 San Antonio, Palo Alto, CA 94303. General ledger, $450; accounts receivable and payable, $350 each; package, $995.

Apple II Business Graphics. Converts numerical data into a variety of charts and graphs. Features mathematical and statistical functions. Requires language card. Apple, 20525 Mariani Ave., Cupertino, CA 95104. $175.

BPI System. Popular five-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.

Computer Programmed Accountant. Five-module package: general ledger (very popular), accounts receivable, accounts payable, payroll, and property management. All other modules post automatically to general ledger. Continental, 11223 S. Hindry Ave., Los Angeles, CA 90045. $1,495. Separate modules: $250 each. Property management: $495.

Condor Series 20. Relational database management system that supports transaction processing, generating audit trail for each posted transaction. Complete batch operation; 127 fields per record, 32,700 records per file. Requires Z-80 card and eighty-column card. Condor Computer, 2051 S. State St., Ann Arbor, MI 48104. File manager, $295. Full system, $650. *7/82.*

The Data Factory. Passauer. Database management system allows listing files, getting file statistics, selecting another file, transferring records to new database, and adding fields to update forms. Disk swapping required; excellent product overall. Several compatible products available. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $150. *8/81.*

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

DB Master. Comprehensive database management system with password protection, extensive report creation options. Up to 1,020 characters per record. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $229. *10/81.*

1st Class Mail. Schoenburg, Pollack. Fantastically user-friendly program for specialized database applications. Twelve fields, ability to sort and filter on any field or combination. Continental, 11223 S. Hindry Ave., Los Angeles, CA 90045. $74.95. *6/82.*

The Incredible Jack. Word processor, database, and spreadsheet in one, plus mailing label print and sort. Gives eighty-column and upper and lower case on the IIe. Requires 16K card for II Plus. Business Solutions, 60 E. Main St., Kings Park, NY 11754. $79.

List Handler. List-lover's delight. Prints lists, labels, and letters. Handles up to 3,000 records per disk and eight disk drives. Takes requests. Silicon Valley Systems, 1625 El Camino Real, Ste. 4, Belmont, CA 94002. $89.95.

Market Analyst. Investment analysis package with portfolio management, technical analysis, and telecommunications capability. 64K. Anidata, 613 Jaeger Ct., Sicklerville, NJ 08081. $395.

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 eighty columns and extended memory of the IIe. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $275.

PFS:File. Page, Roberts. User controls data in totally unstructured database. Up to thirty-two pages (screens) of information in each record. IIe version has 80 columns, u&lc. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175. *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. Eighty columns and increased graphics support in IIe version. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125; Apple III: $175. *5/82.*

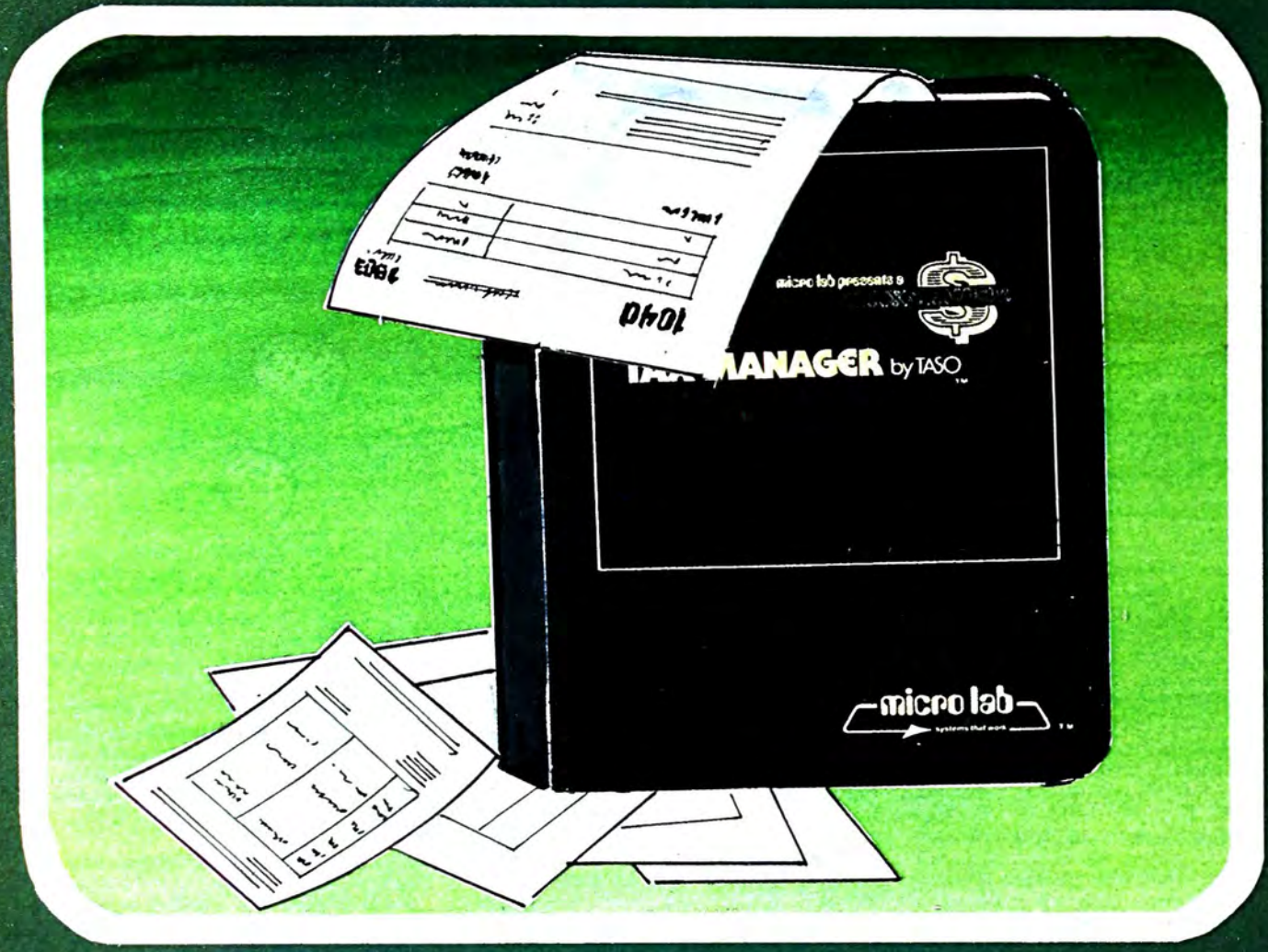
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Stock Market Advance Decline Timing Program. Altman. It won't tell you what stocks to buy, only when to buy them. Buy/sell recommendations on both short and intermediate term. Defines change in direction of advance/decline line. Dr. R. Altman, Box 1197, Hightstown, NJ 08520. $149.

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

Videx Preboot VisiCalc. Run *VisiCalc* in 80-columns with upper and lower case; see complex formulas in their entirety. Advanced version uses mixture of existing memory cards. Vides, 897 N.W. Grant St., Corvallis, OR 97330. $49. Advanced: $89.

• **VisiCalc.** Bricklin, Frankston. Electronic worksheet for any problem involving numbers, rows, and columns. No programming necessary. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250. *10/80.*

VisiCalc Business Forecasting Model. Seven interrelated Visi templates that provide you with financial information most vital to analysis and planning: income statements, balance sheets, statements of cash flow, and so on. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $100.

VisiFile. Creative Computer, Jameson, Herman. Database management system for organization and retrieval of information, allowing sort and modification of records. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250.

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

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

Wall Streeter. Collection of stock analysis and management programs that track price, Dow Jones, indices, and advances and declines. Calculates and charts same. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $300.

Communications

ASCII Express II. Blue. Modem software provides automatic redial, individual macro files, and improved file transfer capabilities. Sends any DOS file; uploads one character or one line at a time. Included utilities convert Integer Basic, Applesoft, or binary programs into text files. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $79.95. *9/81.*

ASCII Express: The Professional. Robbins, Blue. Greatly improved version of the original. Supports multiplicity of hardware and prints simultaneously. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95. *12/82.*

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

Dow Jones Connector. Guide to the use of the company's news retrieval service and Blue Chip membership, too. Dow Jones Software, Box 300, Princeton, NJ 08540. $95.

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

Hello Central! Menu-driven modem software. Upload-download, send-capture, save, retrieve, edit and manipulate files and programs. Advanced Operating Systems, 4300 W. 62nd St., Indianapolis, IN 46206. $99.

Micro/Courier. Electronic mail program. Provides file transfer of any DOS 3.3 file (correspondence, *VisiCalc,* charts) automatically and unattended. Built-in text editor; maintains 100 mailboxes; permits optional clock and calendar scheduling. Microcom, 1400A Providence Hwy., Norwood, MA 02062. $250.

Micro/Terminal. Access and exchange information with mainframes and minis, databases like the Source, and other remote terminals and personal computers. Supports keyboard mapping, upper and lower case, and 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 2,400. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95.

Super Smart. Terminal emulation package to capture, create, edit, print, and save data Softspoken, Box 7000-863, Redondo Beach, CA 90277. $60.

Transend I, II, and III. Intelligent terminal software with multiple hardware compatibility. Advanced, easy to use. The *I* sends text only; menu driven, limited editor. The *II* sends text and files like *VisiCalc*; verifies transmission. The *III* does both and handles electronic mail with auto-redial, clock calendar, and password protection. Upgrade for only $20; all three get an A+ for error handling. SSM, 2190 Paragon Dr., San Jose, CA 95131. $89, $149, $275. *9/82.*

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

Z-Term. Blue. Flexible, customizable communications software written specifically for the CP/M Apple. A quality package. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $99.95. *5/81.*

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.

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4. DISA Disassembles Binary to screen/printer.
5. AL Prints program Address & Length.
6. HIDOS DOS moves itself to Language Card

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TLIST lists Sequential and Random Text Files to screen and printer.

DUMP screen dumps memory with Ascii along the right side. Use A and L for specific dumps. Without them it starts at $00 and stops with return.

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DISA disassembles machine code to screen. Use A and L for specific routines.

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TLIST, DUMP and DISA Features:

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HIDOS command checks for a language card in slot 0 and moves DOS residing in memory to the card at $DD00. Himem is set at $BE00 adding 10K of free memory for programs. The Integer Card is still automatically supported in any slot. $300 to $3D0 is kept free.

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Two More New Commands

HIDOS has all previous commands and features operational and adds a 7th command FIND. Find searches 64K memory in 3 seconds for any Hex sequence up to 31 bytes long and prints the addresses to screen. Hidos has an optional 8th command DATE configured for Mountain Hardware clocks and is useable in basic programs.

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DAVID-DOS is totally accurate and speed loads without over-writing. Great care was taken to keep DOS standard and compatible with most software. All DOS entry addresses have been preserved. Only two routines were moved to allow more room in command tables. DOS is the same length. Init areas were used for DAVID-DOS.

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An introduction to the modern art of programming using the ancient art of drawing.

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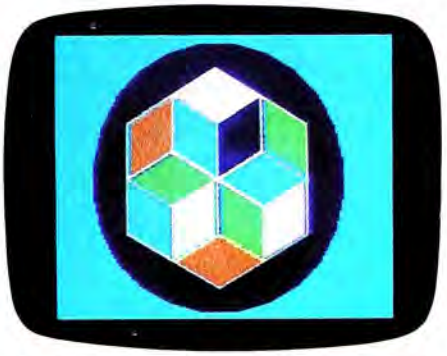
Kids love to draw.

And with Delta Drawing, your children can have fun creating their own colorful drawings, and at the same time, learn about computer programming.

Delta Drawing is much more than just a fun game. It's an educational tool that helps children develop their creativity, learn to write computer programs and build an understanding of procedural thinking.







Easier to use than LOGO.

Delta Drawing makes it easy for children to use the computer—even if they've never used a computer before.

In fact, it's easier to use than LOGO turtle graphics. And Delta Drawing costs less than half as much as LOGO.

With Delta Drawing, your child controls the Delta cursor, and the Delta cursor controls all the action. So kids can learn at their own pace while they're having fun.

How your children will learn programming.

With Delta Drawing, your child first creates a picture using simple, single-key commands, for example: "D" for draw, "L" for left, "E" for erase.

As the picture is being drawn, the computer keeps track of every keystroke and records it as a program.

Then, by touching the "T" key for "text mode," the child can see the program that was written. As children progress, they can begin to write their programs in the text mode and switch to the graphics mode to see their pictures. They can even switch back and forth between graphics and text modes.

Delta Drawing will make your child comfortable with the computer and helps develop procedural thinking—the kind of step-by-step approach needed to write programs and solve problems with computers.

Get Delta Drawing today.

Delta Drawing can be played on Apple,® IBM® and Atari® computers.

It comes complete with easy-to-follow fast-start cards. And for more advanced users, a completely detailed instruction manual.

You can save your child's drawings on a blank disk and even print them, if you have a printer with graphics capabilities.

So look for Delta Drawing at your local software store. Or write to Spinnaker, 215 First Street, Cambridge, MA 02142.

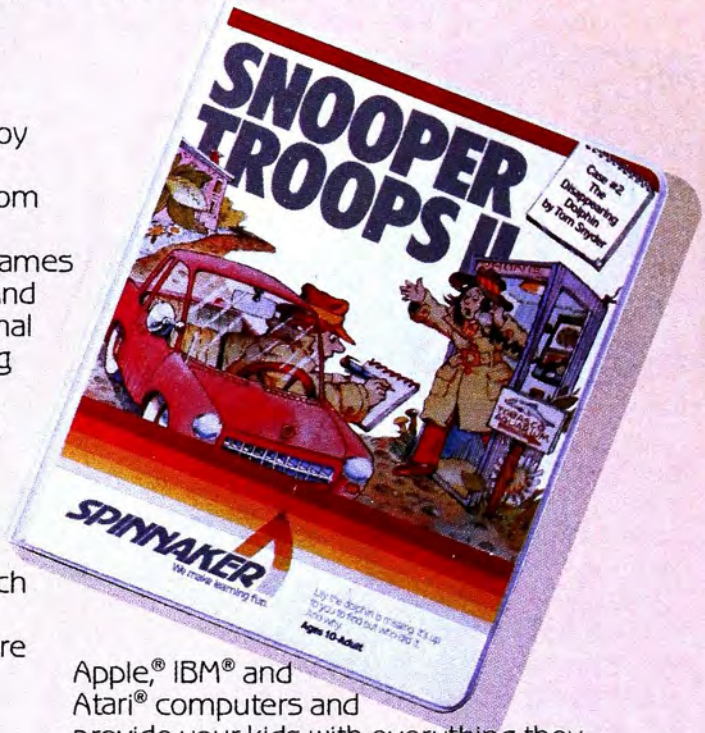
You'll find that when we combined learning and fun, we created a work of art.

SPINNAKER™

We make learning fun.

Apple, IBM and Atari are registered trademarks of Apple Computer, Inc., International Business Machines Corp. and Atari, Inc. respectively

Introducing Snooper Troops™ detective series. Educational games that turn ordinary homes into Sherlock homes.



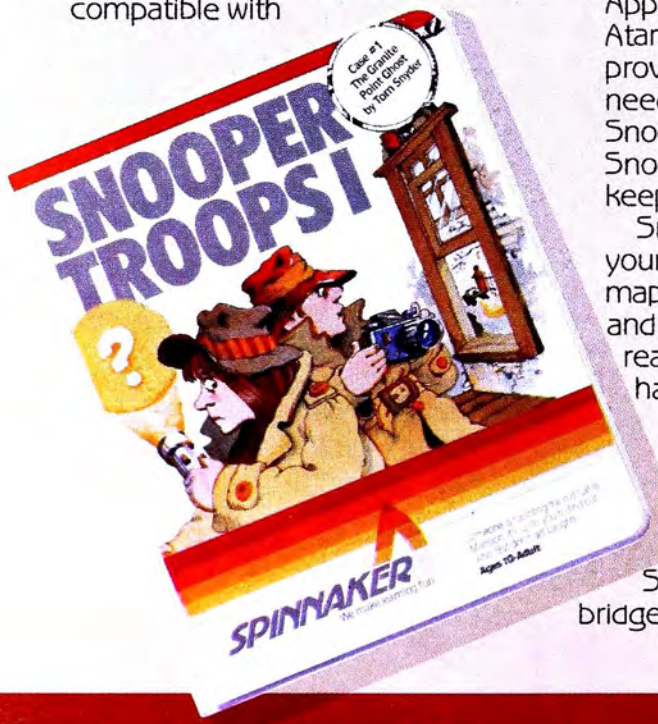
Where can you find educational games that your kids will really enjoy playing?

Elementary, my dear Watson. From Spinnaker.

Our Snooper Troops detective games are fun, exciting and challenging. And best of all, they have real educational value. So while your kids are having fun, they're learning.

As a Snooper Trooper, your child will have a great time solving the mysteries. But it will take some daring detective work. They'll have to question suspects, talk to mysterious agents, and even search dark houses to uncover clues.

The Snooper Troops programs are compatible with Apple,® IBM® and Atari® computers and provide your kids with everything they need: a SnoopMobile, a wrist radio, a SnoopNet computer, a camera for taking Snoopshots and even a notebook for keeping track of information.



Snooper Troops detective games help your children learn to take notes, draw maps, organize and classify information and they help develop vocabulary and reasoning skills. All while your kids are having a good time.

So if you want to find educational games that are really fun, here's a clue: Snooper Troops games are available at your local software store, or by writing to: Spinnaker Software, 215 First Street, Cambridge, MA 02142.

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Spinnaker's early learning games will help make your children as smart as you tell everyone they are.





Your kids are pretty smart. After all, they're *your* kids.

Spinnaker can help make them even smarter. With a line of educational software that kids love to play.

Spinnaker games make the computer screen come to life with full color graphics and sound. And they're fun. Lots of fun. But they also have real educational value.

Some of our games help exercise your child's creativity. Others improve memory and concentration. While others help to improve your child's writing, vocabulary, and spelling skills.

And every Spinnaker game provides familiarity with the computer and helps your children feel friendly with the computer. Even if they've never used a computer before.

And Spinnaker games are compatible with the most popular computers: Apple,® Atari® and IBM.®

Our newest game, KinderComp™ (Ages 3-8) is a collection of learning exercises presented in a fun and exciting manner.

Rhymes and Riddles™ (Ages 4-9) is a letter guessing game featuring kids' favorite riddles, famous sayings and nursery rhymes.

Story Machine™ (Ages 5-9) lets children write their own stories and see them come to life on the screen.

And FACEMAKER™ lets your children create their own funny faces and make them wink, smile, wiggle ears (not your kids' ears, the ears on the screen), etc.

And we're introducing new games all the time.

So look for Spinnaker games at your local software retailer, or by writing to: Spinnaker Software, 215 First St., Cambridge, MA 02142. And show your kids how smart their parents really are.





SPINNAKER™

We make learning fun.

Apple, IBM and Atari are registered trademarks of Apple Computer, Inc., International Business Machines Corp. and Atari, Inc., respectively

Fantasy

Apventure to Atlantis. Clardy. The sequel and worthy successor to *Odyssey*. Many refinements including recruitable entourage of wizards with individual attributes. Included cheat sheet is invaluable. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $40. *6/82.*

●**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., Ste. 105, Reseda, CA 91335. $29.95.

Empire II. Mullich. Second scenario in the promised Empire trilogy. With civilization at the apex of its power and complexity, you must cut through red tape to gain freedom and dignity. Edu-Ware, Box 22222, Agoura, CA 91301. $32.95.

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.*

Microbe. Clardy, Zalta. An internal course in disease diagnostics, medical procedures, anatomy, and health and safety, disguised as a fantasy/adventure/arcade/simulation. "Enjoy your next viral infection!" Good game, great educational tool. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $44.95.

●**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., Ste. 201, Renton, WA 98055. $30. *10/80.*

●**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, 1623 5th St., 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, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $59.95.

Upper Reaches of Apshai. The next four levels (and requires) *Temple of Apshai.* Discover the secret of the monastery, battle giant tomatoes and killer chickens. Epyx/Automated Simulations, 1043 Kiel Ct., Sunnyvale, CA 94086. $19.95.

● **Wilderness Campaign.** Clardy. First fantasy game. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $17.50.

Wizardry. Greenberg, Woodhead. Ultimate role-playing fantasy; ten-level maze in hi-res. Generate twenty characters, six at a time on expeditions. Gripping game; superbly produced. 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 II. Pelczarski. A wealth of graphics tools at a reasonable price. Make 2-D drawings with game paddles, add text in destructive, nondestructive, or reverse modes, create 3-D figures with a panel module and shape tables with a shape module. Manual features complete outline of command structure. Penguin, 830 4th Ave., Geneva, IL 60134. $69.95; Apple Graphics Tablet version, $119.95. *7/81.*

GPS. Versatile graphics program. Creates, manipulates, and edits images like a word processor. Easy to use; in standard and professional formats. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $59.95, $99.99.

GraForth. Lutus. A graphics language rewritten for maximum speed. Plotting, line, text display, character image, and high speed 3-D graphics, with variety of colors and drawing options. Includes music synthesizer. Insoft, 10175 S.W. Barbur Blvd., Ste. 202-B, Portland, OR 97219. $75. *8/82.*

The Graphics Magician. Jochumson, Lubar, Pelczarski. Outstanding animation package consisting of a picture editor and shape table extender designed to allow programmers to design and store graphics files. 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.*

Special Effects. Pelczarski. Artist's graphic package for creating and enhancing computer graphics. With 108 colors and 96 brushes, magnification and editing point by point. Reverse colors, create mirror images, move images around. Penguin, 830 4th Ave., Geneva, IL 60134. $39.95.

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

Career Directions. Take a systematic approach to making career decisions. Professionally designed assessment analysis, planning, and exercises. Systems Design, 723 Kanawha Blvd., Ste. 403, Charleston, WV 25301. $59.95.

Chequemate. Home finance package that handles checks, charge cards, cash control, automatic tellers, and more. Reports to screen or printer. A bargain. Masterworks, 25834 Narbonne Ave., Lomita, CA 90717. $39.95.

The Creator. Write applications programs for database management, mailing lists, invoicing, sorting algorithms, and other applications. Generates title pages and menus. No programming knowledge necessary; lines and increments can be set as program is generated. Software Technology for Computers, Box 428, Belmont, MA 02178. $200.

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

Dow Jones Market Analyzer (formerly *RTR Market Analyzer*). Automatically collects, stores, and updates historical and daily market quotes. Provides technical analysis and plots eighteen different types of charts. Dow Jones Software, Box 300, Princeton, NJ 08540. $350.

Electric Duet. Lutus. Two-voice music without hardware. A bit involved, but superb sound quality. Insoft, 10175 S.W. Barbur Blvd., Ste. 202-B, Portland, OR 97219. $29.95. *7/12.*

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

Know Your Apple IIe. Tutorial program with everything you wanted to know about the soul of your new machine. Muse, 347 N. Charles St., Baltimore, MD 21201. $24.95.

Micro Cookbook. What's for dinner, Apple? Select recipes, create your own cookbook. Includes hundreds of international recipes, charts, tables, techniques, and a glossary. Virtual Combinatics, Box 775, Rockport, MA 01966. $30.

Multi-Disk Catalog III. Very fast machine language database program for reading and storing file names, types, and sizes. Fast, powerful sort-and-search feature. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $25. *10/81.*

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

Real Estate Analyzer. Make buy and sell decisions, compare investments, project future sales year to year for ten years. File, retrieve, and alter information itemized in tabular form. Howard Software, 8008 Girard Ave., Ste. 310, La Jolla, CA 92037. $195. *7/81.*

Tax Manager. Helps prepare federal returns and print schedules. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $150.

Tax Preparer. Record-keeping program with wide variety of federal tax forms and schedules; creates itemized lists. Yearly updates. Howard Software, 8008 Girard Ave., Ste. 310, La Jolla, CA 92037. $99.

VisiDex. Jennings. Electronic index and file-agenda program for spontaneous or structured information entry. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $199.95.

Home-Arcade

A.E. Wada, Horai. Blasting 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, 1938 4th St., San Rafael, CA 94901. $29.95.

Alien Ambush. Shoot-'em-up in which hordes of the little devils divide to conquer you. Micro D, 17406 Mt. Clifford Circle, Fountain Valley, CA 92708. $34.95.

●**Alien Rain (Apple Galaxian).** Suzuki. Monsters in this home-arcade classic seem to take it personally when you gun down one of their kind. Broderbund, 1938 4th St., San Rafael, CA 94901. $24.95. *2/81.*

Apple Panic. Serki. Rid a five-story building of crawling Apples and butterflies by running up and down connecting ladders, digging traps in floors, then covering critters over before they devour you. Extremely addictive, excellent hi-res play. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *9/81.*

The Arcade Machine. Jochumson, Carlston. Step-by-step arcade game designer—shapes, scoring, sound, and titles. Begin with variations on five games included, then on to your own. Broderbund, 1938 4th St., San Rafael, CA 94901. $59.95. *11/82.*

Artesians. Rena-soft. A little maze, a little street-crossing, a little panic, a little beer: get to the fourth floor and fill your water jugs while dodging dog, guard, and annoying title creatures. Renaissance Technology, 1070 Shary Circle, Concord, CA 94518. $34.95.

Aztec. Stephenson. Graphic fantasy arcade with animation on-screen throughout. DataMost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95.

Bandits. Ngo. Fight off waves of multiple menaces intent on killing you and stealing your supplies. Delirious nonstop action, animated to the hilt. Sirus, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *7/82.*

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

THE HEAD OF THE CLASS

Give your child the thinking tools that stand in a class by themselves: programs for your home from Computer-Advanced Ideas.

For The Fun Of It

As professional educators and programmers we've been proving for over a decade that motivated learners do best. Featuring full-color graphics, our animated learning games are fun. They talk like a friend, play like a teammate and teach like a tutor. And they stimulate eager young minds.

Partners In Learning

CAI programs come with a library of knowledge for your child to explore. But that's just the beginning. They also feature a unique authoring system that lets you create lessons on any subject, tailoring the program to your child's needs. No knowledge of computers is required. Our programs make sense to *people* — from 4 to 94 — and grow right along with your child.

A Success In Schools

Over 1800 school districts have chosen CAI programs to teach essential vocabulary and logic skills in a full range of topics. Our products get recognition — because they work.

Head Start

Your child's future begins with opportunities you create at home. Choosing resources that are stimulating, challenging and fun can be one of the best decisions you make. Ask your computer retailer for a demonstration of CAI programs and see for yourself how enjoyable a good education can be.



Computer Advanced Ideas

Bringing Ideas Home

1442A Walnut Street, Suite 341
Berkeley, CA 94709 (415) 526-9100

For the Apple II/IIe

Beer Run. Turmell. Artesian's delight. Catch falling cans on your way up one building, hop the blimp, and work your way down another. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *1/82.*

Bolo. Micro version of sci-fi fantasy. Colossal-sized maze where you don't eat anything. Drive around in tank and destroy enemy bases as you're dogged by intelligent assassin tanks. Much depth, many months' fun. Top class. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $34.95

Cannonball Blitz. Lubeck. In the cold light of *dawn,* you must find the *key* to victory, no matter how incongruous. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95. *7/82.*

Canyon Climber. Mountford. Scale the levels and ladders while avoiding arrows, gorges, and hi-res sheep (no cows). Score by setting explosive charges. Datasoft, 19519 Business Center Dr., Northridge, CA 91324. $29.95.

Choplifter. Gorlin. Fly your chopper into the Bungeling Empire to rescue the sixty-four hostages, avoiding interceptor jets, homing mines, and tanks. Challenging, realistic, and playful. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *7/82.*

Crisis Mountain. Schroeder. Run, crawl, walk, and leap through mountain maze fraught with rolling rocks, geysers, and chasms; collect nuclear devices. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $34.95. *10/82.*

● **Crossfire.** Sullivan. Aliens come at you from three directions on a grid laid out like city blocks. Each alien has four lives and metamorphoses into its next one when shot. 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.*

David's Midnight Magic. Snider. Pinball challenger to *Raster Blaster.* Excellent hi-res graphics and animation. Provision for earning extra balls. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *2/82.*

● **Epoch.** Miller. Superbly stylized animation enhances this filmic shoot-'em-up. Tremendous sense of being in space; neat classical music and dramatic time warp sequence. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *10/81.*

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

Grapple. Lewis. There's a jailbreak of galactic undesirables; player keeps them rounded up in this stun-'em-up showdown. Insoft, 10175 S.W. Barbur Blvd., Ste. 202B, Portland, OR 97219. $29.95.

Jawbreaker 2. Beuche. No relation or resemblance to Number 1—*Jawbreaker 1* or Beuche's first; otherwise, hard to describe but very playable. New, fun, and fresh. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34 95. *1/83.*

LPS II Madness. Besnard. Confused shoot-out in classic Bez style—without game controllers or keyboard. Designed to be used with the LPS II light pen. Nice as a novelty for LPS II owners; give your fingers a break. Bez, 4790 Irvine Blvd., Ste. 108B, Irvine, CA 92714. $26.44.

Lunar Leeper. Beuche. Silly, enjoyable rescue mission with challenging ship control and unpredictable foes. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95. *1/83.*

Marauder. Weigandt, Hammond. Double duty: bust through force field as a rocket, then switch to man in a maze. Nine mazes with fifteen levels of difficulty. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95. *9/82.*

● **Meteoroids (Asteroids) in Space.** Wallace. Making little asteroids out of big ones, plus occasional hostile alien ships. Hyperspace, autobrake, autofire. Quality Software, 6660 Reseda Blvd., Ste. 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 as you avoid or stomp mutants on the way. Hot stuff, best of the genre. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $39.95. *1/83.*

Pandora's Box. Chase game with player as pursuer for a change. Zap ancient evils back to where they came from and live to tell about it. Watch those darn birds. DataMost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95.

Pest Patrol. Allen. Where have all the flowers gone? Frenzied new bug game with hopping spiders, killer butterflies, and shielding snails—all with dive-bombing capabilities. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95. *10/82.*

Pinball A2-PB1: Night Mission. Artwick. Fantastically realistic and competitive ten-mode pinball simulation, allowing user modification and definition of virtually every aspect of play. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $29.95. *5/82.*

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

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

● **Raster Blaster.** Budge. Pinball game as good as real ones. *Softalk* readers' Most Popular Program of 1981. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $29.95. *5/81.*

Repton. Thompson, Kaluzniacki. The ne plus ultra of planet-defending, in the *Defender* style, plus. Top-flight all the way. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *1/83.*

Roach Hotel. Livesay. Vermin-stomping high jinks for those who like that sort of thing. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $34.95. *3/82.*

Sea Dragon. Anderson. Talking tunnel endurance test where a variety of underwater nasties try to keep player from freeing the little sea serpent. Adventure International, Box 3435, Longwood, FL 32750. $34.95.

Seafox. A good sub-versus-convoy home-arcader. Variety of vessels, bouncing torpedoes, refueling dolphins (food not included), and intelligent depth charges. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *11/82.*

Serpentine. Hypnotic snake-chase maze game. Clean action, thrills, hairy escapes. Recommended. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *10/82.*

Snack Attack. Illowsky. A three-maze eat-'em-up; starts at any of five speed levels. Nonfattening. DataMost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95. *1/82.*

● **Sneakers.** Turmell. Many-layered shoot-'em-up, one of the best. Stomping sneakers and swarm of other creatures add to the fun. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *9/81.*

Space Eggs. Nasir. Addictive fuzz ball fighting; right up there with *Galaxian.* Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *4/81.*

Spider Raid. Marsh. Spider hero searches for food while dodging acid rain droplets and spray cans. Insoft, 10175 S.W. Barbur Blvd., Ste. 202B, Portland, OR 97219. $29.95.

Spy's Demise. Be the first on your block to run a maze of pile-driving elevators. Fast, frustrating fun with a game show bonus; complete puzzle after all nine levels and win a prize. Penguin, 830 4th Ave., Geneva, IL 60134. $29.95. *11/82.*

Star Blazer. Suzuki. Bomb-run game with five levels, minutely exact animation, and style to burn. A joy. Broderbund, 1938 4th St., San Rafael, CA 94901. $31.95. *4/82.*

Star Maze. Eastman. Hunting for power jewels through sixteen zero-gravity mazes filled with unfriendlies. Uses eighteen hi-res colors and multidirectional scrolling. Mapping advised. A standout. Sir-tech, 6 Main St., Ogdensburg, NY 13699. $34.95. *11/82.*

● **Super Invader.** Hata. The daddy of home-arcades. Still good hi-res, still a challenge. *Softalk* readers' Most Popular Program of 1978–80. Astar Intl., through California Pacific, 1615 5th St., Davis, CA 95616, and Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07960. $19.95.

Super Taxman 2. Fitzgerald. Pac up your troubles! Bigger, more complex version of the most perfect extant legal rendition of a certain arcade game. You can look at the cartoons whenever you want. H.A.L Labs, 4074 Midland Rd., Ste. 23, Riverside, CA 92505. $25.

Swashbuckler. Stephenson. Hi-res swordfighting with realistic pirates, snakes, rats, and other scum. DataMost, 8943 Fullbright Ave., Chatsworth, CA 91311. $34.95. *8/82.*

Tharolian Tunnels. Nelsen. Shoot-'em-up with several stages of play; on par with *Falcons.* Software Farm, 3901 S. Elkhart St., Aurora, CO 80014. $29.95. *10/82.*

Tubeway. Van Brink. Tempestuous galaxy-saving action with thirty-two levels. DataMost, 8943 Fullbright, Chatsworth, CA 91311. $34.95.

Wavy Navy. McAuley. Galaxy shooting game brought down to sea level in bright, cartoon-style hi-res. No aliens raining on player's patrol boat; just kamikaze pilots, bombers, and missiles. Shoot them, or it's "P.T. blown home." Good, fun game. Sirius, 10364 Rockingham Dr., Sacramento, CA 94827. $34.95.

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

Zargs. McKee. You leap your way to space, dock for repairs, and dodge space debris, all before you battle it out with beasties from space. Four recognizable games make up this multistage game. Insoft, 10175 S.W. Barbur Blvd., Ste. 202B, Portland, OR 97219. $34.95. *1/83.*

Home Education

Algebra 1-4. Sets of learning units progressing from algebraic rules and definitions to graphing and inequalities. Individualized teaching styles to fit everyone's needs. Good for adults wanting to overcome math anxiety as well as for schoolkids. Edu-Ware, Box 22222, Agoura, CA 91301. $39.95 each.

Apple Logo. Papert. Custom version (by its inventor) of MIT-developed turtle graphics language. First-rate educational tool with graphics, mathematical, even games use. Hefty documentation. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Bop-A-Bet. Alphabetic eat-'em-up, teaching letter recognition and eye-hand coordination. Lets little ones emulate older sibs. Sunnyside Soft, 5815 E. Parkside, Fresno, CA 93727. $29.95.

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

Dragon's Keep. Graphics adventure in which youngsters find and free imprisoned animals. Written for second-grade-level readers; requires the touch of a key, no typing, to execute actions. Encouraging and

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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.

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Stickybear. Hefter, Worthington. Early education programs use graphic animation: in *Stickybear ABC*, moving pictures with sound represent letters of the alphabet. In *Stickybear Numbers*, groups of moving objects teach numbers and simple arithmetic. Ages three through six. Xerox Education/Weekly Reader, 245 Long Hill Rd., Middletown, CT 06457. $39.95 each.

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SuperPilot. Courseware authoring language based on Apple and Common Pilot. Twenty-six instructions for creating individually tailored lessons. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $200.

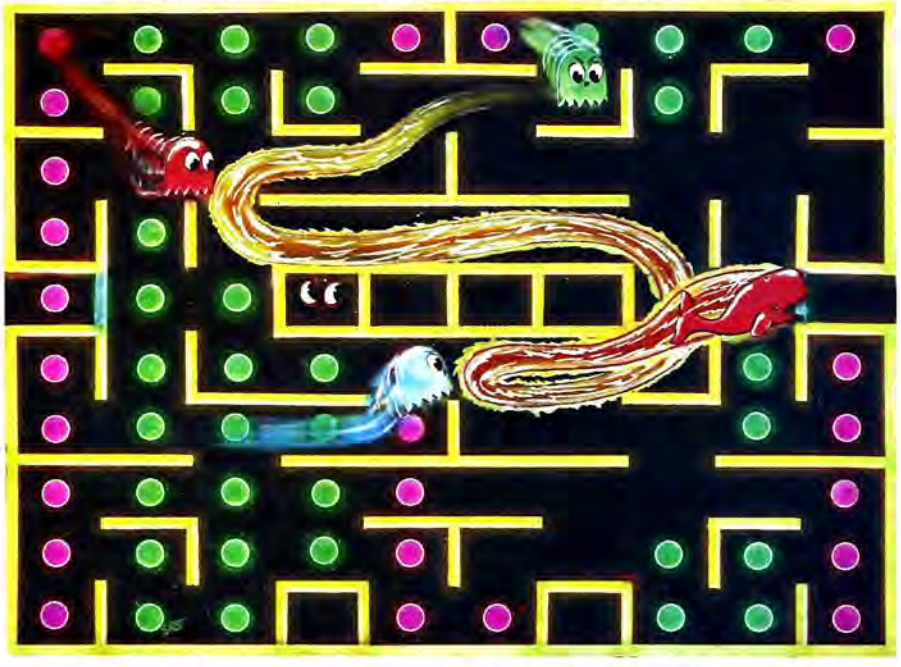
Terrapin Logo. MIT. The Logo language, using a Terrapin turtle to teach state, control, and recursion. Terrapin Inc., 380C Green St., Cambridge, MA 02139. $149.95.

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

Word Attack. Davidson, Eckert. Builds vocabulary through multiple-choice quiz, sentence completion exercises, and an arcade game. Nine levels of word difficulty. Davidson and Associates, 6069 Groveoak Pl., Ste. 2, Rancho Palos Verdes, CA 90274. $49.95.

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Hi-Res Computer Golf. Aronoff. A masterpiece of skill testing, judgment, strategy, and visual acuity. One of the few computer sports simulations that itself requires athletic dexterity. Avant-Garde, Box 30160, Eugene, OR 97403. $29.95. *2/82.*

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Rendezvous. Huntress. Space shuttle simulation in 3-D, created by senior scientist at JPL. Orbit earth, match orbit, and dock with space station. Authentic, demanding. Edu-Ware, Box 22222, Agoura, CA 91301. $39.95. *7/82.*

RobotWar. Warner. Strategy game with battling robots is teaching device for programming. Muse, 347 N. Charles St., Baltimore, MD 21201. $39.95. *1/81.*

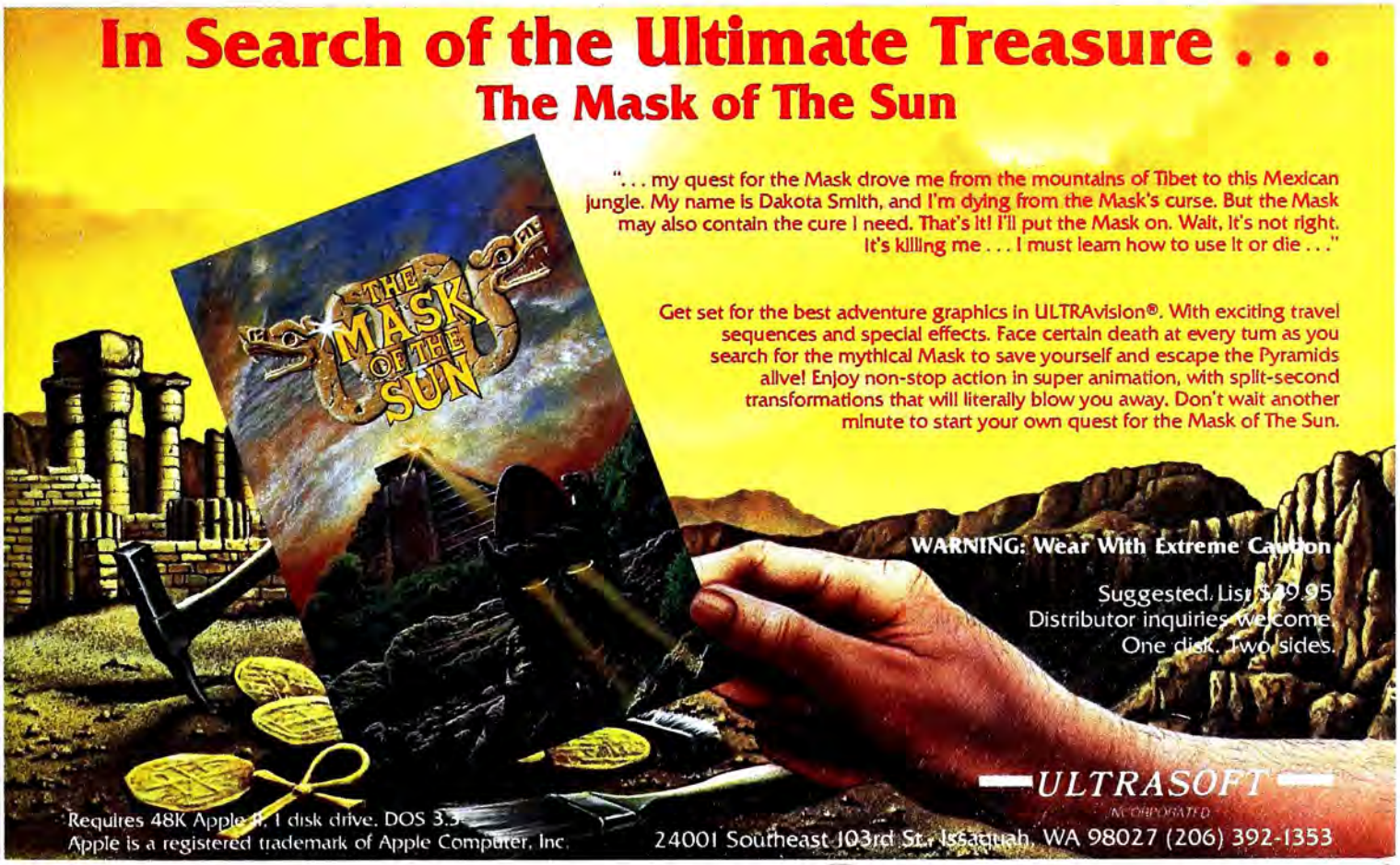
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S.E.U.I.S. Combines two game genres. Build the ships and create your fleet like in a strategy game; actual ship-to-ship combat is like a shoot-'em-up arcade game. Variety of scenarios. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $39.95.

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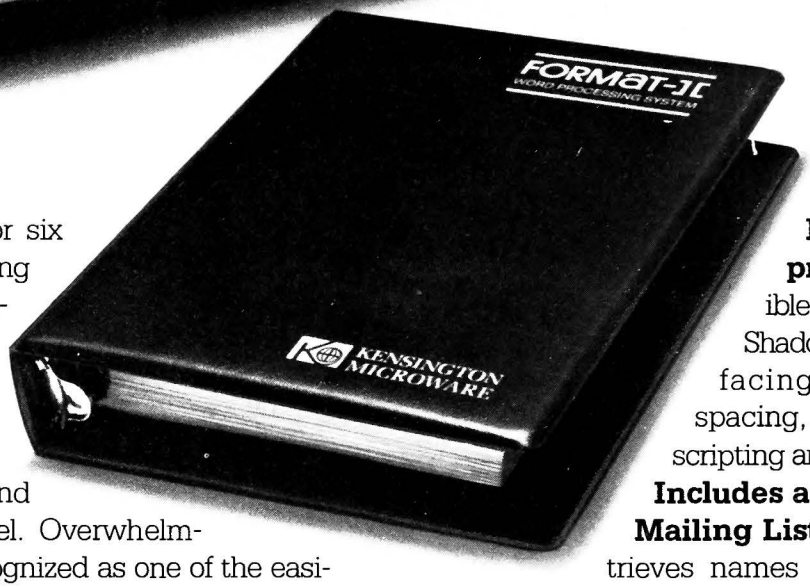
Spitfire Simulator. Air flight simulator—Spitfire in combat with German Aces—with 3-D scenery and moving target aircraft. Mind Systems, Box 506, Northampton, MA 01061. $40. *12/82.*

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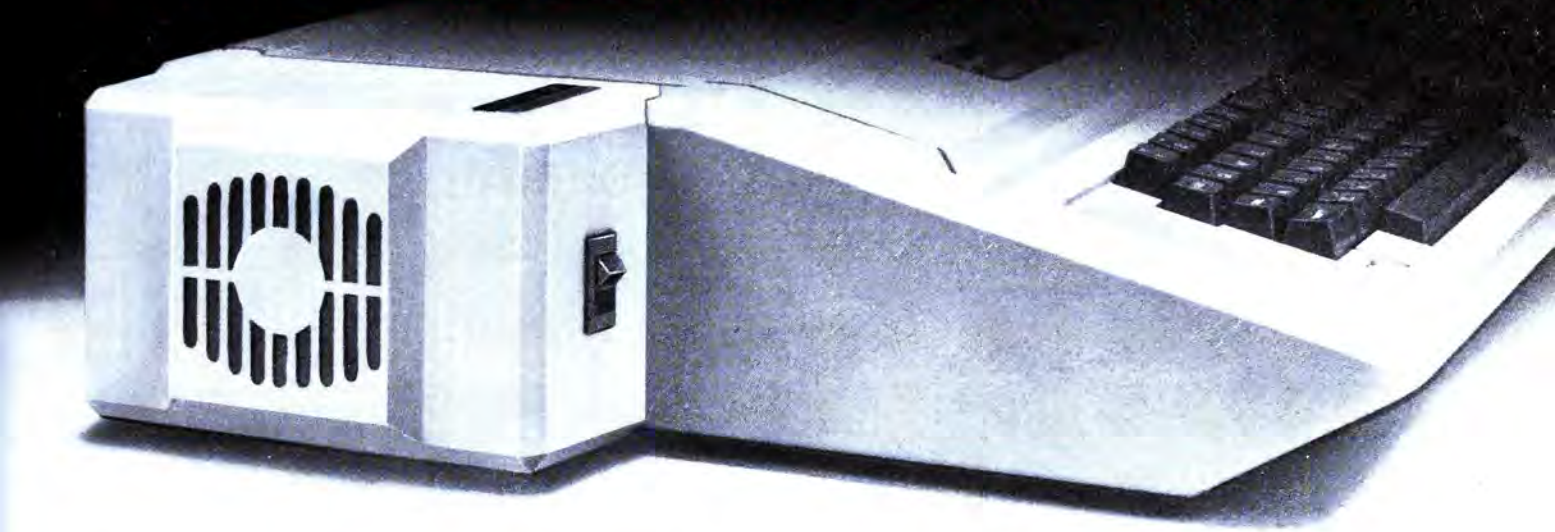
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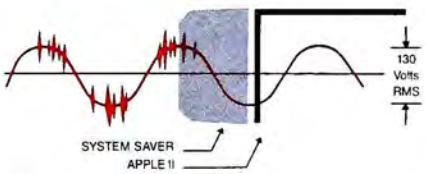
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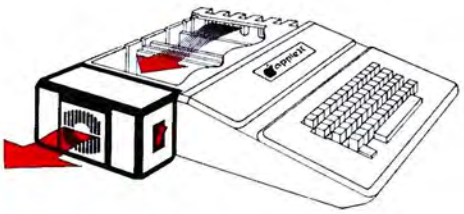


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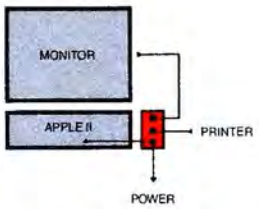
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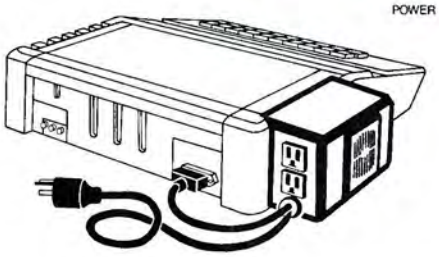


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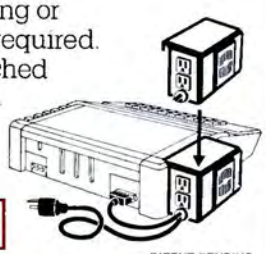




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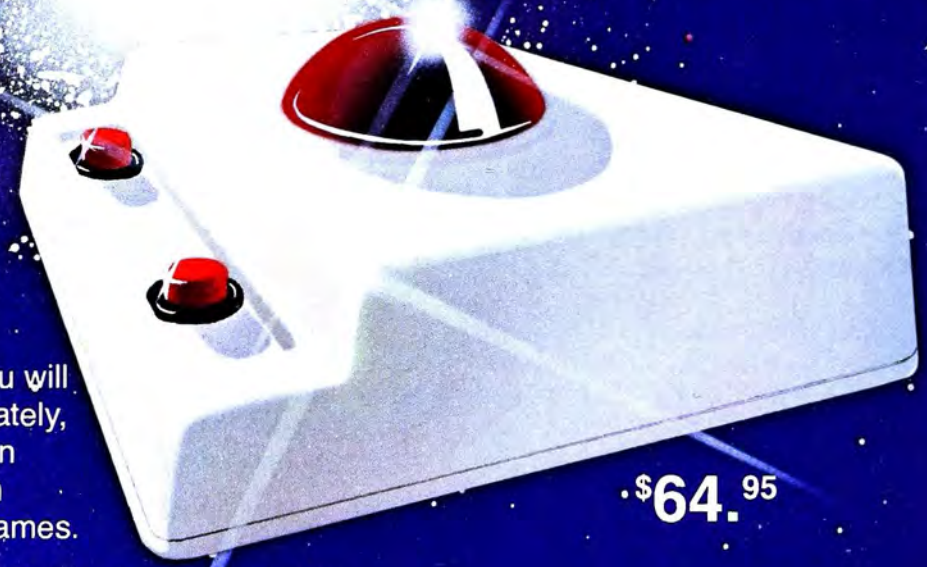
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LISA 2.5. Hyde. Long-time popular assembler with extended mnemonics and more than thirty opcodes. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $79.95.

Master Diagnostics. Twenty-four tests that check your Apple for component malfunctions and suggest replacement. Software Source, 17905 Ventura Blvd., Encino, CA 91316. $69.95. *8/82.*

Merlin. Does assembly language programming with a dozen editing commands and twenty-eight pseudo-ops. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $64.95.

●**Program Line Editor.** Program development and modification program with more than eleven editing commands, listing control, lower case, and programmable cursor control. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $40.

The Routine Machine. Meyer. Programming tool that extends Applesoft. Library of routines; install your own; no programming knowledge necessary. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $64.95. *12/82.*

●**Super Disk Copy III.** Hartley. Easy-to-use menu-driven software utility; transfers all types of DOS files. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $30. *10/81.*

TASC. Peak, Howard. Applesoft compiler. User controls locations of three memory compartments. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $150. *9/81.*

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

Word Processing

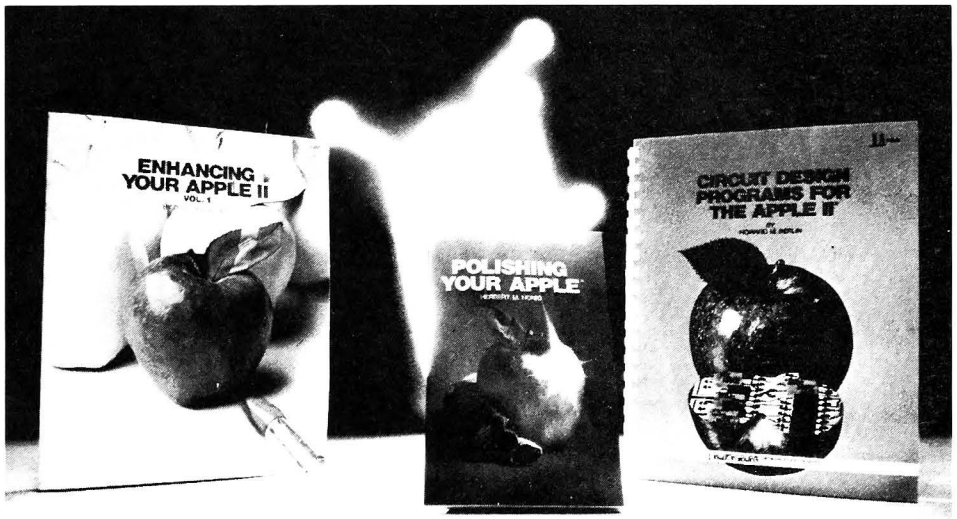
Apple Writer II. Lutus, Finstead. Written in word-processing language. Additional editing features and functions menu; continuing features and functions menu; continuous readout of character count and length. Apple/Special Delivery, 20525 Mariani Ave., Cupertino, CA 95014. $150.

Apple Writer IIe. Shift, shift-lock, and tab with the keys of the same name, four-arrow cursor control, and a delete key. Takes full advantage of the IIe features. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $195.

Apple Writer Extended Features. Malachowski, Cooper. Enables production of multiple copies of *Apple Writer* files and insertion of variables; converts Applesoft programs to *Apple Writer* and vice versa. Brillig Systems, 10270 Fern Pool Ct., Burke, VA 22015. $34.95. *7/81.*

Bank Street Writer. Kusmiak, Bank Street College of Education. This one is designed for use by the whole family. Universal search and replace, inverse highlighting, and word wrap are standard. Upper and lower case without hardware. On-disk tutorial is included. Takes advantage of memory, keyboard on IIe, if you have one. Broderbund, 1938 4th St., San Rafael, CA 94901. $69.95.

Dictionary. Expandable 25,000-word spell checking program for *Superscribe, Screen Writer, Apple PIE,* and *Apple Writer.* Instant look-ups and corrections. Sierra On-Line, 36575 Mudge Ranch Rd.,



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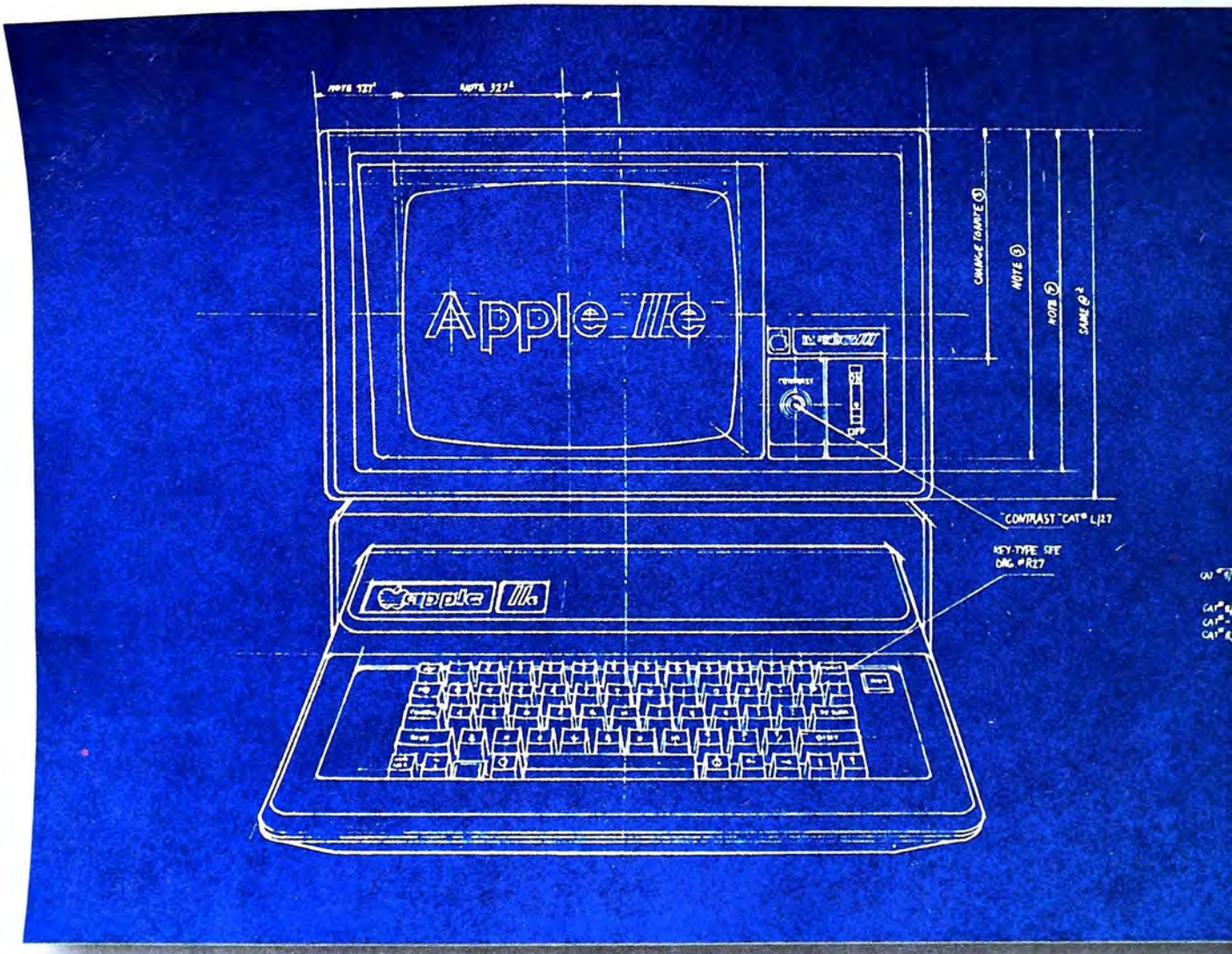
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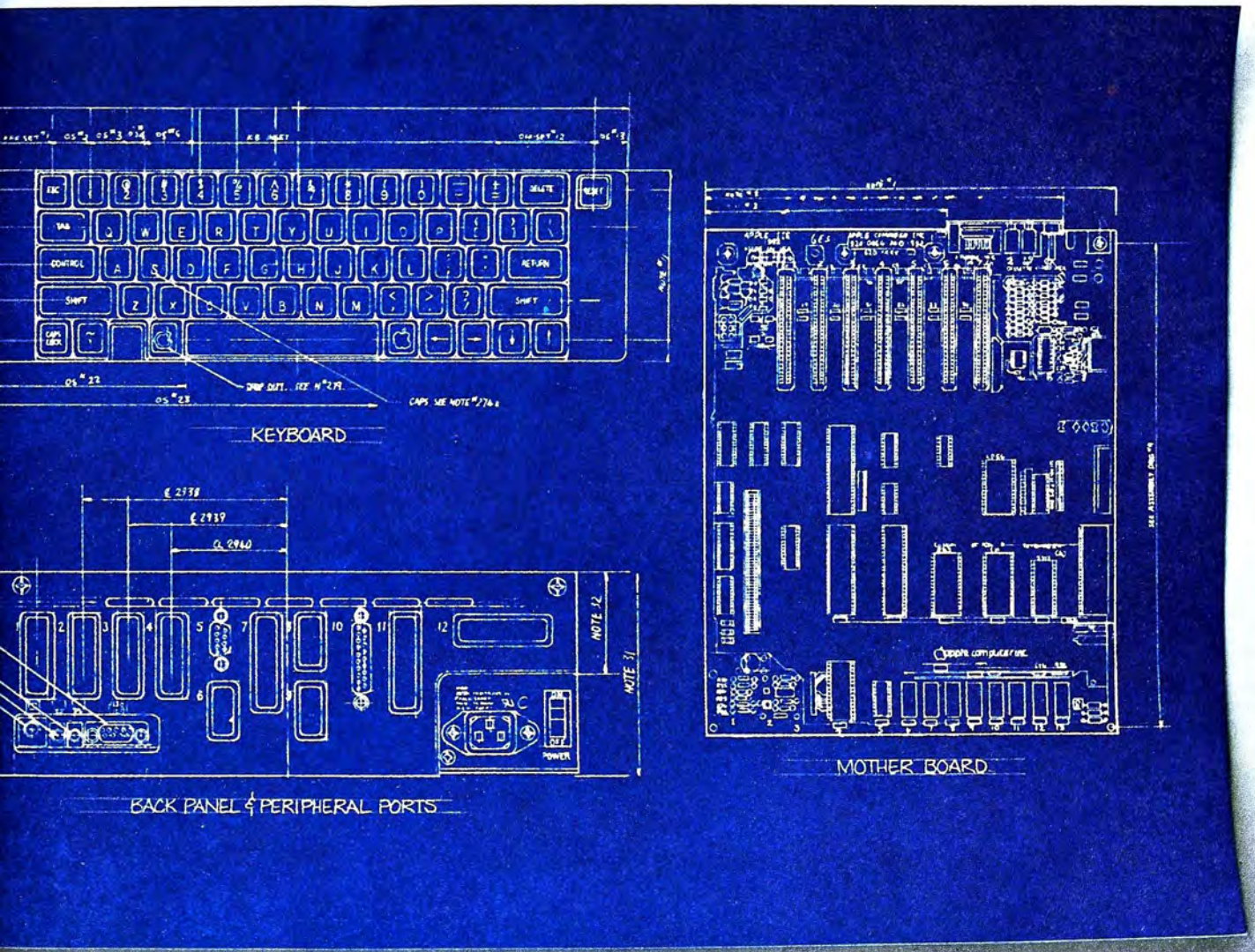
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Coarsegold, CA 93614. $99.95.

EasyWriter. Word processor; choose 40 or 80 column version. Information Unlimited, 2401 Marinship Wy., Sausalito, CA 94965. $99.95.

Executive Secretary. Editing, printing, and form letters, plus mail merge and electronic mail system. SofSys, 4306 Upton Ave. S., Minneapolis, MN 55410. $250.

Format II. Word processor with logic-sorting mailing list. Justifies type, wraps text; has one-key editing, menu prompting. Kensington Microware, 300 E. 54th St., Ste. 3L, New York, NY 10022. $250.

Letter Perfect. Format-flexible word processor with ability to send control codes within body of program. Works with database files from *Data Perfect*. LJK, Box 10827, St. Louis, MO 63129. $149.95.

Magic Window II. 40, 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.

Perfect Writer. Powerful, easy-to-use word processor. Advanced document design features indents, subheads, footnotes, quotations. Requires Z-80 card and 80-column board. Perfect Software, 1400 Shattuck Ave., Berkeley, CA 94709. $389.

PIE Writer. Business processor that allows 9,999 pages. With word deletion, auto indent, spooling, and typeahead buffer. Hayden, 50 Essex St., Rochelle Park, NJ 07662. $149.95.

PowerText. Does memos, letters, reports, and manuscripts without formatting each time. Good balance of automatic and user-defined functions. Beaman Porter, Pleasant Ridge Rd., Harrison, NY 10528. $199.

ScreenWriter II. Kidwell, Schmoyer. Formerly *SuperScribe II*. No extra hardware for lower case, 70-column display, printer spooling. Edits Basic, text, and binary files; complete search and replace. IIe version uses eighty columns, natural u&lc, shift key, and all available memory. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $129.95.

Sensible Speller. Spell-checking program sports listable 85,000 words, extensible up to 110,000 words. Recognizes contractions, gives file word counts, incidence of a single word, and number of unique words. High marks for clear, logically organized documentation and simplicity of operation. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $125. *1/82*.

Super-Text Home/Office (40/56/70). Zaron. Get 40, 56, or 70 columns without hardware. Design your own character sets. Basics of text editing. Character-oriented, floating-cursor edit with add, change, print, and preview modes. Muse, 347 N. Charles St., Baltimore, MD 21201. $125.

Super-Text Professional (40/80). Automatic eighty-column and upper and lower case on equipped IIe; with appropriate equipment on II Plus. On-screen formatting and on-line help reference guides on IIe. Muse, 347 N. Charles St., Baltimore, MD 21201. $175.

Videx Preboot Apple Writer. Eighty-column display for *AppleWriter II* with upper and lower case input from keyboard Enhancer II and Videoterm compatibility. Videx, 897 N.W. Grant St., Corvallis, OR 97330. $19.

Word Handler II. Elekman. Wonderfully simple program with straightforward documentation. Allows folded paper printout for two-sided printing. Silicon Valley Systems, 1625 El Camino Real, Ste. 4, Belmont, CA 94002. $199. *11/82*.

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

Zardax. Philips. Highly recommended. Single program includes all standard word processing features with considerable extras including communication by modem. 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; accesses remote information services, minis, and mainframes. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

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

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

Apple Writer III. Lutus. Uses WPL (word processing language) to automate the process of 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.

Basic Extension. Extension of Business Basic using disk, array, and utility routines as invokable modules. Machine language; nonmodifiable. Foxware, 165 W. Mead Ave., Salt Lake City, UT 84101. $95.

Catalyst. Allows boot from hard disk; transfers all programs to ProFile. Quark Engineering, 1433 Williams, Ste. 1102, Denver, CO 80218. $149.

Data Manager III. Expansion of *Data Factory* allowing 32,000 records per file. Customizable screen display and printing. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $750.

Data Reporter. Flexible database management system. Does form letters, patient files, labels, calculations, inventories, and employment records. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $220.

dBase II. Speedy relational database management system. Requires Z-80 card. Ashton-Tate, 9929 Jefferson Blvd., Culver City, CA 90230. $700.

DeskTop Plan. Sophisticated financial analysis and modeling tool; allows up to four data series on a line chart. More than an electronic spreadsheet. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $300.

EASy. Executive accounting system with accounts receivable, accounts payable, and general ledger. Denver Software, 14100 E. Jewell Ave., Ste. 15, Aurora, CO 80012. $749.95.

Hardisk Accounting Series, 2.0. General ledger, accounts receivable, and accounts payable each handle up to 32,776 customers or accounts; inventory features five methods of evaluation. Also payroll, management analysis, and mailing labels. Great Plains Software, 123 N. 15th St., Fargo, ND 58102. $395 to $595 per module.

Lexicheck. Spelling checker that runs from inside *Word Juggler*. Thirty thousand-word dictionary; add your own words. Eight thousand-word legal dictionary disk also available. Quark Engineering, 1433 Williams, Ste. 1102, Denver, CO 80218. $145.

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

Merge III. Files utility package allowing data files created by *Apple Writer III* or *Personal Filing System* to be merged with any document created by *Apple Writer III*. Forsythe Computers, 521 Olive St., St. Louis, MO 63101. $50.

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

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

PFS:File. Page, Roberts. Form-oriented information management system allows storage and retrieval of 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. $125.

PFS:Report. Page. Generates reports; performs functions that require sorting, calculating, and manipulating data filed with *PFS*. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125.

Program Writer/Reporter. Basic database code generator that creates interactive, standalone programs. Vital Information, 7899 Mastin Dr., Overland Park, KS 66204. $200.

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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. Designed for corporate-wide modeling applications; allows managers to develop sophisticated templates that can be filled in by novice users. Numerous other new features, including on-screen help, IRR and calendar functions, macro facility, variable column widths, locked cell values, and hidden cell contents. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $400.

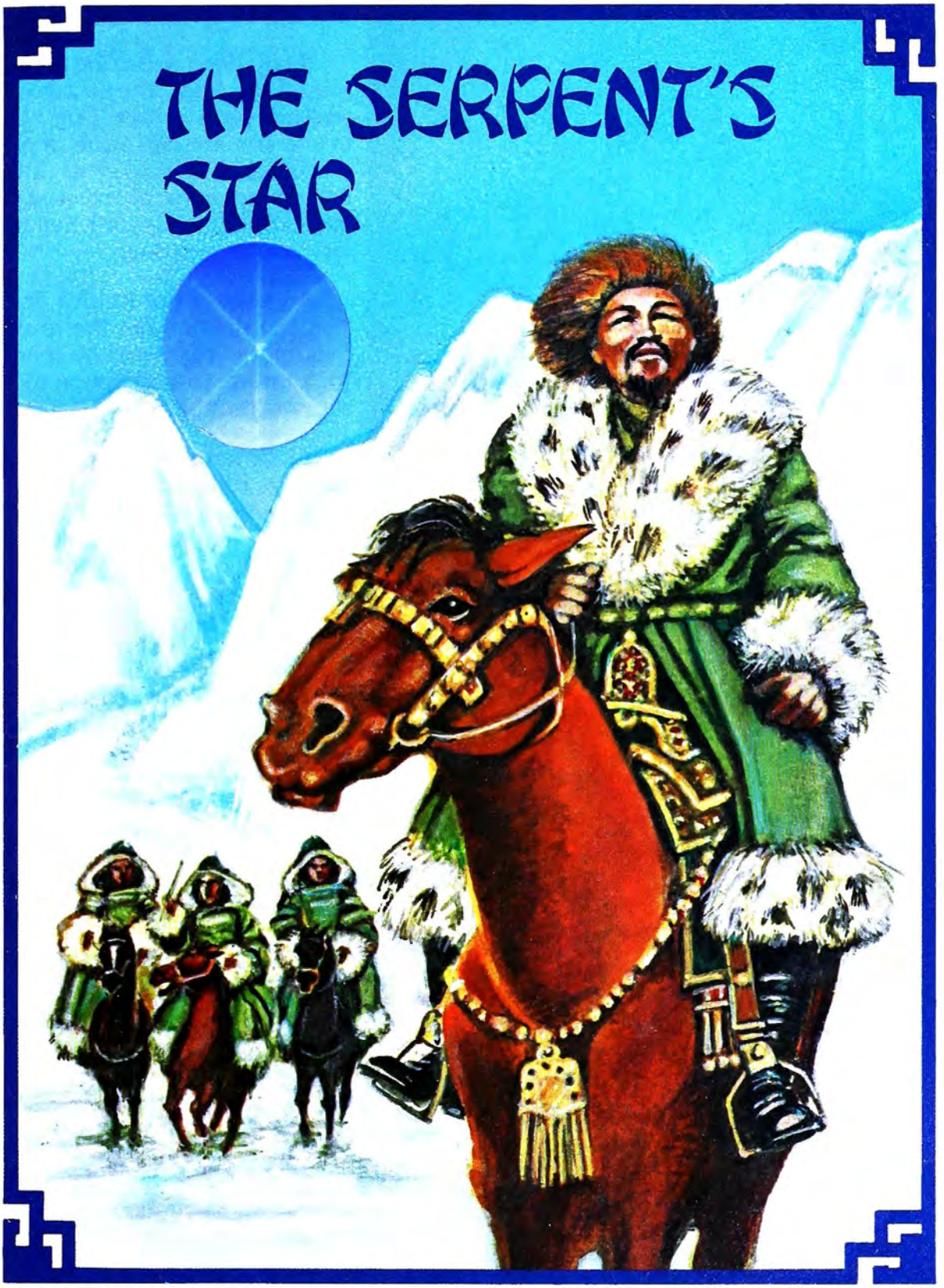
VisiCalc III. Software Arts, Bricklin, Frankston. Just like it sounds; expanded memory, lower case, 80 columns. Four-way cursor movement. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250.

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

Word Juggler. Gill. Word processor makes use of upper and lower case keyboard, 80-column display, and expanded memory. Printout can be reviewed on screen prior to printing; multiple copies printed of selected pages. Quark Engineering, 1433 Williams, Ste. 1102, Denver, CO 80218. $295. *12/82*.

Word Weaver III. Fast word processor with unique feature: it can print out in shapes. Allows line spillover, does insert and delete, prints multiple files. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $99.95. ❑■

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OPEN DISCUSSION

Polemic from a Fellow Pawn

As a subscriber to *Softalk* by default and part-time Apple user I find myself perusing Open Discussion for useful insights and tips on software or equipment. What I find immaterial, and occasionally disturbing, is the tendency of the editors, advertisers, and contributors to engage in flights of metaphysical fancy. This is often coupled to purportedly serious ethical wrangling over, first, the connection of a piece of software to the material universe (usually a game) and, second, the taking to task of the author or producer of such an entity for engaging in some sort of pandering, propagandizing, or other manifestation of moral turpitude.

The latest example is the hassle over *Spitfire Simulator* (which I have neither seen nor intend to buy), and it has been preceded by similar finger pointing and breast beating over such offerings as Muse's *RobotWar*. Do the editors of *Softalk* seriously believe there is a connection between actual war and a computer simulation? Does the management of Mind Systems Corporation seriously believe that the use of the term "warmonger" would refer to the players of a computer game, that is, in the *actual* sense?

I am willing to accept the notion of criticism of these products when there is a clear point of reference. For instance, if the graphics of a particular game are substandard, the point of reference would be the opinion of the reviewer who has presumably seen many games and has a point of reference from which to speak. Moreover, that point of reference may not be readily transferable into objective data.

As for the ethical poppycock and almost tearfully defensive responses—if anyone out there really thinks that hi-res robots, pixelish planes, and binary bimbos need to be justified, then we must, by all means, take Parker Brothers to task as the producers of *Monopoly*, that *Grand Guignol* of capitalism that's used to brainwash the young into complacent tools of the cryptofascist elite. Better still, let's go all the way to the bottom line and eradicate chess, war game of war games. Comrades, we can save the ranks of the poor proletarian pawns from being callously sacrificed at the whim of the evil king and queen! We will create a workers' paradise where all pawns will have equal rights to all shortages, and. . . .

John Avelis, Jr., White Heath, IL

Saluting the General

Last February I purchased Sierra On-Line's *General Manager* and it has proven to be extremely useful to me in my business. I've used it for order entry, invoicing, accounts receivable, and a host of other applications. Now I've got the 2.0 version, and any bugs that may have existed in previous versions have been exterminated. In addition, the new version adds tremendous flexibility in reporting and the search speed is vastly improved. The manual is very clear and the program is versatile. My system is now up and running on a Corvus Omninet. I recommend it highly to other *Softalk* readers.

William Kaufman, Long Island City, NY

Documentation Diatribe

There are software houses producing quality products. It is apparent from their programs and accompanying documentation. In my opinion, these companies are the ones that will still be in the marketplace five years from now. The difference between a well-written, well-edited, and thoroughly tested user manual and one that was put together as an afterthought gives me enough reason to purchase one program over another. The days are gone, or nearly so, of personal computer users tolerating programs that almost work and manuals that are rife with typos, misleading and confusing information, and slipshod writing and organization.

Because there are software companies producing quality products, I have a choice in purchasing software for my Apple. I will never buy a program marketed by a company that thinks so little of the user that it sells inadequate documentation, when, for the same money, I can purchase a program that instills confidence in the image projected from a well-written, well-presented manual.

Carol J. Manley, Issaquah, WA

Double Your Pleasure

I recently purchased *The Accountant* by Decision Support Software. My aim was to purchase an inexpensive piece of software that would allow access to my business transactions for my secretarial business. I required a system that would do more than balance a checkbook. I wanted one that would perform basic accounting functions and be reasonably priced. *The Accountant* has met these criteria for me.

Designed by E. Forman, who clearly demonstrates a keen perception of the user's needs, *The Accountant* utilizes the double-entry accounting method and requires the insertion of a key (series of pins) into the game I/O socket of the Apple II Plus. On first inclination I thought this would be too complicated for the novice. However, with just a few hours of reading the instruction manual and following the demonstration exercise, I recognized the power of the program. It not only keeps track of numerous balance sheets for user-defined accounts, but it also provides several options of printing account transactions. It provides codes and inverted pointers for quick retrieval of specially identified transactions or accounts. Outstanding billings can be tracked by identifying them with a code. By setting up group accounts, a profit and loss statement can be obtained. I find that the use of the calculator is quite convenient when calculations are required before dollar amounts can be entered during a transaction.

The double-entry accounting method allows flexibility in defining accounts for specialized needs, and it was through *The Accountant* that I learned the importance and power of double-entry accounting. It's really not difficult.

At first I was not comfortable with inserting the key into the game socket each time I used the program. Mr. Forman suggested using a zero-force port extender. One end fits into the game socket, and the zero-insertion force receptacle mounts conveniently on the outside of the computer. In this way there is no need to go inside; and the key allows the user to make an unlimited number of copies for business or personal use. It's not at all inconvenient. *The Accountant* is an excellent program and well worth the price.

Theodore J. Roseman, Portage, MI

Eagle-Eyed Reading

We appreciate the careful review of the *Zardax* word processor by Peter Olivieri in the November '82 *Softalk*. Harking back to the feature article, we feel we have the eagle in a world filled with word processor turkeys. Although the re-

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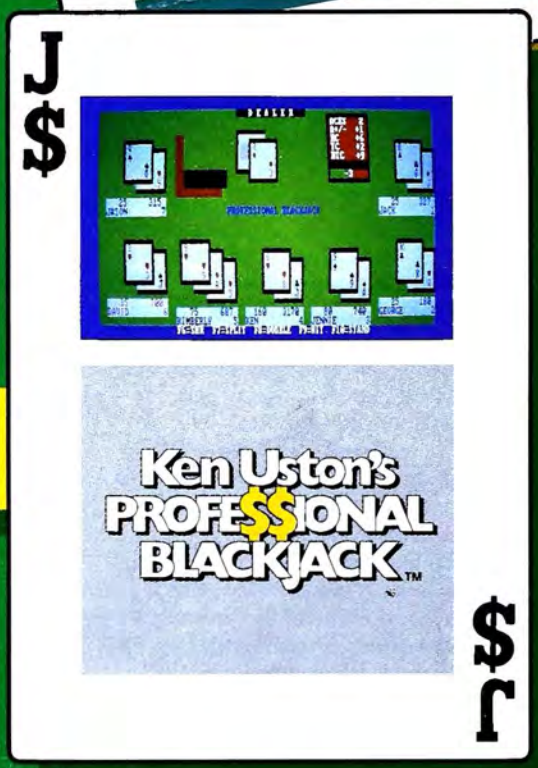


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IBM PC* requirements:
48K RAM, disk drive, PC DOS,* 80-character display. Color and monochrome versions supplied with each package.

APPLE II requirements:**
DOS 3.3, 48K RAM, disk drive, 40-character display.

Osborne 1™ requirements:
Standard Osborne 1 package.

Display shows actual photograph of IBM PC version. Apple color graphics and Osborne monochrome graphics are similar.

Versions for Atari,** TRS-80** and other brands will be available shortly.

intelligent statements™

GROWN-UP GAMEWARE™

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view didn't miss much, there are a few points we'd like to clarify.

First, the file size in *Zardax* is not limited to 13,500 characters. This is the limit only for 48K machines without an eighty-column card. With both eighty columns and a 16K RAM card the maximum is more than 30,000 characters per file. In addition to the eighty-column cards that were mentioned, we work with the Vantec 80, STB-80, Viewmax-80, Magnum-80, and others not yet available in the American market. *Zardax* is also available for the Franklin Ace 1000. We are at work on support for RAM cards and other disk drives.

Printer formatting normally is done through embedded standard controls. At last count there were something like nineteen different protocols supported. We wish the printer manufacturers would standardize! In any case, subscripting and superscripting are not limited to letter-quality printers. The newer dot-matrix machines such as the type three Epsons do it nicely.

Finally, the Fastalk column notes each month that our "considerable extras" include "communication by modem." Our telecommunications package, *Zip-Comm*, is new. It works in forty or eighty columns, at up to 1200 baud, and from within *Zardax*. It is, however, an option and is priced at $80.

Thanks again, and congratulations on the new post office–resistant binding.

David A. Lingwood, Action-Research Northwest, Seattle, WA
Ian Phillips, Computer Solutions, Brisbane, Australia

Ribbit, Ribbit, Ribbit

I fully agree with your reviewers regarding *Frogger*. Sierra On-Line does not deserve good reviews just because of its being Sierra On-Line, regardless of whether the company has the rights to the "official" version.

As for reviews in general, I would like to see a zero to four star rating system. For instance, four stars would go to a startling advance in the state of the art, three if it's just a cute idea, two would mean only buy it as a gift, and with one star you'll know it might as well be a blank disk. Even better would be a simple statement of whether the package is worth the money. You can cite good and bad points all day, but there should be a final, absolute judgment. I have read *Softalk* since the beginning and have been able to count the negative reviews on one hand. Aren't there any die-hard cynics on your staff, people who would find fault in all but four or five games per year?

What about a simple list of the new products for the month? Fastalk is a so-so idea, but when does *Wizardry* get a bullet? Graphically Speaking is an excellent column. Most, if not all, series on graphics have ended like this: Apple II graphics—part 120 of 120: shape tables!

All I have to say about Penguin's new nonprotection policy is that, at $59.95, software had better be copyable and modifiable.

One more thing: how about putting a couple of blank lines between software reviews—it would make them a lot less confusing to read.

D. Ladd, Lisle, IL

Reasoning through Beliefs

Fundamentalists will grab any pretext to put forth their fervently held beliefs. Howard Balsam's letter in November '82 Open Discussion gives cursory applause to David Hunter's farm article and then launches into an attack on evolutionary science. Because of the half-truths and misleading content I am prompted to reply.

Mr. Balsam states, "It is truly impossible to scientifically prove or disprove any particular concept of origins." Then he goes on to imply that the scientific method requires an observer to make evolution valid.

The scientific method requires tests, not necessarily observers. When was the last time anyone saw a subatomic particle? We make testable inferences to tell us the particle is there. In a like manner, fully testable predictions and retrodictions are abundant in all the historical sciences. To see the evidence all one has to do is put aside prejudices and look at amino acids, animal breeding, fossil records, resistant bacterial strains, or similar examples from other related fields.

Mr. Balsam also misused the often misquoted second law of thermodynamics to explain that life cannot become more complex. This would leave one with the annoying prob-

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- ASSEMBLER TEACHER is written by John Fairfield, a Ph.D. in Computer Science who regularly teaches assembler. A RAM Mini-Assembler is included.

"Rating: A . . . a great help to anyone interested in learning machine language programming . . . and the price is right." Peelings II (Jan. '82)

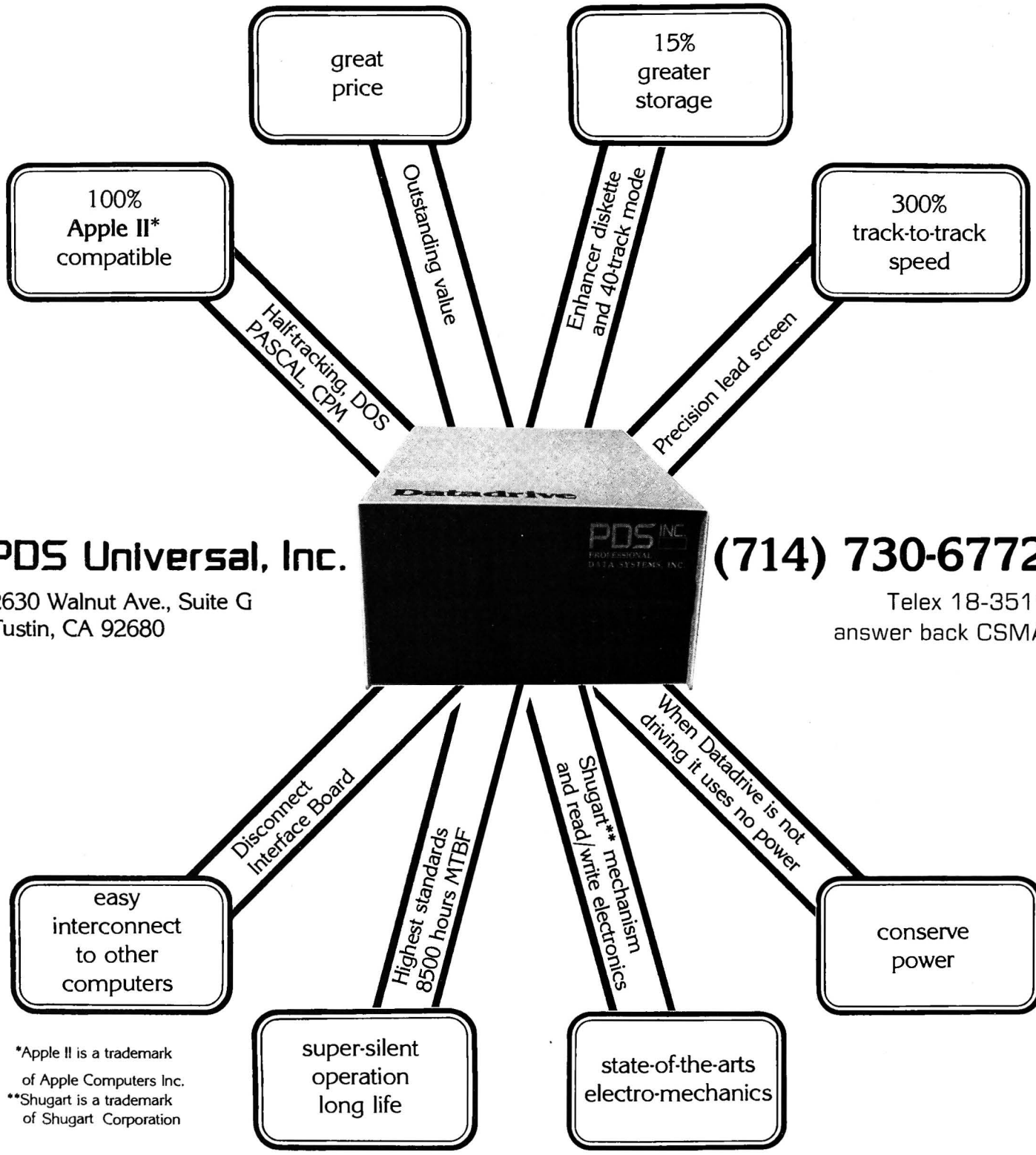
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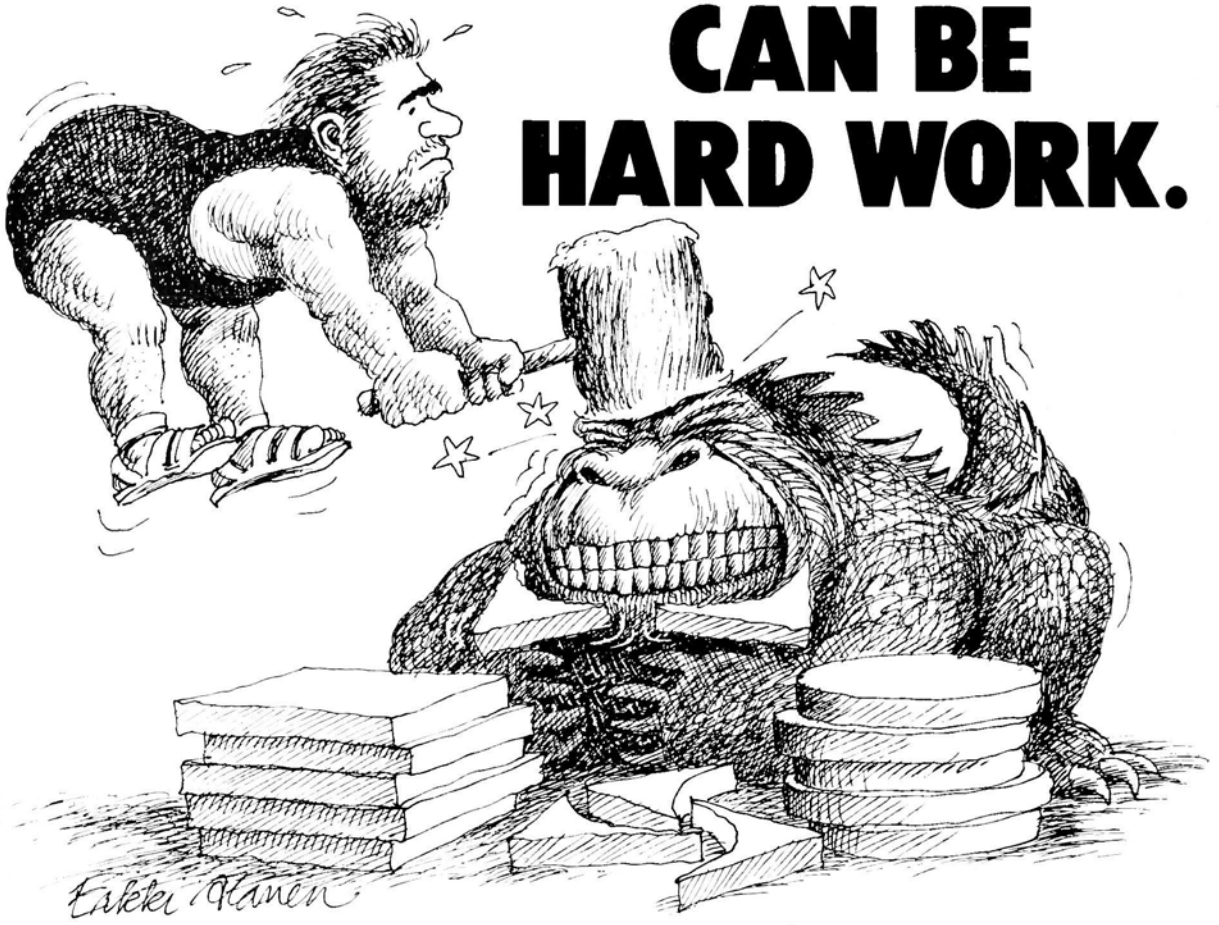
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lem of explaining how a single cell can become a multibillion-celled human being in nine months. It also conveniently forgets that this law deals with a closed system, and that Ilya Prigogine was given the Nobel Prize in chemistry for showing that the influx of solar energy places living matter in a temporarily open system.

Everyone is entitled to their personal beliefs. Science, however, must deal with the acquisition and analysis of data and the synthesis of that data into the most logical theory currently possible. It serves no purpose but to confuse the reader when half-truths and misinformation are used to support personal beliefs at the expense of science.
Richard P. Gensmer, Littleton, CO

Let's Talk Turtle
In November '82 *Softalk* the Young Peoples' Logo Association was mentioned in "The Voice of the Turtle" tutorial by Donna Bearden. Do you know how to get in contact with this group? Thanks for your help.
Judy Olson, Edmond, OK

The address of the Young Peoples' Logo Association is 1208 Hillsdale Drive, Richardson, TX 75081; the phone number is (214) 783-7548.

Selective Trash Picking
This is in response to the letters in Open Discussion from Lynn Leopard and Richard Norling (November '82) and Charles Wells (September '82).

Richard, save yourself a lot of trouble and get the January 1981 issue of *Call–A.P.P.L.E.* Randy Wiggington presents an assembly language routine that does exactly what you want.

Lynn should refer to my articles "Garbagemen Strike" and "Weed Out the Trash" in the August and November 1982 issues of *Call–A.P.P.L.E.* I describe an Applesoft programming technique called selective string preservation. Proper use of this technique will eliminate the need for garbage collection altogether. Lynn's database sounds like a perfect place to apply it. Random-access database programs are very easy to backfit with selective string preservation. Every time a record is written out to the disk, you reset the string space pointers to where they were before any of that data was entered. In that way, the next record you enter goes into RAM in the same space as the one before, so you never run out of room. You throw away the old data as soon as it becomes garbage instead of letting it build up to become a monumental task.

File Cabinet is another story. Since it uses sequential files the entire database must be maintained in RAM. This makes selective string preservation very difficult, if not impossible. I have experienced garbage hangups with *File Cabinet* but have not yet done anything about it. As Charles Wells said, garbage collection is the price paid for variable-length strings. But it doesn't have to be so painful! Perhaps the fast garbage collection routine would be the best compromise for *File Cabinet.*
Clay Ruth, Dyer, IN

Words of Wizdom
Wizardry experts, help! Where is the entrance to level ten? Where are the stairs going back to level eight? I haven't found them yet; I get to level nine from the buttons. Is there an outer limit to level three? What good are the keys? Is the frog statue of any use? What are the requirements for a ninja? What good is a jeweled amulet?

In *Knight of Diamonds* my current party is just now beginning to make level twelve of experience. I have mapped most of level one. The dark area is one unknown area. I cannot map very far without getting killed. Can anyone give me some information on this area? Is it a requirement to be level thirteen before advancing to level two? Does the shade of Gnilda have anything to do with the level one riddle?
Matt Lentz, Blue Earth, MN

You haven't covered every square of level nine, have you? You can't miss that entrance if you map the whole thing by being there. There are no stairs to level eight from level nine. Whatsamatta, you don't like elevators? Is there an outer limit to level three? Why, yes. The keys and the frog—try going without them. Ninjas are evil and very strong. What good is a jeweled amulet? What good is hitting a home run?

The dark area of level one of Knight of Diamonds *is very dark. You need to map it. Go back to* Wizardry *and grow stronger. You should be*

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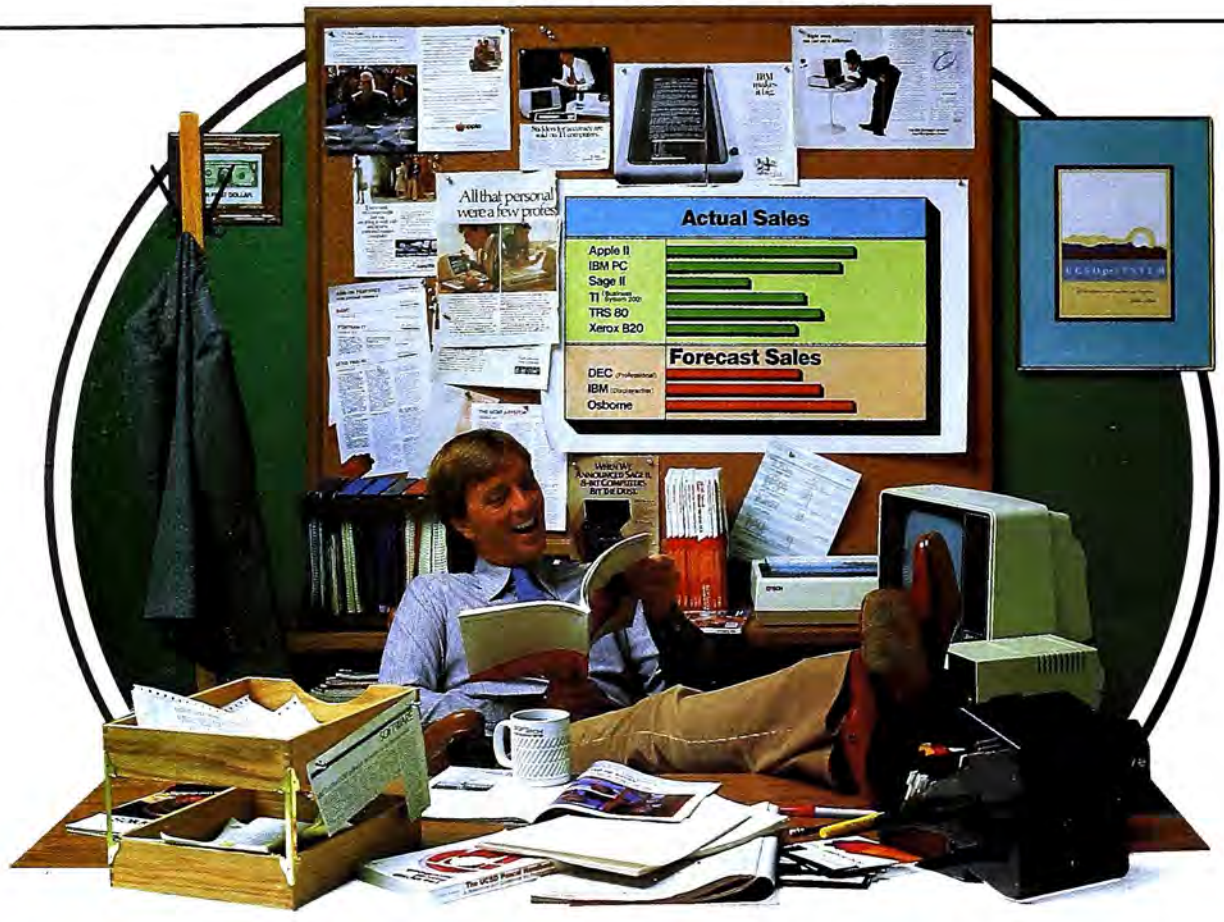
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level thirteen minimum to go into Knight of Diamonds *at all. And the shade of Gnida? No.*

How To Get Stuffed

I've got a couple of questions. First, does anyone know a way to load DOS into a language card? Second, how do the software companies get their products in *Softalk*'s Christmas gift guide?

Chris Riley, Pompano Beach, FL

With one exception, any company that produces or publishes Apple-oriented products may contribute at no charge to the holiday gift guide. Companies are asked to write their own product descriptions according to a format Softalk *provides. The one excepted category is discount sales.*

That Program Was Dipsy

Since I have the Epson 80 with Graftrax I decided to try the program from the "Hi-Res Dumpster" letter that was in the December Open Discussion. After loading into memory the hi-res picture and then running the program, I discovered the printer would stop after about thirty-four lines. In reviewing the program I noticed that line 230, which makes sure that the high bit is clear, needed to be changed:

```
230  IF C1 > 127 THEN C1=C1-128:REM
     RID HIGH BIT
```

Also, I would like to recommend *The Other Epson Manual* for the Apple II and the MX-80 with Graftrax 80 from Cut the Bull Software of San Diego, California.

Jerry White, Pittsburg, CA

You Are What You Count

I have written a program *Softalk* readers might be interested in. It was inspired by the hi-res turkey contest in the November issue. We started out like probably hundreds of others diligently counting turkeys. We remembered all the rules—only count the hi-res turkeys, not those in pictures. After five minutes or so of this tedious task a vision came to us. We knew right then what our mission in life was to be (at least for the evening). We were to help free people everywhere from ever counting another turkey. We were to write a hi-res turkey counter!

With this quest in mind, we drew a turkey to help people identify what turkeys really look like. Once our turkey had taken shape we could see clearly how the program was to be written. To make a short story even shorter, we have completed our mission. The hi-res turkey counter is a reality and we are entrusting it to *Softalk*'s care. Pass it on to Appledom and make this world a better place to live. (By the way, we got too interested in the turkey counter program and never did go back to totaling the turkeys up.)

```
10  REM TURKEY COUNTER PROGRAM
20  REM BY VALERIE A. FLOETER
30  REM THE SOFTWARE EXPERIENCE
40  REM NOVEMBER 1982
50  REM INSPIRED BY THE TURKEY
51  REM CONTEST
60  REM SOFTALK, 1982
65  POKE 232,252: POKE 233,96
70  PRINT CHR$ (4)"BLOAD TURKEY"
80  GOSUB 1000: REM OPENING SCREEN
90  GOSUB 2000: REM DISPLAY TURKEY
100 GOSUB 3000: REM COUNT TURKEYS
    FOUND
110 GOSUB 4000: REM ENDING SCREEN
120 END
1000  HOME : VTAB 10: HTAB 10
1010  PRINT "HI-RES TURKEY
      COUNTER": PRINT
1020  HTAB 10: PRINT "INSPIRED BY
      SOFTALK": PRINT : PRINT
1030  HTAB 6: PRINT "WRITTEN BY
      VALERIE A. FLOETER"
1040  HTAB 13: PRINT "NOVEMBER 1982"
1050  PRINT : HTAB 9: PRINT "HIT A KEY
      TO CONTINUE.": GET A$: PRINT A$
1060  :
1070  HOME : HGR : HCOLOR= 7:
      SCALE= 1: ROT= 1
1080  FOR I = 1 TO 20
1090  X = INT (300 * RND (5)): IF X < 20 OR
      X > 260 THEN 1090
1100  Y = INT (200 * RND (6)): IF Y < 20
      OR Y > 180 THEN 1100
1110  DRAW 1 AT X,Y
1120  NEXT I
1130  :
1135  VTAB 21
1140  PRINT : HTAB 13: PRINT "A TURKEY
      PATCH": FOR I = 1 TO 2000: NEXT I
1150  TEXT : HOME : VTAB 10
1160  PRINT "THIS PROGRAM IS
```


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C.O.D. VISA

```
      DESIGNED TO HELP READERS
      COUNT TURKEYS. IT SHOWS YOU
      HOW TO IDENTIFY A TURKEY AND
      THEN HELPS YOU MATCH
      TURKEYS FOUND IN THE
      NOVEMBER"
1170  PRINT "SOFTALK ISSUE. AS YOU
      FIND TURKEYS, IT KEEPS TRACK
      OF THE NUMBER YOU HAVE
      LOCATED."
1180  PRINT : PRINT "GOOD LUCK ON
      YOUR WILD TURKEY SAFARI."
1190  PRINT : PRINT "HIT A KEY TO
      CONTINUE.": GET A$: PRINT A$
1200  RETURN
2000  HGR : SCALE= 2: DRAW 1 AT 120,70
2005  PRINT : PRINT : PRINT : PRINT
2010  PRINT " THIS IS AN ENLARGED
      VIEW OF A TURKEY.": FOR P = 1 TO
      2000: NEXT P
2020  RETURN
3000  VTAB 21: PRINT "TURKEY
      COUNT; ":TC
3010  PRINT
3020  PRINT "DOES YOUR OBJECT LOOK
      LIKE THIS? ": PRINT " (N=NO,
      Y=YES, S=STOP)";
3030  HTAB 38: VTAB 24: GET A$: PRINT
      A$;
3035  VTAB 21: HTAB 1
3040  IF A$ = "Y" THEN TC = TC + 1:
      GOTO 3000
3050  IF A$ = "N" THEN 3000
3060  IF A$ <> "S" THEN 3030
3070  RETURN
4000  TEXT : HOME
4010  VTAB 10: PRINT "YOU FOUND A
      TOTAL OF ";TC;" TURKEYS."
4020  PRINT : PRINT "HOPE YOU FOUND
      THEM ALL."
4030  RETURN
```

Call-151

```
60FC:  01 00 04 00
6100:  41 C0 39 3F 38 3F 17 BF
6108:  17 17 36 36 15 15 BD 2A
6110:  AD 36 AE 15 AE 2E 15 15
6118:  45 15 45 28 15 C7 3B 3F
6120:  30 27 38 20 C5 29 20 C5
6128:  29 2D 28 28 20 C5 21 C5
6130:  21 2C 20 24 24 24 C7 21
6138:  24 2C 28 2C A8 3C 38 38
6140:  38 38 BF 17 36 AE 36 36
6148:  17 17 C7 39 C7 39 BF 3F
6150:  17 C7 39 38 C7 39 C7 39
6158:  17 17 AE 15 AD 2D D7 9A
6160:  3F C7 39 38 30 BE 36 36
6168:  15 36 15 AE 2E 2D 28 C7
6170:  38 38 C7 29 08 38 C7 39
6178:  A8 51 8A 51 2D 08 B5 AD
6180:  2E C5 29 C5 39 18 17 C7
6188:  B9 93 AD 11 15 36 D7 45
6190:  08 08 28 1F 2F 48 49 D7
6198:  9A D3 9A D3 92 C7 18 18
61A0:  C0 40 C0 40 C0 40 38 C7
61A8:  39 18 18 18 18 18 C0 08
61B0:  C5 21 45 08 08 08 48 49
61B8:  49 49 49 49 21 C5 A9 C5
61C0:  39 C7 08 00 FF FF 00 00
```

BSAVE TURKEY, A$60FC, L$C7

Now, after typing control-C, all you've got to do is run the program!

Valerie A. Floeter, Milwaukee, WI

Snugly Debugged

Paul Raymer's problem (December '82 Open Discussion) of missing material because of the goto statements in *Softalk* is shared by many readers I'm sure. His solution of using "Gosub page such and such" and "Return to page such and such" statements instead simply will not work, though! When returning to a page, one would eventually read on and get to the return statement again, thereby generating a "return without gosub" error.

To avoid this problem, I suggest structured reading. Namely, have a simple stack where, before saying "Goto page such and such" you say "Push this page number." Then, when you finish reading an article, you say "Pop a page number." If the stack is empty, read on. If not, run "Goto page so and so" as you do now (but using the number you got off the stack). This concept will solve these reading problems quite nicely without further complications.

By the way, I think *Softalk* is excellent reading. It's the best there is for the Apple. I don't know why anyone should complain about too much advertising. I usually read the advertisements first and the articles later in the month. Why don't you come out with a book compiling different articles into one volume. It would make excellent reference material. Keep up the good job; you deserve all the credit you get—and then some!

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GOTO 46

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exec penguin software



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If it laid an egg, it would fall down the back of the television set.

Publishing software can be fun.

Okay. It's a dog-eat-dog world. The powerful and wealthy are as desperate as the poor and unimportant. Information has become the lifeblood of our society, but its circulation isn't great. Everybody's looking for the answers or looking to get out.

Okay. Times are rough. The movie industry is struggling. The steel industry is gasping for breath. International Harvester is losing more money this year than Daddy Warbucks made in his whole life. Unemployment is out of sight. And no one can say for sure when the tide will change.

Chilly Willy caught the last train to the coast.

Okay. We're under the gun. Living for work and working for a living. There isn't a lot of room for mistakes, and the pressure is intense.

Okay already! It's bad, but at least one hope remains.

Publishing software can be fun.

"Penguins Don't Come from Next Door!" Penguins are famous for surviving in even extremer conditions than our frosty economy and its persistent cold fronts. A penguin's native habitat is the frozen wastes of the Antarctic Circle. The temperatures range from a pitcher's batting average to the total yearly rainfall in Death Valley. In other words, low.

Penguins can't fly. Penguins can't rob banks

---

by David Hunter

When driving through rural northern Illinois it is possible to catch glimpses of the wildlife. We were lucky to capture this scene in Geneva, an hour west of Chicago. The denizens of the chilly midwestern plains in the picture are neither penguins nor humans. They're software publishers.



or play hockey. Penguins are not normally baseball players. Penguins are erect, short-legged, flightless, aquatic birds. Fun as it may be, no penguin has ever published software.

Penguins are boring, but they're cute. They nonchalantly peck away their lives in the most severe of Earth's climates. Penguins don't brag; they can't talk.

Noble, but embarrassingly harmless, penguins are probably the descendants of some ravenous aquatic dinosaur. You say times are rough? Look at penguins. They're content to be shrimps who were once terrifying behemoths. They don't make war and they don't pay taxes. They've progressed little; they've digressed considerably.

So who are these goofs who call themselves Penguin Software? Do they come from Alexander Island near the Bellingshausen Sea? Did they buy their first Apple at the only computer store on all of Rockefeller Plateau? Do they eat raw fish and dance on ice floes? Do they look E.T. in the eye when they stand up straight?

"Hello. It's Just After 8:00 P.M. and Time for the Penguin on Top of Your Television Set To Explode." What kind of penguins live in Geneva, Illinois? That's where Uncle Bob and Aunt Betsy junked the Edsel when it threw a rod and rolled into a cow pasture. That's where Elvis stopped to change his belt once. It's so far from the big town, most Chicagoans think it's in Iowa.













Top of page, Penguin president Mark Pelczarski ("We try not to take ourselves seriously, but we take our products and service seriously"). Top row, bottom of page, from left to right: Mary Locke ("This company is run on coffee, M&Ms, and beer"); Dave Albert, bumper car champion of the world; Cheryl Pelczarski, the one-person graphics art department. Bottom row, from left to right: Trish Glenn ("White Castles are an essential part of the Penguin diet"), Mary Beth Pelczarski ("You know having an animal around keeps the blood pressure down"); Todd Porter, who'll tell you what you can do with your *Complete Graphics System*.

Geneva is a hotbed of midwestern normalcy. Neighboring Saint Charles is even worse. One expects to meet the Ray Conniff singers walking down main street. The local White Castle plays host to Michael Landon and Burl Ives. This place has got class and it's the last place you'd expect to find penguins. The nearest zoo is O'Hare Airport, thirty miles away.

The small flock of creatures working out of a one-story house in Geneva, Illinois, are humans who merely call themselves penguins. Their leader is a curly-haired, bespectacled devil named Mark Pelczarski.

What kind of leader is this Pelczarski? You need not go any farther than the name. Sandwiched between Pel and ski is the best description of the Illinois-born software kingpin—*czar*. Need we say more?

Okay. Humans can be penguins, but can penguins be human? Can humans turned penguins be human? Does Tennessee Tuxedo dance the Charleston?

The story of Penguin Software defies easy classification. Is it a Western? A musical? A space opera? The only label that fits is comedy. And comical indeed is the continuing saga of Pelczarski and his flock of Penguins as they contentedly peck away in these times of economic woe.

"They Don't Stamp Animals Property of the Zoo!" It all started when Mark Pelczarski studied mathematics and computer science at the University of Illinois in Champagne. Unbeknownst to the future head Penguin, another great programmer was absorbed in the university's digital computer labs at the same time. Pelczarski and Bruce Artwick of SubLogic missed each other somehow. Darn! We might have had *Pie Man Simulator* or *Transylvanian Pinball*.

Wait, the story gets even funnier.

After graduating from college Pelczarski taught math and computer science at Sycamore High School, a junior college, and Northern Illinois University in De Kalb. All of you who follow his column, Graphically Speaking, in *Softalk* can imagine what that must have been like. And all of you who don't follow Pelczarski's column, don't sweat it.

Born and raised in and around the Chicago suburb of Clarendon Hills, Illinois, Pelczarski went for computers and programming like a penguin goes for the freezer. He taught programming for four years and seriously pursued the discipline on his own time. Early on he wrote a couple of programs for the Commodore Pet and had programs published in *Recreational Computing* and in *Cursor*, a magazine on cassette.

In the fall of 1979, while at Northern Illinois, Pelczarski got an Apple; two months later, under the guise of MP Software, he started to push *Magic Paintbrush*, the earliest predecessor of *The Complete Graphics System*, at computer stores in the Chicago area.

As fate would have it, programming won out and Pelczarski is no longer a teacher. The chalk and textbooks have been abandoned for Apple and utility programs.

The combination of his experience with computers, the fact that he had written good software, and his educational background landed Pelczarski a job at *SoftSide* magazine. Striking his best Fleet Street pose, Pelczarski packed up and went to New Hampshire to be the editor, no less.

Did he know what he was doing? "Oh no. I had done a little writing, but I had no journalism degree or anything like that." Pelczarski has trouble stifling a grin at the memory, but, floating to New Hampshire on a good-sized ice floe, puckish Pelczarski did well at *SoftSide*.

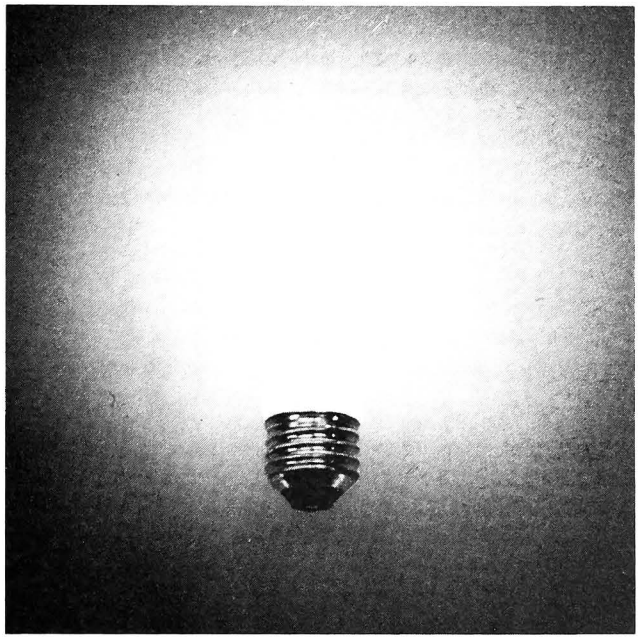
"It's Odd, That Penguin Being There." Pelczarski met his future wife, Cheryl, while he was teaching at Sycamore; she was a student at Northern Illinois University. By the time they both headed off to New Hampshire, they were married. A graphic artist, Cheryl Pelczarski worked for a local art agency while Mark tackled the magazine business.

Teaching at Sycamore, Pelczarski also became good friends with fellow teachers Trish Glenn and her husband Mark. A year or two later Trish would come to work for Pelczarski, helping to found Micro Co-op.

Pelczarski met his future business partner and soon-to-be fellow Penguin Dave Albert while at *SoftSide*. A real journalist, Albert knew little about computers and the two men learned much from each other. Something in their personalities jibed, and a rare friendship developed, growing stronger over the years.

We must make note of the fact that an early, crippling fit of Penguinitis (a rare disease) struck Pelczarski while he was the editor of *Soft-*

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Side. Someone who had seen *Magic Paintbrush* wrote a letter asking if MP Software stood for Mark Pelczarski or Magic Paintbrush. Pelczarski answered that neither was correct; it stood for Magnificent Penguin.

You have to be slightly wacky to get into the software publishing business, and Pelczarski proved early on to be made of the right stuff. He loved the title Magnificent Penguin and it became his nickname for the duration of his stay in New Hampshire.

All through his reign as editor of *SoftSide*, Pelczarski practiced programming and had a bunch of little pieces printed in the magazine. They were mostly simple games, easy animation routines, programs for making shape tables, and the like.

In the middle of 1980, Pelczarski began entertaining notions of forming a software cooperative that would inform its members of the latest and greatest software via a newsletter and offer that software at co-op prices. The idea was to go back to Illinois and spend full time on the co-op, living off savings from his teaching days. If after six months it wasn't working, Pelczarski had had other job offers. He considered it a fair gamble; so he made the essential decisions and left New Hampshire after only eight months.

"Perhaps It's from the Zoo." So much for journalism. Except for his monthly ink slinging in *Softalk*, Pelczarski has done little writing or editing in the last two years. Programming became his primary means of creative expression.

That is, when he wasn't putting together the latest issue of the Micro Co-op newsletter. In January of 1981, working out of his apartment, Pelczarski founded "the largest software cooperative in the world," or so the ads said. Eventually boasting more than three thousand members, Micro Co-op was and still is meant to be a source of evaluative information and software for the discerning buyer.

The magnificent Pelczarski really thought that Micro Co-op was the way of the day. So much so that he sought ways to bring money into the business. Pelczarski the programmer went to work.

In March 1981, *The Complete Graphics System* appeared on the market under the label Co-op Software. No one was fooled. The toddling baby penguin in the logo was hard to miss. Half a year later, that penguin would grow up.

The Complete Graphics System was the first part of a trilogy of graphics utility packages that eventually became bestsellers. Boasting more than a hundred hi-res colors, 3-D graphics, the ability to create shape tables with paddles or keystrokes, and the option of putting hi-res text anywhere on the screen, *The Complete Graphics System* was heartily welcomed, breaking into *Softalk*'s Top Thirty in September 1981.

Penguins can make mistakes. Pelczarski sold a lot more *Complete Graphics Systems* than he expected. The idea of seriously publishing software gained favor in Pelczarski's mind. Perhaps software cooperatives were not the answer.

Birth of a Penguin. Lots of things happened in the summer of 1981. The baseball strike was settled. *Raiders of the Lost Ark* thrilled millions. *Raster Blaster* cleaned up. These are all minor events in the long run. For this was the summer that Penguin Software was born.

While Pelczarski flapped around starting Penguin, Trish Glenn took over the operations of Micro Co-op. She has been incredibly valuable, according to Pelczarski, and can lay claim to being the first true Penguin other than Mark and Cheryl. "She's the one that gets things done," Pelczarski says.

Pelczarski suffered from Penguinitis all that year. When he thought of an image for his company, all his Spheniscidae mind could conjure up were penguins. In delirious moments he admits that he truly came to appreciate penguins with the help of the irreverent English comedy group Monty Python. Their funky vignette "Penguin on the TV," on the album *Another Monty Python Album*, has haunted Pelczarski for years.

Another Monty Python routine, which has Scott of the Antarctic battling a giant electric penguin, doesn't seem to bother Pelczarski at all. For whatever reason, demented or deliberate esthetic choice, penguins it was going to be.

Still working out of his apartment, Pelczarski programmed like crazy, mainly in Basic and assembly language, through the summer of 1981.

"Each of the graphics programs is a combination of languages. The editors are written in Applesoft, while the graphics routines are in assembly language," Pelczarski explains. "I like Basic because it's easier to understand when debugging. There are also a lot more utilities for it."

His next offering through the newly born Penguin Software, *Special Effects*, appeared in September 1981. Another graphics utility, dubbed "for the artist" in subsequent ad campaigns, *Special Effects* allows you to paint, more or less, on the Apple with many useful features including shading, magnification, color reversing, and partial screen movement.

Wizards and Penguins. The third part of Penguin's graphics trilogy, this one "for the programmer," was released at the beginning of 1982. Originally credited to Chris Jochumson, Mark Pelczarski, and friend, *The Graphics Magician* contains the collected wit and machine language animation routines for the creation of computer games and other programs needing quick manipulation of visual elements. Friend was eventually revealed to be David Lubar, who is now programming for Sirius.

For a good part of 1982, the trilogy was really a tetralogy with the Space Tablet, produced by Micro Control Systems, rounding out the foursome. Boasting 2-D and 3-D drawing capabilities, Micro Control's graphics tablet came complete with a customized version of *The Complete Graphics System* designed to accept input from three dimensions.

"I agreed to be the distributor, but Micro Control kept changing designs in the hardware," says Pelczarski. "We like to fill orders in the next day's mail, but the difficulties of hardware changes made keeping up with the demand difficult. Eventually, we worked it so that people now go directly to Micro Control for the system."

Albert had taken over as editor of *SoftSide* when Pelczarski quit, but he left for a stint as a proofreader of "trashy adult Westerns. My big claim to fame," he says, "is having proofread *Halloween II*." Albert had been back at *SoftSide* for a month when Pelczarski called. It was the end of 1981. Reeling from success, Pelczarski asked Albert to come work in Geneva.

Born in Venezuela, Albert began his journalism career on an English language newspaper, *The Daily Journal*, in Caracas. Destroying the myth that penguins don't like to travel around, Albert has lived in Venezuela, New Hampshire, Connecticut, the Bahamas, Switzerland, Los Angeles, and Iowa.

Albert attended college at the University of Iowa in Iowa City, with a double major in journalism and American studies, emphasizing communications theory. He met his future wife, Mary Locke, while at the university. She was a photographer on the university's student paper, *The Daily Iowan*, when Albert was the managing editor. The two worked together at *SoftSide* and both succumbed to Penguinitis at the same time.

Ms. Penguin. Today Mary Locke is one of the key Penguins, defining the experience and ensuring that future Penguins will keep the faith. She takes care of the dealers while Albert and Pelczarski drink beer. A little taller than one would expect a penguinized human to be, Locke has a lively sense of humor and believes wholeheartedly that publishing software is fun.

Albert came on in the beginning of the year to take the pressure off Pelczarski, taking over the operations of Micro Co-op and its newsletter. In the summer of 1982, Pelczarski sold Micro Co-op and he and Albert ceased having any involvement with the business.

Since then, Albert has participated in Penguin's daily activities, mainly handling the marketing. Not a programmer, Albert has, nonetheless, had some input into Penguin's products. He rewrote the text for the graphic adventure *Transylvania* and carries his load of the never-ending task of testing and retesting a new program before it's released.

Only a few months ago, Penguin Software moved out of Pelczarski's home into a single-story house on Hamilton in Geneva. Albert and Pelczarski share an office in the living room. Pelczarski still spends time at home programming, but the rest of the Penguins flock daily to the office/house. The kitchen refrigerator is well-stocked with beer and the cupboards with M&M's.

As fun as publishing software is, there are bound to be some sore spots. The Penguin people have met head on the single most difficult problem in the industry—piracy. In March 1982, Pelczarski wrote a letter to several publications announcing a change in Penguin's policy toward software protection.

Coinciding with the release of *The Graphics Magician* and the updated *Complete Graphics System II*, Penguin's announcement was a plea

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THE EINSTEIN COMPILER is a breakthrough in new programming utilities that rapidly translates your Applesoft programs into machine language that is fast, efficient, and compact. When you use THE EINSTEIN COMPILER, all the features of Applesoft are fully supported, including the use of Hi-Res graphics, shape tables, Lo-Res graphics, defined functions and DOS commands. Moreover, THE EINSTEIN COMPILER is the most powerful compiler on the market in its level of code compression and string handling capabilites.

Here are the more impressive features of THE EINSTEIN COMPILER:

EASE OF USE: The program is professionally human engineered. Thus although the compiler is very powerful, it is incredibly easy to use by beginners and experts alike. Clear, comprehensive documentation is provided.

DOS COMPATIBILITY: All DOS functions and commands are supported in exactly the same way as in the uncompiled Applesoft program.

CODE COMPRESSION: a unique memory compression algorithm is employed and pre-existing Applesoft routines are exploited to keep the size of your compiled program to an absolute minimum.

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to the software buyer. Speaking as a programmer, Pelczarski explained how he appreciates the need for applications software to be unprotected and modifiable. Speaking as a publisher, he voiced the fear that "casual" copying by a few bad or, even worse, unthinking people can put a small company out of business.

Pelczarski's overriding concern for the good customers won out. The graphics utility trilogy was unlocked and the industry held its breath. Would the Penguins perish? Had the answer to the piracy problem been found? If Pelczarski trusted consumers instead of penalizing them with the extra time and cost of copy protection, would they respond with the same honesty?

If ever there was a clear answer to all these questions it appeared in the results of *Softalk*'s Bestsellers column through the last six months of 1982. The graphics trilogy was close to dominating the Hobby 10. *The Graphics Magician* and *Complete Graphics System II* both made the top thirty in December 1982's poll. The torrid sales were obviously buoyed by Softsel picking up Penguin's line in May. Still, Pelczarski's gamble paid off; people like to buy unlocked software. Honesty and trust worked.

"There! I've Run Rings around You Logically." In the final months of 1982, Penguin turned around and offered two arcade games and one adventure game, all protected. It's a different story with games.

"You can play a protected game," explains Pelczarski. "They don't depend on documentation like a utility program. That's why games are easily traded.

"I also can't take a chance with someone else's program. If it's my own graphics package, then it's my neck. I can't gamble with another programmer's work, though the idea of unprotected games is appealing."

All three games—*Spy's Demise* by Alan Zeldin, *Pie Man* by Eagle Berns and Michael Kosaka, and *Transylvania* by Antonio Antiochia—were created with the aid of the *The Graphics Magician*. This is much more exciting than the predictable news that none of the games was the next *Choplifter*. Adventure International, Sentient Software, Sunnyside Soft, and other publishers have used Pelczarski's utility for producing games such as *Gold Rush*, *Congo*, and *Scott Adams's Graphic Adventures*.

The big news is that Mattel Electronics's six new arcade games for the Apple use *The Graphics Magician*. They were first seen at the Consumer Electronics Show in Las Vegas this January.

So the times have been good for Pelczarski and his flock of demented Penguins. There are seven Penguins in all, and they eat together and play together. Two favorite hangouts are the local White Castle, with its regionally renowned miniburgers, and Funway Park in nearby Batavia, with its bumper cars and arcade games.

One day not too long ago, Dave Albert got wind that Funway was planning to get an Apple for interfacing with their in-house video system. Albert graciously offered a complete set of Penguin software in exchange for lifetime passes on the bumper cars. It worked. Nowadays, when the job gets to be too much, several Penguins will relieve the tension by smashing into each other in a friendly sort of way.

Penguin Software is a small company that seems content to stay that way, at least personnel-wise. Everyone works hard and does whatever job needs to be done. Everyone has a reasonably well-defined niche, but emergencies do occur.

Two fun-loving Penguins are Cheryl Pelczarski and Todd Porter. Cheryl is the one-woman art department, responsible for Penguin's advertising and other forms of visual marketing. Strong distribution is one thing, but effective advertising can make a big difference.

Todd Porter is the technical consultant. He works with customers who need programming advice in adapting Penguin's wares to a specific task. Just turned twenty-three, Porter looks to have a bright future with Pelczarski's bunch.

Rounding out that bunch is Mary Beth Pelczarski, Mark's younger sister, and Trish Glenn. Fiercely loyal Penguins and vocal supporters of Penguin rights, the younger Pelczarski and Glenn are the customer service department and anything else that's needed at any given moment. Mary Locke, Trish Glenn, and Mary Beth are the three funny ladies of Penguin Software. Together and in a good mood they are a riot—indomitable, powerful, and totally in charge.

The Great Penguin Train Ride. What's it like to be a Penguin? Things get done, somehow.

Mary Locke tells a terrific story about the Penguin trek to Applefest last May in Boston. When it came time to take a train from New York up to Boston, a few things went wrong. The train wasn't announced. Lugging boxes of merchandise and booth materials, Pelczarski and Albert barely made it on the train in time. Mary Locke and Cheryl Pelczarski had gone ahead of them and got separated.

The train was very crowded. Mary and Cheryl couldn't find a seat for themselves, let alone for the other Penguins on the trip. Eventually they found Mark and the others huddled on a vestibule between cars with all the boxes piled up precariously. This was how they rode the rails up to Boston.

Every day, working together, having epic snowball fights when it snows, and eating M&M's are part of being a Penguin. After work, the whole company can comfortably go out for a drink at Scottland Yard, a local drinking establishment in Saint Charles. They lunch together frequently at the Great Dane Mini Deli in downtown Geneva.

Camaraderie and esprit de corps among a group of people makes running a small business a real joy. Pelczarski is not a difficult man to work for.

A little wacko perhaps, but not difficult.

With two new games, *Thunderbombs* and *Crime Wave*, due out later this month, improved graphics software in the works, a few secrets, and one big surprise also due in March, Penguin Software is on course and flying high.

Ah, if only it were true. But penguins can't fly.

Penguin Software is on the ground and waddling ahead. Enjoying the winter weather and last year's profits, they are looking forward to their best year yet in 1983. Courageous and fun-loving, they must be on to something.

Publishing software can be fun. ■

The display quote at the beginning of the article and the quotes used as subheads are from "Penguin on the TV Set" on Another Monty Python Album.

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THE BASIC Solution

By Wm. V. R. Smith

A frustration commonly experienced by microcomputer users is caused by the machine's inability to hold more than one Basic program in memory at a time. Whether you have 16K, 32K, or 48K of RAM on board, the computer's operating system just won't recognize the presence of two programs, even if the programs are tiny. Loading one while another is already in memory just wipes out the first. There seems to be no way around it.

The problem is not lack of space. There is a lot of memory space in the Apple that the typical Basic program doesn't take advantage of. The problem is that Applesoft always puts programs in the same place unless you tell it different.

Well, there are ways around this limitation, and this month we have a reader-contributed program to do just that. Ken Kashmarek of Eldridge, Iowa, sent in a program that tells Applesoft where you want a program to start in memory when you load it or type it in.

Incidentally, starting your programs in different locations can have other uses as well. For instance, when you're using hi-res page one and the program starts at the standard location (2048 or $800), you can only make the program so long before the variables start overrunning the hi-res screen memory space. That length is usually about twenty sectors on the disk (varying according to how many variables are used)—a large program, to be sure, but there's much more memory left unused above the hi-res memory area. This program will let you use that space. Or it will let you leave a protected area below your program for machine language routines.

The program isn't very complicated. Lines 100 through 170 give you a menu of possible start locations. If you don't want to select any of them, just hit return and you'll be given the opportunity to enter your own location. Hit return again to exit the program. Lines 180 through 240 handle these options.

Lines 250 to the end handle the pointer setting to allow your Basic program to begin somewhere else. The operative commands are the ones that poke numbers into 103 and 104 (the start-of-program pointer) and LOC (your starting location).

Note: *Save* this program right after you type it in (*before* you run it). If you don't take this precaution, you could lose it.

```
100  TEXT : HOME
110  LOC = PEEK (104) * 256: PRINT
     "CURRENT LOCATION = ";LOC:
     PRINT
120  PRINT "PROGRAM START
     LOCATION?": PRINT
130  PRINT "1. 2048 (2K)—DEFAULT SET
     BY FP": PRINT
140  PRINT "2. 3072(3K)—ABOVE
     LO-RES PAGE 2": PRINT
150  PRINT "3. 16384 (16K)—ABOVE HI-
     RES PAGE 1": PRINT
160  PRINT "4. 24576 (24K)—ABOVE HI-
     RES PAGE 2": PRINT
170  PRINT "?";: GET OPT$: PRINT
     OPT$;:OPT = VAL (OPT$)
180  IF OPT <> 0 THEN PRINT
190  ON OPT GOTO 210,220,230,240
200  PRINT : INPUT "OTHER START
     LOCATION=";LOC$:LOC = VAL
     (LOC$):LOC = INT (LOC / 256) * 256:
     ON LOC <> 0 GOTO 250:END
210  LOC = 2048: GOTO 250
220  LOC = 3072: GOTO 250
230  LOC = 16384: GOTO 250
240  LOC = 24576
250  IF PEEK (103) <> 1 OR PEEK (104)
     <> INT (LOC / 256) OR PEEK (LOC)
     <> 0 THEN POKE 103,1: POKE 104,
     INT (LOC / 256): POKE LOC,0
260  PRINT : PRINT "NEW PROGRAM
     START LOCATION = ";LOC
```

To use this program to select a location for just one other Basic program, run it, select the appropriate location, and load (or type in) your program. If you're using the program for this purpose, you may want to add this line:

```
270  NEW
```

If you want to put more than one program in memory at once and use this program as a menu to select from among the others, first load and run this program. Then select a location from the menu. Type *new* and load your program.

Now, before you run the program, find the end statement and replace it with *poke 103, 1 : poke 104,8 : poke 2048,0 : run.* This will make the computer go back to the menu. You can follow this procedure with several programs, provided you give them all enough space to move around in. Putting them too close together could produce what the folks at Apple are fond of calling "unpredictable results."

Before we sign off, there are a few problems with December's Basic Solution we'd like to clear up. Line 1800 of the *Poker* program should read:

```
1800  DATA    "D ","C ","H ","S "
```

And line 1940 should read:

```
1940  HTAB HT: PRINT "! ";SU$(SUIT);" !"
```

If you have any other problems, try taking out line 40. This will allow normal error messages to be displayed.

Finally, Jeffery Jacobs of Canton, Ohio, has pointed out that the program doesn't handle royal straight flushes correctly. He sent us these new lines to correct it.

```
1190  IF Q2 = 5 THEN STRAIGHT = 1:HI
      =Q + 4
1225  IF HI <> 13 THEN 1230
1227  VTAB 1: HTAB 1: PRINT "ROYAL
      FLUSH";: WIN = 500 * BE: RETURN
```

Thanks to Ken and to Jeff, and to them and the rest of you, happy programming. ■

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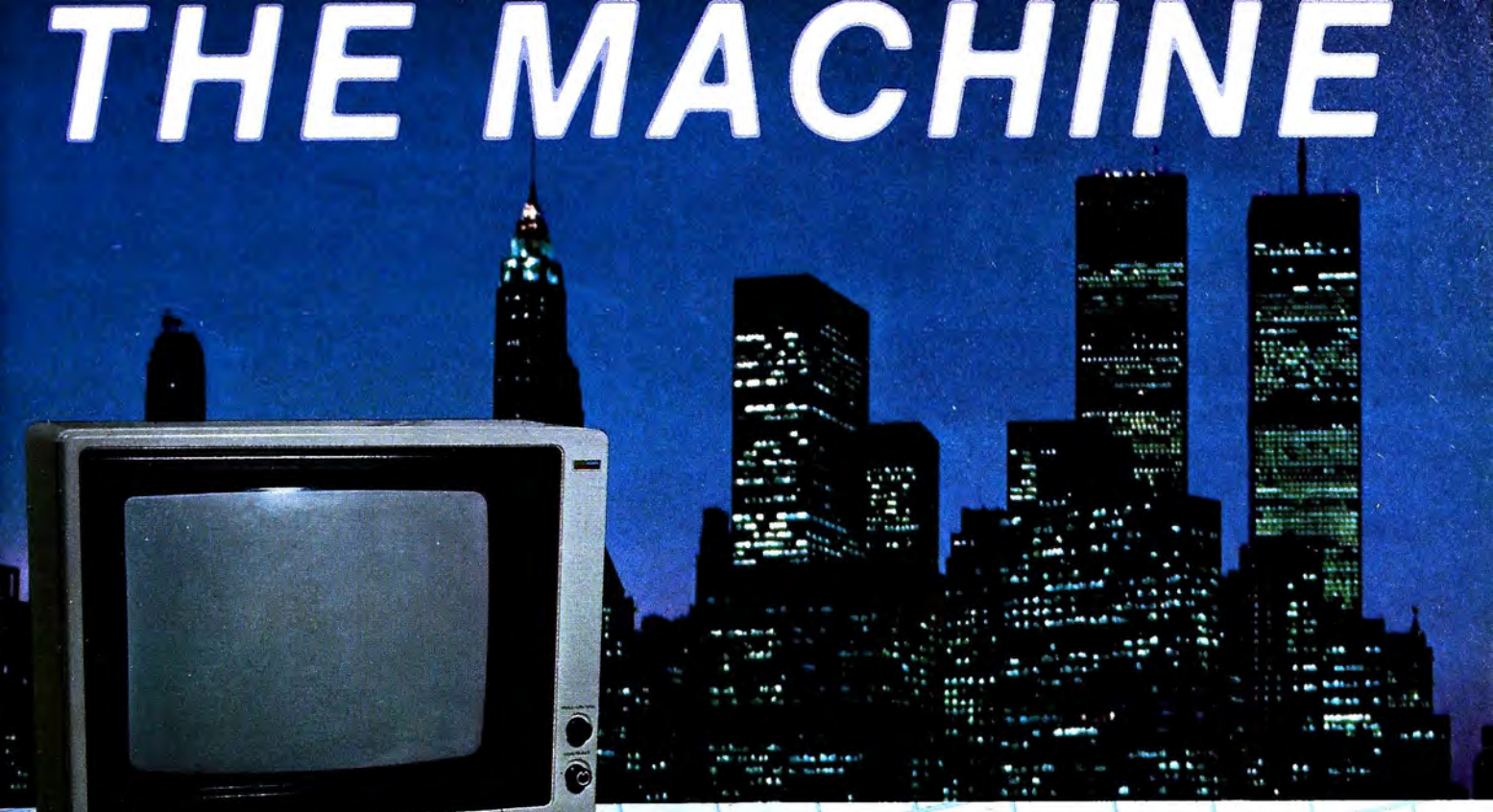
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Jones: "Just what can our software do?"

Dow: "In a nutshell, Jones, with a personal computer, a telephone, a modem and Dow Jones Software, you can easily perform complex analyses on the information available from our information service, Dow Jones News/Retrieval®."

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BY KEN LANDIS



In identifying potentially profitable investments, two basic types of analysis are used: *fundamental* and *technical.* Fundamentalists use the financial statements of a corporation, general economic indicators, business conditions, and so on to isolate investments that they feel may be profitable. Technicians, or as they are more fondly called on Wall Street, elves, study the movements of securities and their relationships to events in the world outside.

Say, for instance, that a certain security has rapidly dropped twelve points the last three times the unemployment statistic increased one-quarter of a percent or more. Whereas a fundamentalist might see inherent strength within the stock and stay long, a technician might identify the relationship between the two events and sell short. Technicians look also at a security's present condition and at how that relates to its past. Moving averages and oscillators are among the tools used to quantify these kinds of relationships.

The More the Harrier. Technical analysis requires the manipulation and charting of large amounts of data. It is time consuming and, to be effective, must be done frequently. Computerization of the calculations and charting required has helped technicians do more in less time, thereby increasing their productivity and (one would hope!) the value of their portfolios.

Technical charting ability, together with a portfolio accounting module and a communications module for retrieving news, views, and quotes from remote databases, is a good summary of the computer power a technician can put to use. This combination is also an accurate description of the *Market Analyst* package.

Market Analyst, Anidata (613 Jaeger Court, Sicklerville, NJ 08081; 609-228-3034). $495.

Backup policy: Two copies supplied with purchase (both sides of the disk); $9.95 for each additional backup; $25 per update.

System requirements: 16K RAM card (in slot 0); one disk drive. Recommended: Graphics-compatible printer (slot 1); Micromodem II or Apple Communications Card (slot 2).

The *Market Analyst* package was written by Ed Gillott, a gentleman and a devout technician. Gillott is always standing by to answer questions concerning his package and to talk about the markets, money, or whatever.

Some people may find fault with this program because it requires a 16K RAM card. The author reasoned that a 16K RAM card is a smaller investment than a mandatory second disk drive. This is a good point. There aren't many serious Apple-equipped investors who don't have two disk drives and a 16K RAM card, but the novice who may just be starting with an Apple will appreciate being able to run a sophisticated analysis package with only one disk drive. This arrangement saves an investor money—money that might well be put into the market!

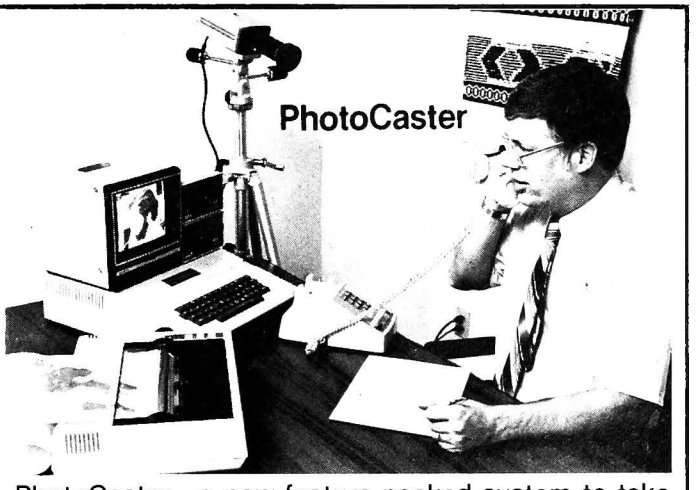
Market Analyst consists of three main programs: the portfolio management module, the technical analyst module, and the news, quotes, and view module. Let's look first at the technical analyst module.

Talk of the Technical Town. The technical analyst is the major reason for purchasing the program. It gives investors the tools required to judge an investment based on its technical merits. To use the package effectively, you must be a proficient technician. *Market Analyst* does not claim that it will teach you to do technical analysis, and it won't. What it will do is help novice or advanced technicians with their investment studies.

The graphic display of the technical analyst splits the Apple's screen horizontally into two sections. The upper half displays historical stock quotations in standard bar charts. The lower half of the display is reserved for the various technical studies built into the package and for user-supplied formulas. The results of the calculations are displayed in hi-res graphics.

The technical calculations included in the lower plot analysis are moving average, on-balance-volume (the gospel according to Granville), accumulation/distribution, various price and volume formats, positive and negative volume indicators, and trend/support/resistance lines.

It's also possible to input algebraic relationships and have the program chart them. Throughout the documentation, this feature is referred to as *user-customized studies.*



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You can also instruct the computer to plot the information on either standard or exponential graphs, which are automatically aligned by date with the upper price bar chart.

Multiple charts can be displayed at the same time on the lower plot screen. This helps you identify critical points in the study, such as the crosspoints of various oscillators, that may indicate a significant price movement.

Within the technical analyst, you can choose interactive analysis or auto-analysis; auto-analysis creates complex charts automatically.

As soon as you've loaded a data file in the interactive mode, the high-low-close bar chart for the most recent six months of trading will be displayed on the upper portion of the split screen. Then, from a menu on the lower screen, you can mess with the chart. You can compress it, expand it, zoom in on it, look at moving averages, get rid of parts you don't want, plot trend/support/resistance lines, or display numbers. (See figure 1.)

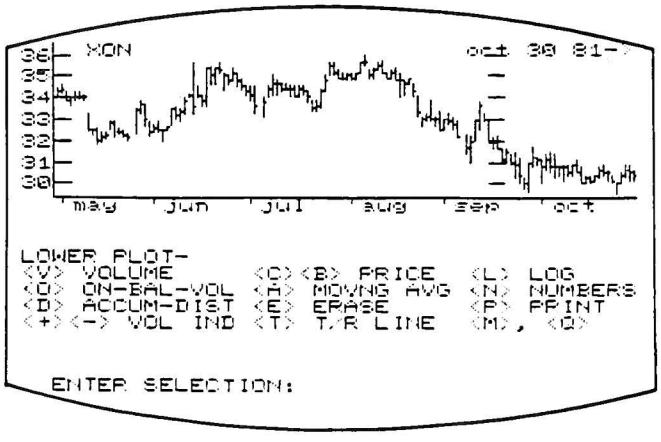


Figure 1.

The compress feature permits you to work with a display larger than the latest 131 data records, or six months of daily trading activity. Compressing changes the display to a year's worth of data in two-day intervals. Compressing further can show thirty months' data in weekly increments.

The compress feature even considers the stock historian. If your data is stored weekly instead of daily, compressing can display monthly information for as much as eleven years; and, if your data is monthly, you can look at sixty years' worth at one time.

The expand feature reverses the process of compressing. It expands the chart back to its original scale and range.

The zoom feature lets you zoom in on part of the chart in enlarged form. It doubles the horizontal scale of the right half of the display, erasing the left half and highlighting the most recent data.

Moving average calculations are plotted for a time period you select. The period must cover at least two chart points but must not exceed the time period displayed on the chart. If you are working with a chart that you've compressed, the program automatically adjusts for the level of compression.

The erase feature erases the last moving average drawn without disturbing the balance of the screen.

In the numbers mode, the bottom sixth of the upper screen becomes a numeric chart displaying the volume-high-low-close of your chosen point on the chart.

The Voluminous Plot Thickens. When you're satisfied with the display on the upper screen, you're ready to work with the lower screen, where a majority of the technical analysis and plotting of the upper screen chart takes place. Here you can look at a histogram of volume; at center (zero) axis charts of on-balance volume (OBV) and accumulation/distribution; at normal axis charts of the PVI and NVI (positive volume indicator, which highlights price movements on trading days with higher trading volume than on the previous day, and at its opposite, the negative volume indicator); at a closing price line plot; at a high-low price bar chart; and at a moving average plot. (See figure 2.)

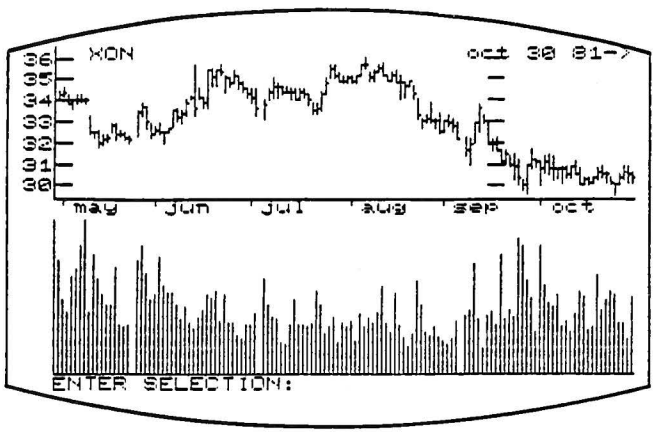


Figure 2.

A moving average of the last plot, calculated and plotted over a user-supplied period, can be done. These comparisons require a previous study or plot to have been done on the lower half of the screen. Even though the previous chart has been erased, the data is stored in memory. The memory buffer will always hold the information from the previous chart.

Residential Basics. *Market Analyst* also has the ability to plot closing price data from files other than the basic file. Basic file data is the data resident in the upper plot, which was initially loaded into the lower plotting area. These plots are useful for making inter-issue comparisons or for comparing the investment to industry averages. To prevent misinterpretation of the data, the program only allows files with similar periodicity (daily, weekly, or whatever) and matching dates to be displayed.

The user-defined formula option allows you to input your own formulas to *Market Analyst*. Three formulas can be stored on disk at one time, and you can enter and work with one more formula, but the fourth one cannot be saved. Of course, you can edit and replace the stored formulas too.

The formula specifications are well defined and explained in the

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documentation. Standard operators are used for addition, subtraction, multiplication, and division. The ampersand is used for absolute value calculations, and time offset calculations are accomplished using a number within brackets, such as <−1> for today minus one (yesterday). The operands to be used within the user-defined algebraic equations are logical, easy to use, and clearly documented.

The equations, which may not exceed sixty characters, are strictly evaluated from left to right. You must use parentheses wherever they're called for to ensure proper mathematical evaluation of the expression.

And here's a rare treat: Should you have trouble figuring out how to represent a calculation algebraically, the author of *Market Analyst* is willing to help you figure it out!

You can toggle the plots between linear and semi-log scales. Log functions are undefined for a value of zero. Any plots having a zero point in their data set are plotted on a linear scale, even in the log mode. Volume charts are the exception to this rule. A special routine is activated for plotting volume in log mode. Volume data is plotted on a log chart, even though zero data may exist. (See figure 3.)

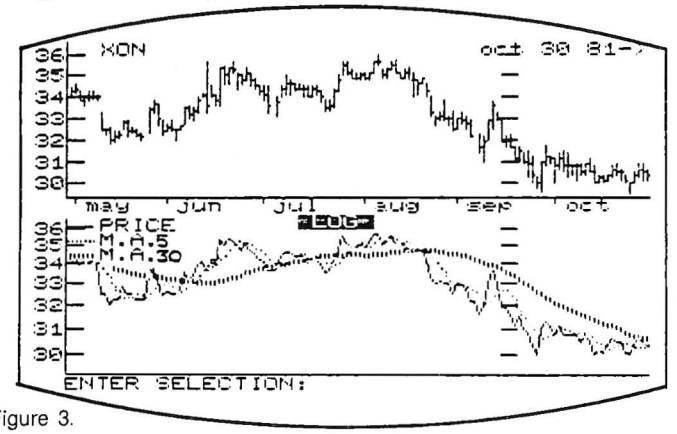


Figure 3.

Assuming you have a printer set up for graphics, you can produce hard-copy printouts of the plots currently displayed on the upper and lower plot screens at any time. *Market Analyst* is set up for printers connected by the Grappler and Microbuffer interfaces and for the Apple Silentype printer.

The auto-analyze feature stores the keystrokes used to create a complex chart and repeats them as you have directed.

The two parts of auto-analyze are a program creation mode and a chart mode. In the chart part, all quote files on a data disk are charted automatically according to the steps you've prescribed in the program creation mode.

In truth, the program does all the programming in the program creation mode, so don't be dismayed. You merely choose which keystrokes—up to twenty-nine—should be saved in the auto-analyze keystroke file. The keystrokes you choose are the very ones you use in the interactive mode. The program shows the file-select menu, from which you select a file so *Market Analyst* has sample data to build the auto-analyze file on. All of the regular analysis functions are available with the exception of trend lines and numbers, which require real-time interaction.

Once you've chosen all the features to be activated within the auto-analyze mode, you must decide such things as what decision criteria should be used, when the program should pause, and what conditions have to be met before a particular chart can be displayed. During a pause, the charting stops, allowing you to interact through any normal keyboard function. The system won't begin processing the remaining commands in the auto-analyze file until you let it know you're ready to go on.

When the program is in the auto-analyze mode, status indicators show what phase you're in.

The auto-analyze feature is used to identify charts that fit your predetermined decision criteria. An example given in the documentation is:

Plot the volume and pause for every stock that has appreciated 10 percent

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in the last three months. On the lower plot, plot the <C> Close; enter the conditional parameter '>11/10*c<-60>' to select those charts whose last Close is 110% (11/10) of the Close of the sixty days prior; enter <V>, <CTRL -P> for processing if the condition is met.

Historically Quotable Quotes. To store and manipulate all this data, *Market Analyst* has a quotes-file maintenance function. This module is used to create and maintain the historical price/volume data files for use by the technical analyst.

Each disk holds up to sixty-seven individual quote files. Each file may have from seven months to five years of daily data, or data for a proportionately longer time span if the data is weekly or monthly. The maximum number of files on the disk is determined by the amount of data stored in the individual files; the more information you store per file, the fewer files you can have on one disk.

The most important feature of this module is its ability to retrieve stock quote information via a modem from CompuServe or the Warner Computer Systems Database.

To use a modem, you're required to store some information in the *Market Analyst*'s configuration file. *Market Analyst* needs to know what modem you're using, your CompuServe user identification and password, and, optionally, five telephone numbers you'd like it to remember. The CompuServe information service uses page numbers to identify its various features. Should these page numbers ever change, you can change them also in the *Market Analyst*'s internal fetch routine, preventing the routine from becoming outdated.

Also in this phase, you can choose whether estimated liquidating commissions should be deducted from the portfolio profits, whether the zoom default setting should be on or off, and what printer specifications you want the program to provide for.

The teleprocessing update section has sophisticated data-checking routines. If *Market Analyst* is receiving bad or garbled data transmissions from the remote database, it stops the data transfer automatically. Three short beeps sound to alert you, and *Market Analyst* attempts to restart the data transfer from the last good data received.

During the teleprocessing fetch, you may override the commands being issued to the remote database simply by pressing the appropriate keys on the Apple. The program author warns that you must be quick. There is, however, a time-delayed procedure in the program to let you change the ending date of the data set being fetched. If changed, the date is used for all the data files being updated.

The teleprocessing module for Warner is similar. *Market Analyst*'s data-checking feature is also activated. During any data fetch, *Market Analyst* will attempt to correct data transmission errors three times before hanging up.

Through an edit feature, *Market Analyst* allows you to adjust stock prices for splits automatically. This is an important feature. Without a subsequent adjustment in the stock's historical prices, a split can severely affect the technical interpretation of the data.

Revealing Secret Identities. Once you've identified securities that you wish to buy or sell, you can use the portfolio manager module to help with your portfolio.

The portfolio manager keeps track of open and closed positions. The open position file reflects your current holdings; the closed or liquidated position file is used for analyzing the tax implications of your current year's activity.

The portfolio information that you enter is stored in memory and on the disk in eighty-column format. Since the Apple II displays only forty columns at a time, the program allows you to toggle between the left-hand and right-hand displays. A sample report screen is shown in figure 4.

NAME	QTY	TYP	COST	PRICE	PROFIT T
CITZ SN	100	L	8.00	9.25	61.48
EXXON	150	L	32.25	35.13	263.24 S
I B M	30	L	62.50	59.75	-203.14
I B M	40	L	55.50	59.75	22.81 S
IND V B	200	L	17.50	21.00	552.42 S
OCC PET	200	L	21.50	25.50	662.63
R C A	1500	OP	1.25	2.38	1574.64 S
TRNSNET	200	L	3.50	3.50	-60.00 S
WEST EL	2500	OC	0.37	0.63	561.13 S
					3435.21

NAME	L.VALUE	YLD	MM/DD/YY	COMM	AT
CITZ S	892.09	4.3	8/25/80	30.61	DW
EXXON	5182.95	8.5	8/30/81	82.21	DW
I B M	1732.86	5.8	7/ 1/79	61.60	SO
I B M	2315.05	5.8	3/16/81	72.24	DW
IND V	4149.16	10.5	6/18/81	46.74	DW
OCC PE	5002.05	7.8	3/18/79	89.42	TM
R C A	3497.09	0.0	11/28/81	47.45	TM
TRNSNE	670.00	0.0	7/13/81	30.00	TM
WEST E	1526.51	0.0	11/ 2/81	27.88	DW
	24967.76	6.2%	ON	25501.25	

Figure 4.

From the portfolio manager, you can elect to see a detailed display of the open positions with totals for profit and loss, liquid value, and portfolio yield on the total market value; or an averaged portfolio display, similar to the detailed display but with only one line allotted for any group of like positions in an issue. The quantity displayed is the total for that position, and the price is the weighted average of all prices in that group.

You can also update prices in the portfolio files and close out a position, moving the data to a history file. You can display the securities stored in the closed history file, long and short term profits, and total profits; delete records in the history file; or delete an entire history file, usually done at year-end to initialize the program for the coming year's tax records.

The portfolio manager has its own built-in editing, formatting, reporting, and printing facilities and, like this entire package, is extremely friendly and well protected against user errors that might cause loss of information.

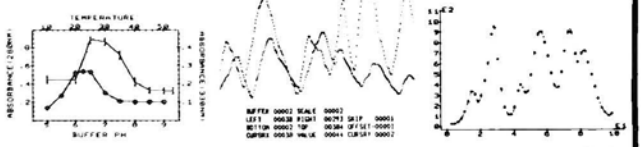
The news, views, and quotes module is an easy to use communications program that gains access to a remote database and stores up to thirty pages of text in a memory buffer. Then you can sign off and review the transmitted information without incurring the cost of staying on-line for the length of time it takes to digest thirty pages. In addition, the information can be printed out.

Three Ways of the Analyst. *Market Analyst* is an integrated software package. It provides the three essential tools needed for technical analysis and investing: analysis and charting, portfolio accounting, and a communications capability to retrieve quotes and market news. The program is well written and reflects the effort of the author to produce a high quality software package. Ed Gillott has shown the highest commitment to his product and a willingness to provide complete, professional support. This package is recommended without reservation for consideration and use by anyone involved with technical analysis. ■

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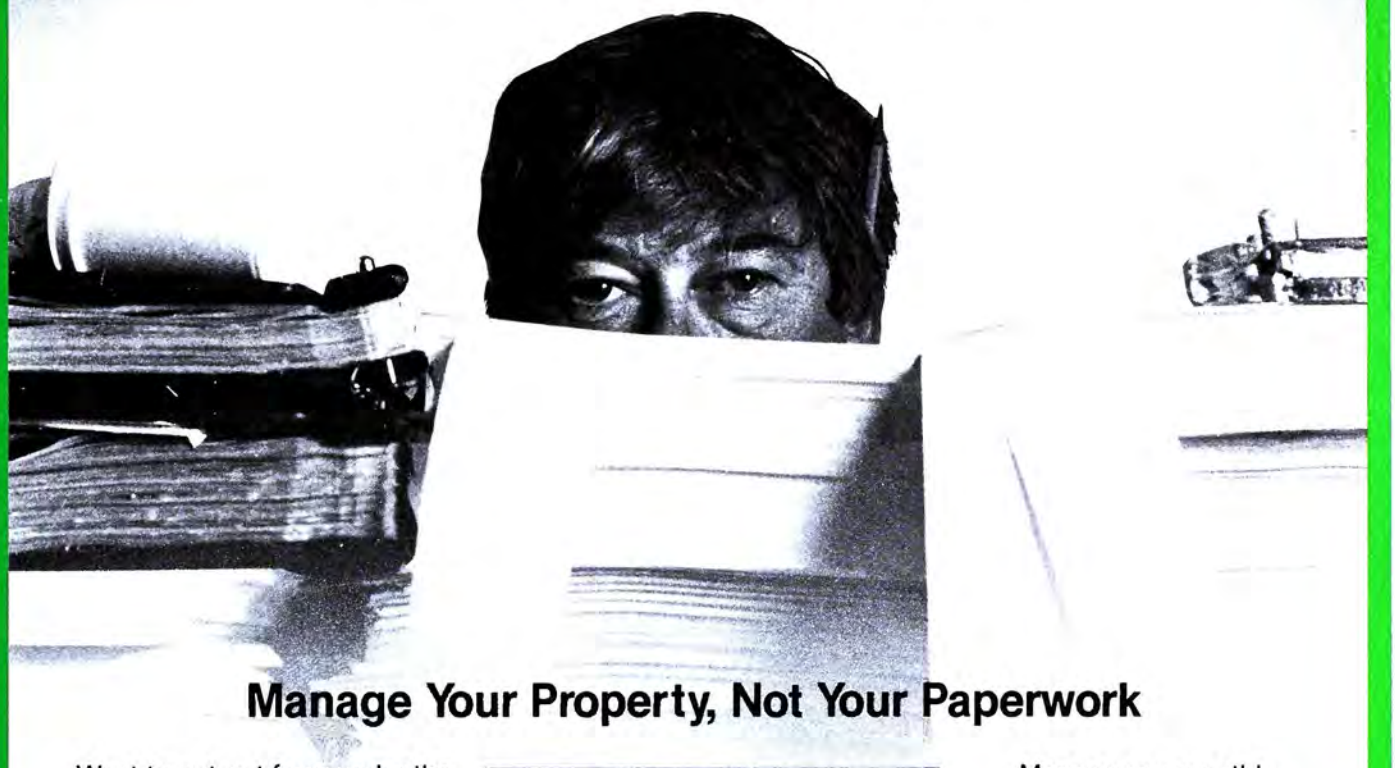
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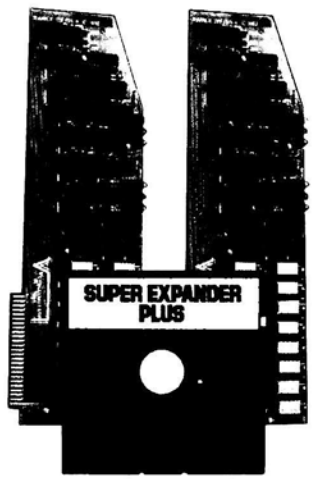
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Exploring Business Basic, Part 17

An Immediate Apology. If, like a lot of people, you looked at the program listing in this article before reading the text, you're probably wondering, "Where is that hi-res game he promised last time? This giant mess can't be it!" Right again, buckaroo. The game that was promised will be delivered, but next month. A bigger issue, related to hi-res games, will be covered this month as a precursor (heh, heh) to that article.

To tell the truth, the original plan was to create a little shape generator and editor to do the graphics animation characters. Well, the shape editor grew and grew and threatened to overwhelm the entire article. Shortly after threatening to do so, it did. Forthwith, this month's article presents a hi-res character set and a shape and font editor with some really nice features. Next month we'll use the editor to create creatures to inhabit our game. Also, because the program is so large, the usual chatty narrative will be somewhat terse. And now, on with it!

An Immediate Digression. Having made all those imposing statements about terseness (tersity?), let's digress for a moment. Several new products have been introduced on the Apple III that deserve notice. First is a parallel printer interface from Interactive Structures. What distinguishes this card is the software, which is really complete. It supports many different printers, including Apple's new Dot-Matrix Printer, both in emulation mode and with SOS drivers. The driver can print with a variety of options, and, if your printer has a graphics print option, the driver can even use the current screen font for printing! In addition, an invokable module is supplied, usable from Basic and Pascal, which permits graphics screen dumps with lots of options. Altogether, a nice piece of work.

The next two products are floppy disk drives for the Apple III. Yes, Virginia, there are high-density floppies! Apple introduced their new UniFile and DuoFile at Comdex, and they should be available soon. They feature 860K per disk at a very reasonable price. Also on the market now is the MicroSci A143, a 560K disk that daisy-chains along with the standard drives. This disk has less storage, but it also has the advantage of not requiring a slot. Since both disks come with SOS drivers, they are completely compatible with all your other software. Go SOS!

And Now, On with the Show. First, we'll look at the general operation of the shape editor, using line number ranges to describe large operations. Then, some of the routines will be examined in detail to clarify points of possible confusion and to indicate which routines could be adapted for other purposes.

General Operation. Apple III hi-res shapes and characters are drawn on the screen using a procedure in the Bgraf invokable module called Drawimage. This actually utilizes the Drawblock capability of the .Grafix driver. Unfortunately, knowing all this, and even reading all the documentation, doesn't make it completely clear. The program that follows should help by illustrating lots of useful subroutines that perform these functions.

The program operates by creating a work area on the screen that allows you to look at and change data blocks used by Drawimage. These data blocks consist of integer arrays that Drawblock interprets as bits to be drawn on the screen. From now on, the word *bit* will mean a piece of data in an array, and the word *pixel* will mean the representation of that bit as a dot on the screen. Obviously, the different graphics modes have different looking pixels, although the bit in the array is the same. For now, we won't worry about color, since that is not a function of the bit arrays, but rather of the pen color assigned at the time the bits are drawn.

Another important feature of the editor is that it maintains separate windows on the screen for each video mode. This allows you to see the shape in all the modes at once as it's being created. Sometimes a shape that looks good in one mode looks terrible in another, because of the different proportions. Enough theory, let's look at the code!

Getting a Bit Under Control. After setting up arrays in lines 10 through 15, variable and table initialization is done in lines 4000 through 4500. The program uses several arrays as work areas and holding areas for data, and others for fast look-up of information for performance. Work% is an array that holds the bit patterns currently available to be modified. These can come from a character set (char%), a shape definition (shape%) or an Apple III system font (cset%). The most important tables used for look-up are shex%, bits%, and flip.

Shex% is defined in lines 4000 through 4015 and contains the bit representations of all sixteen hex digits in four modes: two high, four wide; one high, four wide; one high, two wide; and one high, one wide. These modes correspond to character bit patterns for the work area, 140 by 192 mode, 280 by 192 mode, and 560 by 192 mode respectively. This is necessary since we will be using the 560 by 192 screen for all editing functions, but we'll want to look at the characters and shapes as they would appear in the other modes.

Bits% is a table that has four entries for each hex digit (one for each bit) and allows quick determination if a particular bit is on or off in a given hex number.

Flip contains 256 entries, each one corresponding to a byte with its bits reversed end for end. For example, consider the number 75. In hex, it would be $4B; in binary, 01001011. If we were to flip the bits exactly, the result would be 11010010, hex $D2, or decimal 210. All this would be extremely unimportant if it were not for the fact that the character images used by the Apple III system fonts and the images used by the Bgraf invokable module are exactly reversed. Therefore, to move back and forth between the two requires some way of reversing the sets. Thus the table flips. By looking up the seventy-fifth table entry, the program will find the value 210 and make the substitution. Line 4060 builds this array from a smaller array called lookup that consists of flipped hex digits.

Once initialization is done, lines 30 through 50 do some further setup, and the program proceeds to build the graphics screen for editing. If

you're wondering whether the whole program is worth entering, try typing in lines 5 through 200, just to get a look at the screen. It'll make a lot more sense out of the discussion to follow. Notice that line 100 refers to the subroutine at line 600, which creates the four windows referred to earlier. This routine is also used later to clear the windows quickly.

Once the screen is initialized, lines 210 through 235 get the command and dispatch to the proper routine for processing, Note that the actual input is handled in a subroutine at line 3000. This routine, along with the error routine at line 3070 and the message routine at line 3100, handles character input and output to the graphics screen. Remember, the primary action is on the graphics screen, so we want to avoid flipping back and forth between graphic and text screens. You could use this routine in any program that wants to accept text input on the graphics screen.

A Routine a Day. Rather than describe the various functions one at a time, it's more instructive to look at some in detail and give a general overview of the rest. One command that shows off most of the features of the program is Load, selected as item 2 on the menu. Load is handled by the routine at 1400.

Getting Loaded in Hi-Res. First the routine prompts for what kind of file to load. Shape and character set files are unique to this program, but the font file must be treated specially, since Basic cannot directly open a system font file. Note the use of the INSTR function at line 1410 to determine the value of the variable choice. There are two spaces in front of the "Ss" and one space between "Ss," "Cc," and Ff." When divided by three and truncated (INT), the result is 0, 1, 2, or 3. This is a handy technique to handle multiple-choice options in either upper or lower case.

The error flag is set in line 1430 to handle any errors in dealing with the files, and then, unless it's a font file, the file is opened in line 1435. If the choice is a font file, the Getfont invokable procedure is used to load it into memory, and the subroutine at line 3950 is called to flip the font to the graphics mode. If the choice is a shape or character file, then information about the data is read in line 1450 from the first record. Filtyp is the type code used to save the file, ch is character height, cw is character width, and sl is the valid length of the shape definition in words (0 to 7). Not all these values will have meaning, depending on the value of filtyp. If everything is okay, then the Filread invokable procedure is called (from the Request.Inv module) to read in the array from the file. The actual size of the file as read, ret%, is checked against the expected size, size%(filtyp); if everything checks out, then the subroutine at line 3600 is called to display the results of the load.

The subroutine at line 3600 does most of the work of displaying the bit images on the screen as various sized pixels. First, depending on the type of image to be displayed (shape, character set, or font), it loads a section of the appropriate array into the work area using the routines in lines 3700 through 3940. If the choice is a shape, it is directly transferred to the work area, since shape definitions are arbitrarily defined to be a maximum of 128 pixels wide by 16 pixels high. In the case of character set and font definitions, the routine at line 3800 prompts for a starting character number to display in the work area. Normally character definitions are each eight pixels wide, and fonts are always eight pixels wide. Although it is possible to define a larger character cell size, for the purposes of this program fonts will be transferred to the work area on eight-pixel boundaries and character sets will be transferred on even eight-pixel boundaries. This simplifies things considerably, since the data is stored in integer (sixteen-bit) arrays. Lines 3815 through 3830 determine the starting location in the char% array to begin the transfer and calculate sl, the shape length, which is the number of array elements (maximum eight elements or 128 bits) to display in the work area.

As you can see, the storage format of shapes and character set definitions is similar. Basically, the first index of the array represents the bits in a given row, and the second index represents the row number. Things are considerably different in the font definition, however, as shown in the routine at line 3900. The Getfont procedure reads the font definition into a one-dimensional array that is decoded in lines 3915 to 3935. You can think of the font definition as a set of eight bytes for each character, one byte for each character row, arranged one after another. Every eight bytes (four integer elements), a new character begins. The requirements of the Drawimage procedure are that each row byte be in a separate row element, and that each row element (an integer) contain the two row bytes of two adjacent characters. Whew! No wonder a lot of these programs haven't been written! Anyway, trust it, it works.

See It All. After all that messing around, we now have the proper information in the work% array and can draw the images on the screen with the routines at lines 3605 through 3690. After clearing all the windows, and setting up the variables (rs—starting row to display, re—ending row to display, bw—beginning word of column, ew—ending word of column), we are ready to draw in each window. Line 3610 gives the starting position of the window in xdot and ydot and then defines where in the shex% array the drawing of the pixel definitions will take place. Rows zero and one of shex% are pixel definitions of hex digits in four wide, two high format, the format for the work area display. The subroutine at line 3670 then proceeds through the work% array, drawing from the definitions in shex%. Note that line 3625 performs the Drawimage procedure directly, since the window at 7, 117 is for 560 by 192 mode, which is the current screen mode and can thus be drawn directly. The drawing proceeds with list 3630 through 3635, which sets up the 280 by 192 mode (two wide, one high), and finally lines 3640 through 3645, the 140 by 192 mode (four wide, one high); the display is now complete.

Although this information is useful, it is by no means complete. A thorough reading of Appendix I of the Basic manual on the Bgraf invokable and the *Standard Device Drivers Manual* section on Grafix is strongly recommended.

This program has also been somewhat simplified by limiting the shape and character size definitions in size. In actual practice, Drawimage can be used to draw shapes or characters actually larger than the entire graphics screen! An interesting challenge is to modify this routine to handle larger shape and character definitions, treating the work area as a window, as is done to a limited extent with the character set and font definitions.

Putting the Bits and Bytes to Bed. A quick look at the save function is worthwhile, especially now that you are familiar with the internal format of the information. The save routine is found at lines 1100 through 1195 and is relatively straightforward except for lines 1170 through 1180. In line 1170 a check is made for file type 3, the font file. Font files are saved without accompanying information, since the format is fixed. This also allows you to alter the file type on disk to font type and load the font into the standard system character set. The Pascal filer will allow this, and there is a new invokable from Foxware that makes it easy to do from Basic. In addition, the Loadfont procedure will allow you to use Download.Inv for the same purpose.

Line 1175 then goes to a subroutine, depending on file type, which loads the work area back into the appropriate array for saving. Any

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modifications, as we will see later, are made only in the work area, until saved or another work area is chosen. After transferring the work area, a check is made to see if the save is being attempted in a different format than the original load. For type 1 (shape) the sizes are identical to the work area, so nothing has to be done, but for character set to font and vice versa, some translations must be made. They are handled by the subroutines beginning at line 2000, and then the appropriate array is written to disk, safe at last.

Other Interesting Stuff. The catalog, delete, and define functions are relatively simple and won't be covered here. View uses some of the functions we have already discussed in the load and save routines. It permits scanning around in the character set or font, beginning at different places. This routine first must save the current work area back to its original array, and then load and display the new section, much the same as the original load routine did. Obviously, for shapes, there is nothing to view beyond what is on the screen, so a redisplay is done.

Okay, it's there; now what?

Which brings us to the edit, clear, and invert routines.

After displaying what you want to edit in the work area, selecting option 4 gets you into the routine at line 250. An immediate gosub is performed to line 450 to determine if the pixel at the current grafix cursor location (chorz, cvert) is on or off. The value of the bit is stored in cstate. On returning, cflash is set to the opposite value, and an on kbd loop is entered to flash a pixel at that location. Note that the routine in line 275 makes a longer wait between flashes if cstate is 0, allowing you to tell whether the underlying pixel is on or off.

When a key is pressed on the keyboard, the long routine at lines 280 through 345 is entered to process the keystroke and perform the appropriate action. The request is decoded in line 295 by scanning the ctrl$ string, previously defined in line 4085. Then line 300 transfers control to the appropriate routine. Lines 315 through 330 handle simple cursor movements. Note that when the open-apple key is held down, the value of skp is set to the current character width (line 290), useful for moving rapidly from character to character.

Line 335 handles toggling a bit and redrawing of the associated screen pixels. First, the current bit is determined by a gosub 450. Then the subroutine at line 470 changes the appropriate bit, and, finally, the routine at line 400 is called to update the pixels in all the windows. All of these routines will come in handy in a minute when we discuss the invert and clear routines. Finally, the routine restores the on kbd condition and returns to the flashing cursor loop in line 270.

That leaves only invert and clear as major, undiscussed functions. These can be called from edit mode directly, or in command mode. Let's take invert, the more complicated of the two, first. Line 1500 prompts for clearing a whole row, a whole column, a block (defined as eight bits wide, ch high), or the whole work space. Rows are handled in lines 1540 through 1565 by moving through the row, subtracting 255 from each byte, and storing them back. Then lines 1560 through 1565 set up and call 3610 to redraw the row. Inverting a row is handled by our bit-toggle routines, called repeatedly in lines 1575 through 1585 as if we were inverting each one separately with the space bar. Inverting a block and inverting the whole work space are handled in 1600 through 1655 as special cases of the invert row technique just discussed.

Once you understand the invert techniques, clear becomes simple, since it mostly involves zeroing out various locations. Note, however, that in clearing a column in lines 1765 through 1775 the bit toggle and draw (470 and 400) are only performed if the bit is on (cstate is true). Also, when the clear work space command is executed, line 600 is called to clear the windows fast, instead of drawing the pixels (all zeros) in them.

At Long Last, the Program! Well, there you have it, a monument to the Apple III graphics capability. Next month we will continue on with this topic and use the editor to create shapes to populate our games and other graphic adventures. Until then, happy typing!

```
5 REM Shape, Character, and Font Editor
10 DIM char%(127,15),shape%(7,15),
   name$(10),ary$(10),size%(10),
   bits%(15,3)
15 DIM work%(7,15),shex%(15,3),
   cset%(511),lookup(15),flip(255),
   block$(15)
20 PRINT"Initializing variables, please wait"
25 GOSUB 4000
30 INVOKE"/basic/bgraf.inv","/basic/
   request.inv","/basic/download.inv"
35 OPEN#1,".grafix"
40 PERFORM initgrafix
45 PERFORM grafixmode(%2,%1)
50 PERFORM fillcolor(%15):PERFORM
   pencolor(%0)
55 HOME:PRINT:PRINT"Initializing the
   graphics screen, please wait."
60 PERFORM
   viewport(%0,%559,%0,%191):
   PERFORM fillport
65 PERFORM moveto(%0,%184)
70 PRINT#1,"================
   ====================
   ====================
   ====================
   ==";
75 PERFORM moveto(%0,%191)
80 PRINT#1 USING"79c","DrawImage
   Editor"
85 PRINT#1,"================
   ====================
   ====================
   ====================
   ==";
90 PERFORM fillcolor(%0):PERFORM
   pencolor(%15)
95 PERFORM moveto(%261,%176):
   PRINT#1;" Work Area "
100 GOSUB 600
125 PERFORM
   viewport(%5,%556,%13,%58):
   PERFORM fillport
130 PERFORM
   viewport(%5,%556,%1,%10):
   PERFORM fillport
135 PERFORM
```




```
    viewport(%0,%559,%0,%191)
140 PERFORM moveto(%28,%128):
    PRINT#1;" 560 X 192 ";
145 PERFORM moveto(%253,%128):
    PRINT#1;" 280 X 192 ";
150 PERFORM moveto(%233,%98):
    PRINT#1;" 140 X 192 ";
155 PERFORM moveto(%233,%67):
    PRINT#1;" Command Keys "
165 PERFORM moveto(%7,%57):PRINT#1;
    " Arrow keys move cursor  ESCAPE
    quits current mode  SPACE
    toggles bits";
170 PERFORM moveto(%69,%45):PRINT#1;
    " 0 : Catalog  3 : Delete  6
    : Clear"
180 PERFORM moveto(%69,%36):PRINT#1;
    " 1 : Save  4 : Edit  7
    : Define"
190 PERFORM moveto(%69,%27):PRINT#1;
    " 2 : Load  5 : Invert  8
    : View"
200 PERFORM grafixon
210 prompt$="Select a Command: "
215 GOSUB 3000
220 IF fin THEN 1000
225 a=ASC(MID$(line$,1,1))
230 IF a>47 AND a<57 THEN ON a-47
    GOSUB 1200,1100,1400,1300,250,
    1500,1700,2500,1900:GOTO 210
235 GOSUB 3070:GOTO 210
250 GOSUB 450
255 cflash= NOT cstate
260 ON KBD GOTO 280
265 PERFORM moveto(%chorz*4+7,
    %cvert*2+134)
270 PERFORM drawimage(@shex%(0,0),
    %32,%24+cflash*4,%0,%4,%2)
275 cflash= NOT cflash:FOR z=1 TO
    5+200*( NOT cstate):NEXT:
    GOTO 270
```


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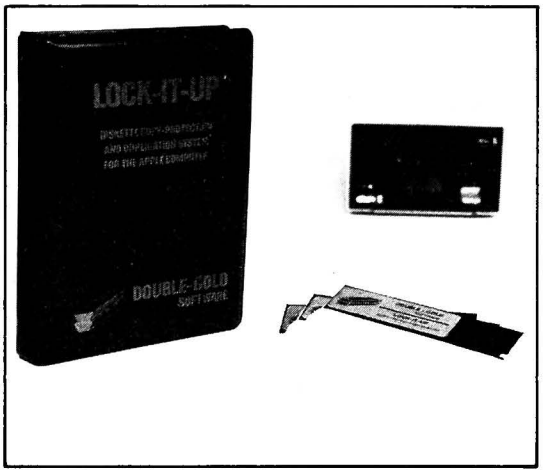

```
280 OFF KBD:PERFORM
    drawimage(@shex%
    (0,0),%v32%,%24+cstate*4,%0,
    %4,%2)
285 key= KBD:IF key=27 THEN
    kvl=0:POP:GOTO 210
290 IF key>127 THEN skp=cw:key=
    key-128:ELSE:skp=1
295 kvl=INSTR(ctrl$,CHR$(key))
300 IF kvl THEN ON kvl GOTO 315,
    320,325,330,335,1500,1700
305 ON KBD GOTO 280
310 RETURN
315 IF left<=chorz-skp THEN chorz=
    chorz-skp:GOSUB 450:GOTO 340:
    ELSE:GOTO 340
320 IF right>=chorz+skp THEN chorz=
    chorz+skp:GOSUB 450:GOTO 340:
    ELSE:GOTO 340
325 IF top>=cvert+skp THEN cvert=
    cvert+skp:GOSUB 450:GOTO 340:
    ELSE:GOTO 340
330 IF bot<=cvert-skp THEN cvert=
    cvert-skp:GOSUB 450:GOTO 340:
    ELSE:GOTO 340
335 GOSUB 450:GOSUB 470:GOSUB 400:
    IF ch<15-cvert THEN ch=15-cvert
340 PERFORM moveto(%chorz*4+7,
    %cvert*2+134)
345 ON KBD GOTO 280
350 RETURN
400 PERFORM moveto(%chorz*4+7,
    %cvert*2+134):PERFORM drawimage
    (@shex%(0,0),%32,%24+cstate*4,
    %0,%4,%2)
410 PERFORM moveto(%chorz+7,
    %cvert+102):PERFORM drawimage
    (@shex%(0,0),%32,%6+cstate,%3,
    %1,%1)
415 PERFORM moveto(%chorz*2+157,
    %cvert+102):PERFORM drawimage
    (@shex%(0,0),%32,%12+cstate*2,
    %2,%2,%1)
420 PERFORM moveto(%chorz*4+7,
    %cvert+72):PERFORM drawimage
    (@shex%(0,0),%32,%24+cstate*4,
    %0,%4,%1)
425 RETURN
450 col=INT(chorz/16):bitnum=
    chorz-col*16
455 cval$=HEX$(work%(col,15-cvert)):
    nibpos=INT(bitnum/4):nib$=MID$
    (cval$,nibpos+1,1)
460 bit=bitnum-nibpos*4:cstate=bits%
    (TEN(nib$),bit)
465 RETURN
470 cnval=2^(3-bit):IF cstate THEN
    cnval=-cnval
475 SUB$(cval$,nibpos+1,1)=MID$(HEX$
    (TEN(nib$)+cnval),4,1)
480 work%(col,15-cvert)=TEN(cval$)
485 cstate= NOT cstate
490 RETURN
600 PERFORM viewport(%5,%556,%131,
    %166):PERFORM fillport
605 PERFORM viewport(%5,%135,%101,
    %118):PERFORM fillport
610 PERFORM viewport(%155,%420,%101,
    %118):PERFORM fillport
615 PERFORM viewport(%5,%540,%71,
    %88):PERFORM fillport
620 PERFORM
    viewport(%0,%559,%0,%191)
625 RETURN
1000 REM clean up and go home
1005 HOME:TEXT
1010 PERFORM release:PERFORM
     release:PERFORM release
1015 INVOKE
1020 CLOSE
1030 END
1100 IF choice=1 THEN filtyp=1:GOTO
     1125
1105 prompt$="Save as a "
     +name$(1)+", "+name$(2)+" or "
     +name$(3)+"? "
1110 GOSUB 3000:IF fin THEN RETURN
1115 a$=MID$(line$,1,1):filtyp=
     INT(INSTR(" Ss Cc Ff",a$)/3)
1120 IF filtyp=0 THEN1105
1125 prompt$="Pathname of Save file: "
     :GOSUB 3000
1130 IF fin AND choice=1 THEN RETURN:
     ELSE:IF fin THEN 1105
1135 ON ERR GOTO 1190
1140 OPEN#3,line$
1145 IF TYP(3)=8 THEN message$=
     "INVALID, "+line$+" is a TEXT
     file.":GOSUB 3100:GOTO 1125
1150 IF TYP(3)=0 THEN 1170
1155 prompt$="Ok to destroy old data in file "
     +line$+"? ":GOSUB 3000
1160 IF fin THEN 1125
1165 IF NOT INSTR("Yy",MID$
     (line$,1,1)) THEN 1125
1170 IF filtyp<>3 THEN WRITE#3,0;
     filtyp,ch,cw,sl:WRITE#3,1;
     0:READ#3,1
1175 ON choice GOSUB 3750,3850,3860
1178 IF choice>1 AND choice<>filtyp
     THEN GOSUB 2000
1180 array$=ary$(filtyp):PERFORM
     filwrite(%3,@array$,%size%
     (filtyp))
1185 message$=name$(filtyp)+" saved.":
     GOSUB 3100:CLOSE#3:OFF ERR:
     RETURN
1190 message$="Error in opening or
     writing to file. ":GOSUB 3100
1195 OFF ERR:GOTO 1125
1200 prompt$="Pathname to Catalog: "
1205 GOSUB 3000
1210 IF fin THEN delay=1:RETURN
1215 oldpre$= PREFIX$
1220 ON ERR GOTO 1270
1225 PREFIX$=line$
1230 OPEN#8 AS INPUT, PREFIX$
1235 OFF ERR
1240 ON EOF#8 GOTO 1285
1245 delay=0
1250 INPUT#8;message$
1255 IF MID$(message$,1,10)="        "
     THEN 1250
1260 GOSUB 3100
1265 GET a$:IF ASC(a$)=27 THEN 1285:
     ELSE GOTO 1250
1270 message$=line$+" is not a valid
     Prefix"
1275 delay=1:GOSUB 3100
1280 OFF ERR
1285 PREFIX$=oldpre$
1290 GOTO 1200
1300 prompt$="Pathname of file to Delete: "
1305 GOSUB 3000
1310 IF fin THEN RETURN
1315 ON ERR GOTO 1360
1320 OPEN#8 AS INPUT,line$
1325 IF TYP(8)<>1 THEN message$=
     line$+" is not a Save file":
     GOSUB 3100:CLOSE#8:GOTO 1300
1330 ON ERR GOTO 1380
1335 CLOSE#8:DELETE line$
1340 OFF ERR
1345 message$=line$+" deleted."
1350 GOSUB 3100:GOTO 1300
1360 OFF ERR
1365 message$="Cannot delete "+line$+".
     (doesn't exist or can't be opened)"
1370 GOSUB 3100:GOTO 1300
1380 OFF ERR
1385 message$="Cannot delete "+line$+".
     (write-protected or locked)"
```

```
1390 GOSUB 3100:GOTO 1300
1400 prompt$="Load a "+name$(1)+", a "
     +name$(2)+" or a "+name$(3)+"? "
1405 GOSUB 3000:IF fin THEN RETURN
1410 a$=MID$(line$,1,1):choice=INT
     (INSTR(" Ss Cc Ff",a$)/3)
1415 IF choice<1 OR choice>3 THEN
     GOSUB 3070:GOTO 1400
1420 prompt$="Pathname of "+name$
     (choice)+": "
1425 GOSUB 3000:IF fin THEN 1400
1430 ON ERR GOTO 1455
1435 array$=ary$(choice):IF
     choice <>3THEN
     OPEN#3,line$:GOTO 1450
1440 ch=7:font$=CHR$(34)+line$+CHR$
     (34):PERFORM getfont(@font$,
     @array$)
1445 OFF ERR:GOSUB 3950:GOTO 1485
1450 IF TYP(3)=1 THEN READ#3;
     filtyp,ch,cw,sl:IF filtyp=
     choice THEN 1470
1455 message$="Not a "
     +name$(choice)+" file.":GOSUB
     3100
1460 OFF ERR:IF choice=3 THEN 1420
1465 CLOSE#3:IF TYP(3)=0 THEN DELETE
     line$:GOTO 1420:ELSE:GOTO 1420
1470 READ#3,1:PERFORM filread(%3,
     @array$,%size%(filtyp),@ret%)
1475 CLOSE#3:IF ret%=size%(filtyp)
     THEN 1485
1480 message$=name$(choice)+" in "
     +line$+" is invalid.":GOSUB
     3100:GOTO 1420
1485 GOSUB 3600:message$=name$
     (choice)+" loaded.":GOSUB 3100
1490 RETURN
1500 prompt$="Invert Row, Column, Block
     or Work space? "
1505 GOSUB 3000:IF fin AND kvl THEN
     GOSUB 3500:GOSUB 450:GOTO 340
1510 IF fin THEN RETURN
1515 a$=MID$(line$,1,1)
1520 a=INT(INSTR(" Rr Cc Bb Ww",a$)/3)
1525 IF NOT a THEN GOSUB 3060:GOTO
     1500
1530 ON a GOTO 1540,1570,1600,1640
1540 crow=15-cvert
1545 FOR i=0 TO sl:b$=HEX$(work%
     (i,crow))
1500 work%(i,crow)=TEN(MID$(HEX$
     (255-TEN(MID$(b$,1,2))),3,2)
     +MID$(HEX$(255-TEN(MID$
     (b$,3,2))),3,2))
1555 NEXT
1560 rs=crow:re=crow:bw=0:ew=sl
1565 GOSUB 3610:GOTO 1500
1570 cur.vert=cvert
1575 FOR cvert=15-ch TO 15
1580 GOSUB 450:GOSUB 470:GOSUB 400
1585 NEXT
1590 cvert=cur.vert
1595 GOTO 1500
1600 cloc=INT(chorz/16):chalf=
     (chorz-16*cloc>7):st=chalf*2+1
1605 FOR i=0 TO ch:b$=HEX$(work%
     (cloc,i))
1610 SUB$(b$,st,2)=MID$(HEX$
     (255-TEN(MID$(b$,st,2))),3,2)
1615 work%(cloc,i)=TEN(b$)
1620 NEXT i
1625 bw=cloc:ew=cloc:rs=0:re=ch
1630 GOSUB 3610:GOTO 1500
1640 FOR crow=0 TO ch:FOR i=0 TO
     sl:b$=HEX$(work%(i,crow))
1645 work%(i,crow)=TEN(MID$(HEX$
     (255-TEN(MID$(b$,1,2))),3,2)
     +MID$(HEX$(255-TEN(MID$
     (b$,3,2))),3,2))
1650 NEXT:NEXT
```


LOCK-IT-UP

DISKETTE COPY-PROTECTION
AND DUPLICATION SYSTEMS
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The Lock-It-Up systems are sophisticated, menu driven copy-protection and duplication utilities for the Apple II Computer. They feature several levels of protection which make standard diskettes uncopyable by even the most sophisticated nibble copy programs currently available.



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DOS VERSION:

- Any standard DOS 3.3 diskette can be protected.
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- Autorun can be used to prevent the listing of a program or the use of any basic commands outside of a program.
- A faster DOS can be used in order to decrease disk access time by up to 50%!

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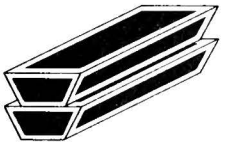
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```
1655 GOSUB 3607:GOTO 1500
1700 prompt$="Clear Row, Column, Block or
     Work space? "
1705 GOSUB 3000:IF fin AND kvl THEN
     GOSUB 3500:GOSUB 450:GOTO 340
1710 IF fin THEN RETURN
1715 a$=MID$(line$,1,1)
1720 a=INT(INSTR(" Rr Cc Bb Ww",a$)/3)
1725 IF NOT a THEN GOSUB 3060:GOTO
     1700
1730 ON a GOTO 1740,1760,1800,1830
1740 crow=15-cvert
1745 FOR i=0 TO sl:work%(i,crow)=0:NEXT
1750 rs=crow:re=crow:bw=0:ew=sl
1755 GOSUB 3610:GOTO 1700
1760 cur.vert=cvert
1765 FOR cvert=15-ch TO 15
1770 GOSUB 450:IF cstate THEN GOSUB
     470:GOSUB 400
1775 NEXT
1780 GOTO 1700
1800 cloc=INT(chorz/16):chalf=
     (chorz-16*cloc>7):st=chalf*2+1
1805 FOR i=0 TO ch:b$=HEX$(work%
     (cloc,i))
1810 SUB$(b$,st,2)="00":work%
     (cloc,i)=TEN(b$):NEXT
1815 bw=cloc:ew=cloc:rs=0:re=ch
1820 GOSUB 3610:GOTO 1700
1830 FOR crow=0 TO ch:FOR i=0 TO
     sl:work%(i,crow)=0:NEXT:NEXT
1835 GOSUB 600:GOTO 1700
1900 IF choice=1 THEN GOSUB
     3605:RETURN
1905 IF choice=2 THEN GOSUB
     3850:ELSE:GOSUB 3860
1910 GOSUB 3800
1915 GOSUB 3605
1920 RETURN
2000 ON filtyp GOSUB 3750,2100,2200
```


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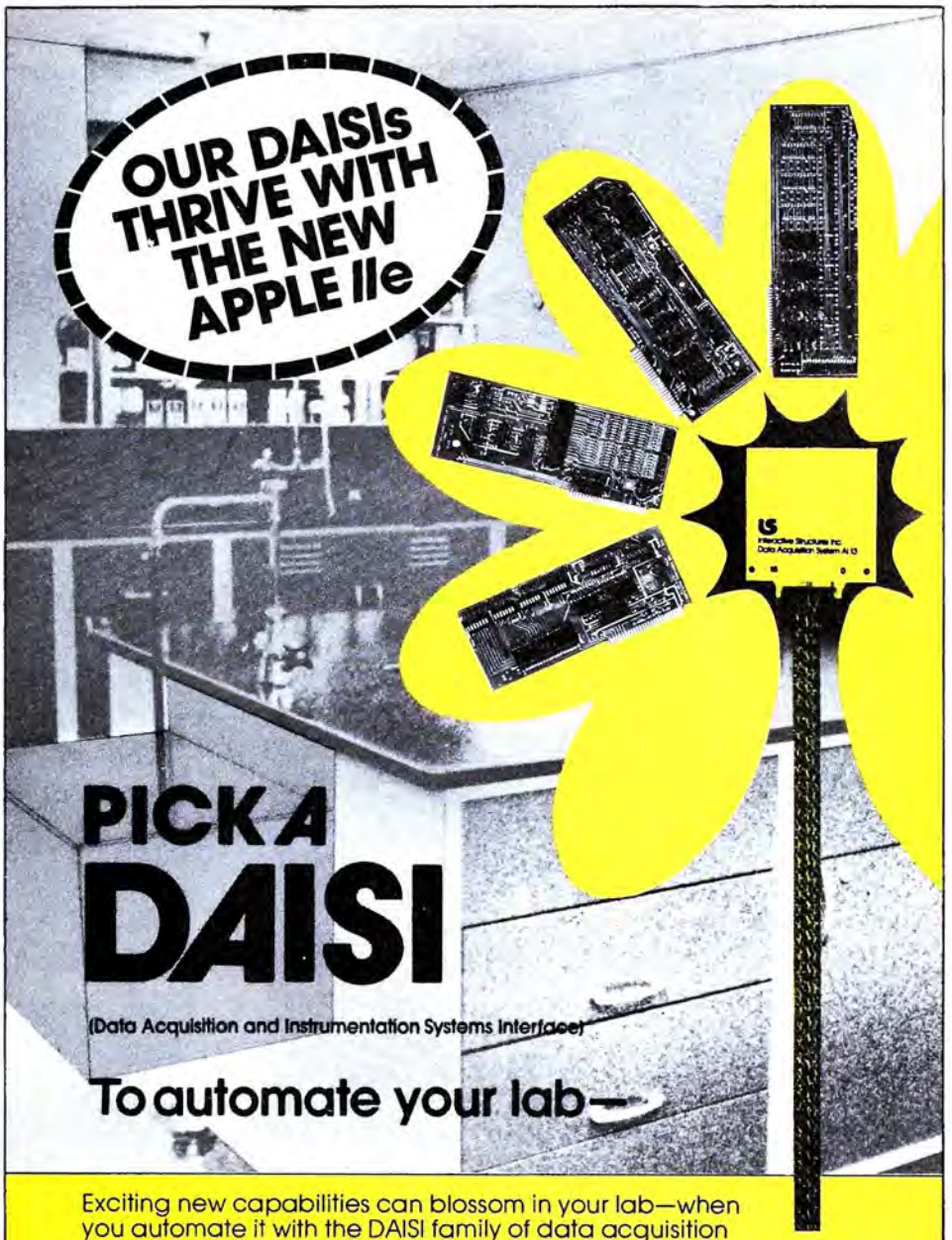
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```
2005 RETURN
2100 message$="Transferring Font format to
     Character set format":GOSUB 3100
2105 FOR k=0 TO 63:j=8*k-1
2110 FOR i=0 TO 7 STEP 2:j=j+1:
     a$=HEX$(cset%(j)):b$=HEX$
     (cset%(j+4))
2115 char%(k,i)=TEN(MID$(a$,1,2)
     +MID$(b$,1,2))
2120 char%(k,i+1)=TEN(MID$(a$,3,2)
     +MID$(b$,3,2))
2125 NEXT:NEXT
2130 FOR k=64 TO 127:FOR i=0 TO
     7:char%(k,i)=0:NEXT:NEXT
2135 FOR k=0 TO 127:FOR i=8 TO
     15:char%(k,i)=0:NEXT:NEXT
2140 RETURN
2200 message$="Transferring Character set
     format to Font format":GOSUB 3100
2205 FOR k=0 TO 63:j=8*k-1
2210 FOR i=0 TO 7 STEP 2:j=j+1:
     a$=HEX$(char%(k,i)):b$=HEX$
     (char%(k,i+1))
2215 cset%(j)=TEN(MID$(a$,1,2)+MID$
     (b$,1,2))
2220 cset%(j+4)=TEN(MID$(a$,3,2)
     +MID$(b$,3,2))
2225 NEXT:NEXT
2230 GOSUB 3950
2235 RETURN
2500 prompt$="Character height is
     now "+CONV$(ch+1)+". New value: "
2505 GOSUB 3000:IF fin THEN 2550
2510 a=CONV(line$)
2515 If a < 1 OR a > 16 THEN message$=
     "Character height must be between 1
     and 16" :GOSUB 3100:GOTO 2500
2520 ch=a-1:message$="Character
     height is now "+CONV$(ch+1)+".":
     GOSUB 3100
2550 prompt$="Character width is now "
     +CONV$(cw)+". New value: "
2555 GOSUB 3000:IF fin THEN 2600
2560 a=CONV(line$)
2565 IF a<1 OR a>255 THEN message$=
     "Character width must be between 1
     and 255" :GOSUB 3100:GOTO 2550
2570 cw=a:message$="Character width
     is now "+CONV$(cw)+".":GOSUB
     3100
2600 prompt$="Work area width in
     dots (must be 16,32,48,64,80,96,
     112 or 128: "
2605 GOSUB 3000:IF fin THEN 2700
2610 a=CONV(line$)/16-1
2615 IF INT(a) <> a THEN message$=
     "Width must be a multiple of 16":
     GOSUB 3100: GOTO 2600
2620 IF a<0 OR a>7 THEN message$=
     "Width must be between 16 and 128":
     GOSUB 3100:GOTO 2600
2625 sl=a:message$="Work area width
     is now "+CONV$((a+1)*16)+".:GOSUB
     3100
2630 right=(a+1)*16-1
2635 message$="Definitions complete."
     :GOSUB 3100
2640 RETURN
3000 REM Accept a message from the
     window
3005 GOSUB 3500:PERFORM moveto
     (%7,%9):PRINT#1;prompt$;
3010 line$="":fin=0
3015 GET a$:a=ASC(a$)
3020 IF a>31 THEN PRINT#1;a$;:
     line$=line$+a$:GOTO 3015
3025 IF a=13 THEN fin=LEN(line$)=
     0:RETURN
3030 IF a=27 THEN fin=2:RETURN
3035 IF a<>8 THEN 3015
3040 IF LEN(line$)=0 THEN 3015
3045 PERFORM moverel(%-7,%0):
     PRINT#1;" ";:PERFORM moverel
     (%-7,%0)
3050 line$=MID$(line$,1,LEN
     (line$)-1)
3055 GOTO 3015
3060 REM print an error message
3070 PERFORM moveto(%450,%9)
3075 PRINT#1;"INVALID";:FOR i=1 TO
     500:NEXT
3080 PERFORM moveto(%450,%9)
3085 PRINT#1;"       ";
3090 RETURN
3100 GOSUB 3500
3110 PERFORM moveto(%7,%9):PRINT#1;
     message$;
3120 FOR i=1 TO 750*delay:NEXT
3130 RETURN
3500 PERFORM viewport(%5,%556,%1,
     %10):PERFORM fillport
3510 PERFORM viewport(%0,%559,%0,
     %191)
3520 RETURN
3600 ON choice GOSUB 3700,3800,3800
3605 GOSUB 600
3607 rs=0:re=ch:bw=0:ew=sl
3610 xdot=7:ydot=164:rows=2:width=
     16:srow=0
3615 GOSUB 3670
3620 PERFORM moveto(%7,%117)
3625 PERFORM drawimage(@work%(0,0),
     %16,%0,%0,%128,%ch+1)
3630 xdot=157:ydot=117:rows=1:
     width=8:srow=2
3635 GOSUB 3670
3640 xdot=7:ydot=87:rows=1:width=
     16:srow=0
3645 GOSUB 3670
3650 RETURN
3670 xhorz=xdot+16*bw*(width/4)
3675 FOR k=rs TO re:PERFORM moveto
     (%xhorz,%ydot-rows*k):FOR
     i=bw TO ew
3677 IF work%(i,k)=0 THEN PERFORM
     moverel(%width*4,%0): GOTO 3695
3680 a$=HEX$(work%(i,k)):FOR j=1 TO
     4:dhex%=TEN(MID$(a$,j,1))
     *width
3685 PERFORM drawimage( shex%(0,0),
     %32,%dhex%,%srow,%width,%rows)
3690 PERFORM moverel(%width,%0):
     NEXT
3695 NEXT:NEXT
3698 RETURN
3700 FOR i=0 TO 7:FOR j=0 TO
     ch:work%(i,j)=shape%(i,j):NEXT:NEXT
3705 RETURN
3750 FOR i=0 TO 7:FOR j=0 TO 15:
     shape%(i,j)=work%(i,j):NEXT:NEXT
3755 RETURN
3800 prompt$="Starting Character number
     to display: "
3805 GOSUB 3000
3810 IF fin THEN cr=0:GOTO 3850
3815 cr=VAL(line$)
3820 IF cr<0 OR cr>254 THEN message$=
     "Number out of range":GOSUB
     3100:GOTO 3800
3822 IF choice=3 THEN 3900
3825 IF cr/2<>INT(cr/2) THEN
     message$="Character number must
     be even (0,2,4, etc.)":GOSUB
     3100:GOTO 3800
3830 wd=cr/2:sl=7:IF wd+sl>127
     THEN sl=127-wd
3835 FOR i=0 TO ch:FOR j=0 TO sl:
     work%(j,i)=char%(wd+j,i):
     NEXT:NEXT
3840 RETURN
3850 FOR i=0 TO ch:FOR j=0 TO sl:
     char%(wd+j,i)=work%(j,i):
```

```
      NEXT:NEXT
3855  RETURN
3860  FOR k=0 TO sl:j=skip+8*k-1
3865  FOR i=0 TO 7 STEP 2:j=j+1:
      a$=HEX$(work%(k,i)):b$=HEX$
      (work%(k,i+1))
3870  cset%(j)=TEN(MID$(a$,1,2)+MID$
      (b$,1,2))
3875  cset%(j+4)=TEN(MID$(a$,3,2)
      +MID$(b$,3,2))
3880  NEXT:NEXT
3885  RETURN
3900  IF cr>127 THEN
      message$="Character range must be
      0-127":
      GOSUB 3100:GOTO 3800
3910  skip=4*cr:sl=7:IF cr+2*sl>126
      THEN sl=(126-cr)/2
3915  FOR k=0 TO sl:j=skip+8*k-1
3920  FOR i=0 TO 7 STEP 2:j=j+1:a$=
      HEX$(cset%(j)):b$=HEX$(cset%
      (j+4))
3925  work%(k,i)=TEN(MID$(a$,1,2)
      +MID$(b$,1,2))
3930  work%(k,i+1)=TEN(MID$(a$,3,2)
      +MID$(b$,3,2))
3935  NEXT:NEXT
3940  RETURN
3950  message$="Preparing the character
      font.":GOSUB 3100
3955  FOR k=0 TO 511:b$=HEX$(cset%
      (k)):cset%(k)=TEN(HEX$
      (v256*flip(TEN(MID$(b$,1,2)))
      +flip(TEN(MID$(b$,3,2))))):NEXT
3960  RETURN
4000  DATA 0000,000F,00F0,00FF,0F00,
      0F0F,0FF0,0FFF
4005  DATA F000,F00F,F0F0,F0FF,FF00,
      FF0F,FFF0,FFFF
4010  DATA 0003,0C0F,3033,3C3F,C0C3,
      CCCF,F0F3,FCFF
4015  DATA 0123,4567,89AB,CDEF
4025  DATA 0,8,4,12,2,10,6,14,1,9,5,
      13,3,11,7,15
4026  DATA 0,0,0,0,0,0,0,1,0,0,1,0,0,
      0,1,1,0,1,0,0,0,1,0,1,0,1,1,0,
      0,1,1,1
4027  DATA 1,0,0,0,1,0,0,1,1,0,1,0,1,
      0,1,1,1,1,0,0,1,1,0,1,1,1,1,0,
      1,1,1,1
4028  FOR i=0 TO 15:READ block$(i):
      NEXT
4030  FOR i=0 TO 15:h%=TEN(block$
      (i)).shex%(i,0)=h%:shex%(i,1)=
      h%:NEXT
4035  FOR i=0 TO 7:READ a$:shex%
      (i,2)=TEN(a$):NEXT
4040  FOR i=0 TO 3:READ a$:shex%
      (i,3)=TEN(a$):NEXT
4045  FOR i=0 TO 15:READ lookup(i):NEXT
4050  FOR i=0 TO 15:FOR j=0 TO 3:READ
      bits%(i,j):NEXT:NEXT
4055  v256=256:v16=16
4060  FOR i=0 TO 255:a$=HEX$(i):
      flip(i)=v16*lookup(TEN(MID$
      (a$,4,1)))+lookup(TEN(MID$
      (a$,3,1))):NEXT
4065  sh=7:sl=7:ch=7:cw=8:choice=2:
      cr=0:wd=0:skip=0
4070  name$(1)="Shape definition":
      name$(2)="Character set":
      name$(3)="Font"
4075  ary$(1)="shape%":ary$(2)=
      "char%":ary$(3)="cset%"
4080  size%(1)=256:size%(2)=2048:
      size%(3)=1024
4085  ctrl$=CHR$(8)+CHR$(21)+CHR$
      (11)+CHR$(10)+CHR$(32)+"5"+"6"
4090  left=0:right=127:top=15:bot=0:
      cvert=15:chorz=0:delay=1
4500  RETURN
```

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BY JUDVANN CHRISTENSEN

"Controlling my house with an Apple has done wonders for my social life," Mike Graziano quips facetiously. "In the middle of my entertaining a date, my computer's voice synthesizer blurts out that Ralph's using the cat box. It's hard to continue being romantic after that!"

Such situations are commonplace to Graziano, a technical analyst for Hartford Insurance Group in Connecticut, and his unique housekeeping system. A bachelor with time on his hands and a lively sense of humor, Graziano didn't program a typical housekeeping system; his Apple's chief chore as homemaker is keeping tabs on a tabby named Ralph.

Graziano's system starts with the essentials. Every indoor cat needs to visit a cat box several times a day, and Ralph's cat box is unlike any other on the block. It sports a photoelectric light cell in the doorway to notify the Apple each time Ralph slinks in. After waiting a few minutes for Ralph to do her thing undisturbed, the computer activates a fan above the cat box that scatters the vapors from Ralph's tiny rest room.

Modesty has not been considered. Ralph's powder room visits are noted by the system twice. When Ralph pussyfoots past the light cell, the voice synthesizer immediately announces throughout the townhouse, "Ralph is in the potty," and it keeps a running total of her visits. Then, after Ralph uses her water closet a prescribed number of times, cleaning the w.c. is automatically added to Graziano's automated to-do list.

The biggest benefit of the electronic cat-patrol accrues when Graziano is on the road for days at a time. It enables him to check on Ralph. He just phones his Apple, which is hooked through an acoustic coupler to the phone lines, to learn how often Ralph has been activating the light source on her latrine. If Ralph's schedule is not the usual, Graziano calls a neighbor to check on her.

Not one to let his cat become bored, Graziano programmed the computer to keep Ralph entertained. At random times during every hour, the



synthesizer says, "Hi, Ralph." Obligingly, the cat curls her long tail in reply.

"I used to have the synthesizer say, "Hi, ugly," but I kept responding to it. It was driving me crazy and offending my visitors," adds Graziano.

Cat-sitting is only a part of Graziano's extensive housekeeping system. His home management program is written in Basic with some assembly language routines. The system includes a 48K Apple II with Applesoft card, communications card, Mountain clock, Echo II speech synthesizer, SciTronics remote controller, ComData acoustic coupler, and an originate/answer modem.

"With these electronic workhorses, I have the power to be as creative as I want."

In the three years he has had his system, Graziano has been very creative. He even planned ahead to let his imagination run wild. While

The Cat That's the Apple's Meow



A day in the life of a high-tech kitty. Ralph works out, checks on the output of her in-house programmer, and tests the photoelectric sensor in her home control system. A speech synthesizer, Mountain clock, modem, and acoustic coupler all go into making up the recipe for gracious feline living.



building a condominium last year, he installed a complex system of wires to ensure the capacity to connect his system to as many electronic appliances as possible.

Man's Best Friend, Too. A typical weekday for Graziano's Apple starts at midnight. That's when it automatically lowers the heat for the time Graziano and Ralph are sleeping. At 6:00 a.m., it raises the temperature ten degrees to tempt man and cat out of bed. At 6:15, the computer turns on the stove to boil water for morning coffee, while the synthesizer drones, "Good morning, Mike," in an unconvincing monotone. If Graziano doesn't get out of bed, the pleasantry is repeated until he turns it off. Then the system politely rewards Mike with a "thank you" for getting out of bed.

When 6:30 rolls around, the system turns off the electric blanket. "This makes me want to get up because it's as cold in bed as it is outside," says Graziano.

At 7:00, the Apple lowers the temperature until late afternoon, when it raises it again in anticipation of Graziano's return. To lower the thermostat, the computer activates a heater that generates a small amount of hot air next to the thermostat. This stimulates the thermostat's meter to lower the heat. At 10:30 p.m., the electric blanket turns back on to provide another comfortably toasty night for Graziano. Ralph does without.

Weekends vary from this regimen. The heat turns on at 9:00 a.m. and the electric blanket shuts off at noon. Unfortunately, even though the weekend routines are activated automatically, once in a while the human programmer makes an error.

"More than once I've been awakened at 6:15 a.m. because I forgot to notify the computer of a holiday," Graziano admits with a sigh. "On those days, I feel like ripping the system out of my house."

When Graziano has a late night, the computer knows it. If he doesn't activate the front door sensor on schedule, the simulator is programmed to turn on the lights at random times—as if he were at home. As soon as he arrives, the computer continues its daily routine as if he had been home all evening. When Graziano travels, he has the computer bypass all daily routines and turn on the lights at random times to simulate his being home.

Graziano has missed no convenience programming his system. He no longer has to fumble for his door keys. As he nears home, a transmitter in his car conveniently turns on the porch light, as well as his stereo. As he parks, the door automatically unlocks. Yet, even the best-laid plans of Mike Graziano are apt to go awry. Once, a friend who'd borrowed the place for the day reprogrammed the stereo to blare out

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"The Stripper" when Graziano and his date arrived home that night. "Boy, was I embarrassed."

Ralph isn't the Apple's only ward. It also takes care of Graziano. For example, he must review his automated tickler file each morning before he leaves for work. If he doesn't, the synthesizer reminds him aloud and the front door sensor won't let him out.

No detail of Graziano's or Ralph's lives is overlooked by the to-do list. Twice each day, at 6 a.m. and at 6 p.m., the system updates Graziano's reminders, first from a permanent list of important dates, such as his parents' birthdays, and second from a temporary list of appointments to remember and bills to pay.

These are just a few of Mike Graziano's computer connections. His system is capable of hooking up as many as 255 electrical appliances and devices—although he uses only twelve so far. In addition, a security system links all the townhouse doors and windows to the computer, and an energy management system maintains a temperate environment. When a hot day cools off, the outside temperature sensor tells the computer to shut off the air conditioning and open an air duct that lets cool air in. Graziano reports a 30 percent minimum decrease in his energy bill since he installed the system.

While You Were Out. A gregarious type, Graziano hates to miss a friend's call. When you phone his house, his system logs the date and time of your call as well as how many times the phone rang. "I count the number of rings because I figure that I'd better call people who let the phone ring eight or nine times," says Graziano. "They must really want to talk."

Even though he doesn't have the computer programmed to answer his phone, it does place calls for him. He has a Motorola Dimension IV voice pager that his Apple actually dials. Then, depending on what it is responding to, the computer will pick out an appropriate phrase and simulate it through the phone lines to Graziano.

"If my house were robbed, the computer would dial the local police department and state six times 'Burglary in progress,' along with my address. Then it would call my pager and tell me, too," says Graziano, referring to a few of the twelve hundred statements that his synthesizer is programmed to simulate.

"The police are ready for the day that may happen. They have a card on me that says, 'This guy's got a computer that will notify us of burglaries in a very strange voice.' "

That's only one of the many ways that Graziano has computerized his communications. If he has to leave before he receives an expected call, he takes his pager along. When the computer activates his pager, he goes to a nearby phone and, by using a remote tone key, listens to any messages the computer has received since he left.

Best of all, Graziano can still use his computer while he's on the road. When he calls home and lets the phone ring more than a certain number of times, the computer turns on the modem, allowing Mike to talk to it through the phone lines. When he gives the Apple his password, he has full access to the computer—just as if he were sitting in front of the keyboard.

"In the near future, I want to program the system to understand more Touch Tone codes. I can already use a Touch Tone phone as a keyboard to communicate with my Apple. I just type three sixes on my phone and, because it was programmed to recognize certain Touch Tone frequencies, the system will know to turn on the heat, talk to Ralph, or whatever." In order for microprocessor chips to be able to decode high and low Touch Tone frequencies, Graziano is currently developing a decoder card that will plug into his Apple.

Graziano has been interested in electronics since childhood. "When I first got the idea for this system, I shopped around and bought an Apple II. The Apple is wonderfully engineered. It has an interrupt capability that will let me run my daily routines, yet it would suspend any program to alert the police if a burglary were taking place."

As a matter of fact, Graziano's Apple seems to have a mind of its own. When he gives a command that it doesn't understand, it responds with "Huh?" And when he completes a task that the computer assigned him, it even says thank you with a modicum of sincerity.

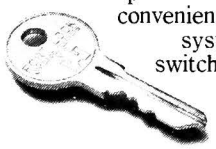
Unfortunately, the Apple-based housekeeper doesn't yet apologize for accidentally waking Graziano at 6:00 a.m. on holidays or weekends. Perhaps that faux pas isn't yet excusable—electronically or not. ■

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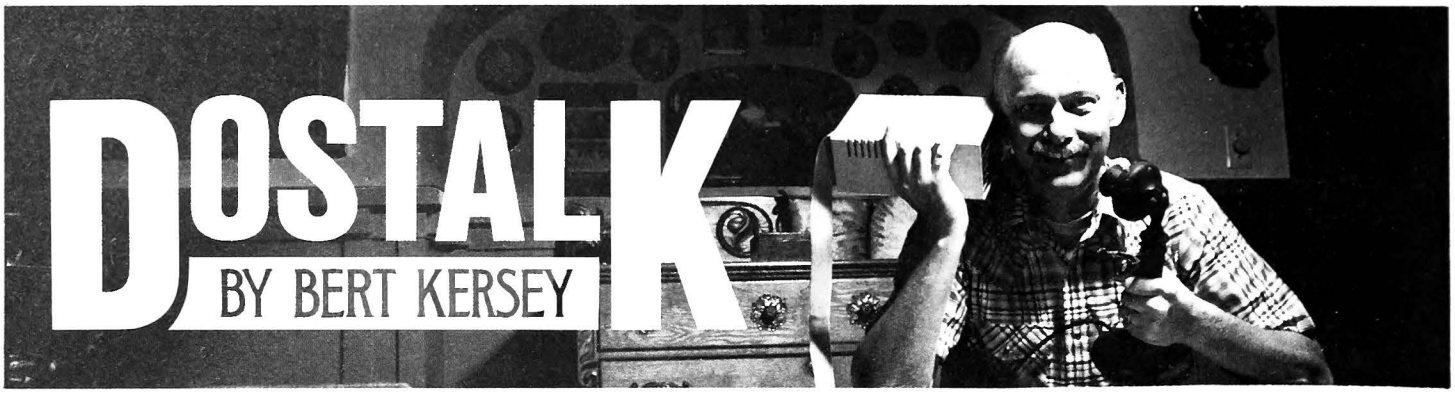
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This month, let's see if we can cram some more data onto our disks. First, let's review DOS 3.3's disk layout:

Tracks 0–2:	48 Sectors	DOS
Tracks 3–16:	224 Sectors	Data storage
Track 17:	16 Sectors	Disk directory (catalog)
Tracks 18–34:	272 Sectors	More data storage
Total:	560 Sectors	

Tracks 3–16 and *18–34* are where DOS stores data when you execute a save, bsave, or write command. That's a generous 496 (31 times 16) sectors or 126,976 (496 times 256) bytes of storage before you get a "disk full" error message. You can tell how many of those 496 sectors you have used by brunning FID (on your System Master disk) or by cataloguing a disk and totaling the sector numbers next to each file name. Each sector, by the way, contains *256 bytes* of data, so to tell roughly how many *K* (thousand bytes) of memory a program uses, divide the number of sectors by four (for example, a (60-sector file occupies about 15K).

Well, even if DOS *is* generous, let's get greedy and scrounge up some more storage space.

Track 17 is pretty much unavailable, since it's tied up with valuable information about a disk's catalog. Track 17, *sector 0*, contains the indispensable Volume Table of Contents (VTOC), the place where DOS checks to see which sectors on a disk are free. Track 17, *sectors 1–15*, contain the names and information regarding each of a disk's files. With seven file names stored per sector and a usually-too-many one hundred five (15 times 7) file names allowed on a disk, we could free up a few sectors here on track 17, but it would hardly be worth the effort.

Tracks 0–2, however, are three tracks that are usually wasted on a disk. They simply contain DOS, the machine language instructions that tell your Apple how to use a disk drive. The thing is, DOS does *nothing* sitting there on your disk; it is only of use when it climbs inside your Apple when you boot! And, in case you hadn't noticed, most disks do not need to be booted. If you are using only normal DOS, you can boot one disk when you get up in the morning and be set until sign-off time.

So, at the expense of making a disk unbootable, let's let DOS overwrite itself and free up some valuable sectors. Get out your *Sector-Reader* program from the October DOStalk (or any disk zap utility).*

Clear memory by typing:

```
FP (return)
```

Now *initialize* a new disk, and take a look at hex and/or decimal dumps of the VTOC, track 17, sector 0, on that disk. Or take my word for it, and read along. The VTOC on a new disk should look something like that in figure 1.

The numbers in the left columns could be different, depending on which utility you're using; we've used simple byte numbers for easy reference. I added the dotted line after byte 55 ($37); you'll see why later.

First, let's take a look at each byte in the VTOC.

Byte 0 is a 4. I have no idea why.

Byte 1 is a 17 ($11). This byte tells DOS the *track* where the first catalog sector is located.

Byte 2 is a 15 ($0F), telling DOS which *sector* of track 17 contains the start of the catalog.

Byte 3 is a 3, meaning this is DOS *3.3*.

Bytes 4 and 5 are unused.

Byte 6 is a 254 ($FE), the disk's volume number.

Bytes 7–38 ($26) are usually unused, containing zeros. Use these bytes, and other unused VTOC bytes if you want, to store some kind of secret info about your disks.

Byte 39 ($27) contains a 122 ($7A), and the reason why isn't very interesting.

Bytes 40–47 ($2F) are unused.

Bytes 48–49 ($30–$31) tell DOS the last track used for storage and the direction of sector allocation.

Bytes 50–51 ($32–$33) are unused.

Byte 52 ($34) tells DOS that thirty-five ($23) tracks exist on the disk.

Track 17, Sector 0 (VTOC)

	HEX:								DECIMAL:							
$00-	04	11	0F	03	00	00	FE	00	0-	4	17	15	3	0	0	254	0
$08-	00	00	00	00	00	00	00	00	8-	0	0	0	0	0	0	0	0
$10-	00	00	00	00	00	00	00	00	16-	0	0	0	0	0	0	0	0
$18-	00	00	00	00	00	00	00	00	24-	0	0	0	0	0	0	0	0
$20-	00	00	00	00	00	00	00	7A	32-	0	0	0	0	0	0	0	122
$28-	00	00	00	00	00	00	00	00	40-	0	0	0	0	0	0	0	0
$30-	12	01	00	00	23	10	00	01	48-	18	1	0	0	35	16	0	1
$38-	00	00	00	00	00	00	00	00	56-	0	0	0	0	0	0	0	0
$40-	00	00	00	00	FF	FF	00	00	64-	0	0	0	0	255	255	0	0
$48-	FF	FF	00	00	FF	FF	00	00	72-	255	255	0	0	255	255	0	0
$50-	FF	FF	00	00	FF	FF	00	00	80-	255	255	0	0	255	255	0	0
$58-	FF	FF	00	00	FF	FF	00	00	88-	255	255	0	0	255	255	0	0
$60-	FF	FF	00	00	FF	FF	00	00	96-	255	255	0	0	255	255	0	0
$68-	FF	FF	00	00	FF	FF	00	00	104-	255	255	0	0	255	255	0	0
$70-	FF	FF	00	00	FF	FF	00	00	112-	255	255	0	0	255	255	0	0
$78-	FF	FF	00	00	00	00	00	00	120-	255	255	0	0	0	0	0	0
$80-	3F	FF	00	00	FF	FF	00	00	128-	63	255	0	0	255	255	0	0
$88-	FF	FF	00	00	FF	FF	00	00	136-	255	255	0	0	255	255	0	0
$90-	FF	FF	00	00	FF	FF	00	00	144-	255	255	0	0	255	255	0	0
$98-	FF	FF	00	00	FF	FF	00	00	152-	255	255	0	0	255	255	0	0
$A0-	FF	FF	00	00	FF	FF	00	00	160-	255	255	0	0	255	255	0	0
$A8-	FF	FF	00	00	FF	FF	00	00	168-	255	255	0	0	255	255	0	0
$B0-	FF	FF	00	00	FF	FF	00	00	176-	255	255	0	0	255	255	0	0
$B8-	FF	FF	00	00	FF	FF	00	00	184-	255	255	0	0	255	255	0	0
$C0-	FF	FF	00	00	00	00	00	00	192-	255	255	0	0	0	0	0	0
$C8-	00	00	00	00	00	00	00	00	200-	0	0	0	0	0	0	0	0
$D0-	00	00	00	00	00	00	00	00	208-	0	0	0	0	0	0	0	0
$D8-	00	00	00	00	00	00	00	00	216-	0	0	0	0	0	0	0	0
$E0-	00	00	00	00	00	00	00	00	224-	0	0	0	0	0	0	0	0
$E8-	00	00	00	00	00	00	00	00	232-	0	0	0	0	0	0	0	0
$F0-	00	00	00	00	00	00	00	00	240-	0	0	0	0	0	0	0	0
$F8-	00	00	00	00	00	00	00	00	248-	0	0	0	0	0	0	0	0

Figure 1. The VTOC on a new disk.

*There was a gross error in the October column. In the *Sector-Reader* program, please change line 250 to read:

```
250  IF DSP$="H" THEN A$="2710.280F N D823G":
     FOR X = 1 TO LEN(A$)
```

If you ran *Sector-Reader* the way it was printed, you got an incorrect display when choosing the hex option. We're sorry for the boo-boo.

Byte 53 ($35) tells DOS to look for sixteen ($10) sectors per track.

Bytes 54–55 ($36–37) report the number of bytes per sector (in lo/hi hex notation—$0100 or 256 bytes).

The bytes below the dotted line tell DOS which sectors of which track are used and which are free. Each group of four bytes designates the free sectors of the next consecutive track in the form of a "bit map":

Bytes 56–59 ($38–3B) show free sectors in track 0.
Bytes 60–63 ($3C–3F) show free sectors in track 1.
Bytes 64–67 ($40–43) show free sectors in track 2.
Bytes 68–71 ($44–47) show free sectors in track 3.
Bytes 72–75 ($48–4B) show free sectors in track 4.
And so on for the whole disk, up to . . .
Bytes 188–191 ($BC–BF) show free sectors in track 33 ($21).
Bytes 192–195 ($C0–C3) show free sectors in track 34 ($22).
Bytes 196–255 ($C4–FF) are unused.

For an explanation of how to read these free-sector bit maps, see page 4-3 of *Beneath Apple DOS*. For our purposes here, you only need to know that:

255 255 0 0 ($FF $FF $00 $00) means that *all* sectors on a track are free, and . . .

0 0 0 0 ($00 $00 $00 $00) means that *no* sectors on a track are free.

From the example shown above, you can see that tracks 0, 1, and 2, represented by all zeros (bytes 56–67), are full. So is track 17, the catalog sector (zeros in bytes 124–127). Track 18 (63 255 0 0 in bytes 128–131) is partially used by our hello program, written onto the disk when we initialized it.

All we need to do to free up the sectors used by DOS is poke in some 255s at bytes 56 and 57 (track 0), 60 and 61 (track 1), and 64 and 65 (track 2). Due, however, to a quirk in the way DOS designates deleted files, we are unable to free up track 0, so forget bytes 56 and 57. This means we can create 32 more sectors of usable disk space, raising our total from 496 to 528 sectors.

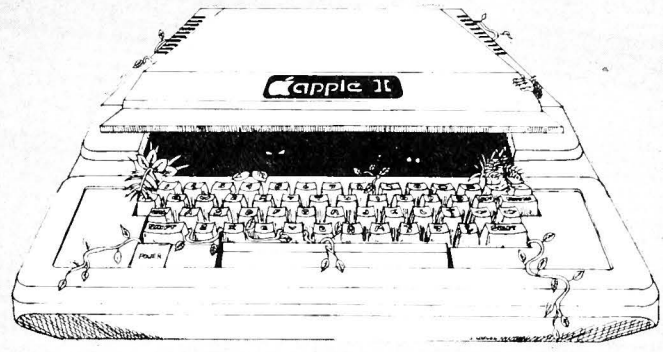
Running the *DOS-Killer* program below will free tracks 1 and 2 for disk storage by reading track 1, sector 0, into memory; poking 255s into bytes 60, 61, 64, and 65; and then writing track 1, sector 0, back to the disk. Now the DOS in memory will allow programs to be saved or written over the DOS on the disk, making it unbootable. You might notice that the disk *will* boot at first, because nothing has overwritten DOS yet. But sooner or later, as you write more files on the disk, forget booting.

Warning: Back up your disks before subjecting them to this utility. You might be glad you did.

```
100  REM DOS-KILLER
101  REM BY BERT KERSEY
102  REM
110  TEXT : HOME
120  PRINT "DOS-KILLER": PRINT "----------": PRINT : PRINT
     "FREES 32 SECTORS FOR AN ADDITIONAL 6%": PRINT "OF
     STORAGE, MAKING THE DISK UNBOOTABLE": PRINT "ONCE
     A PROGRAM HAS OVERWRITTEN DOS."
140  PRINT : PRINT "INSERT DISK AND PRESS RETURN:";: GET A$:
     IF A$ < > CHR$ (13) THEN 260
160  POKE 47084,17: POKE 47085,0: REM SELECT TRACK 17,
     SECTOR 0
170  POKE 47083,0: POKE 47091,0
180  LOC = 10000: POKE 47088,LOC - INT (LOC / 256) * 256:
     POKE 47089, INT (LOC / 256): REM STORE DATA AT
     LOCATION 10000
190  POKE 768,32: POKE 769,227: POKE 770,3: POKE 771,76:
     POKE 772,217: POKE 773,3: REM ROUTINE FOR JUMP TO
     RWTS
210  POKE 47092,1: CALL 768: REM READ SECTOR
220  POKE LOC + 60,255: POKE LOC + 61,255: POKE LOC +
     64,255: POKE LOC + 65,255: REM REWRITE 4 BYTES
230  POKE 47092,2: CALL 768: REM WRITE SECTOR
240  VTAB 3: PRINT : CALL - 958
250  PRINT : PRINT "DONE.": PRINT : PRINT "UPDATE ANOTHER
     DISK? (Y/N):";: GET A$: IF A$ = "Y" THEN RUN
260  VTAB 20: END
```

To Softalk*'s and Bert Kersey's regret, this is the last Kersey DOStalk. Sophie the beagle simply refuses to abstain from sleep any longer. You can read more of Kersey's inimitable prose in the* Beagle Bros Apple Tip Book. ■

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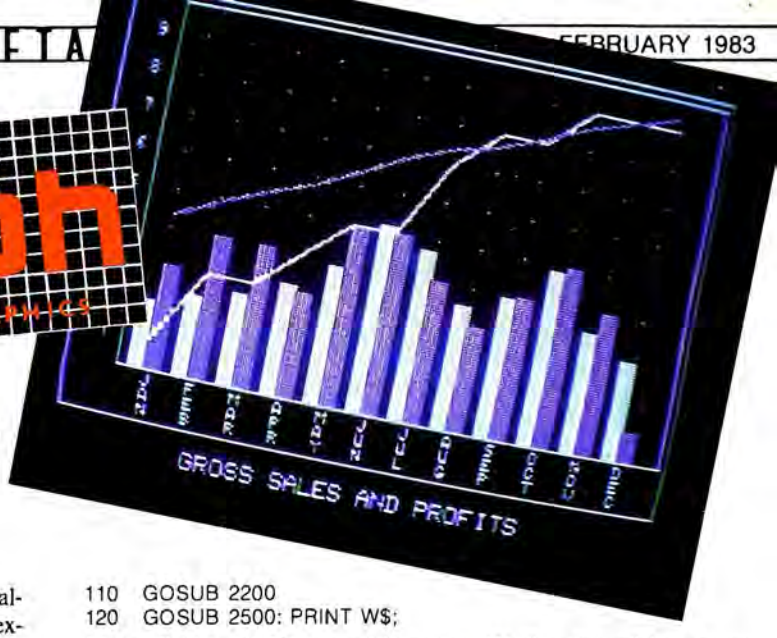
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Part 2: Data Handling and System Control

BY DAVID DURKEE

Next time you hear, "Easy as Apple pie," think again. Creating really delicious Apple pie *charts*, at least, is less simple than might be expected—or, to be more specific, more lengthy.

Fact is, before we can make an intelligible graph, we have to have intelligible data. So the pie chart program promised for this month won't arrive until next month (the easy-as-pie pun moratorium will be similarly deferred). In the meantime, we'll tackle the preliminary necessity of creating a good data editor. You'll be busy typing until then anyway—but you'll get a much nicer pie chart, and line and bar charts, in the end.

The *Data Editor* allows you to create and edit data on a single text screen where you can see it all at one time. This necessitates certain limitations on the amount of data that can be presented, but the data fields are arranged in such a way that the editor won't introduce many limitations that aren't inherent in the charts themselves.

For instance, the *Data Editor* organizes things in five columns of eighteen rows. Each column is eight characters wide, so no number greater than 99,999,999 (without the commas) is possible. If you want to chart trends involving numbers in the billions in one column, it is easy enough to label the column "millions" and enter numbers like 1,000 (meaning one thousand millions, or one billion). You'd still get more than 100 million different possible values (including negative numbers and nonintegers), more distinction than the Apple can display or the eye can comprehend.

The left-hand column of the *Data Editor* is called the X field, so named for the X axis labels it holds for line and bar charts. The X field also holds labels for the slices of pie charts. You can type in the labels for pie charts or automatically generate a range of numbers, months, or days for bar and line charts.

The top two rows are for legends. The pie chart generator can graph only one column at a time, so the words in the legend box will be printed at the top of the chart. Bar and line charts will be able to read and display as many as four sets of data at a time, provided they all use the same values in the X field. The legend boxes will be treated as labels for each line or set of related bars.

That leaves eighteen rows for data. This was selected as a reasonable limit because, given the Apple's resolution, any kind of chart would get crowded if more data fields were allowed. In a chart of sales or profits over a period of time, you can graph eighteen months. That's a year and a half at a glance.

Enough of whys and wherefores; on to more meaty matters. Here's the program, one routine at a time.

```
10  DL = 25056:EL = 25856: REM DATA LOCATION
20  TEXT : HOME : HTAB 6: INVERSE
30  PRINT "*** SOFTGRAPH DATA EDITOR ***"
40  GOTO 1800
50  NORMAL
60  POKE 34,1
70  DL$ = CHR$ (32) + CHR$ (8)
80  GOSUB 2100
90  VF = 1:HF = 1
100  GOSUB 2000
110  GOSUB 2200
120  GOSUB 2500: PRINT W$;
```

Lines 10 through 120 are initialization. We'll wait until later to go over all the subroutines called. DL and EL hold the addresses in memory for the beginning and end of data. DL$, defined in line 70, is a deletion character that we'll use in several input routines. It is a space followed by a backspace. When printed, DL$ has the effect of erasing the character under the cursor without moving the cursor. VF and HF stand for vertical field and horizontal field, respectively. They keep track of which data field is being edited.

```
130  GET A$:A = ASC (A$)
140  IF A < 32 THEN 200
150  IF LEN (W$) = 8 THEN PRINT CHR$ (7);: GOTO 130
160  W$ = W$ + A$: GOSUB 2200: PRINT W$;
170  GOTO 130
```

These lines are the program's main input loop. Instead of using the input command, we build a string by getting A$ and adding it to an existing W$. W$ will always hold the word (or number) in the data field at location HF,VF. With the get-type input routine, we can limit the number of characters in the field (line 150) and keep an eye out for control characters (line 140), which the program interprets as commands.

```
200  REM CONTROL COMMAND HANDLER
210  IF A = 8 THEN 1100
220  IF A = 21 THEN 1200
230  GOSUB 2700
240  IF A = 24 THEN 600
250  IF A = 12 THEN 400
260  IF A = 3 THEN GOSUB 2000: GOTO 110
270  IF A = 17 THEN 1000
280  IF A > 8 AND A < 14 THEN 1300
290  IF A = 4 THEN 1500
300  IF A = 1 THEN 1600
310  GOTO 130
```

If the user enters a control character, the program goes to this routine. These are the possible values for A that the program will react to:

If A is 8 or 21, then an arrow key has been pressed. If it isn't, the gosub in line 230 moves the word from temporary storage in W$ to its permanent location in memory.

A 24 means control-X has been pressed and control goes to the X field builder routine. A 12 indicates control-L, which calls the legend editor. This is the only way to put labels at the tops of the columns, as normal cursor movement in the program doesn't go up that far.

If A is 3, then control-C has been pressed. This indicates to the program that you wish to clear the entire data area to spaces.

A value of 17 indicates a control-Q. *Data Editor* understands this to mean you want to quit and go to the main menu program.

Line 280 looks for a range of numbers from 9 to 13. As we've already "filtered out" control-Ls in line 250, this accepts the control keys I, J, K, or M. These entries allow you to move the cursor about in the various data fields.

The last two possibilities are control-D and control-A, which stand

for delete and add. These routines allow for deleting or adding an entire row of data quickly. The delete routine takes out a row and moves all the subsequent rows up to fill the gap. Add does the opposite, inserting a blank row and moving all the following rows down one. Any data on the bottom row will be lost when you add a row in the middle.

By the way, a line at the bottom of the screen will prompt you as to what the control commands are, but it won't tell you what they mean. Don't be afraid to press one you're not sure of, as the program will always ask you to confirm any command that could be destructive.

```
400  REM LEGEND EDITOR
410  FOR L = 1 TO 4
420  L$ = ""
430  VTAB 24: HTAB 1: NORMAL
440  PRINT "INPUT LEGEND ";L;":";: INVERSE : PRINT SPC( 16);:
     HTAB 16
450  GET A$: IF A$ = CHR$ (8) AND LEN (L$) < 2 THEN L$ = "":
     HTAB 16: PRINT DL$;: GOTO 450
460  IF A$ = CHR$ (8) THEN L$ = LEFT$ (L$, LEN (L$) - 1): PRINT
     A$;DL$;: GOTO 450
470  IF A$ = CHR$ (13) THEN 510
480  IF LEN (L$) = 16 THEN PRINT CHR$ (7);: GOTO 450
490  IF ASC (A$) > 31 THEN PRINT A$;:L$ = L$ + A$
500  GOTO 450
510  NORMAL : IF L$ = "" THEN 560
520  L$ = LEFT$ (L$ + "                ",16): REM 15 SPACES
530  IF L = 1 OR L = 3 THEN INVERSE
540  VTAB 3: HTAB 1 + 8 * L:W$ = LEFT$ (L$,8): PRINT W$;:HF = L
     + 1:VF = -1: GOSUB 2300
550  VTAB 4: HTAB 1 + 8 * L:W$ = RIGHT$ (L$,8): PRINT W$;:HF =
     L + 1:VF = 0: GOSUB 2300
560  NEXT L
570  VTAB 24: HTAB 1: CALL -868
580  VF = 1:HF = 1: GOTO 110
```

At the bottom of the screen, the legend editor asks for input. It indicates the sixteen-character limit (each legend is displayed in two data fields) by printing a line of sixteen inverse spaces. This routine is like the main input routine except that it stops at sixteen characters instead of eight and only reacts to two control characters: backspace to delete is handled in line 460 and return, the CHR$ (13), is dealt with in line 470.

When you hit return, line 520 adds spaces to bring the string up to sixteen characters, divides the string in two, and goes to the subroutines that poke the values in memory and print the label on the screen. If you hit return without typing anything first, the routine skips those steps, leaving the previous labels alone.

Once the routine has cycled through the four legends, it returns you to the main input routine, with the cursor wherever it was when control-L was pressed.

```
600  REM X FIELD BUILDER
610  HOME : PRINT : PRINT : PRINT "DEFINE X AXIS BY:"
620  PRINT : PRINT " 1. MONTHS"
630  PRINT " 2. DAYS"
640  PRINT " 3. RANGE OF NUMBERS"
650  PRINT " 4. EXIT"
660  VTAB 12: HTAB 1: PRINT "CHOOSE OPTION: ";: GET A$
670  A = VAL (A$): IF A < 1 OR A > 4 THEN 660
680  ON A GOTO 710,700,840,690
690  HOME : GOSUB 2100: GOTO 110
700  U$ = "DAY":HN = 7:TD = 19:BD = 13: GOTO 720
710  U$ = "MONTH":TD = 12:BD = 1:HN = 12
720  HOME : PRINT
730  PRINT : PRINT "NUMBER OF ";U$;: INPUT "S? ";A$:NM = INT
     ( VAL (A$))
740  IF NM < 2 OR NM > 18 THEN PRINT : PRINT "CANNOT
     PROCESS ";NM;" ";U$;"S", CHR$ (7): GOTO 730
750  PRINT : PRINT "STARTING WITH ";U$;: INPUT " #";A$:SM =
     INT ( VAL (A$))
760  IF SM < 1 OR SM > HN THEN PRINT : PRINT "MUST BE FROM
     1 TO ";HN; CHR$ (7): GOTO 750
770  IF BD = 13 THEN SM = SM + 12
780  HF = 1: FOR VF = 1 TO 18
790  IF SM > TD THEN SM = BD
800  IF VF > NM THEN W$ = " ": GOTO 820
810  W$ = X$(SM)
820  GOSUB 2300:SM = SM + 1
830  NEXT VF:VF = 1: GOTO 690
840  HOME : PRINT
850  PRINT : INPUT "HOW MANY NUMBERS? ";A$:NM = INT ( VAL
     (A$)): IF NM< 2 OR NM > 18 THEN PRINT "CANNOT
     HANDLE ";NM;" NUMBERS"; CHR$ (7): GOTO 850
860  PRINT : INPUT "STARTING NUMBER? ";A$:SM = VAL (A$)
870  PRINT : INPUT "INCREMENT BY? ";A$:IM = VAL (A$): IF IM = 0
     THEN PRINT "CANNOT INCREMENT BY 0"; CHR$ (7): GOTO
     870
880  HF = 1: FOR VF = 1 TO 18
890  IF VF > NM THEN W$ = " ": GOTO 910
900  W$ = STR$ (SM): IF LEN (W$) > 8 THEN PRINT W$;" TOO
     LONG"; CHR$ (7):W$ = LEFT$ (W$,8)
910  GOSUB 2300
920  SM = SM + IM
930  NEXT VF
940  VF = 1: GOTO 690
```

The X field builder saves you some typing if you want the X labels to be months, days, or a range of numbers. Lines 610 through 680 handle the options menu. Lines 700 and 710 set U$ to the unit you requested (if it was months or days) to use in prompting you for more information. The lines following ask you how many months or days you want, limiting you to no more than eighteen and no fewer than two. The routine then asks you where you want to start. If your company's fiscal year begins in July, you would probably enter 7. The loop from 780 to 830 reads the values from the predefined array X$(SM) and pokes them into memory. There is no need to call the printing routine in this case because the whole screen has to be redisplayed.

The routine for numbers begins at line 840. It is both simpler and more flexible than the one for months and days, in that it allows you to enter any starting number and any increment. It simply generates the numbers numerically and then translates them to strings with STR$ (SM) in line 900. If anything comes to more than eight characters, line 900 truncates it to the legal limit and warns you about it.

```
1000  REM EXIT ROUTINE
1010  NORMAL
1020  VTAB 24: HTAB 1: PRINT "QUIT TO MENU? ";: GET A$: HTAB
      1: CALL -868: IF A$ = "N" THEN 1050
1030  IF A$ = "Y" THEN HOME : PRINT "INSERT PROGRAM DISK
      IN DRIVE 1": PRINT "AND HIT A KEY.";: GET A$: PRINT :
      PRINT CHR$ (4);"RUN MENU,D1"
1040  GOTO 1020
1050  GOSUB 2200: GOSUB 2500: PRINT W$;: GOTO 130
```

The exit routine is pretty straightforward. You might want to replace it with an end statement until you have the whole thing typed in and saved to disk.

```
1100  REM BACKSPACE
1110  IF W$ = "" THEN 130
1120  IF LEN (W$) = 1 THEN W$ = "": GOSUB 2200: PRINT DL$;:
      GOTO 130
1130  W$ = LEFT$ (W$, LEN (W$) - 1)
1140  GOSUB 2200: PRINT W$;DL$;
1150  GOTO 130
```

This is the routine that deals with backspaces in the main input loop. Lines 1110 and 1120 handle the special cases of W$ being zero or one character long. Line 1130 removes the last character from the string, and 1140 prints the string. Note the use of DL$ in line 1140.

```
1200  REM FOREARROW
1210  A$ = CHR$ ( PEEK (DL + 40 * (VF + 1) + 8 * (HF - 1) + LEN
      (W$)))
1220  GOTO 150
```

This routine handles the forward arrow. If you just backspaced over something and want it back, it will still be in memory if you haven't moved the cursor into another field in the meantime. The lovely equation in line 1210 computes the item's location, digs it out, and sends it back to the main input routine where it will be reattached to W$.

```
1300  REM CURSOR MOVE
1310  ON A - 8 GOTO 1330,1350,1370,130,1390
1320  GOTO 130
```

```
1330  VF = VF - 1: IF VF = 0 THEN VF = 18
1340  GOTO 110
1350  HF = HF - 1: IF HF = 0 THEN HF = 5
1360  GOTO 110
1370  HF = HF + 1: IF HF = 6 THEN HF = 1
1380  GOTO 110
1390  VF = VF + 1: IF VF = 19 THEN VF = 1
1400  GOTO 110
```

This routine handles cursor moves from one field to another. The four possibilities are the control letters I, J, K, and M. Line 1310 sorts these out and goes to the appropriate line to change the value of HF or VF.

```
1500  REM DELETE A LINE
1510  HF = 1: GOSUB 2200
1520  GOSUB 2500: INVERSE : PRINT W$; SPC( 8 - LEN (W$));:
      NORMAL
1530  VTAB 24: HTAB 1: PRINT "DELETE THIS LINE? ";: GET A$:
      HTAB 1: CALL -868: IF A$ = "Y" THEN 1550
1540  GOSUB 2200: PRINT W$; SPC( 8 - LEN (W$));: GOTO 110
1550  RL = DL + 40 * (VF + 1)
1560  POKE 236, INT (RL / 256)
1570  POKE 235,RL - 256 * PEEK (236)
1580  CALL 25982:V = VF:H = HF
1590  GOSUB 2100:VF = V:HF = H: GOTO 110
```

This is the first of four routines that call machine language routines. For that reason it won't work until those routines are in memory. We'll cover all the machine language routines later on in this article.

Lines 1520 and 1530 give you a prompt at the bottom of the screen to make sure you want to delete the line indicated. Line 1550 calculates the location of the first byte to be deleted, and lines 1560 and 1570 put that location in the place in memory where the machine language routine will look for it.

```
1600  REM ADD A LINE
1610  HF = 1: GOSUB 2200
1620  GOSUB 2500: INVERSE : PRINT W$; SPC( 8 - LEN (W$));:
      NORMAL
1630  VTAB 24: HTAB 1: PRINT "ADD A LINE HERE? ";: GET A$:
      HTAB 1: CALL -868: IF A$ = "Y" THEN 1650
1640  GOSUB 2200: PRINT W$; SPC( 8 - LEN (W$));: GOTO 110
1650  RL = DL + 40 * (VF + 1) - 1
1660  POKE 238, INT (RL / 256)
1670  POKE 237,RL - 256 * PEEK (238)
1680  CALL 26023
1690  V = VF:H = HF
1700  GOSUB 2100:VF = V:HF = H: GOTO 110
```

The add-a-line routine works in pretty much the same way as the delete-a-line routine. The location of the first byte of memory where the line will be added is calculated in 1650 and poked in in 1660 and 1670.

```
1800  REM X AXIS OPTIONS INIT
1810  DIM X$(19)
1820  FOR X = 1 TO 19: READ X$(X): NEXT X: GOTO 50
1830  DATA JAN,FEB,MAR,APR,MAY,JUN
1840  DATA JUL,AUG,SEP,OCT,NOV,DEC
1850  DATA SUN,MON,TUE,WED,THU,FRI,SAT
```

Lines 1800 through 1850 set up the X$(19) array that holds the potential X field labels. With a little modification to this routine and the one starting at line 600, you could set the *Data Editor* up to allow any kind of range to be inserted into the X field with control-X.

```
2000  REM INITIALIZE DATA
2010  NORMAL : VTAB 24: HTAB 1: PRINT "CLEAR DATA? ";: GET
      A$: HTAB 1: CALL -868: IF A$ = "Y" THEN 2030
2020  RETURN
2030  CALL 25955
2040  W$ = "LEGENDS:"
2050  PL = DL - 1: GOSUB 2330
```

This routine wipes out any data in memory. Line 2010 is a prompt to make sure you really want to do that. The call to 25955 requires no parameters to be poked in as it always clears the whole data area. Lines 2040 and 2050 put the string *legends:* in the top left corner of the screen to remind you that the top two rows are labels and not data.

```
2100  REM DISPLAY SCREEN
2110  CALL 25862
2120  VTAB 23: HTAB 1: PRINT "COMMANDS: CONTROL-I,J,K,M,
      L,X,Q,D,A,C";
2130  VF = 1: RETURN
```

This routine displays the screen with a call to 25862. Again, no parameters are required. Line 2120 prints the control command prompt at the bottom of the screen.

```
2200  REM PLACE CURSOR
2210  VTAB VF + 4: HTAB 8 * (HF - 1) + 1
2220  NORMAL : IF HF / 2 = INT (HF / 2) THEN INVERSE
2230  RETURN
```

This routine is called frequently throughout the program. It takes the values VF and HF and moves the cursor to the proper location. Every other column is printed in inverse to keep adjacent fields separate, so if HF is an even number (that is, 2 or 4) line 2220 turns on inverse mode.

```
2300  REM POKE IN WORD
2310  PL = DL + 40 * (VF + 1) + 8 * (HF - 1) - 1
2320  IF W$ = "" THEN 2370
2330  FOR LOC = 1 TO LEN (W$)
2340  POKE PL + LOC, ASC ( MID$ (W$,LOC,1))
2350  NEXT LOC
2360  IF LEN (W$) = 8 THEN 2400
2370  FOR LOC = LEN (W$) + 1 TO 8
2380  POKE PL + LOC,32
2390  NEXT LOC
2400  RETURN
```

Lines 2300 through 2400 poke the word in W$ into memory. The input routine doesn't constantly update memory. Instead, this routine is invoked whenever a control command is given. Line 2310 determines the memory location (again, based on the values of HF and VF) and lines 2330 through 2350 cycle through the word one character at a time, poking the ASCII values into memory. The loop in 2370 to 2390 puts spaces in the remaining bytes if the word is shorter than eight characters.

```
2500  REM READ WORD
2510  PL = DL + 40 * (VF + 1) + 8 * (HF - 1) - 1
2520  WL = 0:W$ = ""
2530  FOR LOC = 8 TO 1 STEP - 1
2540  IF PEEK (PL + LOC) > 32 THEN WL = LOC:LOC = 1
2550  NEXT LOC
2560  IF WL = 0 THEN RETURN
2570  FOR LOC = 1 TO WL
2580  W$ = W$ + CHR$ ( PEEK (PL + LOC))
2590  NEXT LOC
2600  RETURN
```

The read-word routine does the opposite of the write-word routine. When the cursor is moved to a new position, this routine reads the word that is in memory there and puts it into W$. Line 2510 finds the correct memory location. Lines 2530 to 2550 read backward from the end of the field, looking for the last nonspace character. Then lines 2560 through 2590 read everything up to that character into W$.

```
2700  REM INSERT WORD
2710  GOSUB 2200: PRINT W$;
2720  IF LEN (W$) = 8 THEN 2740
2730  PRINT SPC( 8 - LEN (W$));: GOSUB 2200: PRINT W$;
2740  GOSUB 2300
2750  RETURN
```

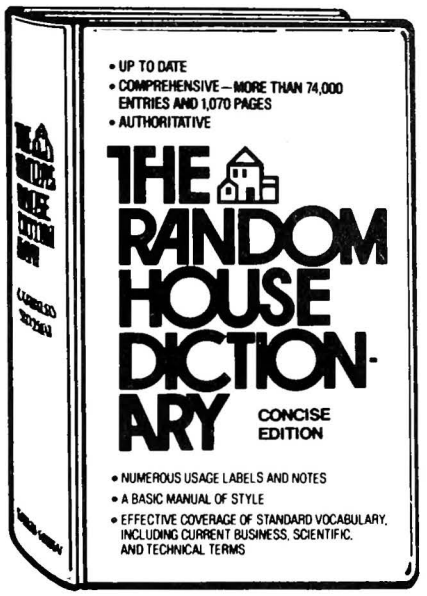
Finally, this routine handles the necessary housekeeping when the cursor is moved: placing the cursor, printing the word, and poking it into memory.

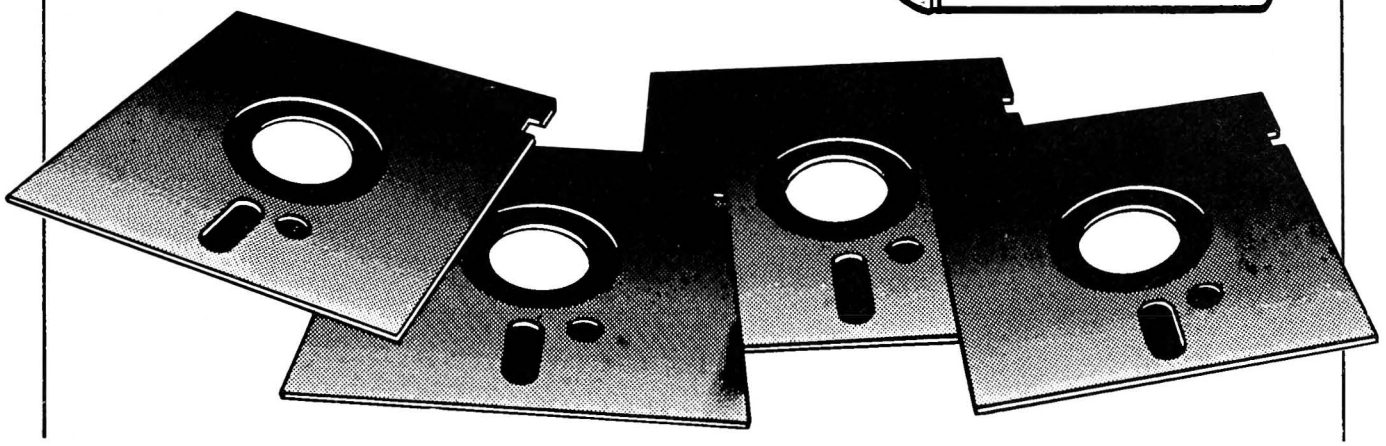
Now let's talk about the machine language routines. The original version of this program had these routines in Basic and they worked but they were slow. Rather than compile the whole program, which makes it difficult to modify later, it's better to speed up the slow poke routines (that's slow-poke routines, not slow poke-routines) by writing them in assembly language.

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Atari 400 & 800 Computers

AMB-16	16K Memory Cord.
AMB-32A	32K Slot Independent Memory Cord.
ATC-P	Porollel Printer Coble.
ATC-S	Seriol or Modem Coble.

Commodore Products for the VIC-20

VIM-16	16K Memory Exponsion Module.
VIM-8	8K Memory Exponsion Module.
VIM-0	EPROM/RAM User Definoble Module.

Miscellaneous

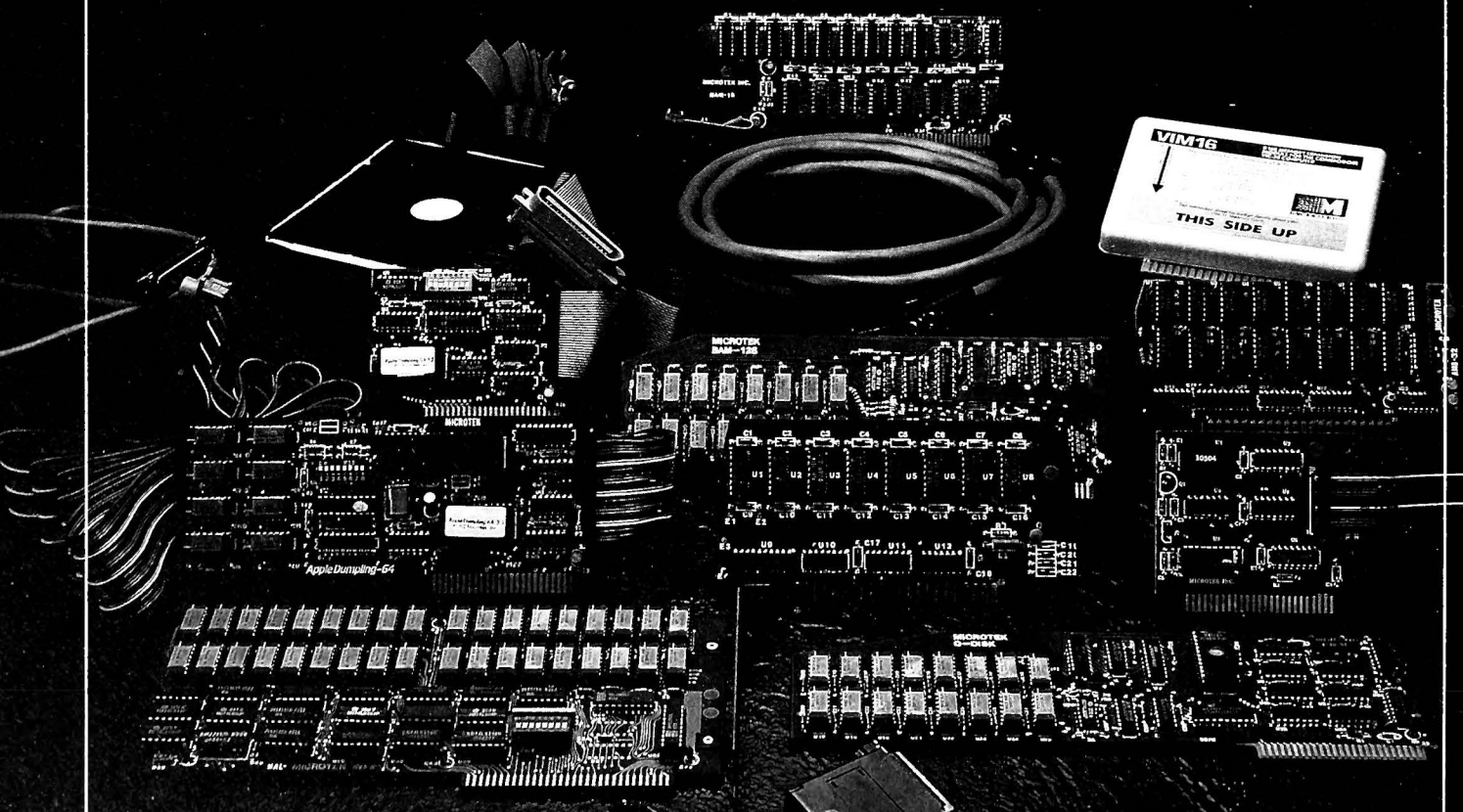
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stored as a binary file. As a result, we can easily manipulate the data from machine language.

```
                                1  ************************************
                                2  *                                  *
                                3  *          Editor Machine          *
                                4  *        Language Routines         *
                                5  *                                  *
                                6  ************************************
                                7           ORG   25862
                                8  COLUMN    EQU   25859
                                9  ROW       EQU   25858
                               10  LOC       EQU   235
                               11  LOCHI     EQU   236
                               12  LOC2      EQU   237
                               13  LOC2HI    EQU   238
                               14  CV        EQU   37
                               15  CH        EQU   36
                               16  INVFLG    EQU   50
                               17  COUT1     EQU   $FDF0
                               18  VTAB      EQU   $FC22
                               19  ************************************
                               20  *                                  *
                               21  *       Display Screen Routine     *
                               22  *                                  *
                               23  ************************************
6506: A9 01      24           LDA   #1        ;First row
6508: 8D 02 65   25           STA   ROW
650B: A9 00      26           LDA   #0        ;Place cursor
650D: 85 24      27           STA   CH
650F: A9 02      28           LDA   #2
6511: 85 25      29           STA   CV
6513: 20 22 FC   30           JSR   VTAB
6516: A9 D8      31           LDA   #$D8      ;Set memory
                                              pointer
6518: 85 EB      32           STA   LOC
651A: A9 61      33           LDA   #$61
651C: 85 EC      34           STA   LOCHI
651E: A9 01      35  NEWROW   LDA   #1
6520: 8D 03 65   36           STA   COLUMN
6523: A9 01      37  NEWCOL   LDA   #1
6525: 2D 03 65   38           AND   COLUMN    ;Is column odd?
6528: D0 07      39           BNE   NORM
652A: A9 3F      40           LDA   #$3F      ;Inverse
652C: 85 32      41           STA   INVFLG
652E: 4C 35 65   42           JMP   INCLOC
6531: A9 FF      43  NORM     LDA   #$FF      ;Normal
6533: 85 32      44           STA   INVFLG
6535: 18         45  INCLOC   CLC             ;Update memory
                                              pointer
6536: A5 EB      46           LDA   LOC
6538: 69 08      47           ADC   #8
653A: 85 EB      48           STA   LOC
653C: 90 02      49           BCC   CELL
653E: E6 EC      50           INC   LOCHI
6540: A0 00      51  CELL     LDY   #0        ;Print eight
6542: B1 EB      52  PRINT    LDA   (LOC),Y   ;character cell
6544: 09 80      53           ORA   #$80
6546: 20 F0 FD   54           JSR   COUT1
6549: C8         55           INY             ;Next character
654A: C0 08      56           CPY   #8
654C: D0 F4      57           BNE   PRINT
654E: EE 03 65   58           INC   COLUMN    ;Next column
6551: AD 03 65   59           LDA   COLUMN
6554: C9 06      60           CMP   #6
6556: D0 CB      61           BNE   NEWCOL
6558: EE 02 65   62           INC   ROW       ;Next row
655B: AD 02 65   63           LDA   ROW
655E: C9 15      64           CMP   #21
6560: D0 BC      65           BNE   NEWROW
6562: 60         66           RTS
                 67  ************************************
                 68  *                                  *
                 69  *         Clear Data Routine       *
                 70  *                                  *
                 71  ************************************
6563: A9 E0      72  CLEAR    LDA   #$E0      ;Start location
6565: 85 EB      73           STA   LOC
6567: A9 61      74           LDA   #$61
6569: 85 EC      75           STA   LOCHI
```


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```
656B: A9 20      76 START  LDA  #32      ;Space character
656D: A0 00      77        LDY  #0
656F: 91 EB      78 LOOP   STA  (LOC),Y
6571: E6 EB      79        INC  LOC
6573: D0 FA      80        BNE  LOOP
6575: E6 EC      81        INC  LOCHI
6577: A9 65      82        LDA  #$65     ;Is it the
6579: C5 EC      83        CMP  LOCHI    ;last location?
657B: D0 EE      84        BNE  START
657D: 60         85        RTS
                 86 ************************************
                 87 *                                  *
                 88 *       Delete A Line Routine      *
                 89 *                                  *
                 90 ************************************
657E: A9 D8      91 CHKLOC LDA  #$D8     ;Is this last line?
6580: C5 EB      92        CMP  LOC
6582: D0 06      93        BNE  MOVE
6584: A9 64      94        LDA  #$64
6586: C5 EC      95        CMP  LOCHI
6588: F0 11      96        BEQ  LASTLN   ;If so, go to
658A: A0 28      97 MOVE   LDY  #40      ;Move data
658C: B1 EB      98        LDA  (LOC),Y  ;back 40 spaces
658E: A0 00      99        LDY  #0
6590: 91 EB     100        STA  (LOC),Y
6592: E6 EB     101        INC  LOC      ;Next location
6594: D0 E8     102        BNE  CHKLOC
6596: E6 EC     103        INC  LOCHI
6598: 4C 7E 65  104        JMP  CHKLOC
659B: A0 00     105 LASTLN LDY  #0       ;Fill last line
659D: A9 20     106        LDA  #32      ;with spaces
659F: 91 EB     107 LOOP1  STA  (LOC),Y
65A1: C8        108        INY
65A2: C0 28     109        CPY  #40      ;Is this last byte?
65A4: D0 F9     110        BNE  LOOP1    ;No
65A6: 60        111        RTS           ;Yes
                112 ************************************
                113 *                                  *
                114 *       Add A Line Routine         *
                115 *                                  *
                116 ************************************
65A7: A9 D7     117 ADDLINE LDA  #$D7    ;Start location
65A9: 85 EB     118         STA  LOC
65AB: A9 64     119         LDA  #$64
65AD: 85 EC     120         STA  LOCHI
65AF: A5 EB     121 CHKLOC2 LDA  LOC     ;Is this last location?
65B1: C5 ED     122         CMP  LOC2
65B3: D0 06     123         BNE  MOVE1
65B5: A5 EC     124         LDA  LOCHI
65B7: C5 EE     125         CMP  LOC2HI
65B9: F0 15     126         BEQ  OPENLN   ;Yes, go to openIn
65BB: A0 00     127 MOVE1   LDY  #0       ;No, move data
65BD: B1 EB     128         LDA  (LOC),Y
65BF: A0 28     129         LDY  #40
65C1: 91 EB     130         STA  (LOC),Y  ;Move forward 40
                                          spaces
65C3: A5 EB     131         LDA  LOC
65C5: C9 00     132         CMP  #0
65C7: D0 02     133         BNE  DECLOC
65C9: C6 EC     134         DEC  LOCHI    ;Go to previous
                                          location
65CB: C6 EB     135 DECLOC  DEC  LOC
65CD: 4C AF 65  136         JMP  CHKLOC2
65D0: A0 01     137 OPENLN  LDY  #1
65D2: A9 20     138         LDA  #32
65D4: 91 EB     139 LOOP2   STA  (LOC),Y  ;Put spaces in line
65D6: C8        140         INY
65D7: C0 29     141         CPY  #41      ;Is that last byte?
65D9: D0 F9     142         BNE  LOOP2    ;No
65DB: 60        143         RTS           ;Yes
```

There are two ways to enter these routines. The first number you see in the listing, 1, is an assembler line number. All the numbers in that column are line numbers. If you have an assembler, get into its editor and enter everything to the right of the line numbers. Most assemblers automatically number the lines, so you don't have to type the numbers in.

These routines were written on *Merlin* by Southwestern Data Systems. They should be compatible with most other assemblers. If your assembler has a limit on label length, you may have to shorten some of the labels. Furthermore, some assemblers require that equates to zero page locations use a different pseudo op-code than EQU. If that is the case with yours, you will have to change lines 10 through 16.

Now, even if you don't have an assembler, you can still enjoy the speed of machine language. Type *call −151* to enter the Monitor. You will get an asterisk as a prompt. To enter the routine, enter everything in the listing that is to the left of the line numbers. The first line, for instance, is *6506: A9 01*. The first number, 6506, is the address you are entering the numbers in. Note that all these numbers are in hexadecimal. The address will be followed by one to three two-digit hexadecimal numbers—in this case, A9 and 01. Type them in exactly, separated by spaces as shown and followed by return. Don't type in the numbers in the line number column.

When you are done typing, check your work by typing *6506L*. This will list the first set of lines in partially disassembled form. That is, the numbers on the left will be the same as they are in the listing here, and the assembly language mnemonics (LDA in the first line you typed in) will be the same, but the labels will be replaced with the numbers they represent. Proofread your work against the left-hand column of numbers only. Type *L* to list the next section, and so on.

When you're done, type control-C and return to reenter Basic and save the code to disk with the command:

```
BSAVE EDITOR.ML,A$6506,L214
```

Now you're ready to run the program. When you're satisfied that it works, come back and we'll do two more short programs.

The first program is the *Menu*, which is used as the crossroads of the *SoftGraph* system. Whenever you quit another program, control goes to the *Menu*, from which you can move to another program. Putting all of the disk access into the *Menu* program avoids redundant load and save procedures. Disk access is handled through the disk submenu.

Here's the program:

```
10  DIM F$(20):D$ = CHR$ (4)
20  ONERR GOTO 50
30  N = N + 1: READ F$(N): IF N < 20 THEN 30
40  NM = 20: POKE 216,0: GOTO 70
50  POKE 216,0:ER = PEEK (222):NM = N - 1
60  IF ER <> 42 THEN PRINT "ERROR #";ER; CHR$ (7);: END
70  TEXT : HOME
80  PRINT "SOFTGRAPH MAIN MENU PROGRAM"
90  PRINT
100  FOR N = 1 TO 20
110  IF F$(N) = "" THEN N = 20: GOTO 130
120  PRINT N; TAB( 4);"- ";F$(N)
130  NEXT N
140  PRINT : INPUT "ENTER NUMBER OF CHOICE: ";N$
150  N = VAL (N$): IF N < 1 OR N > NM THEN VTAB 3: CALL -958:
     GOTO 100
160  IF N > NM - 2 THEN 180
170  HOME : PRINT "INSERT PROGRAM DISK IN DRIVE 1": PRINT
     "AND HIT A KEY.";: GET A$: PRINT : PRINT CHR$
     (4);"RUN";F$(N);",D1"
180  IF N = NM THEN HOME : END
190  REM DOS MENU
200  HOME : PRINT "SOFTGRAPH DISK OPTIONS MENU"
210  VTAB 4: HTAB 3: PRINT "1- LOAD A DATA FILE"
220  HTAB 3: PRINT "2- SAVE A DATA FILE"
230  HTAB 3: PRINT "3- LOAD A CHART"
240  HTAB 3: PRINT "4- SAVE A CHART"
250  HTAB 3: PRINT "5- VIEW THE HI-RES SCREEN"
260  HTAB 3: PRINT "6- CATALOG"
270  HTAB 3: PRINT "7- BACK TO MAIN MENU"
280  PRINT : INPUT "SELECT AN OPTION: ";N$
290  M = INT ( VAL (N$)): IF M < 1 OR M > 7 THEN 190
300  ON M GOTO 310,310,310,310,640,600,70
310  F$ = "": HOME : VTAB 8: PRINT "FILENAME (,S#,D#): ";
320  VTAB 8: HTAB 20: PRINT F$;: CALL -958: GET N$:N = ASC
     (N$)
330  IF N = 8 THEN 370
340  IF N = 13 THEN 390
350  IF N < 32 THEN 320
360  F$ = F$ + N$: GOTO 320
370  IF LEN (F$) < 2 THEN F$ = "": GOTO 320
380  F$ = LEFT$ (F$, LEN (F$) - 1): GOTO 320
390  IF F$ = "" THEN 190
```

```
400  ONERR GOTO 480
410  PRINT
420  PRINT D$;"VERIFY";F$
430  POKE 216,0
440  IF M = 1 OR M = 3 THEN 510
450  VTAB 10: HTAB 1: PRINT "OVERWRITE EXISTING FILE (Y OR
     N)? ";: GET N$: IF N$ = "N" THEN 190
460  IF N$  <> "Y" THEN 450
470  PRINT : PRINT D$;"DELETE";F$: GOTO 510
480  POKE 216,0:ER = PEEK (222)
490  IF ER  <> 6 THEN PRINT "DOS ERROR #";ER; CHR$ (7);: GET
     N$: GOTO 190
500  IF M = 1 OR M = 3 THEN PRINT "FILE NOT FOUND"; CHR$
     (7);: GET N$: GOTO 190
510  ON M GOTO 520,540,560,580
520  PRINT D$;"BLOAD";F$
530  GOTO 190
540  PRINT D$;"BSAVE";F$;",A25056,L800"
550  GOTO 190
560  PRINT D$;"BLOAD";F$;",A16384"
570  GOTO 190
580  PRINT D$;"BSAVE";F$;",A16384,L8192"
590  GOTO 190
600  PRINT : PRINT "CATALOG DRIVE #";: GET A$
610  HOME :N = VAL (A$): IF N < 1 OR N > 2 THEN N = 1
620  PRINT : PRINT D$;"CATALOG,D";N
630  GET A$: GOTO 190
640  POKE -16299,0: POKE -16302,0: POKE -16297,0: POKE
     -16304,0
650  GET A$: TEXT : GOTO 190
1000  DATA DATA EDITOR,PIE CHART,BAR/LINE CHART
1090  DATA DISK MENU,QUIT
```

This program's error handling and the flexibility of the main menu are worth close examination. Line 20 sets an error flag and the lines that follow read data. When an "out of data" error is encountered, the program looks to see how many pieces of data have been read and determines that that is the number of items in the menu. This technique makes it easy to add new program names as menu items later. Just add the new names to the data statements at the end of the program. The only restrictions are that only twenty pieces of data will be read, and the last two must be *disk menu* and *quit* for those functions to work.

The program also uses error handling in the disk access sequence. First of all, a verify command is used in line 420 to tell whether a file name already exists. The program handles this situation differently depending on whether it is loading or saving. If it is loading a file, it gives an error message to the user if the file doesn't exist. If it is saving, it notifies the user if the file does exist to avoid overwriting important data.

The last program this month starts up the system. Type it in and save it to a blank disk with the command *init hello.* Then transfer all your other *SoftGraph* programs to this disk.

```
10  TEXT : HOME
20  PRINT "GRAPHING PROJECT DISK--LOADING SHAPEFILE"
30  SL = 24576
40  POKE 233, INT (SL / 256): POKE 232,SL - ( INT (SL / 256) * 256)
50  PRINT CHR$ (4);"BLOAD SHAPEFILE,A";SL
60  PRINT CHR$ (4);"BLOAD BLANKDATA"
70  PRINT CHR$ (4);"BLOAD EDITOR.ML"
80  PRINT CHR$ (4);"RUN MENU"
```

Briefly, Shapefile is the shape table file we created last month. Blankdata can be created by running the *Data Editor*, clearing the data (with control-C), going back to the menu (with control-Q), and saving Blankdata with the save-a-data-file option. This way, when you start from scratch you won't find garbage in the data field, as you did when you first ran the editor.

If you got some strange results from last month's SoftGraph shape tables, rest assured. The problem is not in your television set. Change line 10 in listing 2, Shape Table Test, and listing 4, Hi-Res Writer, to read:

```
10  HGR : HCOLOR = 3: SCALE = 1: ROT = 0
```

That's about it. Next month: pie charts. Honest. ◨

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VENTURES WITH VISICALC

BY JOE SHELTON

Ever thought about investing in a company? Or purchasing stock? Ever been a manager responsible for the financial health of a company? Or known a banker who was looking at the financial records of a company? Or a college student who was taking classes in finance and accounting?

What all of these people have in common is a desire to be able to determine key indications of a company's financial strength by looking at that company's financial records. It shouldn't surprise you that *VisiCalc* can be the quickest and simplest means of obtaining these indices.

The first thing you need in order to do this kind of analysis is the financial records of the company that interests you. There are a number of ways to find this information. If you want to know more about a publicly held company, write to the company or see a stockbroker; you should be able to get that company's annual reports. In addition, all publicly held companies are required to file a 10K report with the Securities and Exchange Commission. This is a yearly summary of a company's financial position. You'll find 10K reports in many libraries, especially the graduate business school libraries of major colleges.

If the company you're curious about is privately held, obtaining financial information can be difficult or even impossible. You can try going directly to the company, but many private companies won't release financial information. Managers and potential investors need to be able to secure enough information to do cursory or even complete analysis.

Financial Ratios. If you've ever taken accounting or finance classes, the term *financial ratios* probably reminds you of frantic efforts to memorize masses of formulas. Once you completed your coursework, however, you probably rarely, if ever, saw or used any of the formulas again. Schools continue to teach financial ratio formulas, though; the reason is that a world of information can be gleaned from using them to analyze the financial status of a company. But because the process of determining the ratios is a repetitive and complicated task most people stop using these formulas once they finish school. Enter *VisiCalc*, the perfect tool for the job. (You knew that was coming!)

Before we see how *VisiCalc* can be used here, a short review of financial ratios is probably in order. At the simplest level, financial ratios are comparisons of various entries on different financial reports. The most commonly used reports are a company's income statement and its balance sheet.

Financial ratios can be classified in a number of ways. We'll separate them into four groups—liquidity ratios, activity ratios, leverage/equity ratios, and profitability ratios (figure 1).

Liquidity ratios are an indication of a company's solvency. They include net working capital, current ratio, and quick asset ratio. Liquidity ratios deal primarily with current and quick assets and with how these relate to current liabilities.

Activity ratios are an indication of how sales relate to specific assets. As the name implies, activity ratios show how busy (active) a company is. Activity ratios include inventory turnover, inventory as a percentage of assets, average collection period, fixed asset turnover, and total asset turnover.

Leverage/equity ratios are the relationships between debt and equity as they relate to total assets, total debt, preferred stock, common stock, and bonds. Included in this category are total debt to total assets, net asset value per bond, net asset value per share of preferred stock, and net asset value per share of common stock.

Profitability ratios are among the ratios used most often in analyzing a company's financial well being. They include operating margin of profit, operating cost ratio, net profit ratio, price-earnings ratio, return on total assets, and return on net worth.

Various other ratios could be included in these comparisons. Once you've completed this month's template, you'll see how easy it is to add (or delete) any ratios you want to. In fact, that's one of the real strengths of *VisiCalc*—the ability to change your templates quickly whenever you need to.

Most of the information required to complete these ratios can be found in a company's 10K or annual reports. Other information, such as stock price and average daily sales, may or may not be readily available. You'll have to get that kind of information from the company directly or from a stockbroker; in some cases, you may have to draw your own conclusions from related information you've been able to garner from other sources.

If you use *VisiCalc* often, you can probably see already just how simple completing this template will be. Much of the data from the financial statements is used in a number of different formulas. For example, net profit is used in calculating three ratios. Given that, it makes sense to have a data entry section, where the information taken from the reports

---

Liquidity Ratios
Net working capital = current assets − current liabilities
Current ratio = current assets / current liabilities
Quick asset ratio = quick assets / current liabilities

Activity Ratios
Inventory turnover = sales / inventory
Inventory as a percent of assets = inventory / total assets
Average collection period = receivables / sales per day
Fixed asset turnover = sales / net fixed assets
Total asset turnover = sales / total assets

Leverage/Equity Ratios
Debt to total assets = total debt / total assets
Net asset value per bond = total assets − intangible assets − current liabilities / bonds out
Net asset value per share of preferred stock = total tangible assets − current liabilities − long term liabilities / shares of preferred stock
Net asset value per share of common stock = total tangible assets − current liabilities − long term liabilities − value preferred stock / shares of common stock

Profitability Ratios
Operating margin of profit = operating profit / sales
Operating cost ratio = 1 − operating margin of profit
Net profit ratio = net profit / sales
Price/earnings ratio = market price / earnings per share
Return on total assets = net profit (after tax) / total assets
Return on net worth = net profit (after tax) / net worth

Figure 1.

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is entered only once; and a computational section, where the required ratios are computed. We'll also have a report section that's dedicated solely to the display of the ratios.

Ratios aren't particularly useful in isolation. They become more useful when you collect them over a number of years or periods and compare them. A comparison of one company's information against industry averages or information about competitors gives added perspective. A manager or investor equipped with five years of a company's financial ratios and the comparative industry average ratios has a good basic financial picture of a company.

There are a couple of caveats.

First, financial ratios are only a part of the picture. There are other tangible and intangible factors to consider, such as new (announced or unannounced) products, changing market demands, interest rates, general economic trends, and so on, that should also be weighed when you're trying to get a more complete picture of a company.

Second, the data presented in financial reports is developed by accountants and financial officers of a company. Each company can, to a great degree, choose how to define the data presented in its reports. This means that reports from different companies probably won't have the same format, nor will each entry necessarily represent the same information. You may have to do some editing before you enter information into the data entry section of your model. The editing required should be minimal, however.

If you have any questions about the definitions of financial terms, you can generally find the answers in a financial textbook.

The Model. The number of ratios we've discussed tells you that this is going to be a large template. For the purposes of this article, we'll do only some of the formulas in the template. If you wish, you can complete the template by entering the remaining formulas. If you do, you'll have a very useful tool.

The data entry section is the place you'll usually start when using the template, so let's begin there. Laying out the template in a logical fashion will make a difference later on when you begin analyzing reports because fewer calculations will be required. If we place the data entry section at the top of the template and the calculation section below it, the individual formulas will be able to use the information immediately and the template probably won't require any further recalculations to be accurate.

For the sake of presentation and printing, we'll place a ratio report section directly below the data entry section in our example. Then you'll be able to print both sections at once. This means that the model will always require one additional calculation to be accurate.

Before we begin entering random formulas, let's take a minute to discuss the internal order of the three sections. The information in the data entry section will be the same as it would be in actual financial reports. This simplifies entering the data because you can just follow the report format. The ratios displayed in the report section will be grouped by the type of ratio (for example, liquidity ratios). The computational section will group the formulas in the same section order as the financial reports do. So ratios that use information from the balance sheet will be included in a balance sheet part of the computational section. We'll also lay out and label each calculation so that the component parts will be apparent.

Arranging the template in this manner simplifies data entry and makes it easier to see where the ratios actually come from. For example, if you have a question about how a ratio is computed, you'll be able to go to the correct report section of the computational area and see the actual calculations. As we'll see later, this permits you to do what-if analysis on the ratios.

Since we're going to do comparisons of different periods, competitors, and/or industry averages, we'll want to place similar ratios side by side. It's up to you whether to design the template to be horizontal or vertical. Since most time series are horizontal, we'll do our time references in a horizontal format also. That will give us at least sixty columns (three columns will be required for labels) to enter years or different competitive ratios for equivalent periods.

Now let's decide what the data entry section should look like. It would be nice if all annual reports and 10K reports used the same format, but, sadly, they don't. The best method is probably to use the most complete balance sheet and income statement you can find as a model. You'll also have to have a section for the other data (for example, stock prices) that isn't usually included in those reports. For example, we'll use a sample of a 10K report that has proved to be complete enough for most analysis.

Figure 2 shows our data entry section. Note in our example that the labels in column B are out of proportion to the width of the other columns. This is so because this example was done using *VisiCalc Advanced Version.* If you don't have the *Advanced Version,* you can enter the same labels across two or three columns.

Each of the columns shown that's headed by 19XX can either have yearly information from financial reports or competitive data from other companies.

	B	C	D	E	F
6			COMPANY NAME		
7			FINANCIAL STATEMENTS		
8					
9	BALANCE SHEET	19XX	19XX	19XX	19XX
10	= = = = = = = = = = = =				
11	ASSETS				
12	Cash				
13	Marketable Securities				
14	Receivables				
15	Quick Assets				
16	Inventory				
17	Prepaid Expenses				
18	Total Current Assets				
19	Property, Plant, Building				
20	Accumulated Depreciation				
21	Net Fixed Assets				
22	Intangible Assets				
23	Total Assets				
24					
25	LIABILITIES & EQUITY				
26	Notes Payable				
27	Payables & Accruals				
28	Federal & State Income Tax				
29	Total Current Liabilities				
30					
31	Long Term Liabilities				
32	Bonds Outstanding				
33	Total Liabilities				
34					
35	STOCKHOLDERS' EQUITY				
36	Common Stock Value				
37	Shares of Common Stock				
38	Preferred Stock Value				
39	Shares of Preferred Stock				
40	Additional Paid in Capital				
41	Retained Earnings				
42	Total Stockholders' Equity				
43					
44	TOTAL LIABILITIES & EQUITY				
45					
46					
47	EARNINGS & RETAINED EARNINGS				
48	= = = = = = = = = = = =				
49					
50	Net Sales				
51	Cost of Sales				
52	Operating Profit				
53	Other Income				
54	Interest Expense				
55	Earnings Before Tax				
56	Federal & State Taxes				
57	Net Earnings				
58	Retained Earnings (Beginning)				
59	Total				
60	Cash Dividends				
61	Retained Earnings (Ending)				
62					
63	Earnings/Share				
64	Cash Dividends/Share				
65	Market/Price/Share Common				

Figure 2.

Figure 3 shows the financial ratio report section. If you have an Apple II with 48K or less of memory, you should monitor the size of the model as you build it. This model was developed originally on an Apple II with 64K of memory and had memory left over.

Finally, we should begin the computation section shown in figure 4. You'll notice as you enter the labels that the computation for each ratio is shown. In the first example, net working capital is defined as current assets minus current liabilities. In the second example, current ratio is current assets divided by current liabilities. To simplify our example, we'll only work through the computations for the first two ratios.

Calculating the Formulas. Net working capital is our first ratio. In C111, enter the current asset value for column C. The entry is +C18. In C112, enter current liability (+C29). The net working capital is +C111−C112. Alternately, you could use the original cell references (that is, +C18−C29). To enter net working capital in the report section, enter +C113 in cell C75.

Calculating current ratio is equally simple. In C115, enter +C18, and, in C116, enter +C29. The current ratio formula in C117 is +C115/C116 (or C18/C29). To enter the current ratio in the report section, enter +C117 in cell C76.

If you try to complete the template in this manner, you'll find that you're jumping all around the worksheet. There is an easier way. Move the cursor to the center of your screen and divide the screen with a horizontal window (/WH). Move the cursor in the lower window to the computation section and the cursor in the upper window to the data entry section.

Complete the computation section first. As you enter the cell references, it's a simple matter to see the cell reference in the upper window. You can enter the cell reference manually or point with the cursor, using ";" to jump between windows.

Once you've completed all the formulas, it's just as simple to relocate the upper window to the ratio report section and enter the corresponding cell references from the computation section for each ratio. Of course, you'll occasionally have to reposition the lower window.

From this point on, completing the template is as simple as following

	B	C	D	E	F
		COMPANY NAME			
		FINANCIAL ANALYSIS			
71					
72		19XX	19XX	19XX	19XX
73	LIQUIDITY RATIOS				
74	= = = = = = = = = = = = =				
75	Net Working Capital				
76	Current Ratio				
77	Quick Asset Ratio				
78					
79	ACTIVITY RATIOS				
80	= = = = = = = = = = = = =				
81	Inventory Turnover				
82	Inventory as % of Assets				
83	Average Collection Period				
84	Fixed Asset Turnover				
85	Total Asset Turnover				
86					
87	LEVERAGE/EQUITY RATIOS				
88	= = = = = = = = = = = = =				
89	Debt to Total Assets				
90	Net Asset Value/Bond				
91	Net Asset Value/Share P.S.				
92	Net Book Value/Share C.S.				
93					
94					
95	PROFITABILITY RATIOS				
96	= = = = = = = = = = = = =				
97	Operating Margin of Profit				
98	Operating Cost Ratio				
99	Net Profit Ratio				
100	Price/Earnings Ratio				
101	Return on Total Assets				
102	Return on Net Worth				
103					

Figure 3.

	B	C	D	E	F
107	COMPUTATIONS				
108	= = = = = = = = = = = = =				
109	BALANCE SHEET	19XX	19XX	19XX	19XX
110	----------				
111	Current Assets				
112	−Current Liabilities				
113	Net Working Capital				
114					
115	Current Assets/				
116	Current Liabilities				
117	Current Ratio				
118					
119	Quick Assets/				
120	Current Liabilities				
121	Quick Asset Ratio				
122					
123	Total Debt/				
124	Total Assets				
125	Debt to Total Assets				
126					
127	Sales/				
128	Inventory				
129	Inventory Turnover				
130					
131	Inventory/				
132	Total Assets				
133	Inventory as % of Assets				
134					
135	Receivables/				
136	Sales/Day				
137	Average Collection Period				
138					
139	Sales/				
140	Net Fixed Assets				
141	Fixed Asset Turnover				
142					
143	Sales/				
144	Total Assets				
145	Total Asset Turnover				
146					
147	Total Assets				
148	−Intangible Assets				
149	----------				
150	Total Tangible Assets				
151	−Current Liabilities				
152	----------				
153	Net Tangible Assets/				
154	Bonds Outstanding				
155	----------				
156	Net Asset Value/Bond				
157					
158	Total Tangible Assets				
159	−Current Liabilities				
160	−Long Term Liabilities				
161	----------				
162	Net Assets Backing P.S./				
163	Shares of Preferred Stock				
164	----------				
165	Net Asset Value/Share P.S.				
166					
167	Total Tangible Assets				
168	−Current Liabilities				
169	−Long Term Liabilities				
170	−Preferred Stock				
171	----------				
172	Net Assets/				
173	Shares of Common Stock				
174	----------				
175	Net Book Value/Share C.S.				
176					
177					
178	INCOME STATEMENT	19XX	19XX	19XX	19XX
179	----------				
180	Operating Profit/				
181	Sales				
182	Operating Margin of Profit				
183					
184	1−Op. Margin of Profit				
185	Operating Cost Ratio				
186					
187	Net Profit/				
188	Sales				
189	Net Profit Ratio				
190					
191	Market Price/				
192	Earnings/Share				
193	Price Earnings Ratio				
194					
195	Net Profit (After Tax)/				
196	Total Assets				
197	Return on Total Assets				
198					
199	Net Profit (After Tax)/				
200	Net Worth				
201	Return on Net Worth				

Figure 4.

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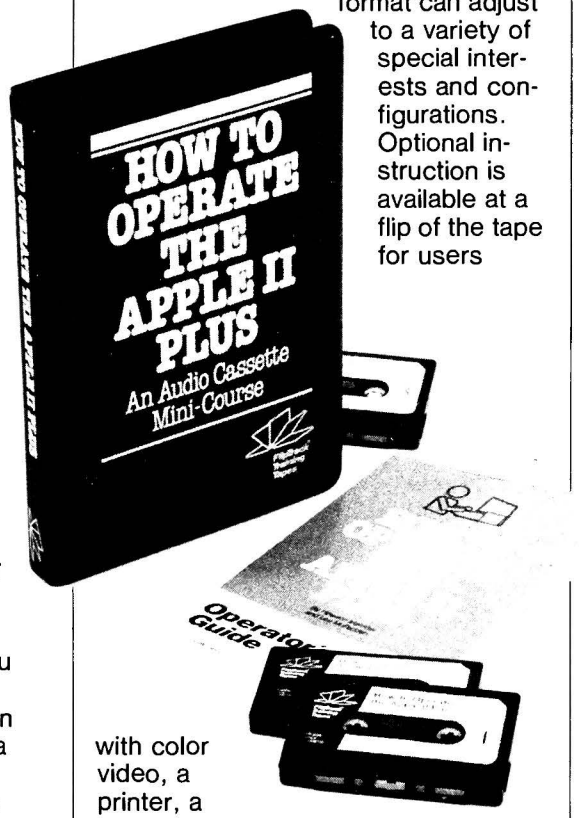
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	A	B	C
16	Inventory		1500000
17	Prepaid Expenses		7200
18	Total Current Assets		644000
19			
29	Total Current Liabilities		316000

	A	B	C
76	Current Ratio		2.037975
108			
109	BALANCE SHEET		1982
110	----------		
111	Current Assets		644000
112	-Current Liabilities		316000
113	Net Working Capital		328000
114			
115	Current Assets/		644000
116	Current Liabilities		316000
117	Current Ratio		2.037975

Figure 5.

the instructions presented in the labels in the computational section. If you want to, go ahead and complete and save (/SS) the remaining part of the template.

Figure 5 shows an example of completed entries, computations, and ratios for net working capital and current ratio.

You'll notice that we've managed to show four different sections of information on the same screen. At times you may want to see different parts of a template at the same time. Using a window and setting individual titles in each window is the answer.

What If? For once, that isn't really the question. Assume we've calculated the ratios of a business for a number of years. Let's say that we can see immediately that some of the ratios aren't even close to the industry average or competitive ratios. We aren't trying to determine what happens (what if?) when a value changes. Instead, we're wondering what financial report entries apply and how much we must change them to cause the ratios we've calculated to be near the average or competitive ratios.

Let's take a common ratio and see how we can use *VisiCalc* to learn something about the business.

Inventory turnover is a measure of the value (size) of an inventory compared to the dollar amount of sales. Some businesses (grocery stores, for example) have very high inventory turnover, while others (such as expensive art galleries) have lower turnover. Two factors affect inventory "turns"—sales and inventory. If we increase sales or decrease inventory, we get a higher inventory turnover.

If our business has had an inventory turnover ratio of 12 and the average is 14, we have to decide what to change to make the ratios equivalent. It would be ideal if we could simply increase sales but, unhappily, that can often be difficult. Our option is to decrease inventory. What does that buy us? One thing we could do is to convert some of that inventory to cash and use it to pay off a debt. This would save us money by decreasing an expense. On the other hand, maybe we ought to leave our inventory ratio alone; maybe we are outselling our competition because we have the best selection of anyone in the area.

Back to our model. If you go to C128, you'll be able to enter different inventory amounts until the ratio is near the average. The difference between the report inventory and our final inventory is the amount of excess inventory you might want to convert to another asset.

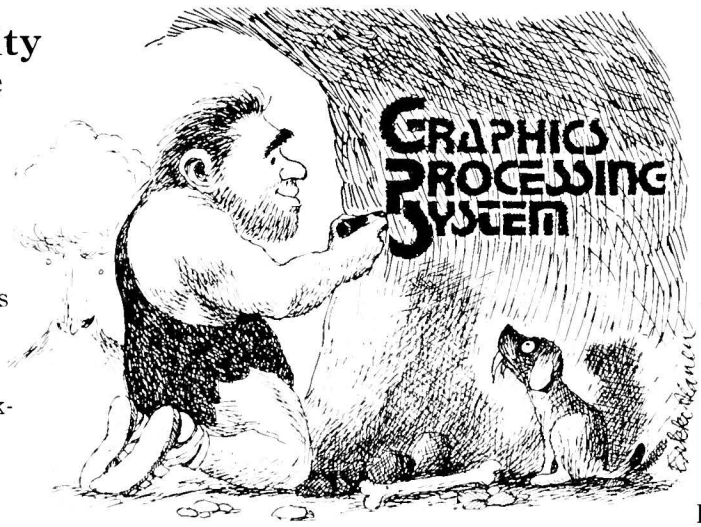
It's worthwhile to remember an important caveat about financial ratios. Sometimes ratios can be substantially different from industry averages and yet not indicate a need for any changes in the operation of a business. For example, some companies operate highly leveraged, and some like very little debt. Remember, ratios are just another way to measure a business. They are not the answer.

Next Time We Meet. If you read the article in this issue on the Connors/Borg Apple Challenge, you saw that *VisiCalc* was used to compute the important match statistics. Next month, we'll look at how that was done and at how to create similar templates for analyzing other sports. Even if you're not particularly sports-minded, you'll be able to learn some interesting things about using *VisiCalc*. ◨

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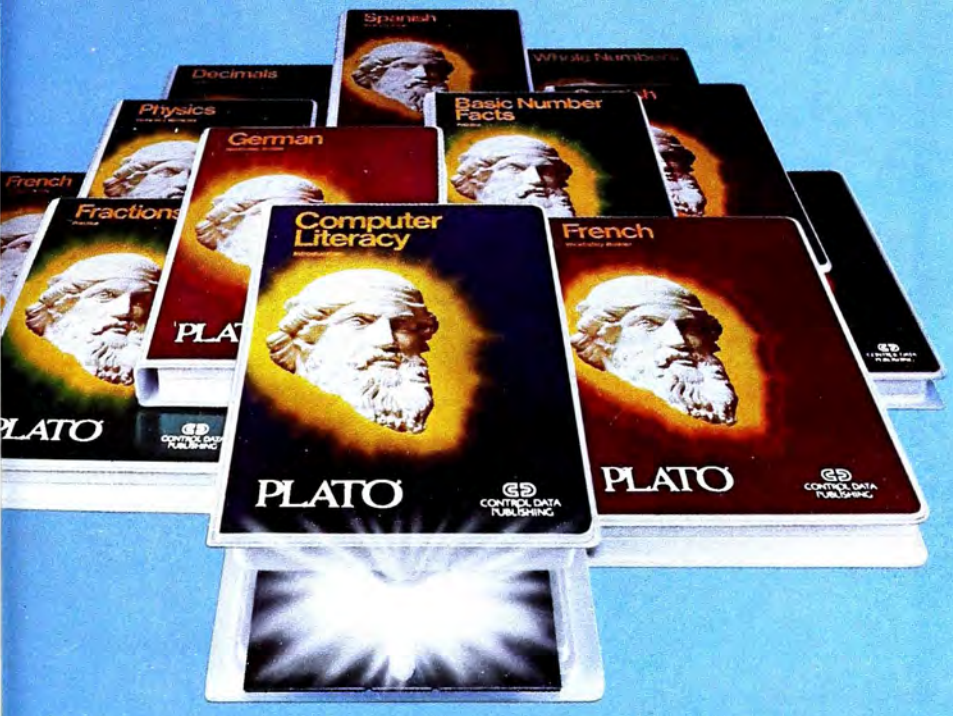
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The Schoolhouse Apple

by Jean Varven

Various people are predicting that educational software will be the fastest growing segment of the microcomputer market during the coming year. The number of new programs released in the last six months lends credibility to this assertion. Because of this, software for learning takes February's Schoolhouse Apple spotlight.

Interested parties—educators, parents, software designers, programmers, people with money to invest, and others—seem to be thinking hard lately about what elements help make a piece of educational software an effective learning tool. A sound theoretical base, logical organization, straightforward instructions, and an appreciation of the computer's special capabilities would seem to be among the key ingredients. Feedback from intended users (real, live kids) is also an essential element in the creation of a good program.

The programs reviewed in this issue are some of those that are causing excitement in kids and in the educational community.

Gertrude's Secrets and **Gertrude's Puzzles.** By Teri Perl, Leslie Grimm, and Warren Robinett. In these two programs, kids learn by experience to analyze situations, think logically, and solve problems. Their guide along the way is Gertrude, a goose with secrets to share and challenging puzzles to present. Uncovering her secrets and solving her puzzles isn't easy—at first. It requires developing the ability to discover the rules a particular puzzle reflects.

Gertrude's Secrets is designed for kids ages four to nine. *Gertrude's Puzzles* has harder puzzles and gives players no hints about their solutions; it's intended for players age six and up and picks up on the skills the first program addresses.

Like *Moptown*, an earlier Learning Company creation, the Gertrude programs help kids learn to identify samenesses and differences on several levels. In these new programs, kids develop and expand their knowledge. Once they see that purple squares differ from green triangles on two levels, shape and color, and blue triangles and green ones are the same on one level (shape) and different on another (color), they're ready to discover the patterns, sets, and subsets that can be created using shapes of different colors.

The player learns two things right off: how to move around and how to pick up and drop objects. From the keyboard, the player uses the I-J-K-M diamond to move up, left, right, and down. These keys also work with control, for slow, small moves, and with repeat, for moving the player along briskly. From the keyboard, objects can be picked up or dropped by hitting the space bar. In the joystick mode, the player moves using the handle and picks up and drops objects by pressing either of the joystick buttons.

The objects to be picked up and set back down include Gertrude and various colored shapes. Children can choose between basic geometric shapes, which are the default, and sets of animal, flower, monster, and other novelty shapes; they can also freely modify any of the shapes using a built-in shape editor. The shapes they choose will be used throughout the puzzles.

The colorful manuals that accompany the programs are addressed to players rather than to parents. They do a good job of explaining how the programs work, although kids don't need to read the manuals to get up and running. Each of the manuals contains a map that shows the layout of Gertrude's secret rooms. Activity cards that enable kids to play similar off-computer games are also available to users who send in the warranty cards that accompany the programs. A brief supplementary section with information about the concepts being explored would probably be welcomed by parents and teachers (and by some kids). So would something about the learning theory on which the programs are founded.

Both programs are colorful, logically organized, and easy to use. Both are also fun, challenging, and genuinely educational. After all, they help kids exercise and develop the ability to think.

Gertrude's Secrets and *Gertrude's Puzzles*, by Teri Perl, Leslie Grimm, and Warren Robinett, the Learning Company (4370 Alpine Road, Portola Valley, CA 94025; 415-851-3160). $75 each.

Dragon's Keep. By Mike MacChesney, Al Lowe, Rae MacChesney, and Margaret Lowe. *Dragon's Keep*, a delightful adventure game from a new California company, was designed with the very young adventurer in mind. The vocabulary used in the game is at the second grade reading level (except for *dragon*, a fourth grade word), and instead of typing in their responses, players need only press the space bar or the return key to indicate the actions they want to take. This means that youngsters who can read at the second grade level can play the game all by themselves with confidence, and younger children can play if the text on screen is read to them by their parents or by an older child.

The action of *Dragon's Keep* takes place in and around a many-roomed magic house, the dragon's house. The object of the game is to find and set free sixteen animals that want to escape the dragon who holds them captive. Naturally, the animals are grateful when the adventurer succeeds in rescuing them. And, naturally, the dragon is always hanging around, hoping to foil the adventurer's attempts.

The player can't free an animal or even poke around when the dragon's in a room; after all, it is the dragon's house. So, the adventurer must move on and return to that room later.

This adventure game for young children really works. The level of the vocabulary is appropriate and the content is challenging, yet manageable. The graphics, created with Penguin Software's *Graphics Magician*, are colorful and attractive; and children will have no trouble recognizing the objects and animals depicted.

The documentation that accompanies the program is brief, clearly written, and certainly adequate. Additional information about the learning theory underlying the program would be nice to have, though. An illustration of the *Dragon's Keep* world, accompanied by some elementary map-making guidelines, would also be welcome.

Perhaps the most striking aspects of this program are its mood and tone. Children are introduced to a magic world in which their efforts at exploration are encouraged and their successes are rewarded. They are never put down for making moves that don't achieve the results they expected. The program's authors promote logical thinking by creating an entertaining world in which thinking of this kind is called for.

Clearly, Sunnyside Soft has succeeded in its effort to create a positive learning environment, one that young computer users will flourish in.

Dragon's Keep, by Mike MacChesney, Al Lowe, Rae MacChesney, and Margaret Lowe, Sunnyside Soft (5815 East Parkside, Fresno, CA 93727; 209-251-5400). $39.95.

Mix and Match. By Children's Television Workshop. Here at last—Apple learning games starring the Muppets and based on the games developed for Sesame Place educational park in Langhorne, Pennsylvania.

In a move that comes as something of a surprise, Apple Computer has released the first three Discovery Games disks—*Ernie's Quiz*, *Instant Zoo*, and *Spotlight*—in Integer Basic rather than in Applesoft. If you own an Apple II, this is good news; if you've got a II Plus, you'll need an Integer card or RAM card in order to run these programs. The fourth program, *Mix and Match*, is written in Applesoft and will run on any 48K Apple II Plus (and on 48K Apple IIs outfitted with an Apple-

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soft card or language card).

Apple Computer describes *Mix and Match* as its family package. Each of the games it contains—*Mix and Match*, *Animal*, *Layer Cake*, and *Raise the Flags*—can be enjoyed by learners of various ages.

In *Mix and Match*, players construct new Muppets out of the top, middle, and bottom sections of six familiar ones. The presence of Big Bird, Ernie, Cookie Monster, and the rest gives this familiar game that extra something.

Animal is a neat version of the program on the system master disk. It puts the player in the role of teacher and the computer in the role of eager student. Because the computer only recognizes a few animals at first, it's the player's job to teach it new ones—to identify what makes various animals different from one another so the computer can recognize all of them later on. Teaching becomes a great way of learning.

In *Layer Cake*, a logic game reminiscent of *Tower of Hanoi*, the player is faced with three layers of a cake on one of three plates. The task is to transfer the layers of the cake to one of the other plates in the fewest possible moves and without crushing any of the smaller layers under the larger ones. The "fewest moves" for a three-layer cake is seven, but success on any level is rewarded. The number of layers can be varied, and, over time, players will begin to discern the logic pattern involved.

Raise the Flags is an appealing version of *Hangman*. Two lists of words are provided, and by means of a fifth program, *Word Editor*, players or parents of players can create their own word lists. The words to be identified can contain three to six letters, and a player is entitled to guess seven incorrect letters before the computer will reveal the answer. Word lists can contain up to forty-five words.

The *Mix and Match* programs are easy to use, reinforcing, uncluttered, and virtually crash-proof. And it's evident that the people who created them honestly believe that learning is fun.

The manual is a genuine resource. It provides information and instructions that inexperienced computer users will find helpful, and it suggests noncomputer games that children and parents can make themselves. Emphasizing the same concepts and skills as their computer counterparts do, these homemade games encourage creativity and provide for hours of rainy day fun in the bargain.

Mix and Match, by Children's Television Workshop for Apple Computer (20525 Mariani Avenue, Cupertino, CA 95014; 408-996-1010). $50.

Ernie's Quiz. By Children's Television Workshop. In typical CTW style, *Ernie's Quiz* refers not just to one game but to a collection of four, each of which covers a different subject.

Guess Who helps kids with image recognition. One at a time the Sesame Street Muppets take shape, appearing one (lo-res) dot at a time. The object of the game is to guess, before the entire picture appears, which of the Muppets it is. A color television set or monitor is recommended for all the games, especially this one. Since the Muppets are made up of different basic colors, color recognition helps the child identify which Muppet is being displayed.

Jelly Beans is a simple counting skills exercise. A random number of jelly beans appear in the bean jar and the child is asked to count how many. The use of different colored jelly beans helps prevent confusion over which ones have been counted and which have not.

Using the game paddles, it's possible to create numerous faces in *Face-It*. The player gets to choose among various head shapes, hair designs, eyes, noses, and so on and then selects what colors different body parts will be.

The fourth game, *Ernie's Quiz*, is a multiple-choice quiz on how well the child knows the Sesame Street Muppets. Three clues are given, one at a time, and the child guesses which of three Muppets is being described in the clues. If the guess is incorrect, the display lets the child know that it isn't that one, thus eliminating one possibility.

One of the strongest points of the package is its stress on the positive. Instead of, "No, that's wrong. Try again," the child is given encouragement. The child is never told that the response typed is wrong, only that the computer's answer isn't the same.

For example, in *Guess Who*, if the child guesses "Grover" incorrectly, the program responds with, "It doesn't look like Grover to me." Or if a guess is made that is not even one of the Muppets, the program fills in that name in its reply.

Likewise, in *Jelly Beans*, an incorrect guess is greeted with, "That's not how many I counted," rather than with, "No, it's not eight. Count again."

When the child guesses correctly, the Muppets respond with congratulatory messages. In *Guess Who*, messages reflect the personality (muppetality?) of each Muppet. ("Yep, me Cookie Monster!" or "Okay, so you guessed it was me, Oscar. What's it to you?") If the child never guesses the Muppet, the image eventually appears with a message telling who it is.

Three out of four of the *Ernie's Quiz* games have definitive endings to them and never leave the child hanging, unsure of what the answers were. In *Jelly Beans*, however, it's possible to get hung up. If the correct number of jelly beans is never entered, the game will go on until the reset key is pressed or the computer is switched off.

Ernie's Quiz can be played by kids of ages four to seven without the aid of an adult. Instructions for each game appear on the screen and in the manual. The directions in the manual are accompanied by life-size illustrations of which key(s) to press and screen samples from the games.

Each game on the disk is supplemented by descriptions of two or three games that don't require a computer. *Ernie's Quiz* is meant to introduce basic concepts and the games described in the manual will help children expand their understanding of those concepts.

Ernie's Quiz, by Children's Television Workshop for Apple Computer (20525 Mariani Avenue, Cupertino, CA 95014; 408-996-1010). $50.

Bop-A-Bet. By Mike MacChesney, Al Lowe, Rae MacChesney, and Margaret Lowe. Here's another group of educators who recognize the futility of educational software running in the textbook emulation mode. Instead of another curriculum-based package that merely turns the Apple screen into the electronic equivalent of a textbook page, *Bop-A-Bet* is a learning game based on maze-chase game techniques.

What does learning have to do with *Pac-Man*? Lots in this context. The learner here is the tyke trying to master the alphabet. The lesson is letter recognition and alphabetic order. Run the cursor over the letters of the alphabet in order and, in the process, bop 'em a good 'un. It's a lot better than staring at a string of characters on a page, and, in the electronic age, it's probably more effective than the books with one letter and one picture on a page. Remember the "C" and "C is for cat" books?

One of the things youngsters do best is emulate their elders. So at this stage in society, *Pac-Man* style learning is probably more appropriate than McGuffey's readers in most households, even if the learning is then more subliminal and less conscious.

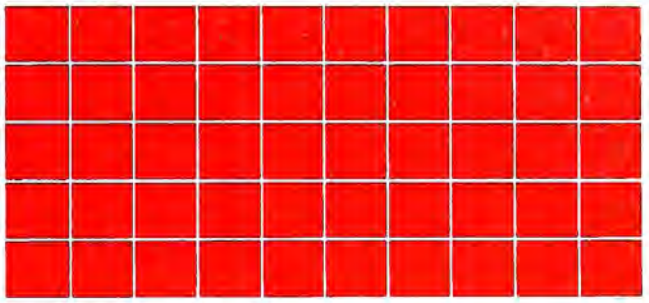
The authors of *Bop-A-Bet* clearly have the right idea. To use the microcomputer as a learning tool, one should use all the capacities of the machine—color, animation, and good graphics. The only quarrel from a technical standpoint with the execution of this game is that the cursor could be more responsive to the keyboard instructions.

Sunnyside Soft doesn't have the bucks to promote their software in the same fashion as Children's Television Workshop, Spinnaker, the Learning Company, Control Data, SRA, and Xerox. But those other guys might do well to pay heed. If Sunnyside can maintain good, fresh ideas and spruce up the efficiency of their code, they could well be a pacesetter in the area that looks to be the fastest growing segment of microcomputerdom in 1983.

Bop-A-Bet, by Mike MacChesney, Al Lowe, Rae MacChesney, and Margaret Lowe, Sunnyside Soft (5815 East Parkside, Fresno, CA 93737; 209-251-5400). $34.95.

Micro Mother Goose. By Classic Family Software. Old King Cole, Little Miss Muffet, and the Three Blind Mice on the computer? Yup—for the three-year-old contingent (and up). Software Productions's first product, *Micro Mother Goose*, is intended to open up the world of microcomputers to very young children.

Micro Mother Goose consists of nine Mother Goose rhymes and three simple games loosely tied to nursery rhyme themes. Each rhyme appears line by line on the screen in upper and lower case letters and is illustrated with an appropriate hi-res picture. A slowed down musical rendering follows immediately after the text of the rhyme. The rhymes are easy to read, the illustrations are effective and fun, and the music is about what you can expect from the a capella Apple speaker—fine but not great.



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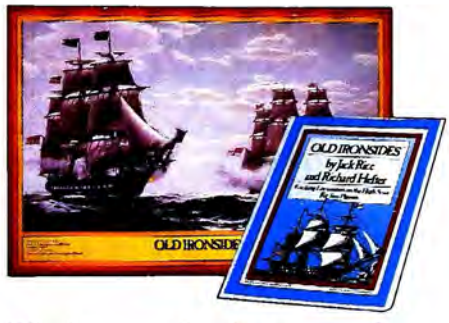
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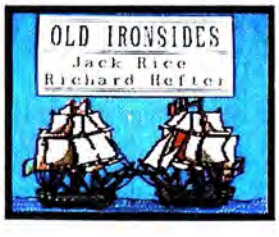
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This program practically runs itself. And because visual cues (such as color coded menus and a pointing finger next to the current rhyme choice) are given, children don't have to be able to read in order to get the program to do what they want it to.

The games are played using paddles or joystick. There's *Lamb Scramb*, in which Mary's little lambs need protection from the wolf and help getting through the hedge; *Splat*, which features one hundred falling eggs (Humpty Dumptys, all of them); and *London Bridge Out*, a *Little Brick-Out* variation. All of the games start out very easy and grow more challenging as children show that they are ready to move to the next level of difficulty.

The manual, designed for parents, is excellent. It is attractive, well written, and thorough, and it does a good job of explaining both the how and the why of the program. It also includes useful information about how to set up the computer and how to ensure that your own kids and those in the neighborhood know how to treat the computer.

The program is not copy protected. Users are encouraged to make their own "working copy" immediately and are even supplied with an extra program label to affix to it. The package also includes a computer dos and don'ts poster and Mother Goose stickers.

It's obvious that care and thought went into the creation of this package. Two things would have added to the program's flexibility—a pause between the end of the rhyme text and the start of the music and a sound-off option for times when the kids want to play but parents don't want to listen.

Micro Mother Goose, by Classic Family Software, Software Productions (2357 Southway Drive, Box 21341, Columbus, OH 43221; 614-486-3563). $39.95.

Rocky's Boots. By Warren Robinett and Leslie Grimm. Remember when it was fashionable to say that the main purpose of school was to teach kids how to think? This was generally said to justify the teaching of facts and processes that were boring to kids who didn't see why they'd ever need to know them. The principle should be true, of course, even if it isn't always practiced, but the justification doesn't work. Learning that the capital of Malaysia is Kuala Lumpur may be romantic, but it won't be a burning issue in most kids' adult lives—or, if it becomes one, they'll learn it then without effort because it is. Learning it at age ten won't teach someone to think—only to memorize.

The Learning Company believes in the principle without justification. In *Moptown*, in the Gertrude series, and now in *Rocky's Boots*, the programs home in on the thinking processes directly, and they make them fun. Kids learning with Gertrude and Rocky learn the tremendous delight of having their own minds function well—of tackling difficult problems, working them through, and solving them.

Presenting difficult problems that require logical thinking isn't so difficult to do. The hard part, which the Learning Company solves, is making hard problems not loom hard—even seem appealing—without taking away the sense of accomplishment that solving hard problems can bring.

The concepts of logic, with all the details of logic gates—*and*, *or*, *not*, electric surges and glitches, and flip-flops—are introduced so simply and naturally in *Rocky's Boots* that the child just can't feel the terror and frustration many adults have felt when introduced to these concepts.

By the end of *Rocky's Boots*, the child is attempting and solving complex plottings of logical gates to achieve configurations that accept or eliminate different colors and shapes. In the child's eyes, of course, she's building a hi-res machine to accept all yellow Pac-Men and blue ghosts, to kick out all ghosts of other colors, and to ring a bell and kick out any other-color Pac-Men; or perhaps some even more complex arrangement.

If you think this too much for a seven-year-old to handle (the Learning Company lists *Rocky's Boots* as being suitable for kids age seven and up), just try it with one. If he's mastered *Gertrude's Secrets* or *Puzzles* first, he's apt to leave you eating his dust.

The Learning Company asks a high stipend for its programs; but a good mind that knows how to delight in its own effort is worth much, much more.

Rocky's Boots, by Warren Robinett and Leslie Grimm, the Learning Company (4370 Alpine Road, Portola Valley, CA 94025; 415-851-3160). $75.

Schoolhouse Apple reviews were contributed by Al Tommervik, Margot Comstock Tommervik, Jean Varven, and Matthew Yuen.



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A Schoolhouse Apple Tutorial

LOGO

JIM MULLER

How can several hundred children, each with different talents, interests, and motivation, find the opportunities to discover their potentials when the school they attend has but a handful of computers? Will only those students who attend schools with very low computer-to-student ratios enjoy the learning potential the computer offers?

A related problem occurs when children's levels of interest at the computer are markedly different. Some kids take to computers like ducks take to water. Others need considerable guidance and structure if they are to make the most of the learning experience. Translating the abstractions of the cybernetic world to the real world—and vice versa—is a bit much for some children.

These problems have much in common with those of a teacher who's faced with twenty youngsters, a forty-five minute class period, and one computer. Unstructured self-exploration is totally impractical in such a real-world situation. But that doesn't mean that Logo and one computer can't be used effectively.

Logo Activities off the Computer. In the November issue, we published a variation of the instant single-keystroke procedure that's being used by developmentally disabled youngsters. This procedure is also very useful in helping preschool and kindergarten students to discover the world of the cybernetic turtle.

For some children, however, moving from the doodling world of the single-keystroke procedures to Logo programming is a bit too abstract. One tool that has proven to be quite valuable is Big Trak, the programmable truck from Milton Bradley.

Big Trak is about thirteen inches long. It can be programmed to move forward, back, and right, much the way you can program the turtle on the screen with the FORWARD, BACK, and RIGHT commands. Programming the truck to avoid tables and chairs provides a very real, concrete experience for young children. Then, if you want to work on building the concepts of shapes, put masking tape on the floor to provide a track for the truck to follow.

Another idea that works is to visit a newspaper printer and pick up roll-ends of paper. Then tape a marker to the back of the Big Trak so it can be programmed to draw as it moves over the paper. If you use the Big Trak Transport, a trailer accessory, you can add PENUP and PENDOWN commands to Big Trak with only minor modifications.

Another way to make turtle shapes come alive for kids is to create them first on the screen. Print them out, and then have the youngsters cut them out and trace them onto colored construction paper. Ask the children to trace the shapes without lifting their pencils from the paper. In doing so, children will move their pencils through the same path as the turtle.

Once you have a variety of basic shapes—squares, rectangles, triangles, and circles—ask the children to assemble them into pictures. Show them how complex structures can be assembled from simple shapes. Soon you will see rocket ships, houses, cars, and other objects appear. After they have had the chance to build complex shapes, take a trip through the neighborhood to discover these basic shapes in nature. Trees, shops, windows, roads, leaves, flowers, and airplanes can all be assembled from basic geometric shapes.

The mathematical concepts of how one, two, and three dimensional objects can move through space can be very difficult for young people to understand. A loop of rope and the computer can help make these ideas come alive more easily.

Draw a clock on the floor that's large enough to allow a child to stand at any hour with another in the middle representing the turtle. Place a child at 12:00 with the turtle in the middle and stretch the rope between them. The rope can then be measured in one dimension—length. Place another child at 3:00 and stretch the rope among the three of them. What would be the resulting shape?

Add a fourth child outside the circle a step or two back from 1:30. Then what shape do you have?

The next step is to have the turtle remain still while each of the other three advances one hour. Rather than standing at 12:00, 3:00, and outside 1:30, the children are now at 1:00, 4:00, and outside 2:30. What has happened to the square?

Next, have another child use turtle graphics to duplicate the clock and square on the computer screen. Show how the children moved through one-twelfth of the clock, or one-twelfth of a circle. How many degrees is that? Now have the turtle turn RIGHT 30 and draw a square. What happens? Have the children on the computer and those on the clock continue to rotate through each of the twelve hours. Don't erase any of the squares from the computer screen. What does the picture on the screen look like?

If drawing a clock on the floor isn't convenient, cut a piece of pine shelving into a square and draw a clock on the board. Hammer nails into the hour positions and the center. Put a loop into one end of a string and loop this over the center nail. The string is now ready to take a turtle-walk around the clock, creating all sorts of repetitive shapes.

These exercises should give you some ideas about how to make mathematics come alive for young people so they will come to know math as a universal language for solving problems and developing analytical skills. The computer and Logo are fascinating, imaginative tools that help this learning process along. But they are only tools, tools that need to be used productively and efficiently within a structured learning experience.

Illustrations and sample procedures have been deliberately omitted from this article. The descriptions are also purposefully brief. We hope you will explore these ideas and modify them to your own purpose.

Good Grief. Last month's Logo installment was written by Donna Bearden, not Jim Muller. ◨

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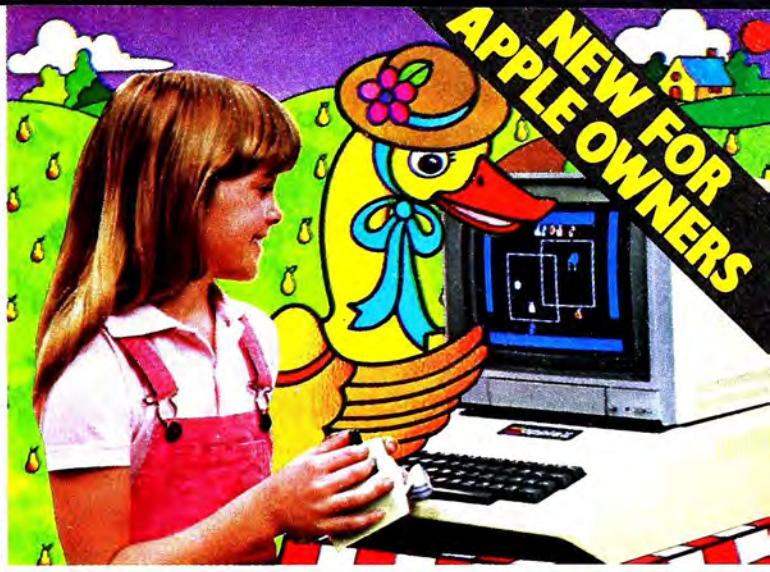
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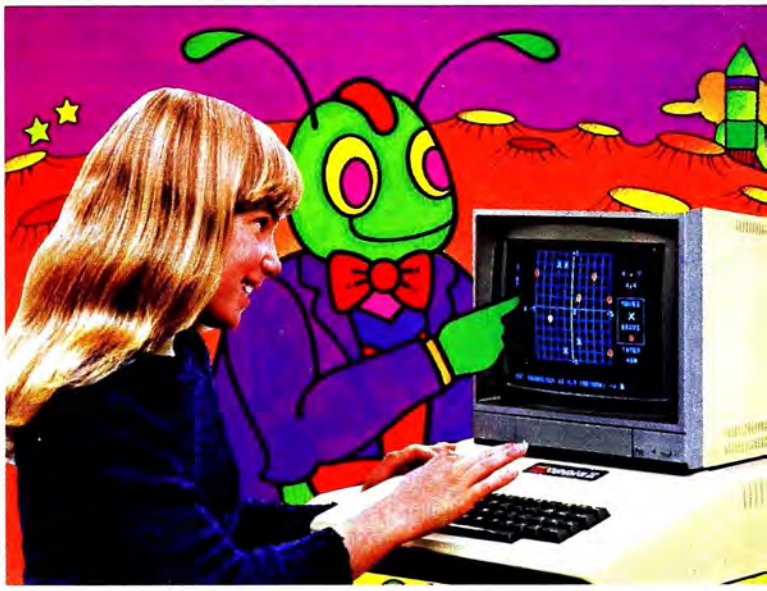
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MARKETALK News



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.

☐ *The Computer: Extension of the Human Mind* is a compilation of twenty-three papers presented at a conference of the same name in July 1982 at the University of Oregon. It's available from the **ERIC Clearinghouse on Educational Management** (University of Oregon, Eugene, OR 97403; 503-686-5043). 238 pages. $10.

☐ It just keeps expanding. *Algebra 4* is the latest in the series from **EduWare Services** (Box 22222, Agoura, CA 91301; 213-706-0661). This one covers graphing, linear equations, variation, solving systems of linear equations, and inequalities. Like its predecessors, *Algebra 4* offers a choice of learning styles for each student. It's all done in hi-res graphics with customized upper and lower case fonts. $39.95.

☐ The first of three **Computer Swap America** (Box 52, Palo Alto, CA 94302; 415-966-6546) shows will be held in San Jose, California, at the Santa Clara County Fairgrounds on Saturday, February 5, 1983. Sold there are overstocked, surplus, or obsolete items, and many new products. Hours are from 10:00 a.m. to 6:00 p.m. Admission, $5. You might also mark your calendar for the West Coast Computer Faire that takes place March 18 through 20 at Brooks Hall in San Francisco, California. Admission, $15.

☐ *Binary to Applesoft* is a decompiler from **Simulation Software** (6035 North Maplewood, Chicago, IL 60659) that lets you see binary programs in a Basic format. No programming knowledge is required. $60.

☐ *Tax Mini-Miser,* a tax planning package by **Sunrise Software** (San Francisco, CA), is being marketed by **Starsoft** (4984 El Camino Real, Suite 125, Los Altos, CA 94022; 415-965-8000, 800-882-8000). The program computes the effects of up to six alternative tax strategies over a one-year period, or one strategy over a period of up to six years. Then it tells you the best computation method for each tax year or strategy. $295.

☐ Five new programs, just out from **Howard W. Sams** (4300 West 62nd Street, Box 7092, Indianapolis, IN 46206; 317-298-5400): *Music Games* incorporates twelve different programs. Topics covered include movement on the staff, recognition of notes and rhythms, measures, and musical pitches. $39.95. *PDQ* is a data handler that allows you to create screens of information with up to 840 characters per screen. Up to 114,500 characters may be saved per disk in four files. You can load, manipulate, search for, and save all data. $59.95. Eighteen mathematical programs designed to figure and print reports for loan, savings, and investment plans are what *Financial Facts* is all about. The programs cover depreciation, future value, interest rates, loans, payments, and investments. $59.95. "Protected by a robotic overseer, the fortress, with its miles of corridors, false chambers, death traps, transport devices, and one-way doors, is impregnable to all but one . . . the little Vario 500 egg-shaped robot you become." It all happens in *The Caves of Olympus,* an adventure game that requires quick action and careful plotting and reasoning. $39.95. *Money Tools* is a home or small business financial record-keeping and reporting system. You can create 120 budget areas and twelve recording periods that handle 500 transactions per period. $59.95.

☐ **Creative Insight** (69 Logan, Denver, CO 80203; 303-733-8372) puts out a portable rolltop desk for the Apple. Constructed of solid oak and oak veneer plywood, the desk locks up when it's not being used. Inside the desk is a sliding drawer for the Apple, and there's room for two disk drives. Its knock-down design allows for easy shipping, storage, and assembly. $345.

☐ You can have your personal *Family Medical Advisor* inexpensively. **Navic** (Box 14727, North Palm Beach, FL 33408; 305-627-4132) presents this program to help you identify more than 180 illnesses. Not meant to replace an experienced physician, it will analyze overt symptoms using your "yes or no" answers to a series of questions as its data. $37.50.

☐ **High Technology Software Products** (Box 14665, Oklahoma City, OK 73113; 405-478-2105) has enhanced *PACE,* their general-purpose estimating program, to work with the Corvus hard disk system. In the new version, the number of estimates that can be stored has increased 500 percent. *PACE* can now store and retrieve information on up to 2,000 items. $395. High Technology has also released an enhanced version of their *Store Manager,* once known as *The Cashier* from Apple. The new version reports, sorts, and searches records much faster than the old version. Current *Store Manager* owners can get updates for $35. The price for new buyers is $250.

☐ **Apple Computer** (20525 Mariani Avenue, Cupertino, CA 95014; 408-973-3019) has brought out a new version of *Dow Jones News and Quotes Reporter.* The new version gives investors access to all database services currently provided by the Dow Jones News/Retrieval Service, as well as to future services. What's more, the revised software supports eighty-column displays and autodial modems, and it allows you to log on automatically through Tymnet, Telenet, and the Canadian Bell System's Datapac. Requires modem. Updates for current owners, $40. If you buy it new, it's $135.

☐ Math teachers might be interested in *Multiplication Facts Diagnostic* from **Disk Depot** (731 West Colorado Avenue, Colorado Springs, CO 80905). Not only does the program diagnose students' weaknesses and strengths, but it will also write a prescription to cure their problems. There are nine levels of achievement; the teacher selects the facts to be learned, the time spent on learning, and the number of practice problems. Once the student masters a level, a Certificate of Mastery is issued on the printer. $49.95.

☐ Read *Softalk* from cover to cover, but if you must know what other magazines are printing you can get summaries of their articles from the Microcomputer Index, an on-line file from **Dialog Information Services** (3460 Hillview Avenue, Palo Alto, CA 94304; 800-227-1927, 800-982-5838 in California). Records include a short summary or abstract of the article and complete information about its source, such as the author, title, and publication date. Material indexed includes general articles about microcomputers, software and book reviews, applications, and new product descriptions, not unlike this one. $45 per hour. Dialog's second new database is the International Software Directory, which lists most commercially available software. Records consist of short descriptions of each item with indexing by broad categories. The directory covers business, hobby and entertainment, and games. Names and addresses of software suppliers and purchase prices are also included. $60 per hour.

☐ *Apple Writer II Pre-Boot* by **Compular** (10521 Deodara Drive, Cupertino, CA 95014) provides you with the capability to use the Smarterm eighty-column card. All *Apple Writer II* functions and capabilities are supported. $24.95.

☐ Now you can save money on federal taxes and tax preparation services by using *TaxCut* from **United Micro Systems** (100 North Stone, Suite 1100, Box 3035, Tucson, AZ 85702; 602-622-4751). The program lets you test outcomes of hundreds of tax-related alternatives. When data is entered, you can print out the complete return, including many schedules that will be ready to sign and mail. *TaxCut* can help you make tax-related decisions about IRAs, Keough plans, and investment in business equipment. You also get a year's subscription to *Taxtips,* a monthly pub-

lication designed to keep you informed of changing tax laws. $250.

☐ Quit playing with the power tools so you can try out *The Programmer's Power Tools (PPT)* from **CE Software** (801 73rd Street, Des Moines, IA 50312; 515-224-1995). *PPT II* expands the functions of Applesoft, and *PPT III* does the same for Business Basic. *PPT* (for either Apple) allows formatted numeric output, fast sorting and searching of string arrays, packing of numeric data for efficient disk storage, and creation of flexible input routines. *PPT II*, $59.95; *PPT III*, $79.95.

☐ It's arts and crafts time with the new series from **Nova Software** (Box 545, Alexandria, MN 56308; 612-762-8016). *Finger Painting* lets children learn by using a joystick to finger-paint with all the hi-res colors. Any part of the painting can be erased if you goof up. You can even save those paintings to be displayed later. $14.95. Next is *Color Book1*, which contains ten pages for the child to color with joystick-controlled crayons. These also can be erased in part, saved, and displayed later. $19.95.

☐ **Waverly Dental Group** (10824 North 142nd Street, Waverly, NE 68462; 402-786-2221) sells the *Dental Management System*, a system for practices of one or two dentists. The system functions include billing, receivables, patient recall, and management reports. It will handle more than 2,500 patients and 170 American Dental Association codes. To run the system, you'll need two disk drives and an Applejuice power supply. Under $7,000.

☐ *Grapple* is the third in a series of games written in GraForth by **Insoft** (10175 S.W. Barbur Boulevard, Suite 202B, Portland, OR 97219; 503-244-4181). *Grapple* tests your speed and cunning in squelching a galactic jailbreak. You must stop the Horrible Hoppers, Sneaky Snerds, and Flippant Flyers before they escape the intergalactic prison. $29.95.

☐ Four books are available from **Alfred Publishing** (15335 Morrison Street, Sherman Oaks, CA 91403; 213-995-8611). *How To Use VisiCalc/SuperCalc* explains the two most popular spreadsheet programs that help you forecast and budget. Appendices list feature-by-feature comparisons of the two programs plus other spreadsheet programs and manufacturers. $2.95. *Understanding Database Management* uses extensive diagrams to explain how databases are established and maintained. $2.95. *Understanding APL* introduces this computer language that can solve the most difficult mathematical and business problems in just a few statements. $2.95. *Understanding LISP* is a guide to help you comprehend this language of artificial intelligence that can manipulate symbolic expressions. The book is full of examples, problems, and helpful figures. $2.95.

☐ Now, users of *VisiCalc* can have easy and accurate access to worldwide economic and business information in a format for *VisiCalc* analysis. **VisiCorp** (2895 Zanker Road, San Jose, CA 95134; 408-946-9000) introduces *VisiLink*, a program that electronically transfers selected information from the world's largest private business databank, Data Resources. Information is in the form of *VisiCalc* worksheets called Data-Kit worksheets which are also compatible with *VisiTrend/Plot* or *VisiPlot* programs. Requires two disk drives. $250.

☐ **Management Science America** (3445 Peachtree Road N.E., Atlanta, GA 30326; 404-239-2000) releases its first product, the *MSA Executive Peachpak*, a set of applications featuring a direct link to MSA mainframe systems. *PeachCalc* is an electronic spreadsheet for modeling, analysis, and row/column calculations. *The Business Graphics System* offers full-color graphics with a plotting option to display bar, line, area, and pie charts. *PeachText* lets you produce reports, add footnotes to mainframe reports, and make changes to documents. It includes a spelling proofreader and the Random House Dictionary and Thesaurus. *List Manager* is a personal database for address files, schedules, and personal notes. *PeachLink* gives you a link to MSA mainframe systems. Data that's captured by *PeachLink* can be used with all the other *PeachPak* modules. $3,750.

☐ The Quartet from **Vista Computer** (1317 East Edinger, Santa Ana, CA 92705; 714-953-0523) gives you the capacity of four Apple disk drives in the space of one. The Quartet package includes two thinline drives that will perform in dual side forty track or single side thirty-five track modes, a controller, and software patches for DOS, CP/M, and Pascal. $699.

☐ **Judco Enterprises** (Box 963, Scottsdale, AZ 85252; 602-990-1715) would like you to know that microcomputers, software, data and word processing, telecommunications, and peripherals will all be found at the

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—Popular Computing, November, 1982.

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Second Annual Pacific Computer Expo February 18 through 21 at the San Diego Convention and Performing Arts Center. The Expo will feature 150 exhibitors, and seminar sessions will offer more than one hundred presentations covering all aspects of computer technology.

☐ **SSM Microcomputer Products** (2190 Paragon Drive, San Jose, CA 95131; 408-946-7400) has announced the SSM Apple ModemCard to complete its data communications product line. The ModemCard features half and full duplex at 110 or 300 baud, autoanswer and autodial, Touch-Tone and pulse dialing, and audio monitoring. $299.

☐ **Behavioral Engineering** (230 Mount Hermon Road, Suite 207, Scotts Valley, CA 95066; 408-438-5649) has two packages to teach touch typing in a new way. *Typing Strategy* teaches you to associate the character to be typed, the finger to be used, and the position of the character on the keyboard with one another. Once the relationships have been established, two games, *Drag Race* and *Time Bomb*, are used to help develop typing speed. $29.95. Stay up late nights with *Letter Man*, a game that teaches typing and increases typing speed through play. It's the familiar maze game in which you eat the letters while being chased by gobblers. $29.95.

☐ *CP+*, the product by **Taurus Software** (3685 Mount Diablo Road, Suite 251, Lafayette, CA 94549; 415-283-7222) that allows you to control your system with English-language commands rather than with complex CP/M commands, is now being distributed by Softsel. *CP+* is $150.

☐ Gender reversers are available from **B & B Electronics** (Box 475, Mendota, IL 61342; 815-539-5827). Now you can reverse the gender of any RS-232 line to make it compatible with any other accessory. Two models are available, one with both ends male and the other with both ends female. Both models connect all twenty-five pins. $19.95 each; $34.95 for both.

☐ The TG Track Ball game controller from **TG Products** (1104 Summit Avenue, Suite 106, Plano, TX 75074; 214-424-8568) incorporates the ball-type positioning element for fast, accurate movement of objects on the screen. The track ball has a lower control-to-movement ratio than other types of double axes controls to allow more sensitive positioning for graphics work on the screen. $64.95.

☐ **Electronic Specialists** (171 South Main Street, Natick, MA 01760; 617-655-1532) announces Magnum Isolator, designed to minimize damage and problems incurred as a result of power surges and spikes. The Isolator features four individually filtered sockets and will control electrical pollution for a 1,875 watt load. Each socket can handle a 1,000 watt load. $181.95.

☐ Getting right down to business, **Kengore Corporation** (3001 Route 27, Franklin Park, NJ 08823; 201-297-2526) announces that the New Jersey Business Computer Show will be held March 17 through 19 at the Holiday Inn North, Exit 14 of the New Jersey Turnpike. Featured will be small business systems, desktop computers, word processors, software, and accessories. Strictly business, no hobbyists.

☐ **S-C Software** (2331 Gus Thomasson, Suite 125, Box 280300, Dallas, TX 75228; 214-324-2050) has added the *68000 Macro Cross Assembler* to its series of macro assemblers. With it, you can develop programs for the Motorola MC68000 16-bit microprocessor. It assembles Motorola 68000 mnemonics, using the same assembler syntax as in the Motorola reference manual. $130. *S-C Macro Assembler* owners may purchase it for $50.

☐ A new automated commodity trading system called *Macro-Trend* is available from **Steven E. Bollt** (7420 Westlake Terrace, Suite 1509, Bethesda, MD 20817; 301-365-3737). It generates entry points, exit points, reversals, and protective stops. After the market closes, daily trading data is retrieved via modem from Commodity Systems's database. *Macro-Trend* identifies major trends early. One year lease, $2,000.

☐ You can get a program that covers reading skills typically taught in kindergarten through third grades from **SouthWest EdPsych Services** (Box 1870, Phoenix, AZ 85001; 602-253-6528). *The Reading Machine* contains more than twenty-eight skill levels, ranging from alphabet matching and sequencing to blends and digraphs. Additional features include hi-res graphics, pictures to match words, large upper and lower case letters, and instructional materials for parents and teachers. $59.95.

☐ **Saint Olaf College** (Northfield, MN 55057; 507-663-3139) is hosting the 16th Annual Small College Computing Symposium on March 25 and 26, 1983. The symposium is designed to foster widespread use of computers in small universities and colleges.

☐ A three-stage protection from voltage spikes and noise interference is now being offered by **National Field Sales** (Box 230, Broomall, PA 19008; 215-352-9214, 800-345-1280). Stedi-Watt Jr. gives you dual protection of fifty joules on both transverse and common modes. It plugs into a three-wire grounded outlet and will accommodate six plugs. $79.50.

☐ The *Richmond Library Management System* was developed by **Follett Library Book** (4506 Northwest Highway, Crystal Lake, IL 60014; 800-435-6170) to give librarians control of 65,000 items. The system keeps track of book loans, returns, and overdues for 2,650 students and 200 faculty members. It generates daily overdue notices and automatically prevents delinquent borrowers from checking out additional books. Cataloguing books by call number, author, title, accession number, and subject headings is another feature. Under $1,000.

☐ News from **Hayden Software** (600 Suffolk Street, Lowell, MA 01853; 617-937-0200): *Championship Golf* is a realistic, eighteen-hole simulation golf game that can be played by one to four players. Each hole is displayed from two angles—bird's-eye view and side view. A status line is displayed and indicates the hole number, its length, the par number, the ball's distance from the hole, and how many strokes you've taken. You also get twenty clubs to choose from (country club not included), including all popular irons, wedges, and woods. $24.95. *Bellhop* puts you under the pillbox hat, where your job is to deliver luggage to different suites. A mischievous ghost and grumpy guests keep you on your toes. Elevator racing is a crucial element! $34.95.

☐ And news from **Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 201-843-0550): *Basic Apple Basic* takes you through Applesoft from beginning concepts to advanced topics. Subject matter is explained with short programs that slowly become larger, more complex ones. More than eighty sample programs are presented. 237 pages. $12.95.

☐ **Sawhney Software** (888 Seventh Avenue, New York, NY 10106; 212-541-8020) offers *Taxmode*, a tax planning system for individual income taxes. *Taxmode* displays the results of tax computations continuously on the screen, and results are updated after each entry, enabling you to see immediately the effects of each item you enter. Multiple report formats allow you to print reports that fit your requirements, including most IRS forms. $250.

☐ **Overbite** (8621 Laurel Canyon Boulevard, Sun Valley, CA 91352) offers Double Data, a heavy-duty metal hole punch with hole guide that doubles the capacity of a floppy disk by punching a notch that lets you use the other side of the disk. No more accidentally punching through the disk itself. $19.95.

☐ The Documentation and Integration of Software into the Classroom (DISC) Project of **Oakland Schools** (2100 Pontiac Lake Road, Pontiac, MI 48054; 313-858-2121) has produced the *DISC Compendium*, a collection of ninety-one software evaluations and documentation. $20.

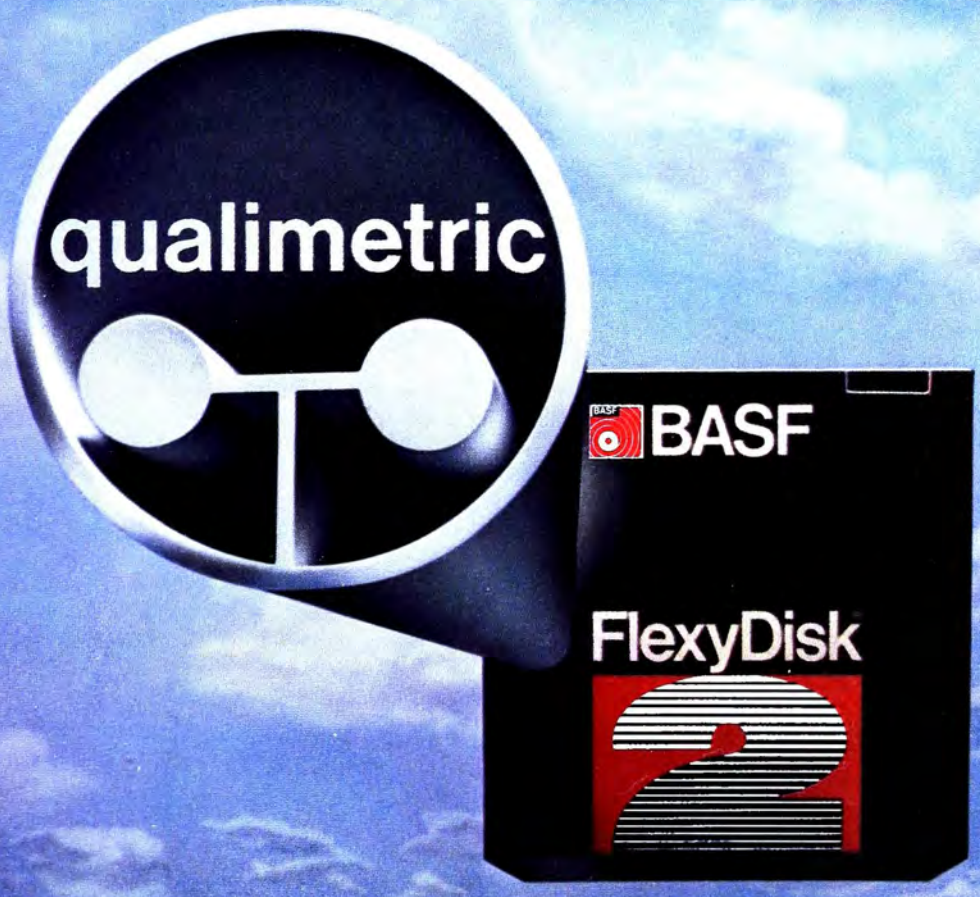
☐ No shoot-'em-ups here. **Earthware Computer Services** (Box 30039, Eugene, OR 97403) introduces *Star Search*, a game in which players set out to find the origin of a mysterious signal originating from Pluto. Land space probes or send them through the planets' atmospheres. Search for alien life forms along the way, while maximizing your resources. Whichever player turns out the most efficient space commander will win the game. Educator inquiries encouraged. $45.

☐ **Metatek** (12525 Hummingbird Street, Minneapolis, MN 55433; 612-755-9587) announces Metascope, a low-cost data line monitor. The unit can display and store data in asynchronous, byte-oriented synchronous, or bit-oriented synchronous modes at speeds to 19.2K bits per second. Metascope has a built-in capability to generate synchronous clock signals, eliminating the need for modem emulators. $895.

☐ Protect your Apple with the Byte Box, a case from **Kel Tech** (34732 Calle Fortuna, Capistrano Beach, CA 92624; 714-661-0435) that covers the computer and the keyboard. It also has a built-in cooling fan with line surge suppression. There are even plugs for your CRT and printer. $289.

☐ **Voice Machine Communication** (10522 Covington Circle, Villa Park, CA 92667; 714-639-6150) presents the Voice Input Module to add voice input to any Apple II application without having to do any pro-

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gramming. Unlimited vocabularies in subsets of up to eighty words or phrases are stored and recognized without using any memory or processing power. $800.

☐ **Novation** (18664 Oxnard Street, Tarzana, CA 91356; 213-996-5060) miniaturizes the modem with the introduction of the J-Cat. This 300 baud, direct connect, autodial/answer modem is about a fifth the size of conventional modems. Light-emitting diodes show you its current status, and an audio beep tells you when you've reached a busy signal. $149. Novation also unveils two smart modems. Both offer a built-in Touch-Tone or rotary dialer, auto answer, direct connect, and analog and digital loopback testing. The 103 Smart-Cat operates at 300 baud and is $249. The 103/212 Smart-Cat operates at 1200 baud and is $595.

☐ *The Investors Interface* from **MarketWare** (Box 34647, Richmond, VA 23234; 804-276-8577) captures Dow Jones stock data and converts it for use by VisiCorp products, *Apple Plot, PFS: Graph, Apple Business Graphics,* and other software. With the interface, your Apple can log on, record data, and log off, all by itself. This one requires a Hayes Micromodem II and two disk drives. $125.

☐ *The Computer Coloring Book* from **Prentice-Hall** (Englewood Cliffs, NJ 07632; 201-592-2348) uses twenty-five full-page illustrations to introduce kids to computing. The book integrates coloring with fifty definitions that explain the meanings of the pictures and terms. $6.95.

☐ **Verbatim** (323 Soquel Way, Sunnyvale, CA 94086; 408-245-4400) will market specially formulated, high density disks for the new Apple UniFile and DuoFile disk drives (Marketalk News, January 1983). The new disks have a life expectancy of 70 million revolutions and a warranty of seventeen years. Storage potential is greater than before to accommodate the drive capacity of the new Apple drives.

☐ The **3M Company** (Box 33600, Saint Paul, MN 55133; 612-733-9562) offers its media to be used with Apple's UniFile and DuoFile disk drives. Fileware are Scotch brand disks made for use with the new Apple drives. Disk capacity is approximately 871K formatted, offering an increase in data transfer rates over disks used in current disk drives.

☐ And now, from **Advanced Logic Systems** (1195 East Arques Avenue, Sunnyvale, CA 94086; 408-730-0306), come three video interface cards. Smarterm II gives you automatic keystroke selection of an eighty-column screen or a forty-column screen. With it, you get to select special characters, custom graphics, replaceable character sets for foreign languages, and a twenty-fifth line for status update for use by the *WordStar* word processor. $179. The Dirt Cheap Video interface card connects you to a television set with an RF modulator or monitor and provides a sixty-four column display. Dirt Cheap also permits the same character selection options as the Smarterm II. $89. The Color II interface card connects your Apple to high or medium resolution RGB color monitors. It converts the Apple composite video to red, green, and blue and provides the highest quality color hues available on RGB monitors. $179. Advanced Logic also releases the first plug-in CP/M interface card for the Apple. In addition to letting you run CP/M software on your computer, the board provides 64K extra memory. $399.

☐ The B.T. Space Saver Printer Stand from **B.T. Enterprises** (10B Carlough Road, Bohemia, NY 11716; 516-567-8155) allows continuous form paper to be stored under the printer, so you can stack completed forms behind the printer. This stand comes in several configurations to accommodate both small 80-column printers and hefty 132-column printers. If you want, all sizes are available with an optional shelf for storage of a second kind of data form. The large stand can be purchased with a center slot, allowing paper to feed up through the stand. Prices begin at $29.95.

☐ **AGT Computer Products** (20675 South Western Avenue, Torrance, CA 90501; 213-533-1244, 800-421-5838) now has a line of dual-plastic Olivetti-compatible printwheels. Fifteen typestyles are currently available. $14.50.

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☐ The **Securities Industry Association** (120 Broadway, New York, NY 10271; 212-425-2700) is sponsoring the 1983 SIA Microcomputer Conference and Exhibit which will be held February 16 through 18 at the New York Statler Hotel. The conference is devoted exclusively to the use and future of the microcomputer within the securities industry. Workshops and meetings for exhibitors will be held. Registration: $150.

☐ **Davong**'s (610 Palomar Avenue, Sunnyvale, CA 94086; 408-773-8370) U5XXM Hard Disk Subsystem comes in both master and slave configurations to give you expansion of up to sixty megabytes of on-line storage. Available in five, ten, and fifteen-megabyte versions, the master subsystem acts as a controller for an additional slave drive or other back-up device. Apple users can transfer data between their terminals and an IBM pc. Masters, $1,995 to $2,995; slaves, $1,495 to $2,495.

☐ **Custom Software Design** (831 Maplewood Avenue, Anderson, IN 46012) announces *Stock*, the latest in their Investment Analysis Series. *Stock* is designed to help the personal investor to analyze and compare corporate stocks using the computer. The program gives you comprehensive, statistical analysis of a single stock, storage and retrieval of up to 150 stocks per disk, side-by-side comparison of stocks, and printing of stock analyses. $95.

☐ *What's Where in the Apple* provides a framework for understanding both the overall organization and structure of the Apple system and programming techniques that use that knowledge. This book from **Micro Ink** (34 Chelmsford Street, Box 6502, Chelmsford, MA 01824; 617-256-5515) contains lists of memory locations of peeks, pokes, and calls. At last, an atlas of the Apple. 256 pages. $24.95. *The Guide* is a version of *What's Where* with text only (without listings). 158 pages. $9.95. Finally, *Micro on the Apple*, volume 3, is a collection of nineteen articles from *Micro*, and it comes with more than forty programs on disk. 224 pages. $24.95.

☐ **Queue** (5 Chapel Hill Drive, Fairfield, CT 06423; 203-335-0908) puts out a monthly journal called *Microcomputers in Education*. It carries reviews of educational software, articles and analyses, and it offers subscribers a 10 percent discount and thirty-day return privileges on all educational software Queue sells. $33 per year. Also, the Queue catalog 12 lists several thousand programs from more than 140 publishers. It's a complete catalog of game, education, business, and utility software. Catalog 8 lists available software for kindergarten through ninth grade students, and catalog 9 is for high school and college scholars. All catalogs are free.

☐ For programmers, **D & M M Software** (Box 1031, Palatine, IL 60078) offers *Development and Debugging Aids*. One utility in the package lists all active variables and matrices in an Applesoft program, along with their current values. A second utility is a keyboard enhancer that gives you automatic generation of strings by using the control key. One control character will perform several operations that are normally typed in one at a time. $19.95.

☐ *Mike Caro's Video Poker* from **Arisoft** (Box 9184, Whittier, CA 90608; 213-698-9931) comes in two parts. The first is a simulation of the video poker slot machines found in Las Vegas, that nutty, nutty town; the second part gives you the option of playing against another person, against the computer, or of having the computer play against a phantom computer player. Both games include tutorials that help you learn strategies as you watch two phantom players play. It also includes a strategy designed by professional gamblers. $39.95.

☐ A fantastic voyage is in store for players of *Microbe: The Anatomical Adventure* from **Synergistic Software** (830 North Riverside, Suite 201, Renton, WA 98055; 206-226-3216). It's a game that combines adventure, arcade action, and medical science all in one package. Your miniature submarine is injected into the human body; your mission is to find and rid the body of disease and repair damage to the brain. Three different levels of play make it a challenging game for beginners, teachers and parents, students, premeds, and medical students. You decide what treatment to give and what drugs to prescribe at what immunity levels. $44.95. Synergistic's *Bolo* is a strategic arcade game that offers complex and challenging play because of its high speed and varied intelligence levels of computer-controlled opponents. Wind your tank through a maze that's 132 times the size of your screen, fighting off enemy tankers whose movements and fire power vary. $34.95. ◨



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CONTEST WINNERS

from page 6

Sandwich Generator was smiling on Heimowitz that fateful day when all the correct entries were examined. Besides, Heimowitz's turkey sandwiches tasted the best, according to the contest staff. For his adroitness with the turkey net, Heimowitz will receive *Jigsaw* and *Microbarmate* from his local Computerland.

The contest staff appreciates all the letters everyone sent in with their entries. Believe it or not, we do look at each entry. But you have to remember that when you send us an out-of-the-ordinary entry, if you're not saluted for outstanding performance, then you run the risk of being embarrassed in front of fellow readers.

Softalk Salutes. Throwing herself on the mercy of the contest staff was Susan Jordan (Fort Valley, GA), who pleaded, "I have served turkey sandwiches three times a day to get in the mood for the contest. I have gained forty-seven pounds from eating all those sandwiches. My husband developed an allergy to turkey and had to move. My daughter asked to be placed up for adoption, preferably in a country where turkeys are considered sacred and may not be killed or even counted."

Boy, if there's one thing we can't stand, it's a whiner. But Jordan did not stop there.

"If I win, I want everything, including: software, hardware, peripherals, a color monitor, modem, books, magazines, flowchart templates, and a job in the computer field."

Jennifer Myers (New York, NY) and Michael Friedlander (Los Angeles, CA) aren't too good at turkey hunting, but they sure are good with the scissors. Though they missed catching all the birds, both Myers and Friedlander sent in their entries accompanied by all the turkeys they counted, clipped out of the magazine. Myers locked up hers in a crayon-decorated turkey pen for easy handling. Friedlander carelessly threw his in, not even thinking about the consequences of his thoughtless actions. When we opened the envelope, all the turkeys fell to the floor, killing them instantly. They were delicious.

Loren Neill (Woodland, TX) just sent us his name, address, dealer, and choice of prizes, but he forgot to tell us how many turkeys he counted. W. Yelke (LaGrange, IL) sent us a coupon and left the turkey count area empty. But of all the absent-minded contestants, Bill Cheng (Rivervale, NJ) stands out the most. He sent us an empty envelope.

Family Feud. Not only could the Stark family (Gaithersburg, MD) not spell "Softalk" correctly, they couldn't agree on the number of turkeys either.

"Dear Sirs: After much debate with my wife and son, here's my entry into the Solftalk contest: 348 turkeys. Greg Stark." Sorry, Greg.

"Dear Sirs: After much debate with my husband, here's my entry into the Solftalk contest: 345 turkeys. Anita Stark." Nope.

"Dear Sirs: I spent the Thanksgiving weekend watching my parents trying to count hi-res turkeys in your contest. After they both came up with different numbers, I decided to count them myself to see who is really right. My entry is: 349 turkeys. Chris Stark." Good going, Chris. Send your parents to their room without supper.

While the Starks scream it out, take a look at Michael Schindler's (Fitchburg, MA) entry. He sent it via Express Mail. Never mind that his turkey count (334) was considerably short. Schindler spent $9.35 on postage to get his entry here on time. That's dedication.

You Want What for a Prize? Then there's the subject of what people want if they win. The prize was the usual $100 in goodies made by our advertisers. Some contestants weren't so easily satisfied. Apparently, our overwhelming generosity was not enough. More people than you'd want us to list requested that we send them some real turkeys as the prize. Not Gary Kielar (Clinton, NY). He wanted us to send him someone to get all the turkeys out of his office.

"If I should win," wrote Mark "No Return Address" Chan, "I hope you can award me with $100 cash instead of $100 worth of goods. This is because I don't have and cannot afford a computer." Can't do that, Mark, but we will give you $1,400 worth of advice on which computer you should buy. Get the hint?

Michael Varga (San Francisco, CA) said he would make out a check for $2,000 in *Softalk*'s name to the Rhode Island House for the Nasally Deficient. Though $2,000 is nothing to sneeze at, we don't take bribes. Well, most of us don't.

Finally, Matt Dixon (Bloomington, IN) and Chris Nenzel (Reno, NV) actually owe *us* prizes. Between the two of them, they requested *Apple Panic, Crossfire, Frogger*, and a TG Track Ball—all for the Atari computer.

Is He, or Isn't He? The votes are in; the peoples' voices have been heard. "No way!" was the cry. No way did the readers believe that the clumsy-looking beginner on the Beginners' Corner page is Bill Budge. Well, we can't fool you. You're all correct. Bill Budge is not a beginner. But that's him in the picture, all right!

Steve Rosenberg (Moraga, CA) can't be fooled. Rosenberg was yanked out at random from all the entries that correctly identified Budge as the beginning bungler. For his ability to recognize pinball wizards at a glance, Rosenberg will receive a copy of BudgeCo's *Pinball Construction Set*.

We understand that the thought of Budge being a beginner is a ridiculous one. That's why we understand why the piles of postcards that poured in were two-to-one on the "No way" side. We sympathize with you all.

But what we won't tolerate is cheating. Watch out for Scott Nelson (Minneapolis, MN), John Estell (Maumee, OH), Marc Ries (Whittier, CA), and Donna DeBonis (a schoolteacher, yet!) (Farrell, PA) in the next election. Each submitted both "No way" and "That's him all right" votes.

Next month: Oracle results start anew. ❑■

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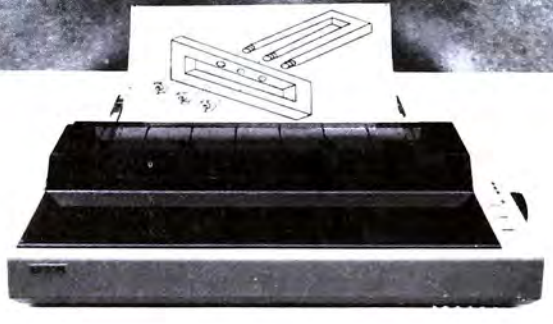


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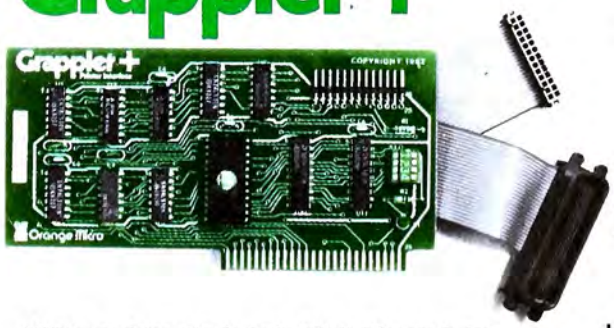
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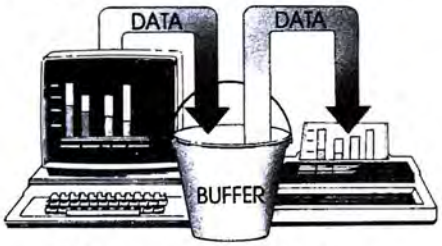
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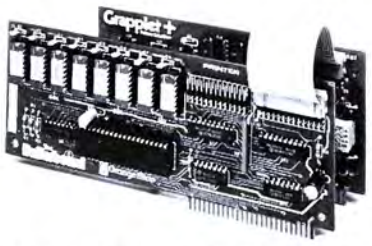
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The Bufferboard—designed exclusively for the Apple Computer.

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The Bufferboard is made by Orange Micro, Inc.; the same people who brought you the popular Grappler + printer interface. Both the Grappler + and The Bufferboard are now available at your local Apple dealer.

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The Bufferboard™
For Apples and Printers

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With the speed of light and a hearty "Heigh-ho, Lisa," Apple Computer roared back to the forefront of microcomputer technology at the annual meeting of their stockholders January 19 when they unveiled Lisa, their answer to corporate America's desktop computer needs. With equal fanfare, they brought forth the Apple IIe personal computer.

It was the Silicon Gulch equivalent of Hollywood announcing that Bo Derek and George Burns would costar in a movie. We all know where attention will be riveted. And we all know who'll get upstaged.

Lisa is definitely the computer of men's dreams. It's got gizmos in places where other computers don't even have places. If *Sports Illustrated* followed the lead of its sister publication, *Time*, it would feature machines in its infamous bathing suit issue. Lisa would make the cover and the centerfold.

Lisa's standard model has more luxurious appointments than the competition's deluxe edition. In a 100-yard dash, Lisa has a 90-yard head start.

But it's the Apple II that's captured men's hearts. Lisa has a mouse, the IIe is just mousy. Lisa is the high school cheerleader, IIe is the girl next door.

Most important, however, is that Lisa is still in beta testing. The IIe is as available as your local computer store. Lisa may have high density drives, but IIe has high density sales.

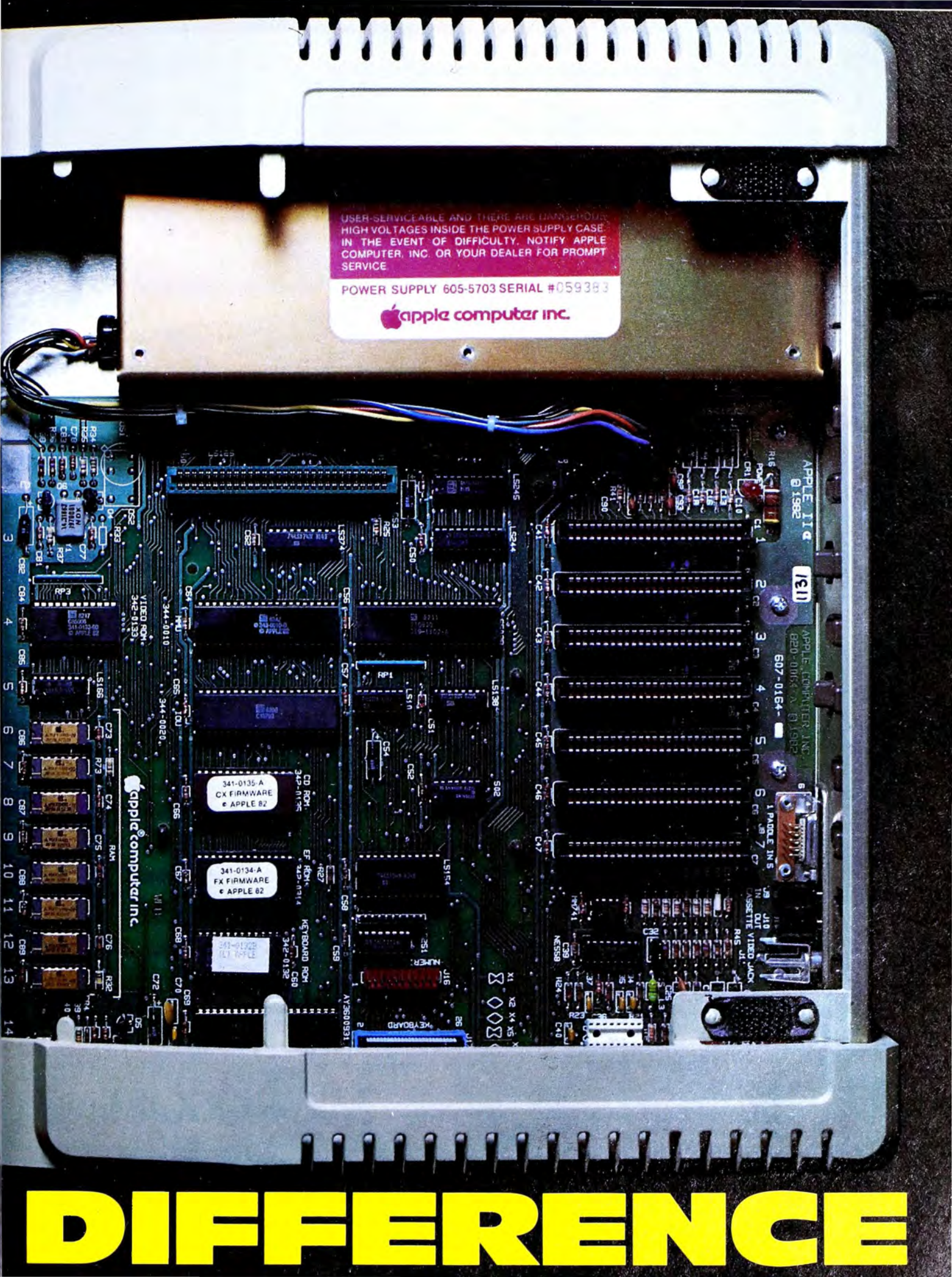
Lisa is neat, nifty, and ninety-nine ninety-five. That's in coin of the realm without decimal points. Few folks will be trotting into their local computeria, MasterCard in hand, to buy one for Junior.

IIe retails at $1,395 for a standard 64K RAM machine. Like George Burns, the IIe has thinning hair, aching joints, and makes us laugh in delight as it does one improbable task after another that senior citizens aren't supposed to be able to do. Lots of Juniors will be benefiting from the IIe.

Lisa may have the glamor (see "Lisa's Debut"), but Apple clearly wasn't blinded for a second by the beauty of the newcomer. Their update to the Apple II is a thoughtful amalgam of hardware changes that honors the software and peripherals industries that have made Apple II the most used and the most useful microcomputer.



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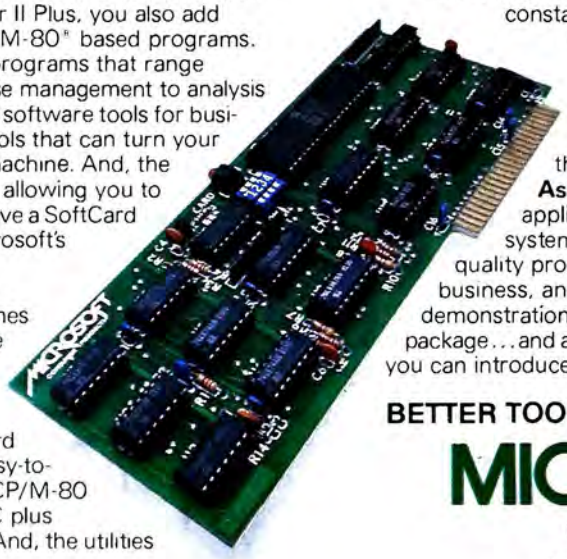


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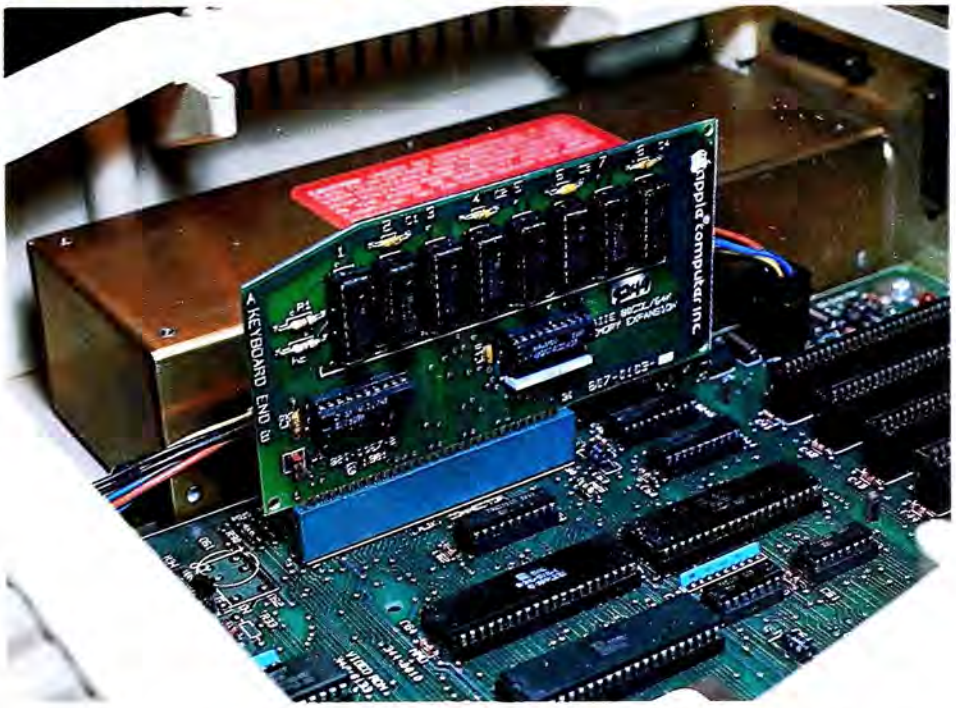
THE DIFFERENCE

That homage to their past has been a salient point in each change Apple has made to their II series, and the installed base of Apple owners can take great comfort in knowing that the company has remained steadfast in their dedication to their old constituency. Even the major revisions executed to accomplish the IIe do not disenfranchise owners of older systems, nor do they invalidate most already existing software and peripherals.

The Key Changes. But major changes there are, ranging from the keyboard to the innards.

The IIe keyboard contains sixty-three keys and is similar to the Apple III keyboard, sans keypad. This keyboard generates lower case as well as upper case characters, allowing it access to the full ASCII character set. The addition of up and down arrow keys completes a set of cursor controls independent of the old I-J-K-M convention.

Additional keys are tab, caps lock, delete, open-apple, and closed-apple. In ordinary usage, the open-apple and closed-apple keys are seen as paddle buttons. But applications software developers can employ these keys in a manner similar to the use of the control key—pressed simultaneously with another key, an apple key will modify the behavior of the original key.



The Apple IIe Extended Eighty-Column Text Card sits in a sixty-pin slot located in front of where slot 0 used to be.

Adoption of this keyboard should finally solve what has been a perennial Apple problem. Rod Holt left Atari to join Steve Wozniak and Steve Jobs almost before they left the garage. Holt designed Apple's power supply and has been a pioneering technical guru with Apple since the Apple I. He says the keyboard "has been the single biggest source of problems with customers."

The first keyboards had separate encoder—Holt likes to call them decoder—boards tucked underneath. The encoder board translated the keyboard signal into intelligible computerese for the motherboard, but the early models seemed to lack uniformity and had low heat resistance properties.



The new keyboard features a delete key. Note the reset key placed one step further out of harm's way.

A change in late 1979 to General Instrument keyboards, which had a more reliable encoder, ameliorated the problem, but the IIe takes the solution one step farther. Signals from the IIe keyboard do not stop at an encoder en route to the motherboard. Instead, they travel unmodified to the motherboard, where they are encoded. One result is a keyboard more open to modification.

Apple is already exploiting that trait in machines marketed in non-English-speaking countries. Although most software is written with directions and input prompts in English, users will want to store their data in their native language, which probably contains accent marks and special punctuation.

Special EPROM chips will contain both the American keyboard codes and codes for various foreign languages. The user will be able to select either set of codes at will by using a switch installed on the front of the case.

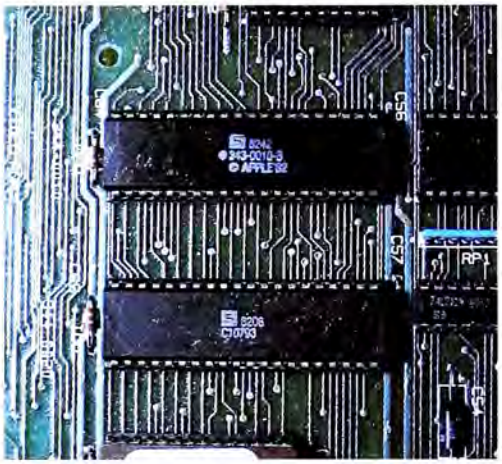
Equally significant changes on the motherboard are the culmination of a drive for simplification that began with Wozniak in 1978. The original Apple II used off-the-shelf MOS and TTL chip components. Woz began searching for ways to integrate functions to reduce the number of components on the motherboard. In pursuit of that concept, he engaged Synertek to design custom integrated circuits. Synertek put Walt Broedner in charge of the project, code-named Annie.

Working in conjunction with Wozniak, Broedner was making significant progress when the project was stopped dead in its tracks by the success of the Apple II Plus. The Plus, for those of you weak in computer history, was essentially a software modification. Integer Basic was replaced as the resident language by Applesoft, and the Autostart ROM, which truly made the Apple a turnkey machine, was added.

This first major alteration of the microcomputer set the precedent that Apple has since always followed: Keep your past customers in mind. Apple almost immediately introduced ROM cards that permitted early Apples to run Applesoft or later Apples to run Integer Basic. In that manner, owners of old Apples could upgrade to the new standard and owners of new Apples could take advantage of the software base developed using the old language.

Sales of Apple II Plus systems skyrocketed, making the company loathe to tinker with what was an outstanding success. Wozniak's IC project was shelved. It resurfaced temporarily a year later, under the name Alice; but those gals at the beginning of the alphabet seemed to be a jinx. Back into cold storage went the idea.

In the meantime, under the supervision of Wendel Sander, the Apple motherboard kept undergoing minor revisions. Less expensive 16K bit chips replaced the earlier 4K bit chips. Grounds on the board were



The MMU and the IOU are the two custom-integrated circuits responsible for the uncluttered look of the IIe motherboard.

improved during a change to meet Federal Communications Commission radio frequency emission standards.

Sander, who was the sixteenth employee of Apple and the writer of one of the first *Star Trek* games, viewed the motherboard revision projects as analogous to tinkering with the Volkswagen Bug—"small evolutionary steps and clean-up kinds of things."

But Sander's motherboard tinkering was not enough to head off Wozniak's integration project. It was reactivated in late 1980 under the code name Diana as a project to simplify manufacturing by reducing the component count. IIe engineering manager Peter Quinn says the change was absolutely necessary. During a period when the company was producing more than thirty thousand units a month, they had, as he described it, "a unit designed to be built in a garage."

Walt Broedner, the first designer to tackle Woz's concept, joined Apple to head the project, which became known as LCA, for "low cost Apple." Inside Apple, the term implied a lower cost of manufacturing. But others who caught wind of the project name decided it meant a $350 Apple. To counteract that kind of misconception, the operation inherited a name that almost lasted the distance: Super II.

The motherboard that Sander had been caretaking had one hundred components. Broedner succeeded in reducing that number to thirty-one while increasing capability by the equivalent of an additional one hundred components.

Renaissance Chips. Central to that success were two large black chips that sit near the 6502 microprocessor on the IIe motherboard: the



The shift key that does more. Seen here with caps lock, open apple, and some new characters.

memory management unit (MMU) and the input output unit (IOU). Broedner's group was so successful in the design of these chips that the first prototypes burned were successful.

The use of 64K bit RAM chips in place of the 16K bit chips reduced the RAM banks from twenty-four chips on the motherboard and eight on a language card to a mere eight total. Standard RAM memory is expanded in this configuration to 64K bytes. The additional 16K not available on the Apple II Plus is treated like the old language card, allowing the user access to an extra language or additional memory space for text editing or data handling.

In this new RAM configuration, the MMU coordinates access to the RAM and supervises bank switching between Apple's ROM and the 16K of RAM that is the equivalent of the language card. While the MMU is so occupied, the IOU handles all the I/O functions of the redesigned keyboard, the peripheral slots, the game I/O port, and the forty and eighty column video output. The IOU also controls a set of memory locations that serve as soft switches, allowing the user to toggle between various graphics modes and display states.

Not only are there fewer chips in the IIe, the expansion slot configuration has changed. The on-board virtual language card eliminated the need for slot 0, so they took it out, leaving seven fifty-pin slots. Yes, Virgina, they're numbered one through seven. No more counting like the computer does.

There is an eighth slot, but it's not your common, everyday, run-of-the-mill, hey-let's-stick-something-here type of slot. It's a sixty-pin connector that sits forward of the other seven and allows a new set of signals that were not readily accessible to users and manufacturers of periph-



The new back panel with video, cassette, and game controller ports.

erals for the II Plus. Among the possibilities for the slot: a low-cost RGB monitor interface.

Apple is providing an eighty-column card for that slot for $125. The card has room for the addition of 64K additional bytes of RAM, accessed through a bank-switching technique governed by the MMU. Although it's difficult to use this memory from Basic software, professionals and expert users will be able to use it as additional storage memory.

Because the eighty-column application uses only a portion of the capabilities of the slot, it's likely that peripheral manufacturers using the slot for other purposes will include eighty-column capability as a matter of course, opening up a new area of multifunction boards for the Apple.

In their implementation of the additional slot, Apple again showed an attention to detail that redounds to the user's benefit. Many current software packages assume the convention that an eighty-column card will be placed in slot 3 and activate the display with a pr#3 directive.

To remain compatible with existing software acknowledging that convention, Apple developed its firmware to recognize pr#3 as the eighty-column command if the card is in the special slot. The catch is that you can't use the regular slot 3 while the sixty-pin slot is being so addressed. Still, IIe owners will find that most existing software calling for eighty-column display will run just fine, a thoughtful touch.

Other visual differences inside the IIe include two LEDs. One is a power light intended as a hard-to-miss reminder not to remove interface cards while the power is on.

The other LED is primarily for production. Apple attacked the testing and quality control problem from two angles. During manufacturing, the motherboard can be put on a burn rack that rigorously controls temperatures and cycles the testing during the infant mortality stage. One quality control person monitoring large concentrations of tests can now have excellent control over the process.

Should a problem manifest itself in the field, the motherboard can be plugged in to diagnostic equipment at a qualified service center. The LED will serve as an indicator of problems, speeding diagnosis and serv-

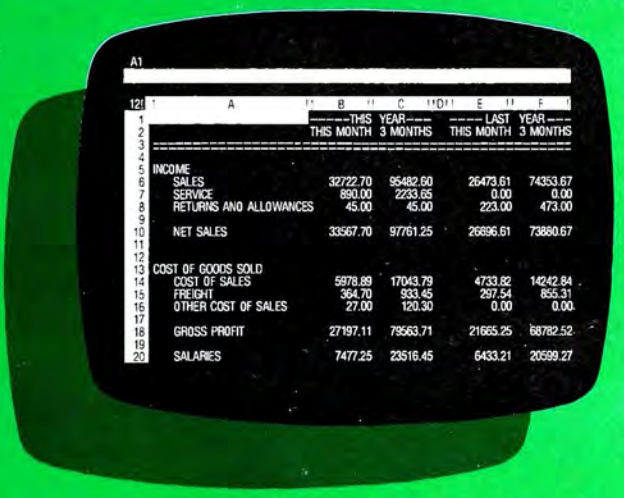
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The new keyboard connection and matching keypad connector on the motherboard.

icing. Manufacturing boss Quinn is not expecting too many field problems, however. The reduced chip count, better manufacturing, and tighter quality control should result in "awesome" reliability. He says, "You should be able to fire a howitzer at it."

Another innovation inside the IIe is an eleven-pin connector for a numeric keypad. Apple's Accessory Products Division has a keypad for use with this connector.

There are invisible differences inside the IIe also. The II Plus had 12K of firmware on which were encoded Applesoft, the Monitor, and the Autostart ROM. The IIe has 16K, 12K of which duplicate the II Plus. The other 4K contain the eighty-column firmware and a keyboard-activated self-test.

The self-test is activated by pressing the control key, the closed-apple key, and reset simultaneously. The IIe then conducts a twenty-second diagnostic of its internal circuitry.

A II Is a II Is a Two. Other differences between the IIe and the II Plus appear on the back panel. A nine-pin game control connector is situated next to the cassette jacks so you won't have to remove the top to change game controllers. Apple is already offering joysticks and paddles compatible with the new, sturdier plug.

The back panel itself is further shielded with a metal plate to cut down on radio frequency interference. The cable notches found in the back of the II Plus have been replaced with twelve capped holes of various sizes. Interface cables for all Apple's peripherals will have adapters so that a cable inside the Apple will lead from the interface card to a hole in the back panel where a plug will be installed. The cable from the peripheral attaches to this plug on the outside. Once installed in this way, any peripheral can be disconnected without opening the case.

Even the lid came in for new attention. Pads were put on the back of the lid to make the top easier to remove for those who are so inclined. For those who are not, such as educators with a classroom full of youngsters, there are two new holes in the lid that allow it to be screwed shut.

For all of these changes, the IIe is still very definitely an Apple II. It has the same Monitor routines and it uses the same disk operating system—the one Wozniak wrote out by hand in a few hours, a feat Rod Holt witnessed and termed incredible. It still looks essentially the way Jerry Manock designed it.

It is compatible with most of the software and peripherals that exist today. That's by design. Hundreds of hours were spent ensuring compatibility, even to the point of calling some software publishers and making information available to them so they could bring their software into line with both the II Plus and the IIe.

That's known as keeping the faith with those who helped you get where you are, and Apple has won the hearts of the software industry. Ten software publishers announced specially tailored packages for the IIe at the unveiling. Simultaneous announcements at other sites by other publishers brought that number higher. No other microcomputer has benefited from such an outpouring of tangible outside support at the time of its introduction.

Nabbing the VisiNod. Many of the software packages are significant, but perhaps none more so than the presence of *VisiCalc: Advanced Version.*

The symbiotic relationship that once existed between VisiCorp—then Personal Software—and Apple has been well documented. Apple transcended the damning epithet of toy essentially on the strength of *VisiCalc.* Likewise, Apple was the only microcomputer in mass distribution that was powerful enough and open enough to give Dan Bricklin and Robert Frankston the wherewithal with which to work.

There was a time when VisiCorp had many of the same private investors as Apple, the same bankers, the same ad agencies, the same growth curve. People started saying VisiCorp was in the Apple emulation mode.

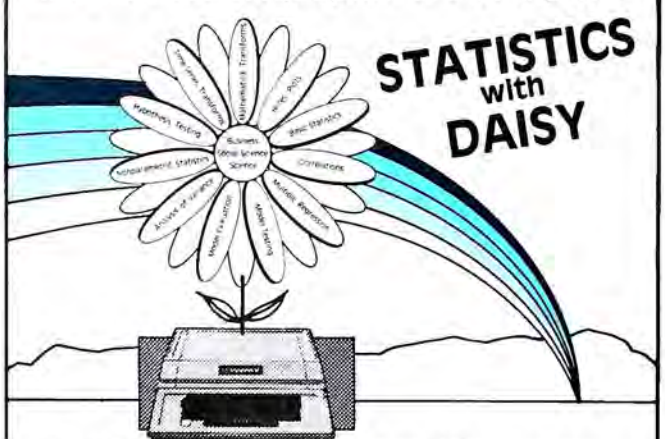
Recently, there's been more distance between the two companies. Apple has other spreadsheet products and VisiCorp is less dependent on its Apple sales for growth. And even when *VisiCalc: Advanced Version* came out for the Apple III, there was a clear understanding that the IBM Personal Computer would be next.

Indeed, the companies were proceeding along parallel lines in developing an overall user friendly approach to software—Apple through its Lisa and VisiCorp through its *Visi-On.* With the two companies striving to be best at bringing Xerox Star technology to microcomputers, it looked like rapprochement might never occur.

Instead of an ever widening rift, the 128K version of the IIe has again brought VisiCorp to the fount from whence their wealth originally sprang. In choosing the IIe over any other micro as the successor to the II for its *Advanced Version,* VisiCorp has essentially ratified the IIe as leader of the pack. A IIe version of *VisiFile* is also in the works. VisiCorp's David Spenser calls the IIe " a nice machine. It's going to do well."

Exciting from the perspective of the approach to the IIe market are the offerings from Microsoft and Broderbund. Microsoft's *Multiplan,* which has been narrowing the gap between it and *VisiCalc* in the Apple market, will recognize the IIe and take advantage of its extended mem-

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ory and eighty-column features from the same disk that runs on the II Plus. As a caveat to that statement: Make sure the version of *Multiplan* you get is 1.04 or later. Microsoft is also bringing out the *Applesoft Compiler* in a IIe version.

Broderbund took the same tack as Microsoft. Their *Bank Street Writer* will run on either the II Plus or the IIe, automatically recognizing which machine it is in and adapting itself to the features of that system. New IIe owners need beware, however. Some early Broderbund product was not initially compatible with the IIe. The company has taken corrective action, but make sure you buy the right version.

The combined package approach is a heartening trend for the several hundred thousand II Plus owners. If publishers follow the lead of Microsoft and Broderbund, there'll be no shortage of new software for the older machine, nor will there be any confusion in the marketplace—one size fits all.



The extra power light inside the IIe case serves as a reminder not to play with interface cards while the machine is on.

The Jack of Apples. The appearance of *The Incredible Jack* from Business Solutions among the IIe specific software is almost a travesty. If there were any justice, Business Solutions would be the only company making a software announcement. This is the single current program that from the conception stages was intended for the IIe only. When Apple's development time on the new machine became extended, Business Solutions retrofitted it to the II Plus.

The Incredible Jack draws its name from your ordinary garden-variety jack-of-all-trades. That's what this program is: a spreadsheet, a database, and a word processor in one integrated package. It's the Apple and eight-bit answer to *MBA* and *1-2-3*, widely heralded and praised software packages for the IBM pc.

The IIe is even generating converts among the heretofore unwashed. Or perhaps it's more apt to say the only hesitantly converted. Software Dimensions has had a potent accounting series for some time, doing excellently in the CP/M world. Their interest in Apple was not what one might call intense, as indicated by the fact that they parceled the rights in the Apple market off to Systems Plus, a professional marketeer.

The package was *Accounting Plus* and Systems Plus moved aggressively into the market, seizing the high ground from Apple's BPI package and consistently running as the second-ranked accounting series. Recently Software Dimensions had tentatively entered the Apple market in their own right in support of the package. But an ostensibly CP/M-based company with apparently lukewarm feelings about the Apple market is not a likely place in which to find enthusiasm about an upgraded Apple II.

Nevertheless, enthusiasm is where you find it, and few wax as enthusiastic about the IIe as Jeff Gold, author of the package. Software Dimensions began their effort as a simple conversion, changing as few lines of code as possible to get the benefit of the advanced features.

As they delved into the system, they began to get excited about the possibilities the IIe presented. They felt the added features gave them the potential to write the best accounting series found on a micro. In the end, they gutted the code from their five-module series and built five new modules that specifically use all the new features to the maximum.

Gold claims, ". . . the Apple IIe is a strong enough product that it deserves its own program." That's what it got in *Accounting Plus Super/e*. Three modules—general ledger, accounts payable, and accounts receivable—are ready for sale, with inventory and payroll to follow soon.

Apple's documentation section rethought its approach to a novice user in its manuals for the IIe and appears to have put together the best bunch yet by a major manufacturer, although that's faint praise in an area where mediocrity abounds.

But they'll get some immediate help in bringing the new IIe owner on board from Muse. The Baltimore folks seem to have done the most work of any company, changing their entire line to take advantage of the additional features. For the first-time owner, Muse's *Know Your Apple IIe* should be a must buy.

In addition, two versions of *Super-Text* are major contributions. *Super-Text Professional*, formerly known as *Super-Text 40-80*, and *Super-Text Home/Office*, formerly known as *Super-Text 40-56-70*, are available in special IIe versions. The Pro version adds on-screen formatting and on-line help functions to an already strong package.

One of the companies needing to do the most work was Sierra On-Line. Some was voluntary, but some was not. Sierra voluntarily sank man-months of effort into recasting *ScreenWriter II*, their bestselling word processor. Using the computer's lower case and eighty-column capabilities cut 8K off the code. Sierra also modified *General Manager* for use on the IIe, girding for a battle with VisiCorp's *VisiFile*. The Sierra On-Line packages are marketed separately for the IIe and the Plus currently, but Sierra president Ken Williams vows to join the one-package-fits-all crowd before the dog days of summer.

Keystone Ken. Sierra found their new copy protection scheme, Spiradisc, wouldn't run on the IIe. So it was back to the drawing boards in search of a new scheme that'd secure the code and still respond to the IIe. Never a dull moment in the cops-and-robbers trade.

Clearly, the software publishers think the new machine is business-oriented. Heavy duty competition is already apparent among the spreadsheet, database, and word processor programs. Artsci magnifies that competition with its two modified entries, *Magic Window IIe* for the

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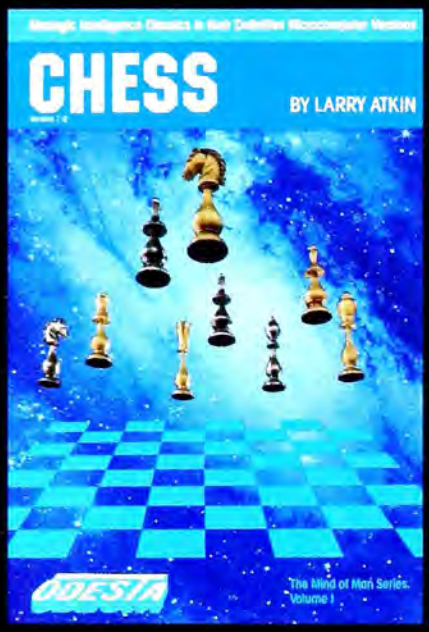
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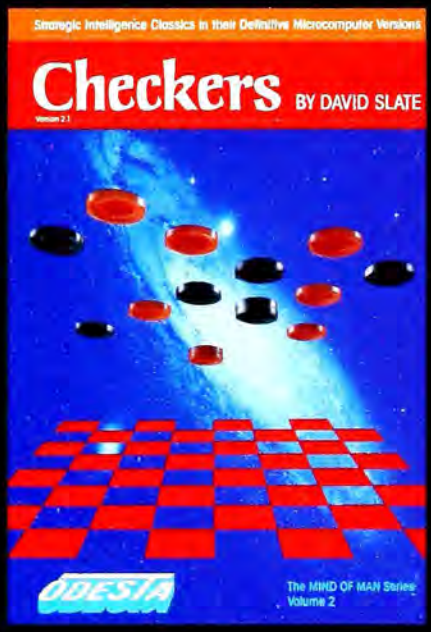
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Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

A.E. by Jun Wada and Makoto Horai. *A-One* would be a more appropriate title than *A.E.* The folks from San Rafael, with a little help from Tokyo, have another winner, another game that's a joy to behold and a pleasure to play.

The object is to chase out of the city, the planet, and the whole galaxy some scientific experiments run amok. The experiments were intended to be pollution control devices; gone wild, they swoop, soar, and strafe with a vengeance. *A.E.* stands for stingray in Japanese, which is what the berserker safeguards look like: flying stingrays. (Not the General Motors variety, but the type you would not wish to step on at the beach.)

The mechanical flatfish attack in waves of six, flying in and out of the scenery with reckless abandon. In and out of, in front of, and behind, all in striking 3-D. There are eight different scenes, each progressively farther removed from home, representing your success in chasing the stingrays farther away. In each case, the A.E. dart in and out of buildings, mountains, asteroids, planets, and stars. Sometimes the stingrays split into pairs or trios to attack in concert; sometimes they attack individually. They drop bombs with some frequency, although their favorite technique for destruction appears to be a simple hit and run.

To discourage these pocket mantas and drive them from the current surroundings, you have to destroy three waves in their entirety. Should just one of a wave escape during an attack, it returns with a full complement of its kind. It takes getting all of three groups to go on to the next scene.

Shooting at the stingrays in *A.E.* involves greater precision in timing than the usual frenzied button-pounding type defense. When you fire, you launch a delayed blast projectile; letting up on the trigger stops the missile and detonates it. Thus, you can shoot at the A.E. when they appear far in the distance, tiny and close together, or when they're full-size up close. Exploding a projectile right in front of a moving line of stingrays can result in some interesting chain reactions. It's not uncommon to wipe out an entire wave with one well-placed shot.

The graphics in *A.E.* are superb. The stingrays smoothly transform from specks in the distance to graceful flyers in the foreground, swirling and diving in a seemingly endless variety of patterns before ducking behind a planet or vanishing into the distance. This is the first computer arcade ballet! Even the chain explosions are detailed and smooth. Curiously, authors Wada and Horai have chosen to use only three colors; it works nicely.

Best of all, *A.E.* plays well. The game involves thought and timing, not simply reflexes. There is enough variety in each level to prevent boredom. As the game progresses, the stingrays change patterns; they quit playing follow the leader and attack singly or in pairs, making it much harder to wipe out all participants in a wave.

And so the parade of winners from Broderbund continues. DA

A.E., by Jun Wada and Makoto Horai, Broderbund Software (1938 Fourth Street, San Rafael, CA 94901; 415-456-6424). $34.95.

Pinball Construction Set. By Bill Budge. If you've been losing sleep wondering when Bill Budge was going to come up with another program, you can kick the Sominex habit. And rest assured: Budge's second offering on the BudgeCo label is every bit as significant as his first and even more innovative.

Arcade games are plenty of fun, but they stir a special yearning in some. There are many more people capable of designing a good game than there are people who can write the code to prove it. So the original pinball wizard has donated his programming skills to the benefit of all those who would try their hands at pinball game design. And he has done it extremely well.

The *Pinball Construction Set*, which Budge has dubbed the first software toy, is disarmingly easy to use. He has provided an array of tools, paints, and parts and the walls of a generic pinball game layout. You manipulate all the objects with a joystick; you hardly have to touch the keyboard.

Each tool's function is represented by its hi-res shape. A pointing hand moves copies of the objects from the parts display to the pinball board, leaving the original as it was. If you decide you don't like where you put it, pick it up again and move it. To get rid of it altogether, drop it anywhere in the parts display and it will vanish. Sloppy work habits aren't forbidden; they're impossible.

Walls are built and shaped with other tools. Selecting any of these tools causes the program to display small white squares along the edges of the walls. The walls behave as if they were defined by rubber bands stretched between these points. With an arrow pointer you can move any of the points, and so change the shape of the wall. You can add points with a hammer and remove them with a pair of scissors. Budge may mix his metaphors, but he gets the point across. With these three tools, you can create walls that break at odd angles or define elegant curves. And, no matter how complicated a wall you design, the ball bounces or rolls off it right every time.

By the time you've set up a wall or two and put in a pair of flippers, you'll probably be itching to bounce a ball around and see how it works. As easily done as said: simply put a ball on the board and push the play button. (Like all the other buttons and tools, this one is marked with an appropriate hi-res symbol rather than a word. You not only don't have to be a programmer to make a good pinball game, you don't even have to be literate.)

When you hit the play button, any balls you placed on the board start to roll. You hit them, they bounce off objects, score points, and so on. When you've seen enough, you can go back to add, move, remove, and redesign. Then try it out again until you get it right.

Aesthetic appeal is as important as function in a good arcade game. Budge has provided for artistic expression with two painting modes. With one, indicated by a paint brush, you can color entire areas with a warp-speed fill routine. For the fine detail work—anything from little pictures to your pinball machine's name in big, bold type—you can use a magnifying glass pointer to edit the screen pixel by pixel.

Other buttons control other functions. A picture of an *and* gate gets you the wiring kit, with which you can decide the scores for all the objects in your game. You can even tell it to award bonus points for hitting special combinations of targets.

A button that will appeal to the megalomaniac in everyone is shaped like the world. It allows you to change the laws of physics in your game, adjusting the pull of gravity, the kick of the bumpers, the elasticity of collisions with the wall, and even the passage of time itself.

The final button takes you to the disk menu. Here you can save your work in one of two forms. You can put it in a data file so you can modify it at a later time. Or you can compile your game. Then you can play it any time, copy it, or give it to your friends. The compiled game runs independently of the *Pinball Construction Set* program.

Bill Budge seems to have spent his professional life setting standards for other programmers to follow, and *Pinball Construction Set* is no exception. Budge's joystick-controlled symbolic menu, allowing options to be selected without your work ever leaving the screen, is so easy that it makes designing the games more fun than playing them. DD

Pinball Construction Set, by Bill Budge, BudgeCo (428 Pala Avenue, Piedmont, CA 94611; 415-658-8141). $39.95.

Bank Street Writer. By Gene Kusmiak and the Bank Street College of Education. "It's all right, I s'pose," our recently anticomputer art director said of the following review, "but it doesn't capture what I feel about *Bank Street Writer.*"

How, then, did he feel?

"Delirious!

"Until now all I could do on the Apple was play games. But *Bank Street Writer does stuff.*

"Yesterday, I looked around the office for a computer with a printer and paper. I didn't consider what it had in it or anything. And *Bank Street Writer* didn't care. It just booted and I wrote and it printed and I sealed and mailed.

"I don't have to learn computers to use one anymore. That's what's really great about *Bank Street Writer.* It just does *stuff*!"

The preceding is a true story; documentation available upon request from the horse's mouth.

The reviewer couldn't say it as well as the horse, but here's the review anyway to fill in the details.

Broderbund doesn't hesitate to do the unexpected. Consider the new word processor from this publisher of top quality, future-of-the-art programs: it won't give you eighty-column display, or complex formats, or macros, or split screens, or superscripts, or subscripts, or footnotes, or graphics in the middle, or underlining, or expanded text, or instant success.

But what it will do it does with grace and excellence, and what *Bank Street Writer* will do is simply all you ever need for word processing at home or in the executive suite.

Bank Street Writer provides general word processing capabilities in a simple, uncomplicated program that just about anyone can have up and running in less than ten minutes, and it does it at a very low price. The closest comparative word processor is the original *Apple Writer,* except that *Bank Street Writer* is, withal its simplicity, state of the art.

The surprise is all the things *Bank Street Writer* does do. It has global search and replace, and it remembers for you to go to the beginning before searching. It moves sections of text around according to your will, and it puts them back if you change your mind. It indents and centers, though it doesn't justify (justification without proportional spacing would be better forgotten anyway).

And, when you boot it up, it knows what machine it's running on. *Bank Street Writer* requires 48K, but if you have 64K, it automatically uses it; if you have a IIe, it simplifies itself even more by using the arrows instead of the I-J-K-M diamond for editing and the open and close apple keys for moving around the menus. And, if your IIe happens to be equipped with 128K, it extends itself into that area too.

Other modifications are available with your help. On the IIe, of course, *Bank Street Writer* automatically uses shift key upper and lower case. On IIs, you must tell it if you have a shift key mod. *Bank Street Writer* recognizes all lower case chips. On all machines, you must tell it where your printer lives, what disk drive you want it to send data to, and all that sort of thing. But you need only tell it once, unless you change your mind.

Not all the screen is reserved by *Bank Street Writer* for input. The input area is delineated by a rectangle. In a four-line area above the rectangle appear all the commands you need for what you're doing, including the commands to stop what you're doing and do something else instead. If you want to move a paragraph, you first move to the menu; although your text stays on the screen, you can now move all around it via the editing keys for your computer. *Move* appears as an item on the menu. When you invoke it, clear instructions about what to do next appear one after another as you carry them out.

From the menu, you can go to the transfer menu (that's all there is) where you can transfer stuff to or from disk, in and out of memory, or onto paper and transfer yourself out of the program.

There are a few other commands, unnecessary but convenient, that you can learn from documentation—or you can get along very well without them if you please. These are for things like indenting blocks of copy, centering things, moving to the beginning or end of data, or moving in twelve-line chunks.

Bank Street Writer prints drafts—always the same—and final copy, for which you get to override your saved format choices.

Broderbund doesn't hesitate to do the unexpected. No one could imagine why on earth they would be bringing another word processor into a market swimming in them; no one had expected them to do that.

Now it's out and it isn't what anyone expected: not a competitor at all, but a new idea. They've brought a Ford into a field glutted with Cadillacs and Lincolns and Mercedes.

Now that we've seen *Bank Street Writer,* what won't be unexpected is watching it take off like the Mustang. MCT

Bank Street Writer, by Gene Kusmiak and the Bank Street College of Education, Broderbund Software (1938 Fourth Street, San Rafael, CA 94901; 415-456-6424). $69.95.

Bolo. By Elvyn Software. Unheralded and unassuming, *Bolo* may well become one of the hit games of the season.

Bolo is officially a home-arcade game, but there are elements of other genres. It takes place in a maze, but the maze resembles those of *Wizardry* or *Wayout* more than that of *Pac-Man.* It's a shoot-out, but you must go find the little devils; they won't bother you until you're near their fort. Even then, at a point apiece it doesn't much matter whether you shoot them or not; your object is to destroy their forts—at a hundred points apiece, six per maze. Prices rise with levels.

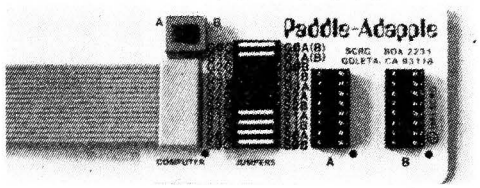
The maze is generated anew every game; you can see about 1/132 of its clean, fine, hi-res walls per screen; you can also see your fire-direction indicator and a chart showing in which directions from you the forts are located. Then you hunt for them.

You can control your speed just as you control direction. You can shoot in other directions than you're moving. When you come upon the little monsters, they tool along at a fixed speed, rather like ants about an anthill. They shoot back, however. In fact, they shoot first, if they spot you first.

On level two and up, the critters aren't so obliging; they come after you, knowingly and fast. Besides choosing your level, you can opt for denser mazes—they're harder to manipulate, but it's rumored that the baddies can't gang up on you quite so much.

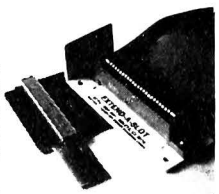
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Somehow, these simple ingredients have been put together in just the right dosages to be totally enthralling and delightful.

When you've played yourself out on *A.E.* and *Wavy Navy* and you're not really up for the creative experience of *Pinball Construction*, you're apt to find yourself reaching again and again for *Bolo*— a truly relaxing, truly engrossing, thoroughly challenging, altogether very addictive game.

Bravo, Synergistic. MCT

Bolo, by Elvyn Software, Synergistic Software (830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216). $34.95.

Karel the Robot. By Richard E. Pattis. Karel is a strange kind of robot—he won't cook or wash dishes, and he can't fly a spaceship or run a city. In fact, he can't do much of anything in the Real World . . . but he can do an interesting, and possibly useful, thing inside your head: he can teach you to think in Pascal.

Pascal is a programming language for computers, a set of rules that lets you write instructions to the machine that it can "understand" and execute. There are several programming languages around—Basic is one—but Pascal is fast becoming the most popular for many applications. This is partly because it can "talk to everybody"; it runs on many different kinds of computers and its programs are organized so that anyone can follow the logic, given the rules.

Karel the Robot runs on a subset of Pascal—a simplified version, a sort of "pidgin Pascal," that will help you get used to the rather odd structural requirements of the language. Karel can teach you most of the grammar and syntax of Pascal and the rules of logical organization; once you have that foundation, learning the rest should be easy.

Karel—named after Karel Capek, whose play *R.U.R.* gave us the word *robot*—is a very simple robot in a very simple world. He has few capabilities and no mind of his own; but within his limits he's the perfect slave—he obeys orders exactly. Of course, you have to give him exactly the right orders. . . .

Karel takes his orders from a program, written in advance by you; and therein lies the challenge: to design a program that will accomplish his task. However, this is not as difficult as you might think, for two reasons: first, you (the programmer) choose what task Karel is to do, so you can make it as easy as you want; and, second, Karel's world is so simple and his abilities so limited that you don't have a great many possibilities to choose among.

Karel's world is a rectangular grid of *streets* (running east-west) and *avenues* (running north-south). The world also contains *walls*; which can be built across a street or avenue, blocking Karel's path; and *beepers*, small objects that Karel can pick up, carry with him, and put down again.

Karel's working vocabulary consists of four instructions: Move, Turnleft, Pickbeeper, and Putbeeper. *Move* means "straight ahead one block"; the others are obvious. There is also a fifth instruction, Turnoff; but that's an end-of-program mark, not a working instruction.

Karel can also make various *Tests*, to determine which direction he's facing in, or whether he's next to a wall, or if there's a beeper on the corner with him, and so on. And he can choose what to do next on the basis of the Test results—known to programmers as conditional branching.

He can do program loops, too, repeating an action until a certain result is achieved. And there is a rule for creating new instructions out of combinations of old ones—for example, you can define a Turnright instruction. For all its simplicity, Karel's instruction set is actually quite powerful.

And that, of course, was the idea; simple, so it would be easy to understand and learn; and powerful, so Karel could behave in some ways like a real robot.

One thing about this program is very unusual. Most programs come with a book of some sort, but the book is less important than the program itself—a support device for the program. With Karel, the program is a support device for the book.

The book is called *Karel the Robot: A Gentle Introduction to the Art of Programming* (also available separately), and is a complete textbook in the programming language Karel uses, which was designed specifically as

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an introduction to Pascal. The rest of the system, two disks and a user guide, is a lab kit for the book—a model of Karel that you can use to practice what you learn from the text.

The system allows you to create a world for Karel by placing walls and beepers at various locations on the grid. You can copy the problems in the book or create new ones. These world patterns can be saved on disk for use with various tasks and programs for Karel.

Then you assign Karel a task, such as, "Go and get the beeper on the corner of Sixth Street and Ninth Avenue and return without hitting any walls on the way"; and, finally, you write the program that will enable him to do that.

Then you run the program and see if it works. You can select the execution speed, run the program step by step (forward or backward), have the system explain what's happening at every step, or choose from various other options.

If your program doesn't work—leaving Karel off in left field somewhere, looking for nonexistent beepers—you can edit it and try again. Eventually, Karel will end up in the right place, having done all the right things—and you will have learned something.

This is a teaching device, not a game; after you've learned to write correct programs for Karel, there's not very much else you can do with him. But by that time you'll be ready for Pascal.

One final word: the user guide tells you that you must do several housekeeping tasks before you start—tasks with frightening names like "krunch the disk." This is not true; you don't have to do these things first. There is room on the disk as supplied to record a couple of short programs and experiment with them. After you've used that up, you'll be more familiar with the system and the housekeeping jobs won't look so awful. JR

Karel the Robot, by Richard E. Pattis, Cybertronics International, Software Publishing Division (999 Mount Kemble Avenue, Morristown, NJ 07960; 201-766-7681). $242.

Wavy Navy. By Rodney McAuley. Do you suffer from seasickness? Does even the slightest sway of a car turn you a delicate shade of green? If you are an unfortunate sufferer of *mal de mer*, don't even attempt to look at this game, much less try to play it. However, if you feel like John Paul Jones this evening, and a swaying deck underfoot just races your adrenalin, then board the U.S.S. *Sirius* for a real challenge.

The ship appears to be fighting either in the Pacific during a typhoon or during a North Sea winter convoy run to Murmansk. The roughness of the sea is incredible. The waves are thirty feet tall! They ripple across the screen like sine waves, while you attempt to wage war against a fierce enemy air force.

The planes fly straight for a while, then become kamikaze fighters, diving straight at the ship. On higher levels the planes imitate Stuka dive bombers. The planes are well protected by squads of helicopter gunboats that fly down and spray very accurate machine gun fire. Long-range bombers periodically appear and saturate the air with bombs, which are difficult to avoid. After a few waves of attackers are destroyed, the enemy starts launching Exocet guided missiles. These missiles love to skim just the tops of each wave, forcing the ship down into the trough of the wave. That would not really be a hardship, except that it seems the storm also displaced some of the enemy's mine fields. These mines appear occasionally along the troughs of the waves, forcing the ship up to the wave's crest.

Imagine yourself, the skipper of the flagship, forced to perch on the side of a rolling wave with mines underneath and missiles overhead. While being divebombed and shot at by helicopters, you try to shoot down the whole air force. What should be your reward for succeeding against these unthinkable odds? *Wavy Navy* is certainly not chintzy when handing out promotions. A landlubber who survives all eight levels of the beginner mode can rise from galley slave to the rank of admiral. Old seadogs will want to try the expert mode, where the ultimate prize for completing the tenth level is the presidency. (Quick trivia question: Which United States presidents, if any, were naval heroes? Don't look now, but the answer's on page 2.)

As many as four players can participate in this rolling madhouse at one time. What a game to play on a Saturday afternoon with a group of friends and a keg of grog! However enjoyed, *Wavy Navy* is Sirius's best

arcade game in quite a while. Watch for it to rise fast in the charts. RRA

Wavy Navy, by Rodney McAuley, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $34.95.

List Handler. *List Handler*'s main function is to manage large lists of information. Besides facilitating the retrieval of selected and sorted information, the program allows you to create customized form letters based on the content of a list file. *List Handler* can also exchange data with other programs that use DIF format or data exchange.

It's easy to use; the program manual provides step-by-step tutorials for each feature, and helpful on-screen menus identify the command options available at each step.

Powerful field-selector, logical-operator-selector, and sort-order operations are defined on-screen in readily understandable English. These operations use the arrow keys to page rapidly through the options. No previous knowledge of the logical operator is required, nor do you have to learn special logical symbols. In this sense *List Handler* comes close to the ideal of a "natural language" program.

List Handler is especially designed to work with the *Word Handler* word processing system; the program also works with text files created by a number of other word processing programs. To facilitate word processing, upper and lower case text in a seventy-column display is provided on a standard Apple II Plus without additional hardware.

List Handler is a flexible, fast, and powerful information-handling system. The program can handle three thousand records of four thousand characters in length each, with up to 255 fields within a record. In turn, each field can be 256 characters in length. If you've developed an extended list that requires two storage disks and you have two drives, both disks can be logged on at the same time. The program allows logging on of an extended list on multiple drives. Up to eight disk drives can be on-line simultaneously. And *List Handler* can perform such random multidisk sorts at extremely high speeds.

The program does require a certain amount of initial organization. The manual does a good job of guiding the user through the labyrinth of procedures.

List Handler is a bargain, especially in view of the form letter capability and the large and flexible record and field sizes allowed. BDV

List Handler, Silicon Valley Systems (1625 El Camino Real, Belmont, CA 94002; 415-593-4344). $89.95.

Demon's Forge. By Brian Fargo. The king's infamous dungeon maze, the Demon's Forge, is open for adventurers, but it seems the king was not pleased when someone got drunk and killed four of his guards. Ancient rumor hints at an exit from this evil place, but no one in living memory has verified it. Most of those unfortunate enough to be cast down here become a snack for the keeper of the dungeon, the demon Anarakull.

Clothes and weapons are not part of your dungeon tour package. The king was gracious enough to allow a small packet of rations. The first level of the dungeon seems deceptively easy. You only need to watch out where you put your hands!

The entire maze is diabolically laid out in modules. When you finally solve the entrance to the next module and exit the old one, you find that it's a one-way trip. If you haven't brought along all the correct items, there's no way back to get them. Luckily the game has a built-in multiple game save feature. The cautious adventurer always saves a game before venturing into the next module.

Most items in this dungeon either are not what they seem or have extraordinary characteristics. Beware of the killer rabbits on loan from *Monty Python and the Holy Grail*. Illusion reigns supreme and everything should be examined, pushed, or prodded. But be careful!

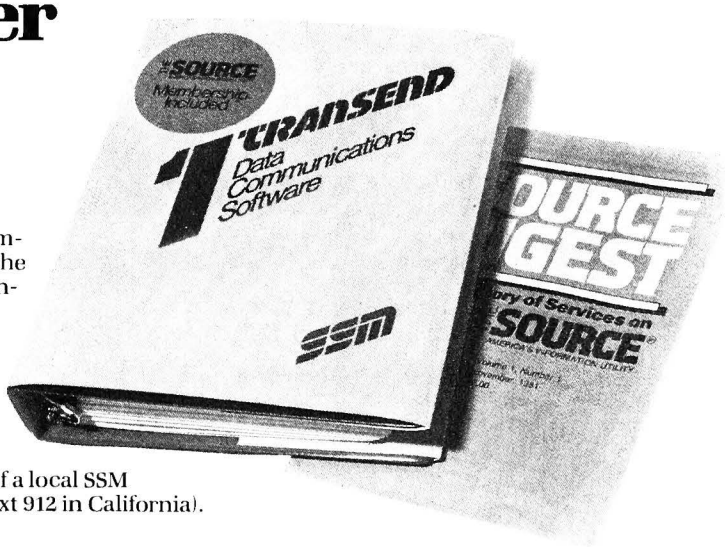
The hi-res graphics are good and some of the effects are quite interesting. The parser, however, is not very forgiving. The player must use the exact word or phrase to achieve a desired effect. In some cases the phrase required seems needlessly obscure.

Demon's Forge is a good first effort by a new software house. It is highly recommended to the intermediate level adventurer. Persistent novices may also be able to complete the hazardous journey. RRA

Demon's Forge, by Brian Fargo, Saber Software (8 Winged Foot Lane, Newport Beach, CA 92660; 714-644-0977). $39.95.

The Stamp Collector. By Dick Stein. With microcomputers becoming increasingly popular for small business and home management use as

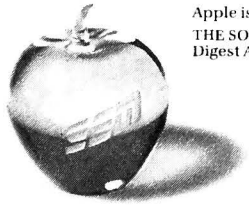
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well as for entertainment, it was inevitable that programs aimed at the philatelist would begin appearing.

Described by its publishers as "A powerful database program [which] consists of six programs," *The Stamp Collector* disk does contain a very general database management program and a file transfer utility for sorting and copying. The other four "programs" are merely examples (Foreign Stamp List, Domestic Stamp List, Meeting List, Sources List) of files that one could construct from the DBM program. With a fair amount of patience and no knowledge of computer programming per se, you could construct similar files for books, cars, baseball scores, telephone numbers, or scientific names for fish! Andent (a dental corporation, actually) also markets what appears to be the identical DBM program with numismatic examples as *The Coin Collector Catalog*.

Adapting *The Stamp Collector* to philately is a task that still rests squarely on the shoulders of the user. The DBM program permits you to assign, within generous limits, characteristics under which you wish to classify any stamp or cover (or fish, birthday, or recipe, for that matter). For example, the country of origin could be one such heading, although it might be better to create a separate file for each country to avoid having to key in the name for each item. Then you might want the catalog number, condition, value, price paid, date of purchase, source, or storage location. Figuratively speaking, the program provides you with the pencil and paper; you must decide what you wish to write. Whether anyone could devise a universal data system for stamp collectors is debatable, but certainly Andent has not.

Report generation, the typical end product of these files, requires some experimenting by the user to develop a suitable format. The instructions are unclear and don't always agree in detail with the disk.

Some of the format generation questions refer to information that is no longer on the monitor screen, having been scrolled off by the previous questions. Some questions are answered by depressing a single key; others require a key plus return; the user has no advance clue.

The use of "default responses" (answers requiring only the use of the return key), augmented by reverse field and/or flashing characters, would greatly improve user interaction with the keyboard. Too many questions lead to a possible dead end, with no means of backing out. At one point we're allowed to choose between creating a new report format or deleting an existing one, but there is no explanation in the manual or on the monitor screen as to how the existing format is to be identified, and there is no parachute by which to escape should we wish to take neither action. Instead of making a graceful exit, we must reset and start the format generating process all over from scratch.

Finally, the choice of a suitable printer is somewhat less than infinite. The program claims to be selectable between the IDS 440 Paper Tiger, the Epson MX-80, and the Centronics 737/739. However, when the Centronics option is used, the program acknowledges that you have just chosen the Epson! Bias? No, just a point of sloppy programming. Perhaps the Centronics would work somehow; the Apple Silentype does, with sufficient care in configuring the format, although it isn't given as an option.

These various shortcomings aren't unique to Andent or author Dick Stein. They're far too common in the mushrooming software industry; users are still too often left wishing that more attention would be given to the creation of "friendly" software—understandable, useful, and free of boobytraps.

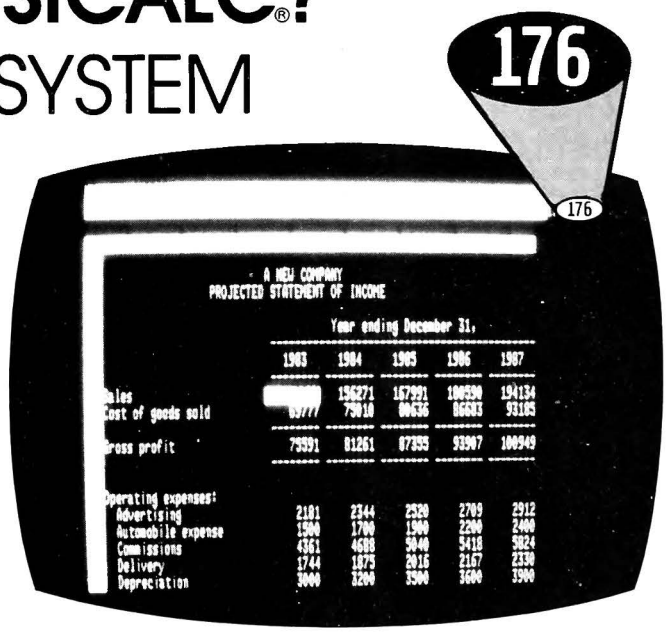
This program is not a panacea for philatelists. It might be a reasonable acquisition for the DBM user with more than minimal skill or patience. RSW

The Stamp Collector, by Dick Stein, Andent (1000 North Avenue, Waukegan, IL 60085; 312-223-5077). $49.

Beneath Apple Manor. By Don Worth. Along about the time that Tandy was asking the world if its children were worth six hundred dollars apiece and a few noncomputer people were poking around to see what all the foofaraw was about, asking wasn't there something better, and finding the Apple II, a very computer person wrote a very fun program for and in honor of that very Apple II. The program was called *Beneath Apple Manor*, and it was the first real attempt at a graphic D&D

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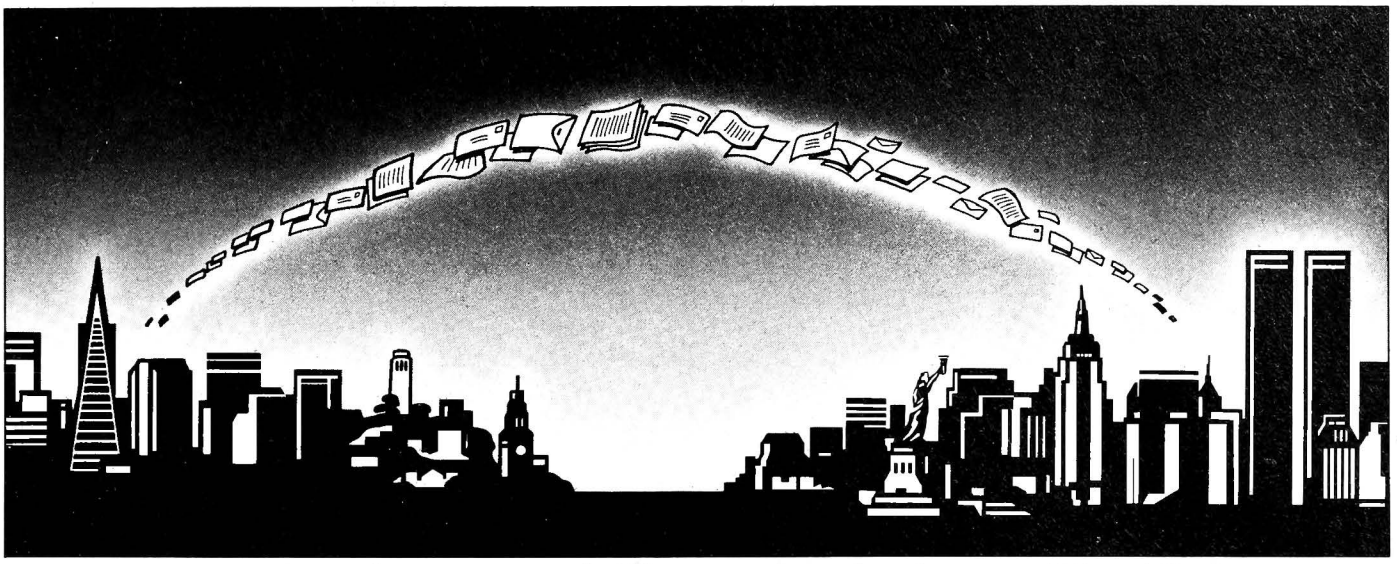


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1:52 PM. Your Apple displays current flight schedules and connects you to a ticket agent via THE SOURCE℠.

SSM's Transend 1 turns your Apple into an intelligent terminal connected to your corporate computer, a timeshare system, or any information service such as THE SOURCE. (In fact, all Transend software includes a valuable subscription offer for THE SOURCE.)

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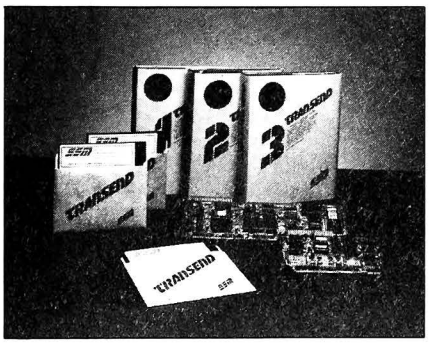
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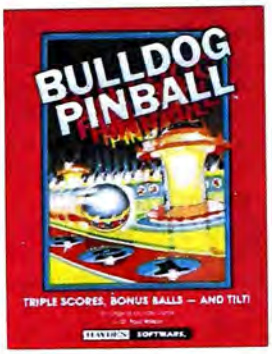
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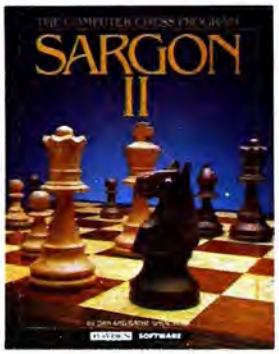
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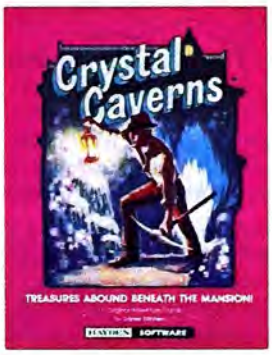
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The original *BAM* still graces the Fastalk column—as a classic. In speed, graphic resolution, and sophistication, it was outdated long ago. Yet its appeal remained and owners of the old program continued to pull it out and give it a play every now and then.

Don Worth and his since-*BAM* affiliation, Quality Software, got the picture. And, as soon as he had the time (a rare quantity for a college professor and businessman), he rewrote *BAM* in hi-res with Applesoft compatibility (the old and new both use machine language, but the old drivers were Integer), sped it up, and added all the bells and whistles—like a save game function—that today's game players like.

He also added a few treasures and fancied up the ending. And there, in his wisdom, he stopped. The old game, with all its super features, remains exactly the same.

Beneath Apple Manor is, in this time of gaming complexity, an exercise in simplicity. Explore the dungeons, fight the monsters, build your character, go deeper, and do it all over again.

But simplicity can be another way of saying elegance. Consider that every dungeon level is generated randomly, every one is one you've never seen before. And you won't see it at all until you explore it, bit by bit. Then, of course, unless you take the memory wipe-out potion, all that you've explored stays on the screen so that you can see the whole thing eventually. Exploring and discovering each maze is a lot of the intrigue of *BAM*; what will the next dungeon look like?

There are tradeoffs. In hi-res, you're limited to five rooms per dungeon; if you choose more (up to ten are allowed), you play in text-res. And one of the new treasures is a potion that reveals the whole level you're on. That's undoubtedly supposed to be a boon, but this reviewer won't chance taking that one again.

The strategy remains, and there's plenty of it. Few *BAM* players haven't a clear-cut strategy they'll recommend above all others. Experience points are tradable for character points in any of a relatively standard four areas—strength, intelligence, dexterity, and body (constitution). Because new levels are populated on the basis of your average and because monsters vary in how they affect you and in what affects them and in which levels they tend to cluster, where you put your points at various times during the game is very strategic.

Its eternal newness renders *Beneath Apple Manor* addictive. Even after you once reach the bottom of the dungeon and walk away with the prized golden apple, the challenge of doing it again at a higher level of difficulty—there are ten—remains. Some fans of the early *BAM* have changed the rules to keep playing; they never take the golden apple when it's offered. Their goal is to see how much of a superhero they can build. Since the dungeons keep getting harder to match your strength, the challenge continues.

BAM doesn't have the complexity of a *Wizardry* or a *Temple of Apshai*. But it remains a light, interesting, thoroughly enjoyable game with a wide enough range of play levels to be fun for very small children and to challenge veteran adult players.* MCT

Beneath Apple Manor, by Don Worth, Quality Software (6660 Reseda Boulevard, Suite 105, Reseda, CA 91335; 213-344-6599). $29.95.

Madame Shepp's Tarot. By Madame Shepp. Madame Shepp has done an excellent job of adapting traditional tarot readings to the microcomputer. Her readings are based on the Rider-Waite tarot deck and every attempt is made to individualize each reading.

As the seeker after cosmic truth, you can choose between two styles of divination: the traditional Celtic Cross reading or a simple yes or no answer. Ask your question and choose which significator card best represents your aura. Then the deck is shuffled. Cut the cards while Madame Shepp's Psychic Computer absorbs your energy into the deck.

When a simple yes or no answer is requested, seven cards are laid out. Three cards describing the past, one the present, and three the future are shown, with detailed information given about each card. Then the cards are weighed together to arrive at a final determination.

If an in-depth reading is desired, then the ancient Celtic Cross method is used. Ten cards are dealt, each card symbolizing a very specialized area. The meaning of each of these areas is revealed, based on the nature of the card, whether it is upright or reversed, and whether it belongs to the Major or Minor Arcana. An entire screen full of analysis is shown, summarizing the forces involved, and then an overall prediction is given. If more analysis is desired, the last card of the reading can be used as the foundation for a whole new reading. This is equivalent to switching to 10x power on a pair of binoculars. Vague shapes can suddenly jump into crystal clear focus.

At the end of either style of divination, the seeker may make a hard copy printout of the reading for further reflection and reference.

Unfortunately, all the cards in the readings are shown only in lo-res. While it certainly enhances the reading to see the cards in their proper positions on the table, adding hi-res pictures, especially of the Major Arcana, would do much to heighten the experience.

This program is not designed as a game, but as a serious attempt to provide computerized tarot readings. However, *Madame Shepp's Tarot* is refreshingly delightful and intriguing, even for nonbelievers. The computer will never replace the tarot reader completely, because a machine lacks the ability to empathize fully with the seeker. If voice synthesis were added to this program, the effect would certainly be eerie. Imagine Orson Welles or Christopher Lee intoning your reading. You'd be on the edge of your seat the entire time.

As a test of the program's ability, the question was asked: "What is the future of this program in the market?" The resulting Celtic Cross reading was a fascinating analysis of the trials and tribulations of getting a computer program written and published. The program confidently

*One question remains. When a classic is redressed to give it more modern advantages yet retains all the attributes that made it eligible to be a classic in the first place, which should appear in Fastalk as the classic? The potential customer would do best to buy the later version; the collector should seek the early one. *Prisoner* and *Prisoner 2* present the same problem as *BAM*. What do you think? Send us your opinion, with your reasons, and if you're the best arguer for your point of view we'll send you one of each of these two programs—in the version you argued for. Mail your entry to Softalk Classics, Box 60, North Hollywood, CA 91603, by March 15, 1983.

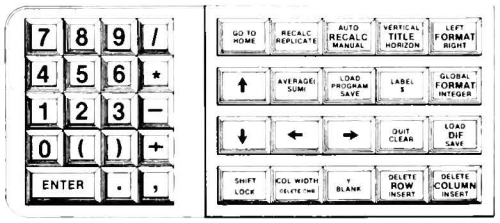


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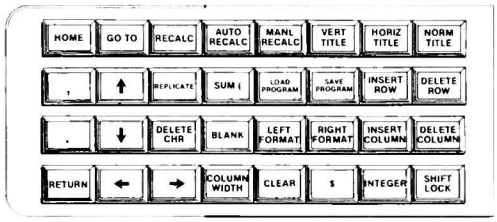
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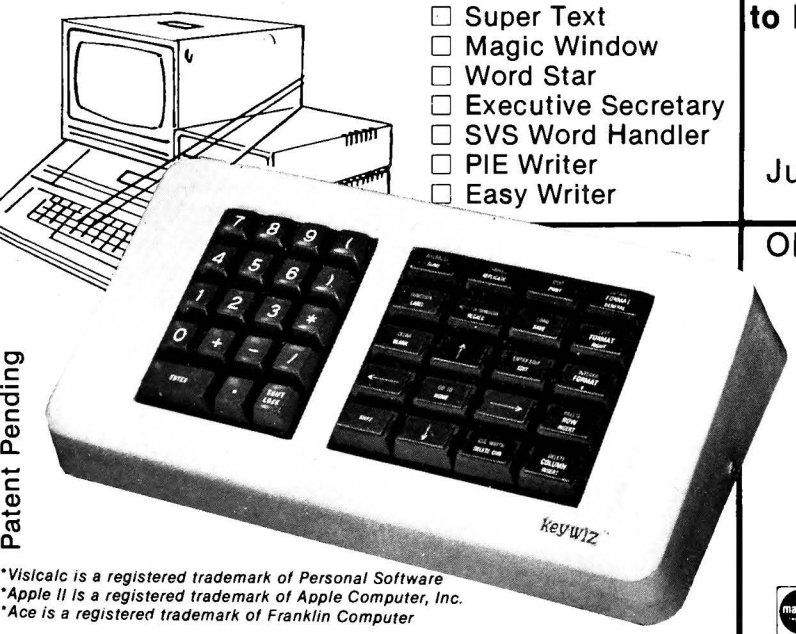
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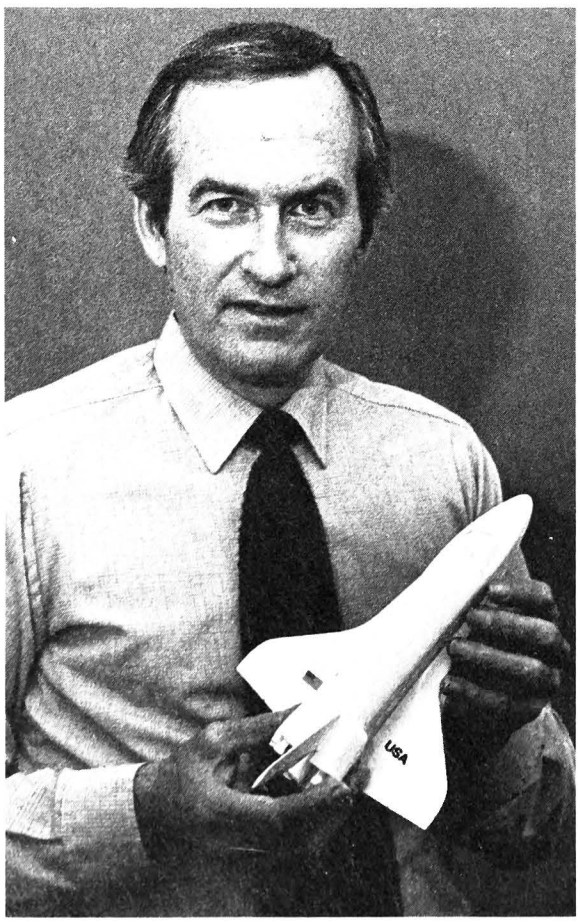
TRACK THE SPACE SHUTTLE ON AN APPLE? YES. WITH MICROSPEED!

At the Jet Propulsion Laboratory in Pasadena, NASA scientists have discovered the power of MicroSPEED. Using this remarkable hardware/software system with an Apple II, they produced a continuous graphic display of the Columbia's position relative to the earth during the second Shuttle mission. This enabled the JPL team to accurately follow the spacecraft in *real time*, and to precisely control its powerful sensors at critical points along the flight path.
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predicted success for itself in the future! It's all in the cards. RRA

Madame Shepp's Tarot, by Madame Shepp, G.Y.S.T. (540 Midvale Way, Mill Valley, CA 94941; 415-383-8438). $37.50.

Ice Demons. By Matthew Jew. High in the frozen wastes of the mythological Norse polar regions, an eternal battle is being waged. Ice demons are rampaging against humanity, and only you can hope to stop these hideously deformed creatures.

Hidden in great caverns beneath the frozen ice packs they lurk, waiting to burrow up and emerge to surround and destroy you.

Each creature has been endowed with magical powers by the evil High Master himself. Slime fires devastating paralysis arrows that relentlessly follow anywhere you run. Plebe can magically transport himself anywhere on the screen instantly. The deadly Willowwisp, whose breath blows icy death, is nearly impossible to vanquish; and Widowmaker moves with lightning speed. All the demons have an icy touch that means instant death.

Into this frozen hell you must travel, deeper and deeper, clearing level after level, in search of the mighty High Master, deadly leader of the ice demons. Only with his destruction may the world become a safe place again.

Armed only with bow and arrow, your task is supported by two magical aids sent periodically by the Great Wizard: a giant magic arrow that helps you to fire faster and a transporter that advances you a level—if you can survive to reach it. Further assistance comes with the magic dollar; grab one and gain bonus points, fire at one and it breaks apart into dozens of arrows deadly to the ice demons.

Ice Demons is an arcade game that's definitely different. At boot-up, the cast of characters is introduced to the accompaniment of Bach's Toccata and Fugue in D Minor. Then the demons begin emerging from icy covered holes that appear randomly on each level. Well defined and distinctive, the demons immediately move toward the hero.

Ice Demons features a unique two-player mode; you can choose either of two configurations—one for people who want to compete and another for those who'd rather gang up on the demons. In both, the players play at the same time (as opposed to taking turns). In team mode, players' arrows cannot hurt the other player and both players may use the transporter. In competition mode, players score for hitting each other, and only one player may use the transporter on a level.

Although marred by poor animation, rather boring sound effects, and occasional image flicker, the inventive quality of the concept plus its totally unique modes of play make *Ice Demons* a significant game and Morningstar a company to watch. HAS

Ice Demons, by Matthew Jew, Morningstar (39 Florence Street, San Francisco, CA 94133; 415-441-2535). $29.95.

The Planetary Guide. By Kevin Bagley and David Kampschafer. About two-thirds of the way out from the hub of a galaxy known as the Milky Way exists a solar system containing Earth and eight other planets, all revolving happily around the Sun. A bestseller for some time in Andromeda, *The Planetary Guide* is now available to intelligent occupants of these nine planets.

The program provides graphic images of each of the planets, showing their general appearance, tables of statistics about each, and descriptive information about them. Looking at the planets as a system, *The Planetary Guide* extracts relative size, comparative orbits, phases of the moon, and movement of comets around the sun. It even gives a hi-res illustration of the motion of the planets around the sun on any given date from 1 A.D. to far into the future.

After using this program you can expect to be able to locate and identify the planets in the night sky. All planets are visible to the naked eye except Uranus, Neptune, and Pluto.

Documentation includes a glossary and additional information describing the ecliptic, phases of the moon, and retrograde motion.

The Planetary Guide is a well put together program that presents the interrelationships of the bodies in our solar system in a clear and easily accessible manner. DAD

The Planetary Guide, by Kevin Bagley and David Kampschafer, Synergistic Software (830 North Riverside Drive, Renton, WA 98055; 206-226-3216). $30.

The Desecration. By Greg and Gil. Somehow this program suggests the Reese's Peanut Butter Cup advertisement: "You got adventure in my arcade!" "You got arcade in my adventure!" *The Desecration* is the beginning of a new breed of game, the Adventurecade. The game is basically a hi-res adventure, but at three different points in the game the player must demonstrate sufficient prowess at arcade skills to proceed.

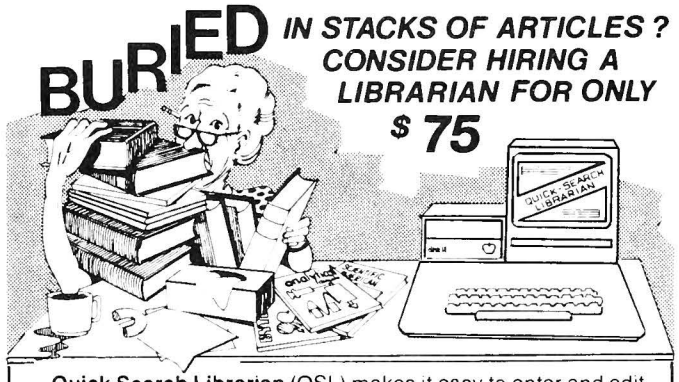
This game is the first in a series of science-fiction Adventurecades featuring the player as an intergalactic assassin. It is a good introduction; the puzzles are generally not difficult and the arcade action is not too demanding.

The plot of *The Desecration* revolves around your assignment to penetrate the tight defenses of the mining community Pyrkon 9, and to assassinate its tyrant chairman, Dunmark Pykro. Keemar, Guildmaster of Assassins, gives you the assignment personally. He informs you that this is a contract paid for by a joint venture of other rulers, who fear Pykro's expansion plans. They are willing to pay your standard fee of ten thousand galactic sovereigns. You may also keep anything you find, subject to guild approval, of course. Keemar then gives you a special password needed to make contact on Pyrkon and wishes you luck.

Along the way to the planet, you must steal a spaceship, break out of prison, and deal with weird aliens and spies. Once on the planet, the adventure gets tougher. The game is rarely boring and maintains a good level of excitement and suspense. The parser is somewhat awkward; at times, strange phrasing is needed to proceed, although the puzzles are all very logical and sometimes even too straightforward.

The arcade segments offer nothing new in arcade games, but they present the average adventurer with quite a problem. Not only must you master the pace of each game, but you must survive two levels to each part of each game. You must therefore become good at the arcade games, not just passable. Arcade fans will flash through these segments, but bog down in the traditional adventure segments. This could be a good game for two-player teamwork. RRA

The Desecration, by Greg and Gil, Mind Games (420 South Beverly Drive, Suite 207, Beverly Hills, CA 90212; 213-277-8044). $49.95. ◨



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:

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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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THE DIFFERENCE

from page 127

word processing set and *MagiCalc* for the number crunchers. *Magic Window IIe*, in its original form the first word processor to offer eighty columns without a hardware enhancement, has considerably speeded up display by using the Apple board.

MagiCalc, as with *VisiCalc*, *Multiplan*, and *Incredible Jack*, will use all 128K of a full machine. It'll even grab up to 512K if you provide the RAM boards and sufficient data.

Software Publishing Corporation, with its PFS series, illustrates another facet of the marketplace. Because they write code in Pascal, they find it easier to bring their programs to a new marketplace. *PFS: File* remains the bestselling filing program on the Apple II Plus and the Apple III. Its immediate availability on the IIe is another competitive point in the machine's favor.

Sirius Software's products all worked on the IIe without modification with two exceptions. Sirius modified *Wayout* to provide gameplayers with a better keyboard layout.

Sirius also immediately modified their highly successful *Type Attack* program to teach placement of the keys on the IIe keyboard. Ernie Brock, a product manager at Sirius as well as coauthor of *Type Attack*, feels the new version will be handy for veteran Apple users trying to make the changeover.

But even as the preceding companies joined Apple at the unveiling announcement, other companies were moving as rapidly. Lightning Software gave proof of their name by having a IIe version of *MasterType*. The version includes the additional keys and uses the extra memory to speed up the pauses between lessons.

Continental Software proved especially opportunistic. Of course, they announced a IIe version of their bestselling *Home Accountant*. The surprise was the announcement that *The Tax Advantage*, a program not then in general release for the II Plus, was also ready for the IIe.

That's an impressive list of solid software companies. With the commitment of Sirius, Sierra On-Line, and Broderbund to make their product compatible with the IIe, it means almost all the bestselling entertainment software will be available to new owners. In addition, the first and second ranked business programs, the first ranked educational program, the first ranked home program, and the first ranked word processor were already available before the machine was ever put in the market.

That's an impressive feat, quite unparalleled in the short history of microcomputing; and that litany ignores the two contributions from Apple itself, which has not exactly been idle. *Apple Writer* is generally the second or third ranked word processor. In its IIe incarnation, it takes advantage of every new feature. Powerful simplicity is the theme of this program. Thoughtful use of the open-apple and closed-apple keys, four-way arrows, and delete key along with typewriter standard use of such keys as tab and caps lock are great improvements.

Apple's other exclusive IIe offering is *Quick File II*, retrofitted from the Apple III program. *Quick File* is today's *File Cabinet*; for its time and for its intended use, *File Cabinet* was a superior program. So is *Quick File*. A supersimple-to-use database, it has all the utilities and features you need for personal use at home or in the office.

Now That We're Here, Where Are We? From what is now known about Apple's new products as well as what is believed to be forthcoming, certain natural avenues of speculation open up.

Apple's action in downloading *Quick File* leads to speculation that other Apple III software might be suitable for downloading. The IIe now has as standard memory the minimum amount available in an Apple III. Is a subset of the powerful SOS operating system a possibility? If so, will such II dynamos as *Word Juggler* impinge on already white hot competition in the II market?

The company has generally conceded that they intend to market a product that's now code-named McIntosh. The Mac is apparently a small Lisa in every way. But if Lisa is a one megabyte standard machine, that implies probably a low end 256K for Mac. Coincidentally, 256K is the largest memory now available for the III. Will Apple build a bridge from its 68000-based systems to its 6502-based systems? If so, they would present prospective personal computer owners with unparalleled vertical mobility.

Regardless of Apple's future plans or future actions, generations yet unborn will owe a debt of gratitude to Wozniak and Jobs for having the genius to provide tools for their intellects. It was Apple, more than any other system, that proved the concept of the personal computer.

Lisa and the IIe are just two more in a string of wonderful gifts.

Contributing to "Apple IIe: The Difference" were David Hunter, history, and David Durkee, technical changes; the story was compiled and written by Al Tommervik. ■





LISA'S DEBUT

Apple's announcement of Lisa, a souped-up third-generation microcomputer, poses the question of whether the Two Guys from Cupertino show can play in Fortune 1000 theaters.

Of course, it's likely that neither Steve had anything to do with the conundrum Apple now finds itself in. Steve the Wozniak was in school last year and apparently was not active in the Lisa project. Steve the Jobs is rumored to be backing Lisa's little brother, McIntosh, as Apple's next big hit.

If Lisa got off the starting blocks without the active assistance of either of the founding teenagers of Apple, more's the pity. The company certainly didn't choose an easy market to aim toward. So they can use all the genius at their disposal.

Lisa is still in beta testing, so no firsthand knowledge of the quality and reliability of the system is available. But conceptually Lisa is either a stroke of genius or a good example of high tech engineering gone amuck. It all depends on whether it sells.

There's no question but that Lisa is a first-class piece of work. The driving microprocessor is powerful, the inclusion of two inboard, high-density, double-sided drives is far-seeing, provision of sufficient applications software to do the jobs an executive would want to do at his desk is a reflection of an Apple III lesson well learned, and the bundling of the ProFile hard disk probably reflects the not unrealistic expectation that anyone who buys a machine this potent will probably need plenty of storage.

The problem is that Lisa sells at $9,995. For those of you slow on the pickup, we're discussing five figure dollars here unless you live in a state with a sales tax of less than one-tenth of a mill per dollar. This is not an item expected to be high on impulse buyers' lists. After all, it can't play *Pac-Man*.

The question is why does Apple fearlessly go where others fear to tread? Xerox pioneered the kind of user interface featured on Lisa at $18,000 per machine, give or take a two-martini lunch. Buyers queued up in numbers estimated to be at least double the population of working lumberjacks in the Gobi Desert.

IBM, one of those other techie companies, saw what Xerox had done and waxed wise. Not desiring to be in the business of selling chain saws to those selfsame Gobi lumberjacks, they entered the market at what appears to be the high end of the low end market. Translated into real English, that means IBM will sell you a real usable machine for about $4,000.

Apple seems to have almost split the difference: They're twice as high as IBM and half the price of Xerox. It's easy to believe that Xerox is too high. Neither Xerox nor IBM has ever shown any indication to run after-Christmas white sales or Valentine's Day two-for-one sales. Margin is the founding principle in both conglomerates. So, if there's a marketing window at ten grand, why aren't these guys there?

It's patently obvious that Fortune 1000 executive and upper level management personnel are the targets here. There are not many Winchell's Donut franchisees in the market for ten gees of computing power. You can almost visualize the advertising campaign: How much is the efficiency of your top executives worth to you? Underneath the headline will be cuts of Lisa and PC with $9,995 under Lisa and $4,000 under PC. Lisa will become the perk of the elite class. That's all of a two-thousand-unit marketplace.

One of the problems in assessing Lisa's future lies in definitions. Everyone knows Apple makes personal computers, so the press kits all announce Apple's wonderful new personal computer. It's understood that the more you pay a massage parlor, the more personal they get. It's not clear that the same law holds for small computers.

Pundits are fragmenting the market into what they hope are functional definitions if they're to maintain their punditry to the end of the decade. Generally, they all agree that we've either got a home computer, a personal computer, a desktop computer, or a work station. What they don't agree on is which computers go into which categories.

Stopping far short of any consensus is the feeling that home computers cost less than $500 and have less than 48K of memory. Personal computers cost less than $2,000 and have 48K or 64K standard. Desktop computers go for 64K to 256K and cost $2,000 to $4,000. Nobody knows what a work station is because we aren't there yet.

These definitions, albeit probably all wet, certainly clear the air. Vic-20 and Atari 400 are home computers. Apple II and Atari 800 are personal computers. IBM pc and Apple III are desktop computers. Does this mean Lisa's a work station?

If it does, the experts think Lisa's too early. They say there'll be nine million desktop computers before any significant phasing into work stations commences. That's four or five years away, even if IBM starts selling a million units a year, which is what they're shooting for.

Apple is a company worth worrying about. The number of businesses that have sprung up in support of the Apple II makes Apple the biggest nouveau employer in America. They've been good for a lot of people who have never crossed the city limits of Cupertino.

Apple seems to be riding a fantastic streak of good fortune, and Lisa is at least starting out that way. After using Lisa as a code name for years, the company got attached to it. But the name was owned jointly by Randy Hyde, author, and Sierra On-Line, publisher, of *Lisa 2.5*, an assembler of some renown.

Apple's a big, rich company now. Hyde or Sierra could have perpetrated highway robbery under the ruse of sincere negotiations. Instead, they negotiated a price representing their fair interest in the name. That's Apple's fairy godmother at work again.

But it's okay.

They deserve success. ∎



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Fruitful Connections.

There are more people in more places making more accessories and peripherals for Apples than for any other personal computer in the world.

Thanks to those people – in hundreds of independent companies – you can make the humblest 1978 Apple II turn tricks that are still on IBM's Wish List for 1984.

But now we're coming out with our very own line of peripherals and accessories for Apple® Personal Computers.

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First, compatibility. We've created a totally kluge-free family of products designed to take full advantage of all the advantages built into every Apple.

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Now the same kindly dealer who keeps your Apple PC in the pink can do the same competent job for your Apple hard-disk and your Apple daisywheel printer.

So if you're looking to expand the capabilities of your Apple II or III, remember:

Now you can add Apples to Apples.

Gutenberg would be proud.

Old Faithful Silentype® has now been joined by New Faithfuls, the Apple Dot Matrix Printer and the Apple Letter Quality Printer.



So now, whatever your budget and your needs, you can hook your Apple to a printer that's specifically designed to take advantage of all the features built into your Apple. With no compromises.

The 7x9 Apple Dot Matrix Printer is redefining "correspondence quality" with exceptional legibility. With 144x160 dots per square inch, it can also create high resolution graphics.

The Apple Letter Quality Printer, which gets the words out about 33% faster than other daisywheel printers in its price range, also offers graphics capabilities. See your authorized Apple dealer for more information and demonstrations. Because, unfortunately, all the news fit to print simply doesn't fit.

A joy to behold.

The new Apple Joystick II is the ultimate hand control device for the Apple II.

Why is it such a joy to use?

With two firing buttons, it's the first ambidextrous joystick – just as comfortable for lefties as righties.

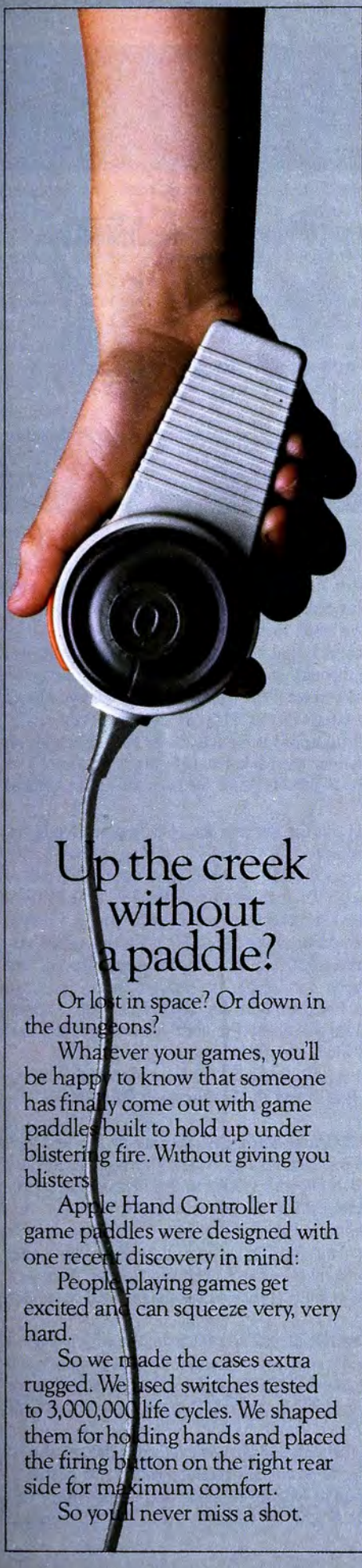
Of course, it gives you 360° cursor control (not just 8-way like some game-oriented devices) and full X/Y coordinate control.

And the Joystick II contains high-quality components and switches tested to over 1,000,000 life cycles.

Which makes it a thing of beauty. And a joystick forever.



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Up the creek without a paddle?

Or lost in space? Or down in the dungeons?

Whatever your games, you'll be happy to know that someone has finally come out with game paddles built to hold up under blistering fire. Without giving you blisters.

Apple Hand Controller II game paddles were designed with one recent discovery in mind:

People playing games get excited and can squeeze very, very hard.

So we made the cases extra rugged. We used switches tested to 3,000,000 life cycles. We shaped them for holding hands and placed the firing button on the right rear side for maximum comfort.

So you'll never miss a shot.

A storehouse of knowledge.

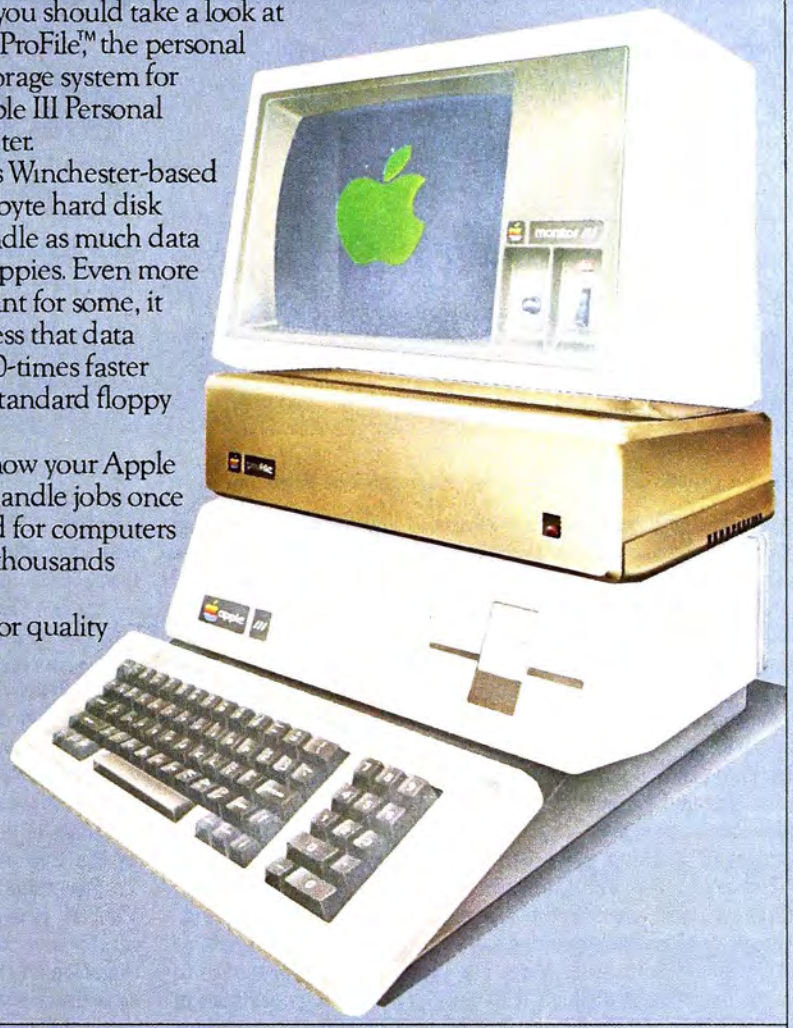
If you work with so much data or so many programs that you find yourself shuffling diskettes constantly, you should take a look at Apple's ProFile,™ the personal mass storage system for the Apple III Personal Computer.

This Winchester-based 5-megabyte hard disk can handle as much data as 35 floppies. Even more important for some, it can access that data about 10-times faster than a standard floppy drive.

So now your Apple III can handle jobs once reserved for computers costing thousands more.

As for quality and reliability, you need only store one word of wisdom:

Apple.



Launching pad for numeric data.

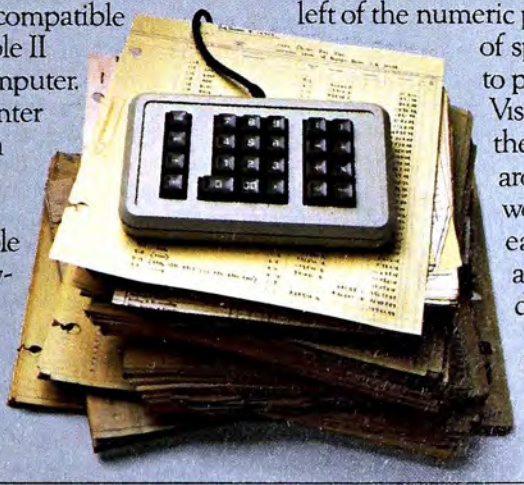
Good tidings for crunchers of numerous numbers:

Apple now offers a numeric keypad that's electronically and aesthetically compatible with the Apple II Personal Computer. So you can enter numeric data faster than ever before.

The Apple Numeric Keypad II has a standard calculator-style layout. Appropriate, because unlike some other keypads, it can actually function as a calculator.

The four function keys to the left of the numeric pad should be of special interest to people who use VisiCalc.® Because they let you zip around your work sheet more easily than ever, adding and deleting entries.

With one hand tied behind your back.



VisiCalc is a registered trademark of VisiCorp Inc.

GRAPHICALLY SPEAKING



by Mark Pelczarski

This month's Graphically Speaking is by guest columnist Eagle Berns.

Filling in areas with color is a very advanced graphic technique. Last month's Graphically Speaking looked at how bit patterns combine to create various colors. Now we'll put theory into practice with a machine language color fill routine.

The routine can fill in any enclosed area, not just squares and rectangles. It allows the use of a wide variety of colors for the fill. These may either be the twenty or so colors included in this program or any color scheme that the user designs through experimentation. The user may even create rainbow effects and random patterns.

The program can be loaded along with any Basic program and called when needed. It can fill areas on either hi-res page, and the area it fills can be either black or white.

This program, working in tandem with any picture packing program, can conserve considerable disk storage space by packing black and white pictures on a disk and then filling in the colors after the unpacking.

The Algorithm. Before the routine can color in anything, you have to tell it what you want done and where. The user supplies information to the routine in locations 0 through 4 of memory. The X coordinate at which filling is to begin goes in locations 0 and 1 and the Y coordinate goes in 2. The color value is poked into location 3, and the choice of hi-res page 1 or 2 is indicated by entering $20 or $40 respectively in location 4.

The program begins by computing the internal memory location corresponding to the X,Y pair given (a nontrivial exercise, as those who are familiar with the hi-res memory layout can attest to). We've used look-up tables to accomplish this in previous articles. Computing the address in machine language takes much less memory, but it's also a little slower.

The routine then fills in each byte to the left of the X,Y pair with the appropriate color until a nonblack or nonwhite byte is found. The same technique is then applied on the right. The point immediately above the given point is then selected and, if the background isn't different for this point, the process is repeated. When the upward motion is stopped, the entire process is repeated, moving down from the original point.

The second most difficult part of the task is handling the end conditions when a byte must be partially changed. Here, considerations of even or odd bytes and color anomalies have to be dealt with. These problems require the use of various masking techniques and won't be discussed in detail here.

Keep in mind that with this filling method an enclosed irregular shape may require more than one color fill to be colored in completely. An example of this is shown in a sample program described later. Also, for the examples given, the objects to be filled were generated by hplotting line segments. There is no requirement, however, on how the hi-res screen is created. To save disk space, you could just save coordinates of the endpoints of lines and color fill points and then generate the entire picture from this information.

A Description of the Program. What follows is a block-by-block description of the essential parts of the code. The areas that the user may wish to modify to fit specific needs are also indicated. Note, for example, the section on color patterns used in the program.

Lines 1 through 35 do some initial housekeeping and parameter saving. The section in lines 36 through 48 finds the bit and byte pointed to by the coordinates and checks to see if the byte is either of the two blacks (00000000 or 10000000) or two whites (11111111 or 01111111).

Lines 49 through 59 set up appropriate masks for data checking on the data bytes based on whether the background is black or white. This calls SETUPB or SETUPW to modify some instructions in the code to use the masks properly.

Lines 60 through 62 pull out the appropriate color pattern requested by the user and store it for later.

The main loop for filling in the line on the left and right (via a call to FILNE) is in lines 63 through 73. It moves up a line at a time (VERT routine computes the address) and checks to see if the bit found is a continuation of the background color to be filled. Lines 74 through 95 essentially repeat the procedure, but they start at the original point and move down a line at a time.

The routine from 96 to 149 computes the horizontal address corresponding to the X coordinate passed by the user. It also finds the particular bit within the byte where the fill will start.

The FILNE routine (lines 150 through 172) just controls the calling of the fill-in-on-right (JSR RGT) and the fill-in-on-left (JSR INS4) routines for a particular line.

The two routines SETUPB and SETUPW, starting at 173 and 193, respectively, modify certain instructions that deal with masking the data byte. They change EORs, ANDs, and ORAs to the instruction appropriate for the masking operation on black versus white.

Lines 220 through 251 contain the code that puts together the byte in hi-res memory with the pattern to be filled. The routine will modify only the part of a byte that is to be filled—that is, a left portion of the byte, a right portion of it, or the entire byte. It then stores the finished byte back in memory.

Lines 252 through 281 handle the movement from the original point to the left, looking for (and stopping at) a byte that doesn't contain a full byte of background. It calls the STORCOLOR routine given earlier for each byte to be modified. Lines 282 through 315 do the same thing to the right of the origin.

The routine in lines 316 through 362 converts a Y coordinate value to the memory address corresponding to the beginning of the row of that Y coordinate. Rather than using a lengthy table to find the location, this routine rearranges the bits of the Y value to form the appropriate address.

Lines 363 through 401 define the local constants and variables

needed for the processing of the code.

Lines 402 to 423 create a table called COLORTAB. The entries in this table are the bit patterns required to form a particular color on the hi-res screen. The first four represent the two blacks and two whites. The next four are the standard hi-res colors supported on the Apple. The remainder (except the last) were found by detective work. The bit configurations were taken from pictures found in other programs. You can give these colors whatever names you like.

There are eight bytes to each entry. Which of them is appropriate depends on whether an even or odd row or column byte is being manipulated. The last entry, SPCL, was provided as a special user entry. By knowing this address (from assembling the program) a user can store any configuration of bytes. Storing random byte values here can create some unusual effects.

The First Sample Program. This small program demonstrates use of the color fill-in routine for generating Venn diagrams (or partially filled-in circles).

```
10  PRINT CHR$ (4);"BLOAD FILIN"
20  FILIN = 24576: REM $6000
30  INC = .1:PI = 3.141592
40  HGR : HCOLOR= 3
50  R = 60:CX = 80:CY = 100: GOSUB 120: REM CIRCLE
60  CV = 12: GOSUB 220: REM FILIN
70  R = 60:CX = 150:CY = 100: GOSUB 120
80  CV = 18: GOSUB 220
90  R = 40:CX = 115:CY = 65: GOSUB 120
100  CY = 35:CV = 16: GOSUB 220
110  END
120  REM ***DRAW A CIRCLE*****
130  TH = 0.0
140  X = CX + R * COS (TH)
150  Y = CY + R * SIN (TH)
160  HPLOT X,Y
170  TH = TH + INC
180  X = CX + R * COS (TH):Y = CY + R * SIN (TH)
190  HPLOT TO X,Y
200  IF TH <= 2 * PI THEN 170
210  RETURN
220  REM ***FILL IN COLOR*****
230  POKE 0,CX: POKE 1,0: POKE 2,CY: POKE 3,CV: POKE 4,32:
     CALL FILIN: RETURN
```

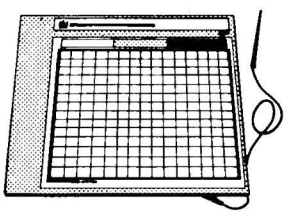
And the Second Sample Program. A country scene. Note that more than one starting point was needed for the sky and ground fill-ins. Note also the minimal amount of information it takes to generate the entire picture.

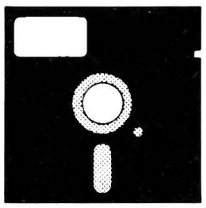
```
10  PRINT CHR$ (4);"BLOAD FILIN"
20  HGR : HCOLOR= 3
30  READ X,Y
40  HPLOT X,Y
50  READ X,Y
60  IF X = - 1 THEN 180
70  HPLOT TO X,Y
80  GOTO 50
90  DATA 0,95,63,95,63,80,77,80,77,95
100  DATA 77,80,87,70,90,60,87,50,70,40
110  DATA 53,50,50,60,53,70,63,80
120  DATA 63,115,77,115,77,95,190,95
130  DATA 190,80,197,60,247,60,240,80
140  DATA 190,80,190,105,253,105,253,80
150  DATA 247,60,240,80,253,80,240,80
160  DATA 240,105,253,105,253,95,279,95
170  DATA -1,-1
180  READ C,X,Y
190  IF C = - 1 THEN 280
200  POKE 0,X: POKE 1,0: POKE 2,Y: POKE 3,C: POKE 4,32
210  CALL 24576
220  GOTO 180
230  DATA 17,135,20,17,30,80,17,255,80
240  DATA 10,70,60,4,135,135,4,30,105,4,255,100
250  DATA 18,70,95,13,215,70,7,247,76
260  DATA 8,215,95,8,250,95
270  DATA -1,-1,-1
280  END
```

Fill Program Source Listing

```
1
2
3
4  ************************************************************
5  *
6  *          HI-RES GRAPHICS COLOR FILL-IN
7  *
8  *                      BY
9  *
10 *                EAGLE I. BERNS
11 *
12 *
13 ************************************************************
14 *
15            ORG   $6000
16 XC         EQU   0          ;PARM: X COORD.
17 YC         EQU   2          ;PARM: Y COORD.
18 COLINIT    EQU   3          ;PARM: COLOR CHOICE
19 HPG        EQU   4          ;PARM: HI-RES PAGE ($20
                                OR $40)
20 HGRBL      EQU   $26
21 HGRBH      EQU   $27
22 *
23 START      LDA   COLINIT    ;GET COLOR CHOICE
24            ASL              ; TIMES 8
25            ASL
26            ASL
27            STA   COLCH
28            LDA   HPG        ;SAVE OFF PARMS
29            STA   HRPAGE
30            LDA   YC         ;PUT IT AWAY
31            STA   YS
32            LDA   XC         ;GET X COORD. (LSB)
33            STA   XS         ;SAVE IT
34            LDY   XC+1       ;GET X COORD. (MSB)
35            STY   XS+1
36            JSR   HORIZ      ;GO FIND BIT/BYTE
                                OFFSET
37            LDA   YC         ;COMPUTE VERTICAL
                                DISP.
38            JSR   VERT
```


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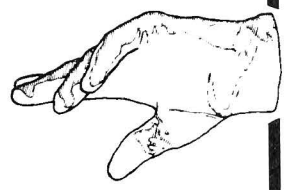
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```
39              LDY   BYT0
40              LDA   (HGRBL),Y     ;GET FIRST DATA BYTE
41              ASL                 ;WIPE OUT SIGN BIT
42              LSR
43              BIT   BIT0          ;CHECK ZEROS UNDER
                                     MASK
44              BEQ   SCN0          ;YEP-  FILLING IN BLACK
45              EOR   #$FF          ;SWITCH TO CHECK ONES
46              BIT   BIT0          ;CHECK ONES UNDER
                                     MASK
47              BEQ   SCN1          ;YEP - FILLING IN WHITE
48              RTS                 ;NEITHER - EXIT
49 SCN0         JSR   SETUPB        ;MOD INSTRS FOR BLACK
50              LDX   #0            ;X WILL INDEX PATTERN
                                     TO
51              LDA   (HGRBL),Y     ; PICK FROM TABLE
52              BPL   GETPAT        ;BRANCH IF PATTERN 0
53              LDX   #1            ;ELSE PATTERN 1
54              BPL   GETPAT        ;(JMP GETPAT)
55 SCN1         JSR   SETUPW        ;MOD INSTRS FOR WHITE
56              LDX   #2            ; CHECK FOR PAT. 2 OR 3
57              LDA   (HGRBL),Y
58              BPL   GETPAT
59              LDX   #3
60 GETPAT       LDA   PATTAB,X      ;GET PATTERN
61              STA   PATTERN       ;O.K., GOT IT
62              LDA   YC            ; GET Y COORD. (1 BYTE)
63 LOOP1        JSR   VERT          ;GET VER. OFFSET (TOO
                                     HGRBL/H)
64              LDY   BYT0          ;BYTE OFFSET
65              LDA   (HGRBL),Y     ; GET DATA BYTE
66 INS1         EOR   #$FF
67              BIT   BIT0          ;ARE WE WHITE/BLACK?
68              BNE   DONE          ;NOPE, GO DO BOTTOM
                                     HALF
69              JSR   FILNE         ;GO FILL IN LINE
70              DEC   YC            ;MOVE UP A LINE
71              LDA   YC
72              CMP   #$FF
73              BNE   LOOP1
74 DONE         LDY   YS            ;RESTORE Y COORD.
75              INY                 ;DOWN ONE ROW
76              STY   YC
77              TYA                 ;NEED IT IN A
78 *
79 * NOW, REPEAT THE ABOVE FOR BELOW POINT
80 *
81 LOOP2        JSR   VERT          ;GET VER. OFFSET (TOO
                                     HGRBL/H)
82              LDY   BYT0          ;BYTE OFFSET
83              LDA   (HGRBL),Y     ; GET DATA BYTE
84 INS2         EOR   #$FF
85              BIT   BIT0          ;ARE WE WHITE/BLACK?
86              BNE   DONE1         ;NOPE, GO DO BOTTOM
                                     HALF
87              JSR   FILNE         ;GO FILL IN LINE
88              INC   YC            ;MOVE DOWN A LINE
89              LDA   YC
90              CMP   #192
91              BNE   LOOP2
92 DONE1        RTS                 ;RETURN
93
94
95
96 ************************
97 *
98 * HORIZ:COMPUTE X OFFSET FOR THE
99 *       HIGH-RESOLUTION GRAPHICS
100*       SCREEN
101*
102* ACCUMULATOR: LSB OF THE "X" OFFSET
103*
104* Y REGISTER: MSB OF THE "X" OFFSET
105*
106*X RANGE: 0-279($117)
107*
108 ************************
109 HORIZ        PHA                 ;SAVE
110             AND   #$1           ;EVEN OR ODD ADDRESS?
111             STA   EVODD         ;SAVE EVEN-ODD FLAG
112             LDX   #$00          ;ASSUME < 256
113             TYA                 ;GET
114             BEQ   SK256         ;"X" IS < 256
115             LDY   #$04          ;BIT OFFSET
116             LDX   #36           ;"X" OFFSET ADDRESS
117 SK256       STY   BIT0          ;TEMPORARY SAVE
118             CLC                 ;CLEAR
119             PLA                 ;GET
120             ADC   BIT0          ;ADD IN ANY BIT OFFSET
121             STA   TEMP
122             SEC
123             SBC   #126          ;18*7
124             BCC   NOADJ
125             STA   TEMP
126             TXA
127             SEC
128             ADC   #17
129             TAX
130 NOADJ       LDA   TEMP
131             SEC                 ;SET
132 SUBLOOP     BEQ   OUT           ;ZERO, ALL DONE
133             INX                 ;BUMP
134             SBC   #$07          ;DECREMENT BY 7
135             BCS   SUBLOOP       ;IF CARRY SET STILL > 0
136             DEX                 ;WENT
137             ADC   #$07          ;CARRY=0, REPLACE THE
                                     7
138 OUT         STX   BYT0          ;SAVE FINAL BYTE OFSET
139             TAX                 ;USE
140             LDA   TABLE,X       ;PULL OUT BIT MASK
141             STA   BIT0          ;SAVE BIT MASK
142             EOR   #$FF          ;AND INVERSE
143             STA   BIT1
144             LDA   TAB2,X        ;NEED THIS BIT TOO
145             STA   BITL
146             RTS                 ;LEST
147
148
149
150 *
151 * FILNE - FILL LINE
152 *
153 FILNE       STY   SBY           ;SAVE FOR LATER
154             LDA   #$7F          ;INIT FORMAL MASK
155             STA   SMASK
156             LDA   BITL          ;STARTING MASK
157             STA   MASK
158             LDA   (HGRBL),Y
159             JSR   INS4          ;FILL IN ON LEFT
160             LDY   SBY           ;GET FIRST DATUM AGAIN
161             LDA   (HGRBL),Y
162 INS3        ORA   BIT0          ;TURN BACK ON/OFF
163             STA   (HGRBL),Y     ;(LFT TURNED EM OFF/ON)
164             LDA   #$7F
165             STA   SMASK
166             LDA   BITL          ;SET INIT. RGT MASK
167             STA   MASK
168             LSR   MASK
169             JSR   RGT           ;FILL IN RIGHT
170             RTS                 ;RETURN TO SENDER
171
172
173 SETUPB      LDA   NOPINS        ;NOP
174             STA   INS1
175             STA   INS1+1
176             STA   INS2
177             STA   INS2+1
178             LDA   ANDINS        ;AND BIT0
179             STA   INS3
180             LDA   ANDINS+1
181             STA   INS3+1
182             LDA   ANDINS+2
183             STA   INS3+2
184             LDA   EORINS        ;EOR #$FF
185             STA   INS4
186             STA   INS5
187             LDA   EORINS+1
188             STA   INS4+1
189             STA   INS5+1
190             RTS
191
192
193 SETUPW      LDA   EORINS        ;EOR #$FF
194             STA   INS1
```



VOLUME TWO!



&Amper~Magic T.M.

by Bob Nacon

The success of the original Amper-Magic™ program package and the introduction of its technique for attaching new commands to Applesoft programs has stimulated the production of Command Library™ packages designed around a 'theme' such as information display or output, input, memory management, etc., which will enhance your Applesoft programs. They will give your program a professional operation and appearance by increasing speed, reducing size, and giving you features you never could have before, while still allowing you to program with the ease of BASIC.

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** Print to the screen while a peripheral is active

** Save and restore instantly any text screen, no matter how complex with flashing, inverse, and any window settings...

** Make your program WAIT a length of time specified in ordinary seconds (to the tenth of a second); the time may be a variable or expression which can be controlled by the program...

** Print anywhere on the screen under program control, either with absolute movements or with relative movements...

** Print string arrays to any device, with or without an appended special character, and WITHOUT A LOOP...

** Set, clear, or toggle ANY bit or bits anywhere in RAM memory...

** Check the keyboard when called, pause if SPACEBAR is pressed, then continue if SPACE is pressed again or GOTO a location if RETURN is pressed...

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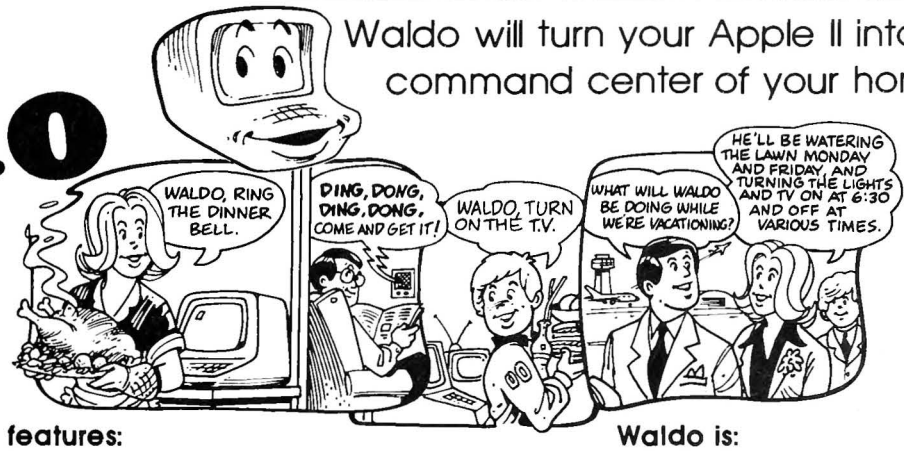
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```
195                STA   INS2
196                LDA   EORINS+1
197                STA   INS1+1
198                STA   INS2+1
199                LDA   ORAINS       ;ORA BIT0
200                STA   INS3
201                LDA   ORAINS+1
202                STA   INS3+1
203                LDA   ORAINS+2
204                STA   INS3+2
205                LDA   NOPINS       ;NOP
206                STA   INS4
207                STA   INS5
208                STA   INS4+1
209                STA   INS5+1
210                RTS
211
212
213 NOPINS         NOP
214 EORINS         EOR   #$FF
215 ANDINS         AND   BIT1
216 ORAINS         ORA   BIT0
217
218
219
220 STORCOLOR      LDA   (HGRBL),Y    ;GET DATA
221                AND   SMASK        ;WIPE OUT CHANGING
                                       BITS
222                STA   TEMP2        ;SAVE FOR A WHILE
223                LDA   SMASK        ;NOW GET WHAT WE PUT
                                       IN
224                CMP   #$7F         ;DID ANYTHING CHANGE?
225                BEQ   STCOLOUT     ;NOPE - GET OUT
226                EOR   #$FF         ;ONES WE WANT
227                STA   TEMP3        ;SAVE
228                LDA   YC           ;COMPUTE WHICH ROW/
                                       COL/BYTE
229                AND   #1           ; WE WANT FROM COLOR
                                       TABLE
230                ASL
231                ASL
232                STA   TEMP4        ;HOLD FOR ADDITION
233                TYA                ;NOW COLOR
234                AND   #3
235                CLC
236                ADC   TEMP4
237                STA   TEMP4
238                LDA   COLCH
239                CLC
240                ADC   TEMP4        ;NOW HAVE EVEN/ODD/
                                       ROW/COL
241                TAX                ;SET TO INDEX INTO
                                       TABLE
242                LDA   COLORTAB,X
243                STA   COLOR        ;GOT IT
244                LDA   TEMP3        ;GET BITS WE WANT FROM
                                       COLOR
245                AND   COLOR        ; GOT THEM
246                ORA   TEMP2        ;MUSH INTO MEM. BYTE
247                STA   (HGRBL),Y    ;AND STUFF IT IN
248 STCOLOUT       RTS
249
250
251
252 *
253 * LFT - LEFT FILL ROUTINE
254 *
255 LFT            LDA   (HGRBL),Y    ;DATA
256                CMP   PATTERN      ;SEE IF FULL WORD
                                       CHANGE
257                BEQ   CHNGALL      ;BRANCH IF SO
258 INS4           EOR   #$FF         ;SWITCH:B/W
259 LPLFT          BIT   MASK         ;CHECK BIT IN QUESTION
260                BEQ   DONLFT       ;IT'S ZERO/ONE STOP
261                TAX                ;HOLD A
262                LDA   SMASK        ;GET FORMAL MASK
263                EOR   MASK         ;NO, MAKE IT ZERO
264                STA   SMASK        ;SAVE IT
265                TXA                ;GET A BACK
266                LSR   MASK         ;GO TO NEXT BIT
267                BNE   LPLFT        ;BACK IF MORE BITS
268                NOP
269                BEQ   LFTBK        ;ELSE GO STORE IT
270 CHNGALL        LDA   #$00         ;CHANGE FULL BYTE
271                STA   SMASK
272 LFTBK          JSR   STORCOLOR    ;SAVE MODIFIED BYTE
273                LDA   LBITL        ;SCAN FROM SIDE NOW
274                STA   MASK
275                LDA   #$7F
276                STA   SMASK        ;RESET
277                DEY                ;MORE BYTES?
278                BPL   LFT          ;YEP - GO BACK
279                RTS
280 DONLFT         JSR   STORCOLOR    ;SAVE FINAL VALUE
281                RTS                ;BYE-BYE
282 *
283 * RGT - RIGHT FILL ROUTINE
284 *
285 RGT            LDY   SBY          ;GET DISPL. FROM EDGE
286 RGTSTRT        LDA   (HGRBL),Y    ;DATA
287                CMP   PATTERN      ;SEE IF FULL WORD
                                       CHANGE
288                BEQ   CHGALL2      ; BRANCH IF SO
289 INS5           EOR   #$FF         ;SWITCH:B/W
290 LPRGT          BIT   MASK         ;CHECK BIT IN QUESTION
291                BEQ   DONRGT       ;IT'S ZERO/ONE STOP
292                TAX                ;SAVE A
293                LDA   SMASK        ;GET FORMAL MASK
294                EOR   MASK         ;NO, MAKE IT ZERO
295                STA   SMASK        ;STORE IT
296                TXA                ;RESTORE
297                ASL   MASK         ;GO TO NEXT BIT
298                BPL   LPRGT        ;BACK IF MORE BITS
299                BMI   RGTBK
300 CHGALL2        LDA   #$00         ;CHANGE FULL BYTE
301                STA   SMASK
302 RGTBK          JSR   STORCOLOR    ;SAVE MODIFIED BYTE
303                LDA   LBITR        ;SCAN FROM SIDE NOW
304                STA   MASK
305                LDA   #$7F
306                STA   SMASK        ;RESET
307                INY                ;MORE
308                CPY   #40          ;RIGHT EDGE
309                BNE   RGTSTRT      ;BACK FOR MORE
310                RTS
311 DONRGT         JSR   STORCOLOR    ;SAVE FINAL VALUE
312                RTS                ;BYE-BYE
313
314
315
316 * *************************
317 *
318 *
319 * HI-RES GRAPHICS
320 *
321 * 192 VERTICAL ADDRESSES $00-$BF
322 *          < XXYY,YZZZ >
323 * MAPPED INTO THE FOLLOWING WORD:
324 *
325 *  <001Z,ZZYY>,<YAAA,A000>
326 *
327 * XX VALUES: 00, 01, & 10; 11 IS OUT OF RANGE
328 *              00 -> 0000 (A)
329 *              01 -> 0101 (A)
330 *              10 -> 1010 (A)
331 *
332 * ***************************
333 *
334 * DEFINE OUR HI-RES BASE ADDRESS
335 VERT           LDX   #$0          ;SET X1,X2 BASE
336                STA   HGRBL        ;SAVE FOR BIT TEST
337                BIT   HGRBL        ;X1,X2 TO "N", "V"
338                BPL   SKX1         ;BR-X1=0
339                LDX   #$A0         ;SET X1,X2 BASE : LESS
                                       "ROR"
340 SKX1           BVC   SKX2         ;BR-X2=0
341                LDX   #$50         ;SET X1,X2 BASE : LESS
                                       "ROR"
342 SKX2           STX   HGRBL        ;SAVE (LOW) ADDRESS
343                TAX                ;SAVE
344                AND   #$7          ;LEAVE "ZZZ"
345                ASL                ;(X)2, CARRY=0
```

```
346                 ASL                 ;(X)4, CARRY=0
347                 ADC   HRPAGE        ;+BASIC BASE
                                         $2000/$4000
348                 STA   HGRBH         ;SAVE (HIGH) ADDRESS
349                 TXA                 ;GET
350                 ROR                 ;SET UP FOR
351                 ROR                 ; Y3 IN CARRY
352                 ROR                 ; POSITION
353                 ROR                 ; Y3-->CARRY, Y1,Y2 LOW
                                         PART
354                 ROR   HGRBL         ;NOW HAVE Y3,XXXX,000
355 * ;AND THE CARRY IS CLEAR
356                 AND   #$3           ;JUST Y1,Y2
357                 ADC   HGRBH         ;SET IN HIGH,CARRY=0
358                 STA   HGRBH         ;SAVE OFF FINAL RESULT
359                 RTS                 ;LEST
360
361
362
363 EVODD          DFB   0             ;EVEN-ODD FLAG
364 BYT0           DFB   0             ;X COORDINATE OFFSET
365 BIT0           DFB   0             ;MASK FOR RIGHT BIT
366 BIT1           DFB   0             ;AND INVERSE
367 XS             DA    0
368 YS             DFB   0
369 SBY            DFB   0
370 BITL           DFB   0
371 MASK           DFB   0
372 SMASK          DFB   0
373 HRPAGE         DFB   $40
374 TEMP           DFB   0
375 PATTERN        DFB   $FF
376 NEWCOLOR       DFB   $00
377 TAB2           DFB   2
378                DFB   2
379                DFB   4
380                DFB   8
381                DFB   16
382                DFB   32
383 LBITL          DFB   64
384 LBITR          DFB   1
385 TABLE          DFB   3             ;BIT MASK TABLE
386                DFB   3
387                DFB   6
388                DFB   12
389                DFB   24
390                DFB   48
391                DFB   96
392 PATTAB         DFB   0             ;00000000
393                DFB   128           ;10000000
394                DFB   127           ;01111111
395                DFB   255           ;11111111
396 TEMP2          DFB   0
397 TEMP3          DFB   0
398 TEMP4          DFB   0
399 COLOR          DFB   0
400 COLCH          DFB   0
401 CPLUS1         DFB   22            ;WHERE VAR. PATTERN
                                         GOES
402 COLORTAB       DFB   $00,$00,$00,$00,$00,$00,$00,$00
403                DFB   $80,$80,$80,$80,$80,$80,$80,$80
404                DFB   $FF,$FF,$FF,$FF,$FF,$FF,$FF,$FF
405                DFB   $7F,$7F,$7F,$7F,$7F,$7F,$7F,$7F
406                DFB   $2A,$55,$2A,$55,$2A,$55,$2A,$55
407                DFB   $AA,$D5,$AA,$D5,$AA,$D5,$AA,$D5
408                DFB   $55,$2A,$55,$2A,$55,$2A,$55,$2A
409                DFB   $D5,$AA,$D5,$AA,$D5,$AA,$D5,$AA
410                DFB   $33,$66,$4C,$19,$4C,$19,$33,$66
411                DFB   $B3,$E6,$CC,$99,$CC,$99,$B3,$E6
412                DFB   $22,$44,$08,$11,$08,$11,$22,$44
413                DFB   $A2,$C4,$88,$91,$88,$91,$A2,$C4
414                DFB   $11,$22,$44,$08,$44,$08,$11,$22
415                DFB   $91,$A2,$C4,$88,$C4,$88,$91,$A2
416                DFB   $6E,$5D,$3B,$77,$3B,$77,$6E,$5D
417                DFB   $EE,$DD,$BB,$F7,$BB,$F7,$EE,$DD
418                DFB   $5D,$3B,$77,$6E,$77,$6E,$5D,$3B
419                DFB   $DD,$BB,$F7,$EE,$F7,$EE,$DD,$BB
420                DFB   $66,$4C,$19,$33,$19,$33,$66,$4C
421                DFB   $E6,$CC,$99,$B3,$99,$B3,$E6,$CC
422                DFB   $33,$66,$4C,$19,$4C,$19,$33,$66
423                DFB   $B3,$E6,$CC,$99,$CC,$99,$B3,$E6
424 SPCL           DFB   $FF,$00,$FF,$00,$00,$FF,$00,$FF
```


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Last month we entered the Monitor, wrote a very short machine language program, and examined memory directly. Our purpose was to see what happens when strings entered from the keyboard accumulate and threaten to take over the space of running programs. In the process we learned something about machine language. Even for a beginner, a bit of knowledge about machine language, including the ability to load, save, and move binary files, is good to have.

Understanding your Apple's memory map and how to manipulate binary files can help you get the most out of certain commercial packages. Take for example *The Graphics Magician* by Chris Jochumson, David Lubar, and Mark Pelczarski and *Electric Duet* by Paul Lutus.

Each package provides in its documentation a short Basic program for playing or displaying your work, but these programs are there mostly as examples. To do anything more complicated than demonstrate one song or picture at a time, you'll have to build on these programs, and that is where your grasp of memory maps, binary files, and hexadecimal numbering will come in handy.

Let's consider hexadecimal first. An understanding of this number system is important because it is the only number system that the Monitor understands. In addition, hexadecimal numbers sometimes appear in DOS commands.

The hexadecimal number system isn't as difficult to learn as it looks. Hexadecimal means base sixteen, and base sixteen works the same way as base ten except that there are sixteen digits in the basic set instead of ten. In base ten, the numerals zero through nine comprise the entire set of digits; after that, we begin counting sets. Twelve means one whole set plus two of a second set. In base sixteen, there are sixteen numerals in a set: zero through nine and A through F. If you had F golf balls, and you were to count them using base ten, you'd count fifteen of them. The number after F in hexadecimal is written 10. Yup, ten still represents one full set and the zeroth item of a second set.

To make it clear what number system we are using, we usually prefix a hexadecimal number with a dollar sign; 10 means ten in decimal, while $10—for hex ten—means sixteen in decimal.

The numeral 100 stands for one full set of sets, or one full set squared. In decimal, it's the number of yards on a football field. In hex, $100 is still one full set of sets; but translating to decimal, that means 256 or sixteen (one full set) times sixteen. Each place is worth sixteen decimal times the place to its right. (If you counted the yards in a football field in hex, there'd be $64—count 'em!)

Once you grasp the concept of bases other than ten, understanding hexadecimal isn't too difficult, but converting between the two systems in your head is still tedious and can lead to errors. Table 1 shows the conversion values for the decimal numbers 0 to 256.

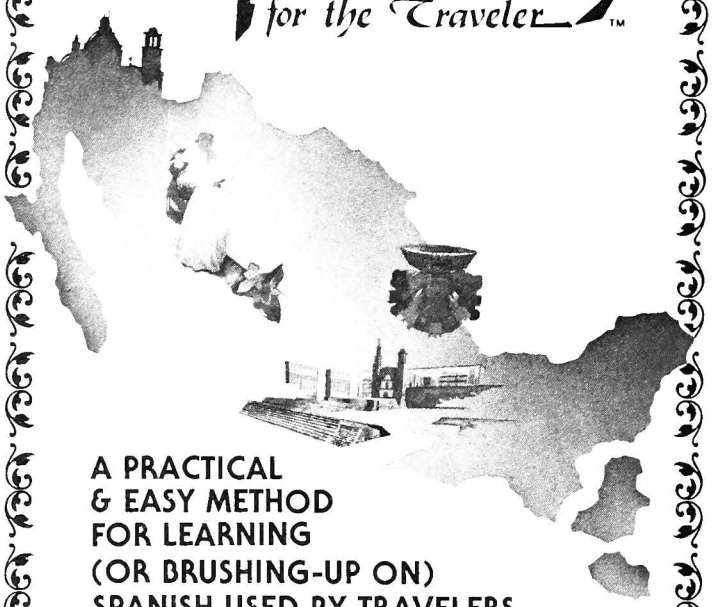
Place an initialized disk in your boot drive and turn on your Apple. It's a good idea to get into the habit of always booting your system with a disk in drive 1. The Apple's disk operating system (DOS), unfortunately, is not permanently in hardware as is Basic. You must load it from a disk every time you turn on the power. If you don't do that, you can't save any program you write (except on cassette, if you have a

Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex
00	$00	32	$20	64	$40	96	$60	128	$80	160	$A0	192	$C0	224	$E0
01	$01	33	$21	65	$41	97	$61	129	$81	161	$A1	193	$C1	225	$E1
02	$02	34	$22	66	$42	98	$62	130	$82	162	$A2	194	$C2	226	$E2
03	$03	35	$23	67	$43	99	$63	131	$83	163	$A3	195	$C3	227	$E3
04	$04	36	$24	68	$44	100	$64	132	$84	164	$A4	196	$C4	228	$E4
05	$05	37	$25	69	$45	101	$65	133	$85	165	$A5	197	$C5	229	$E5
06	$06	38	$26	70	$46	102	$66	134	$86	166	$A6	198	$C6	230	$E6
07	$07	39	$27	71	$47	103	$67	135	$87	167	$A7	199	$C7	231	$E7
08	$08	40	$28	72	$48	104	$68	136	$88	168	$A8	200	$C8	232	$E8
09	$09	41	$29	73	$49	105	$69	137	$89	169	$A9	201	$C9	233	$E9
10	$0A	42	$2A	74	$4A	106	$6A	138	$8A	170	$AA	202	$CA	234	$EA
11	$0B	43	$2B	75	$4B	107	$6B	139	$8B	171	$AB	203	$CB	235	$EB
12	$0C	44	$2C	76	$4C	108	$6C	140	$8C	172	$AC	204	$CC	236	$EC
13	$0D	45	$2D	77	$4D	109	$6D	141	$8D	173	$AD	205	$CD	237	$ED
14	$0E	46	$2E	78	$4E	110	$6E	142	$8E	174	$AE	206	$CE	238	$EE
15	$0F	47	$2F	79	$4F	111	$6F	143	$8F	175	$AF	207	$CF	239	$EF
16	$10	48	$30	80	$50	112	$70	144	$90	176	$B0	208	$D0	240	$F0
17	$11	49	$31	81	$51	113	$71	145	$91	177	$B1	209	$D1	241	$F1
18	$12	50	$32	82	$52	114	$72	146	$92	178	$B2	210	$D2	242	$F2
19	$13	51	$33	83	$53	115	$73	147	$93	179	$B3	211	$D3	243	$F3
20	$14	52	$34	84	$54	116	$74	148	$94	180	$B4	212	$D4	244	$F4
21	$15	53	$35	85	$55	117	$75	149	$95	181	$B5	213	$D5	245	$F5
22	$16	54	$36	86	$56	118	$76	150	$96	182	$B6	214	$D6	246	$F6
23	$17	55	$37	87	$57	119	$77	151	$97	183	$B7	215	$D7	247	$F7
24	$18	56	$38	88	$58	120	$78	152	$98	184	$B8	216	$D8	248	$F8
25	$19	57	$39	89	$59	121	$79	153	$99	185	$B9	217	$D9	249	$F9
26	$1A	58	$3A	90	$5A	122	$7A	154	$9A	186	$BA	218	$DA	250	$FA
27	$1B	59	$3B	91	$5B	123	$7B	155	$9B	187	$BB	219	$DB	251	$FB
28	$1C	60	$3C	92	$5C	124	$7C	156	$9C	188	$BC	220	$DC	252	$FC
29	$1D	61	$3D	93	$5D	125	$7D	157	$9D	189	$BD	221	$DD	253	$FD
30	$1E	62	$3E	94	$5E	126	$7E	158	$9E	190	$BE	222	$DE	254	$FE
31	$1F	63	$3F	95	$5F	127	$7F	159	$9F	191	$BF	223	$DF	255	$FF

Table 1. Decimal-to-hexadecimal conversion values.

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tape recorder handy).

Let's reuse that four-byte machine language program we wrote last month. It doesn't do anything but jump to a subroutine in ROM that rings a bell, but the techniques you use to manipulate this program are the same ones you need for working with the more complicated programs you find as part of the packages you purchase.

First, type *call −151*. The prompt should change from a bracket to an asterisk indicating that you're in the Monitor, where all the commands are expressed in hexadecimal numbers. Although we put the dollar sign symbol in front of a number to indicate that it's in hex notation when we're writing about it or issuing a DOS command, we don't use it in the Monitor because hex is the Monitor's native language. Type *9000.900F*. This is the Monitor command to list the instructions in the sixteen bytes of memory from $9000 to $900F. You'll get two lines that begin with 9000− and contain a bunch of pairs of numbers (what numbers depends on what your Apple's been up to). Now type:

```
9000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Each pair of zeros is separated from the next pair by one space. The colon after a memory location is the Monitor command to enter the next two digits in that location, the following two digits in the next location, and so on. Type *9000.900F* again. You should see that you've zeroed out these sixteen memory locations.

Now enter a program by typing *9000:20 DD FB 60*. Again list it to proofread it and make sure it's there. The command 20 is the machine language equivalent of gosub, while the command 60 is return. Location FBDD (64477) is a built-in Applesoft subroutine high up in memory that rings the bell once.

The number indicating a memory location requires two bytes. Because of an idiosyncracy of the microprocessor, the bytes must fall in reverse order. Thus location number $1357 is entered into memory as 57 13. Type *9000G*, and you should hear a beep from your speaker. The command G, for *go*, is the Monitor equivalent of run.

Now that we have a machine language program in memory, let's move it around. Type *0G* (zero G) to reenter Basic. If for some reason that doesn't work, hit reset; this won't erase your program. When you want to save a Basic program, typing *save* and the file name is enough because your Apple can hold only one Basic program at a time and keeps pointers in special places in its own memory to tell it where the program begins and ends. Machine language programs, however, can be anywhere, and there can be thousands of them in memory at a time. Therefore you can save them on a disk only if you can tell DOS which bytes in memory to save as a single program. You do this by typing *bsave*, to indicate that the file will contain a binary data or a machine language program, followed by the program's beginning memory address and, instead of its ending address, its length in bytes. Type:

```
BSAVE TEST, A$9000,L$4
```

and then check the catalog to make sure that it contains a binary file named Test. You can also use decimal notation for the address and length if you want by typing *A36864,L4* instead. In both cases a comma is needed after the name and between the address and the length.

Even though you can use decimal notation, there's an advantage to hex notation once you get used to it. Many machine language programs, including both *The Graphics Magician*'s drawing program and *Electric Duet*'s player program, are designed to use exactly—or else just under—some multiple of 256 ($100) bytes of memory. Apple's memory is divided into "pages," each of which is 100 hex bytes long (256 decimal). The memory addresses from $800 to $8FF, for example, are referred to as page 8, while the locations from $9000 to $90FF that contain our machine language program are on page 144, which is the decimal equivalent of $90.

A word of warning: On 48K Apples, DOS begins at $9600 (38400) and uses all of the remaining memory that's accessible to the user. Never put a machine language program above $95FF or you'll clobber DOS and may be unable to use your disk drive until you reboot.

When you save a binary file, you also save on the disk its beginning address and length, and the file will automatically reload in exactly the same memory locations you saved it from unless you specify otherwise. Now, reenter the Monitor with *call−151*. Erase your program with

9000: 00 00 00 00, and make sure by listing it with *9000.9003*. Load your file with the command *bload Test* and examine those four locations. They should contain your program.

Fortunately, you aren't limited to reloading a machine language program in the place from which you saved it. If you want to put your program on page 130 (beginning at $8200 or 33280), you include the address information in your load command and type *bload Test,A$8200* (or *A33280*). There's no need to specify the length. After you've done this, either enter the Monitor or *call 33280* to satisfy yourself that it worked.

Moving a machine language program, or any memory range, from one place to another by bsaving and bloading a file is probably the easiest way because you don't have to enter the Monitor. However, if you are in the Monitor anyway you can move memory around directly using the less than (<) sign and the letter M. To copy your program from $8200–$8203 to $1000–$1003, type (in the Monitor):

```
1000<8200.8203M
```

The destination comes first, followed by the current location. Note that the beginning and ending bytes must be specified here rather than the beginning byte and the length.

When you're using programs such as the two we've mentioned, you generally have to bload not only a picture-drawing or music-playing program but also one or more files containing the pictures to be drawn or the songs to be played. Then you have to be able to tell the drawing/playing program where in memory these files are.

Just for the sake of variety, instead of ringing the bell let's pretend that Applesoft's home routine, located at $FC58 (64600), is a picture or music file and that our machine language program that calls it is the drawing or playing program. Enter the Monitor, examine locations $8200 to $8203, which is one place we know this program still is, and change $8201 and $8202 to 58 and FC respectively. If you type *8200G* in the Monitor or return to Basic and type *call 64600*, your screen will clear and the cursor will go to the upper left corner. Since you've changed your machine language program, you need to save the new one on the disk in place of the old by again typing *bsave Test,A$8200,L$4*.

Turn your machine off and on again so that you know that all memory has been cleared. Now enter and run this program:

```
10 D$ = CHR$(4)
20 PRINT D$;"BLOAD TEST"
30 CALL 33280
```

Your drive should come on and then the screen should clear as the home command is executed.

Here's how the program works. Line 10 lets the string variable D$ become the same as control-D, which the computer understands as the number 4. (Remember, your Apple understands *everything* in numbers only.) Control-D is the indication to DOS to take what follows as one of its commands, rather than as an instruction to print something on the screen. The semicolon simply extends the print command to the next instruction, which is to load a binary file called Test. Since a binary file will load into the same memory location it was saved from unless you instruct otherwise, your machine language program is placed again in the first four bytes of page 130. The call command runs the machine language program at memory location 33280 (decimal) or $8200 (hex).

There's only one thing left to do before we can write an Applesoft program that will poke the address of the home command into a machine language program. We must figure out how to take one decimal number and divide it into two decimal numbers whose hex equivalents, when combined into one hex number, will be the hex equivalent of the original decimal number.

Using, for example, the location of the home subroutine, 64600, we can first note that its hex equivalent is FC58. As we did previously, we will poke this into memory backward with 58 going into the lower byte and FC into the next higher one. For any decimal number, L, we get the decimal value for the low order byte from the formula:

```
L – (INT(L/256)*256)
```

and that of the high order byte from the formula:

```
INT(L/256)
```

Using these formulas on 64600, we get 88 and 252 respectively. The hex equivalent of the latter is $FC, while that of the former is $58, which, when combined in correct order, becomes $FC58.

Now, since you may be a bit confused by the fragmented instruction, let's do a Basic program from scratch that will clear the screen, ring the bell, and turn on inverse or flashing mode or whatever depending on what numbers you poke into the example machine language program. The only new command is the one in line 20 that tells DOS to display the input and output commands it receives from the program so you'll know what's going on. Type:

```
NEW
10 D$ = CHR$(4)
20 PRINT D$;"MON C,I,O"
30 INPUT "ENTER A DECIMAL ENTRY POINT";L
40 PRINT D$;"BLOAD TEST,A$9000"
50 POKE 36865, L – (INT(L/256))*256
60 POKE 36866, INT(L/256)
70 CALL 36864
```

When you run this program, the binary file named Test, which contains your four-byte machine language program, will be loaded into locations $9000 through $9003 (36864–36867). The values in two locations in the program, $9001 and $9002 (36865 and 36866), are then changed to the hex numbers that can be combined to form the hex equivalent of the decimal number you'll enter from the keyboard when the input statement prompts you. When your Basic program calls your machine language program, it immediately jumps to the location you've poked into it and executes the machine language program it finds there.

When you first run the program, enter *64600*, and your screen will clear. To make it do something else, let L equal the entry point for a different routine. Some of these for a 48K Apple are: turn on lo-res graphics, 62352; print a question mark, 56154; ring the bell, 64477; print inverse characters, 62071; print flashing characters, 62080; and return to normal characters, 62067. After being in flashing mode, you may have to return to ordinary text mode manually with the command *normal* from the keyboard before the program will run again.

Except for the location numbers, this is the program needed to use fully the graphics and music packages and a number of other packages as well. It's short, simple, and, when you know what you're doing, not nearly as frightening as it looks in the instruction manuals. ■

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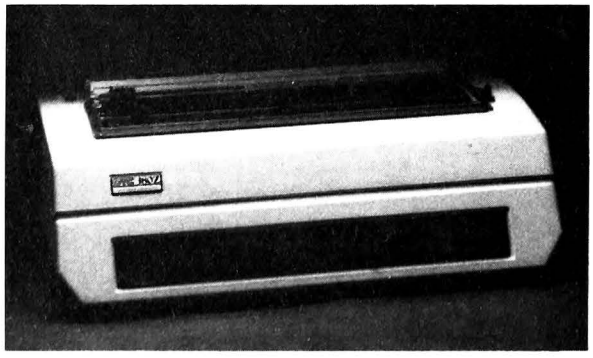
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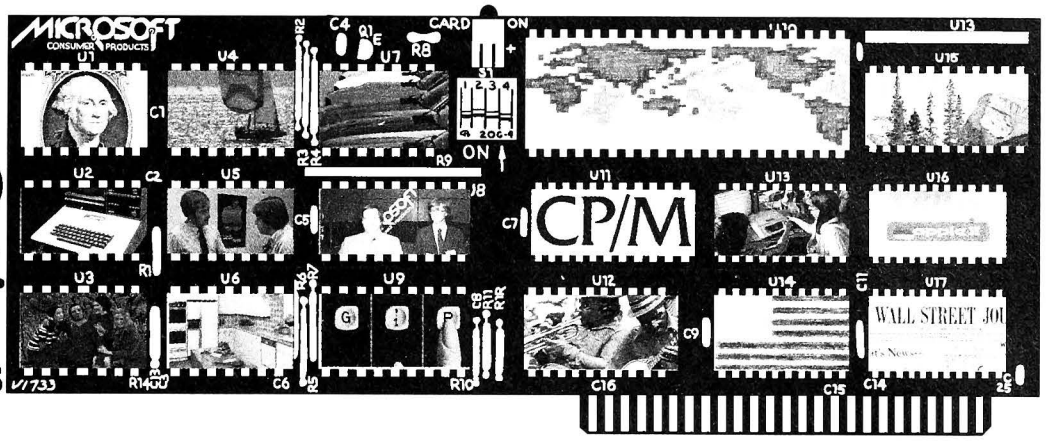
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SOFTCARD Symposium

by Greg Tibbetts



Welcome to Symposium for February.

Review. When we wound up our discussion last month, we had just finished describing in general the BIOS character I/O process. Before picking up where we left off, let's briefly review what we covered so it will be fresh in our minds.

As we discussed, BDOS communicates with the hardware by means of seven BIOS functions. These functions correspond to the seven character I/O routines in the BIOS—CONST, CONIN, CONOUT, PUNCH, READER, LISTST, and LIST. As far as BIOS is concerned, these seven routines represent only four logical devices; namely, Console, Punch, Reader, and List, which can be abbreviated CON:, PUN:, RDR:, and LST:.

We learned that while BDOS only knows of four logical devices we can actually deal with more than four by having BIOS combine several physical device drivers into each of the seven logical device routines. To tell BIOS which physical device to access when each routine is called, we use the IOBYTE. We said that the *device mapping,* as the IOBYTE concept is referred to, can be altered by STAT and that BDOS is unaware of either the change in output or the current value of the IOBYTE.

Finally, we discovered that each BIOS character I/O routine determines the physical device driver routine to use by getting its specific two-bit field from the IOBYTE and decoding it. Based on the value found, the routine selects one of eleven vector addresses from the I/O vector table in the IOCB. Each table entry is the starting address of the actual physical device driver to be used. These vectors are the means by which you can modify the BIOS character I/O routines; this is done by changing them to point at your own drivers rather than at the standard drivers in the BIOS.

We discovered one negative element in all this. Of the eleven possible physical devices named in the system—TTY:, CRT:, UC1:, PTR:, UR1:, UR2:, PTP:, UP1:, UP2:, LPT:, and UL1:—only eight separate devices are allowed in SoftCard CP/M. This is so because three pairs of physical device names (TTY: and CRT:, UR1: and UR2:, and UP1: and UP2:) share the same vector and are therefore a single device. For purposes of simplification, we'll refer to these as TTY:, URx:, and UPx:, respectively.

There's one more thing before we proceed. A while back we discussed the patch area in the BIOS, which is mentioned in your SoftCard manual on page 2-18. This area is made up of three 128-byte areas of memory. The first one (0F200H–0F27FH) is for BDOS's LST: device, the second (0F280H–0F2FFH) is for the PUN: and RDR: devices, and the third (0F300H–0F37FH) is for the CON: device. (The SoftCard manual actually says TTY: instead of CON:, but TTY: is a physical device and these areas correspond to logical devices.)

The purpose of these areas is to provide you with protected space in which to install your own driver routines, alterations to BIOS operations, and other handy stuff. Actually, there's no real restriction on which areas are used for what device, since BIOS is not even aware of the areas' existence. There is a restriction, however, on part of the console patch area. In the last part of this area (from 0F34AH to 0F37FH), Version 2.20B of the BIOS contains corrections for errors in CONST, CONIN, and CONOUT, the three console device routines.

Your usable space, therefore, ends at 0F349H. In the course of this next series of articles, we'll be pointing these patches out.

Enough of Old Stuff, On with the New. This month we'll begin looking in detail at the BIOS character I/O routines in order to find out how the various hardware devices are driven. We won't finish dealing with this subject in one column; two or more may not even be sufficient to cover it. Our approach, therefore, will be to go each month until we run out of space and then pick up the following month where we left off.

One word of warning here. Although no complete source code will be shown, addresses for some specific routines may be given. We aren't at a point yet, however, where you'll be given tested alterations and/or programs to remove and replace the system tracks of your disk. So if you decide to experiment, be sure you have backups of the disks you use. Although zapping a disk is not a common result of an error in the charactor I/O routines, when you're modifying code in the operating system, there's always that risk.

Our starting point this time will be the logical Console device routines. The Console device is used by BDOS for communication with the user, normally via the keyboard and the screen. Of the four physical device names that can be assigned to CON:, only two are actually physical devices. They are TTY: (remember, this is both TTY: and CRT:) and UC1:. BAT:, as we said last month, simply assigns Console input to the logical RDR: device and Console output to the logical LST: device.

In SoftCard CP/M the TTY: device is implemented as the normal keyboard and screen and is the default IOBYTE assignment. UC1:, on the other hand, is the physical device that it's possible to implement as a special device driver of your own.

The TTY: device uses Console Input Vector #1 and Console Output Vector #1 in the vector table, while UC1: uses the #2 input and output vectors. Altering the #2 vector addresses, therefore, makes it possible to implement UC1: as a previously unknown device. Since the UC1: device is not implemented when the SoftCard is shipped, the #2 Console vectors have the same value as the #1 vectors. As shipped, then, UC1: operates just like TTY:; the reason for this is to prevent the system from hanging if the user should experimentally assign CON:=UC1: without having implemented it.

Since UC1: is reserved to be a user-defined device, the TTY: device drivers must be capable of handling all other Apple keyboard/display combinations, including both the standard Apple console (the forty-column display and the Apple keyboard) and such external console hardware as terminals, eighty-column cards, and so on. Therefore, regardless of what type of hardware you're using, all of your console I/O is being handled by the TTY: device drivers through the #1 Console vectors.

Obviously, this same driver can't handle both types of hardware. If nothing else, the addresses to operate a card in slot 3 differ from the addresses of the standard Apple keyboard and screen. It seems as though there must be some fancy footwork going on here, and, in fact, there is. It

happens during the BOOT process, and is performed by the initialization routines we discussed a couple of months ago in our series on the BOOT code. If slot 3 contains an eighty-column card, a serial card, or an Apple Communications card, then certain addresses in the TTY: device drivers in each of the three Console devices (CONST, CONIN, and CONOUT) are patched during BOOT to match the actual hardware that is present. As we'll see when we examine these routines, the addresses altered are those that point to the memory-mapped hardware area from 0E000H to 0EFFFH (6502 $C000 to $CFFF).

Setting up the TTY: device to handle both types of keyboard/screen combinations was a design choice. The CON: device could have been implemented so that TTY: was just the native Apple hardware and UC1: was any eighty-column device installed in slot 3. Had things been done that way, the user could have switched between the forty-column and eighty-column screens simply by changing the IOBYTE. Unfortunately, this would also have eliminated any chance for users to implement their own console devices, since both possible devices would have been used. User expandability was deemed more important than an easy ability to switch between screen formats; and, while doing the latter is not impossible, BOOT's alteration of the BIOS routines makes it difficult.

Let's take a look now at the various devices that the console service routines may have to deal with. Besides supporting the standard Apple hardware, SoftCard CP/M allows three additional console device interfaces—an eighty-column board, a serial interface, and the serial portion of an Apple Communications card. Since SoftCard CP/M requires that these devices be in slot 3, we can count on their access routines being in specific places. Also, since the eighty-column cards that are supported are, from the BIOS's point of view, identical to serial cards, we can treat them as serial cards for our purposes.

With those facts in mind, we now know that we need routines for Apple hardware, serial cards, and the comm card. Since we must test the status of, read from, and write to these cards, we know that we will need a total of nine actual hardware device drivers to accomplish the three console functions. We'll point these drivers out as we discuss the three routines.

The first console routine we'll look at is *console status*, which is known by the label CONST. The Digital Research criteria for CONST states that CONST's function when called by BDOS or another routine is to determine whether or not a character is ready at the physical device currently assigned to CON:. If a character is available, CONST is to return to the routine calling it (which is usually BDOS) with the value 0FFH in the [A] register. If a character is not available, CONST is to return to the calling routine, placing the value 00 in the [A] register. The physical device here is normally the keyboard; therefore, what CONST is usually doing is checking to see whether a key has been pressed since the last keyboard input was accepted.

As stated, we'll need to make allowances for all three types of devices, depending on whether a card is installed in slot 3 and, if so, what type it is. In the case of the CONST routine, the method for determining if a character is ready stays pretty much the same regardless of the kind of card that is or isn't in slot 3, but the addresses used are different. Let's look at how they differ.

As you can see from your Apple reference manual, the Apple keyboard indicates that a key has been pressed by altering the value in the memory-mapped hardware location known as the *keyboard strobe*. To the Z-80, the keyboard strobe is at memory location 0E000H. When a key is pressed, the parity bit of the keyboard strobe is set. (The *parity bit* on any eight-bit value is always the highest order bit; bit 7. To "set" a bit is to make it a 1; to reset it is to make it a 0. Simple, no?) Now, when the parity bit of an eight-bit number is set, the value of that number exceeds 127, since the binary number 10000000B is 128. What we are checking to see, therefore, is whether the keyboard strobe value exceeds 127.

A similar process occurs when a card in slot 3 has a character available. Both serial and comm card interfaces also set a bit in one of the bytes in their address space (for serial cards, this is the parity bit; for comm cards, it's bit 0). The address of the byte altered will actually correspond to one of the card's data or strobe registers, rather than to memory.

Each slot on the Apple has two areas of address space assigned to it—a scratchpad space of sixteen bytes between 0E080H and 0E0FFH and a 256-byte page of space between 0E100H and 0E7FFH. The scratchpad space, normally used for hardware registers or strobe locations, is set up so that for slot *n* the space is 0E0*x*0H−0E0*x*FH where *x* = *n* + 8H (for slot 3, *x* = 0BH). The page of space, usually used for ROMs on the card, is set up so that for slot *n* the space is 0E*n*00H−0E*n*FFH.

With both types of interfaces we're looking at here, the strobe register also called control register, is in fact in the scratchpad space—0E0BEH, to be exact. CONST must therefore check 0E000H for Apple hardware and 0E0BEH for external console devices, such as serial cards and comm cards. It must check the parity bit for Apple hardware or serial cards and bit 0 for comm cards.

CONST accomplishes this by means of two subroutines, one at 0DB0CH (labeled CONST1), which is part of the character I/O routines, and the other at 0F34AH (labeled STSPAT), which is one of the version 2.20B corrections mentioned earlier.

The STSPAT subroutine corrects a problem with comm cards wherein the parity bit was being read in place of bit 0. The correction was implemented by installing STSPAT in the patch area and changing the Console Status Vector address (in the vector table) to be the start of STSPAT rather than the start of CONST1. Since the CONST routine's first activity is a jump to the address contained in this vector, control always goes to the correction first.

STSPAT solves the problem by checking the slot table to see if a comm card is installed. If a comm card is found, STSPAT loads the card's status byte (0E0BEH, remember?) and checks to see whether bit 0 is set. Based on the result, STSPAT makes the value in the [A] register either 0FFH or 00 to fulfill the BDOS criteria and then returns directly to BDOS.

If no comm card is found, control goes to CONST1, where a status byte is loaded. The address of the status byte is the one that BOOT alters during the initialization process. The address starts out at E000H and is changed to 0E0BEH if any card is found in slot 3.

CONST1 checks the status byte for a parity bit. Just like STSPAT, CONST1 alters the value of [A], depending on the result, before returning to BDOS. And that's all there is to CONST.

The second routine we'll talk about is CONIN. It's considerably longer and somewhat more complex than CONST but certainly no harder to understand.

The CP/M design criteria indicates that when CONIN is called it must not return until it has received a character from the current console device. When it has gotten the character, it must place it in the [A] register and reset the parity bit. This resetting of the parity bit is CP/M's way of ensuring that ASCII character data won't be misinterpreted in future transfers or internal operations, since all ASCII characters can be represented by the seven low-order bits.

Like CONST, CONIN must also be capable of dealing with all three types of hardware. This is accomplished in the same way in CONIN as it is in CONST; BOOT alters an address in the TTY: driver. Unlike CONST, CONIN has more than one function to perform, however. First, it must get the character of input; second, it must check to see if this is a character the user wishes to have redefined. This keyboard redefinition is mentioned in your manual on page 2-17. To get the input, CONIN calls a subroutine at 0DB50H (labeled CNIN2) that actually reads the character. Then, when control returns to CONIN, any necessary redefinition will be done. Let's examine the character input function first.

It is CNIN2 that looks at the IOBYTE and decides which device driver is to be used. It is important to note that CNIN2 was called and not jumped to, meaning that, regardless of which driver is used, control will eventually return to CONIN. CNIN2 first checks its field of the IOBYTE (bits 0 and 1), which will indicate TTY:, UC1:, or BAT:. We'll look first at BAT:.

If batch mode is in effect, the CP/M design criteria dictates that it is supposed to get its input from whatever physical device the logical reader device is attached to. To do this it should jump to the READER routine, where the reader bits of the IOBYTE could be checked to see which physical reader device (TTY:, RDR:, or URx) is in use. Instead, how-

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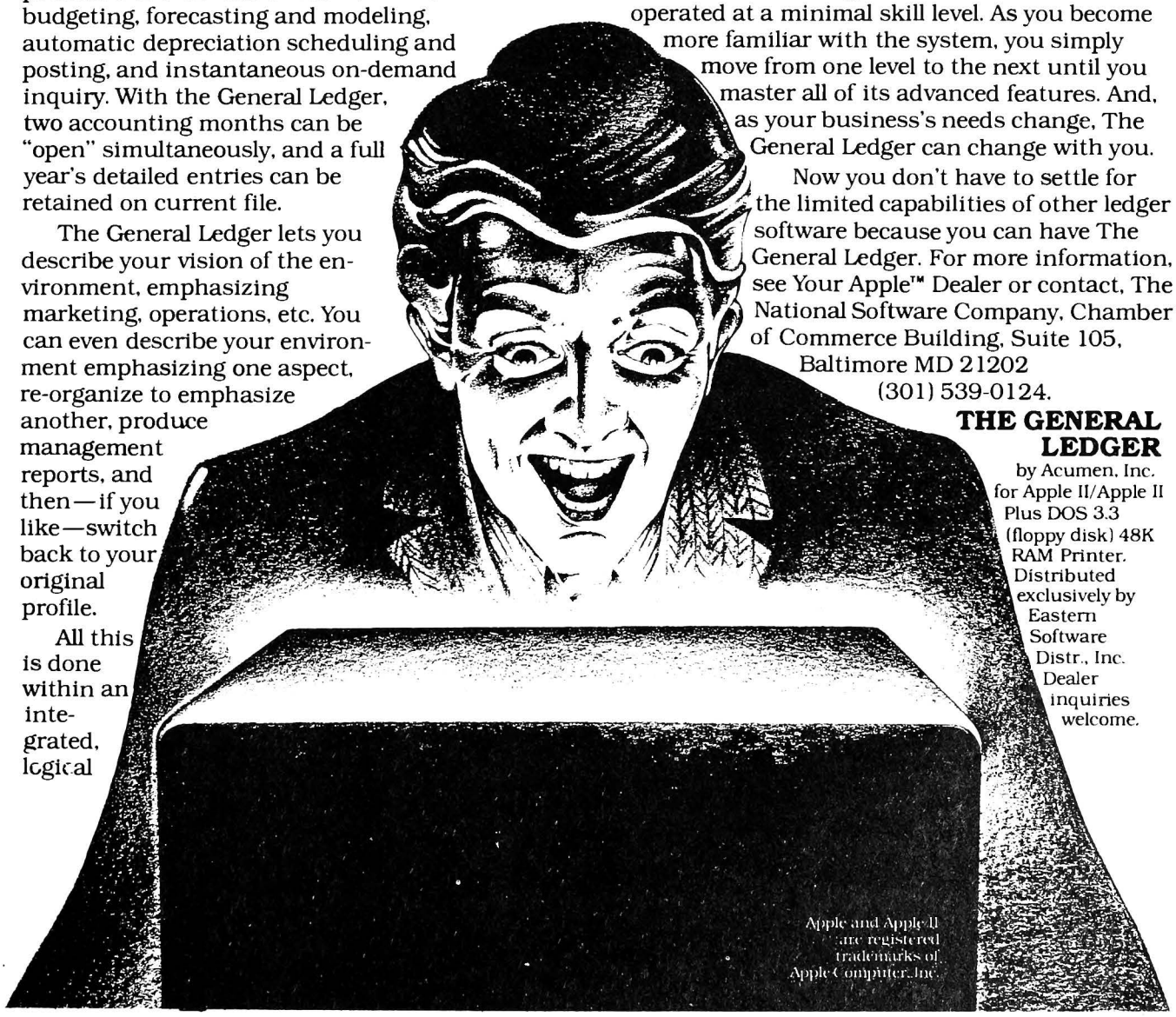
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ever, BAT: jumps to the address contained in Reader Input Vector #1 (in the vector table). That address corresponds to the physical RDR: device driver, and, consequently, batch mode input will only come from this device. (This is a bug that can be fixed easily, but rather than take time to do that now we'll come back to it later on.) If batch mode is in effect and the jump to the RDR: device driver takes place, the flow is identical to the flow that occurs through the READER routine, so we'll leave it until our later discussion of READER and move on to what CNIN2 does for TTY: and UC1:, the other two physical Console devices.

If the IOBYTE isn't set for batch mode, CNIN2 checks it for the value of either TTY: or UC1:. For TTY:, CNIN2 jumps to the address contained in the #1 Console vector, while for UC1: it jumps to the #2 vector address. The #1 vector should contain the start address of the TTY: device driver TTYIN1 at 0DB29H. However, another 2.20B correction made it necessary to change this address to 0F358H, which is the address of INPPAT, the second correction routine in the patch area.

The INPPAT routine was installed to correct the problem of the parity bit not being reset if the character came from a device in slot 3.

Unlike STSPAT, which may never execute the standard driver, INPPAT calls TTYIN1 itself to get the character. When the character comes back, INPPAT simply resets the parity bit before returning control to CONIN.

Earlier we said that UC1: and TTY: have the same function when the SoftCard is shipped. In the case of version 2.20B, this is not technically true. While both devices use TTYIN1, INPPAT's starting address was only placed in the #1 vector and not the #2, meaning that UC1: is prone to error. But, since you won't be seriously using UC1: without altering the vectors yourself, this shouldn't be a problem. In either case, then, TTYIN1 is the device driver used to get keyboard input. As such, it is the driver modified by the initialization routines during BOOT.

When it executes, TTYIN1 sets a register equal to the console device slot, slot 3, and then ordinarily jumps to a routine called RDKB at 0DB2FH. That address is changed by BOOT, however, if there's a usable card in slot 3. In that case, BOOT identifies the card as either a serial card or a comm card and changes the address TTYIN1 jumps to—either to RSER at 0DD1CH, the address of the serial read routine; or to RCOM at 0DD12H, the comm card read routine. Let's examine these three routines in order.

The routine RDKB is reasonably short. Obviously, since the Apple hardware is in use, RDKB ignores the slot 3 value in the register. The routine loads the keyboard strobe value from 0E000H into register [A] and checks for a keypress by testing the parity bit, just as CONST did. If the parity bit is clear, RDKB keeps looping (reexecuting that same code) until a key is pressed. Once the parity bit has been set, RDKB knows a key has been pressed so it clears the keyboard strobe by writing a value into address 0E010H. This address is another register in the scratchpad space that, when accessed, tells the Apple hardware to clear the parity bit at 0E000H. This process works with any value written to 0E010H, since the write itself is all that is required.

RDKB uses the value it just loaded into [A] from the keyboard strobe. This value is also the character just typed in at the keyboard, since the keyboard strobe serves two purposes—it indicates that a key is pressed and contains the character value in the lower-order seven bits. Once the strobe has been cleared, the parity bit of the character value in [A] is reset in accordance with BDOS criteria and an RET instruction is executed, returning control to INPPAT.

RCOM operates in much the same way as the RDKB routine. All accessing of data is done by dealing only with the hardware registers in the scratchpad space.

The hardware status register (which is similar to the keyboard strobe) is, as we already know, at 0E0BEH for a comm card in slot 3. Unlike the keyboard strobe, however, the status register doesn't contain the character itself. The character is stored in a separate data register situated one location beyond it at 0E0BFH. RCOM, then, waits for a character by continually checking the status register's bit 0 and looping until this bit is set. When that occurs, which means that a character is ready, RCOM reads the character from the data register into register [A] and returns to INPPAT.

RSER obtains its character in a different way than the other two routines do. Because getting a character from either a serial card or an eighty-column card is a more complex undertaking, RSER performs its function by calling the input routine that's contained in ROM on the card itself. Since this ROM contains 6502 code, RSER must activate the 6502 and allow it to make the call. The address to call is the same whether the card is a true serial interface or an eighty-column card looking like a serial interface.

Both types of cards use something that is known colloquially as a *C800 ROM*. What this means is that these cards require more ROM space than the 256 bytes allotted to them in their memory-mapped I/O space. This possibility was allowed for when the Apple was designed by making the last half of the I/O space—from 6502 $C800 to $CFFF—an area to be shared by all the cards. To make use of this area of memory, a card must first stop any other card from using it and must then activate its own use of the area. This process is known as *disabling* and *enabling* the C800 ROM.

A card that wishes to use the shared memory area disables the C800 ROMs of all other cards by reading address $CFFF and enables its own by accessing location $CFFF, its first ROM address. Besides the C800 ROM activity, certain memory addresses that the serial card input routine will use must be initialized. Known as *temporaries,* these addresses are in the 6502 page zero and are used by the ROM to get the value to be sent to the card or to store the value that is read from it. RSER performs these tasks by calling SER1, a setup subroutine at 0DCEEH.

SER1 uses the register containing the slot number to calculate the addresses it needs to do the initializations. Once that's been accomplished, SER1 returns control to RSER, which enables the 6502 and calls the serial card ROM input routine at $C84D. When control returns to the Z-80 and RSER, RSER loads the newly read byte of data from the page zero temporary at location $678 + *n*, where *n* = slot number = 3. It then returns to INPPAT.

Now that we've covered these three read routines, it's important to note that RDKB won't be encountered again, since no other BIOS routine uses it. RSER and RCOM, however, are used by other device drivers to get and send data to serial and comm cards in other slots. This is why these routines need the slot number and don't simply assume the use of slot 3. In any case, when we encounter RSER and RCOM in other device drivers, we'll only reference them by name and won't cover them in detail again.

To finish our discussion of CONIN, we have just returned to INPPAT from one of our three driver routines. If we got the character from RSER or RCOM, its parity bit won't necessarily have been cleared. We don't want those two routines to clear the parity bit automatically because, in some cases, other devices using the routines may require the parity bit to be set for data verification.

INPPAT then, finishes the function of getting the character by clearing the parity bit and returning to CONIN. It is at this point that CONIN checks for and performs any keyboard redefinition the user has called for. In the SoftCard manual, the redefinition table is mentioned as being made up of six two-byte pairs, with the first byte being the character you wish to alter and the second being the character you wish to substitute for the first one. CONIN accesses this table now, checking the character it has just received against the first character of each of the two-byte pairs. If no match is found by the time CONIN reaches the end of the table (designated either by six pairs of bytes being examined or by a 0FFH value in the first byte), it returns to the program calling it (usually BDOS) with the character it received, as is, in register [A]. If, on the other hand, a match is found, the second character byte from that entry in the table is loaded into [A] and CONIN returns with that character instead.

This completes our discussion of the CONIN function.

The final console driver routine is CONOUT. It is by far the most complex of the driver routines, since it must handle not only straight character data but also all the screen functions, such as homing the cursor, clearing the screen, and so on. We'll defer our discussion until next month. At that time, when we finish talking about the console I/O routines, we'll also provide the correction we mentioned (to ensure that the logical READER routine and not the physical RDR: device is used during batch processing). Until next month. . . . ■

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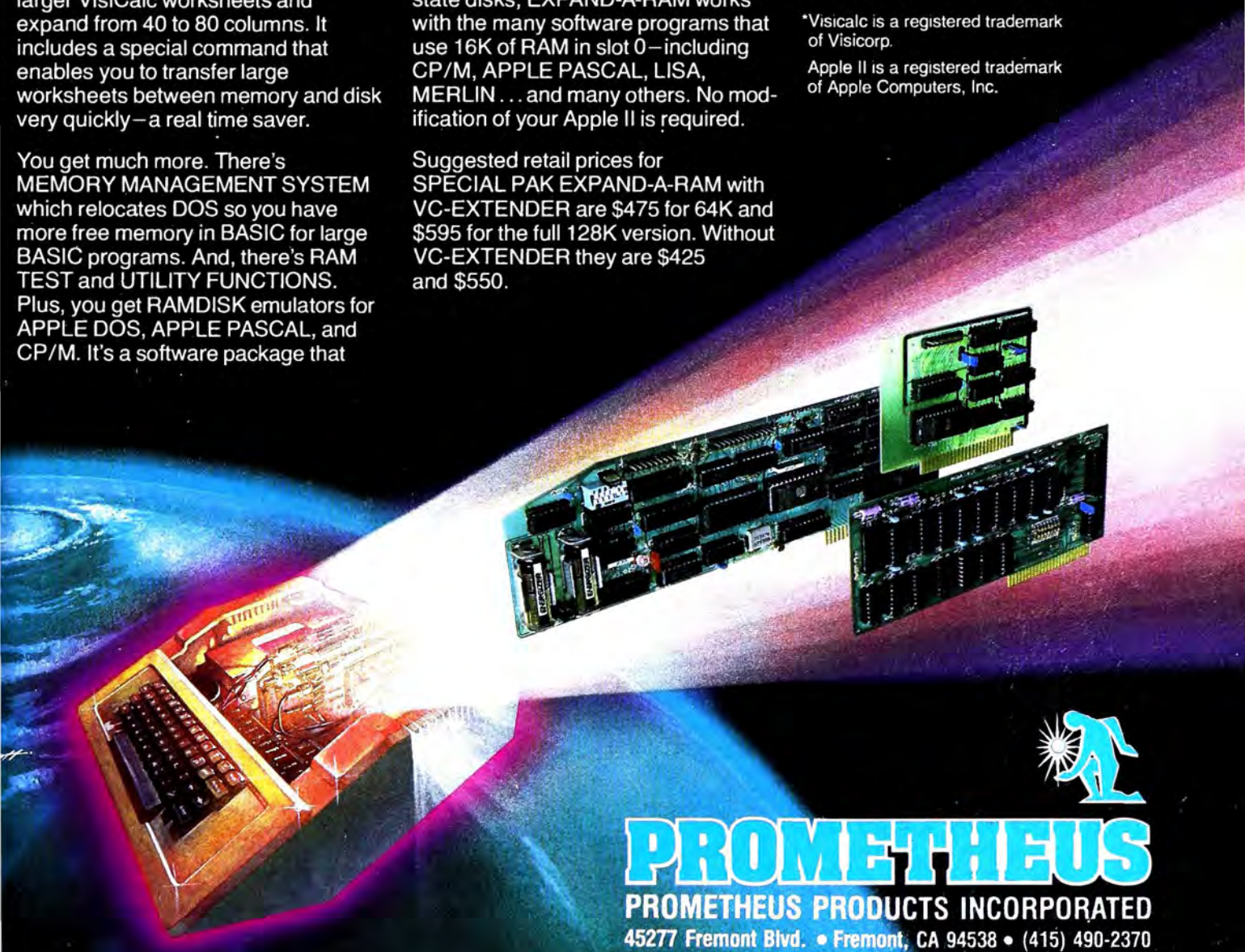
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INTERACTIVE ELECTRONIC WORKSHEET **YES**

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"NAMING" OF CELLS OR AREAS **NO**

PLAIN ENGLISH PROMPTS **NO**

INDIVIDUAL COLUMN WIDTHS **NO**

EXTENSIVE FORMATTING CAPABILITIES **NO**

PROTECTED CELLS **NO**

MULTIPLE, LINKED WORKSHEETS **NO**

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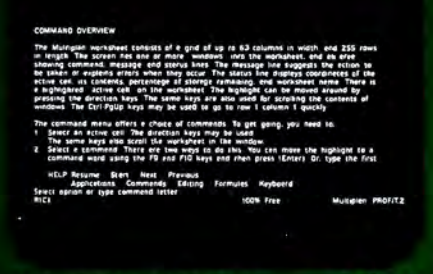
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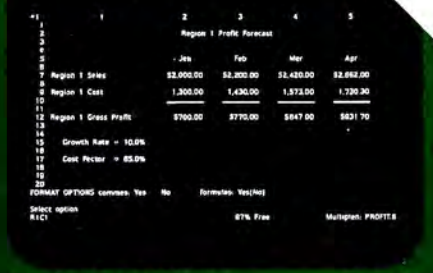
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INDIVIDUAL COLUMN WIDTHS **YES**



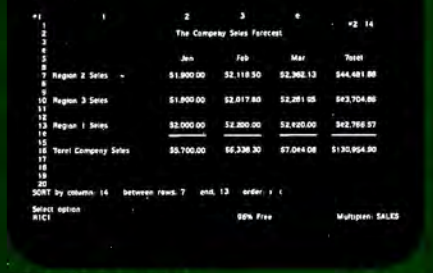
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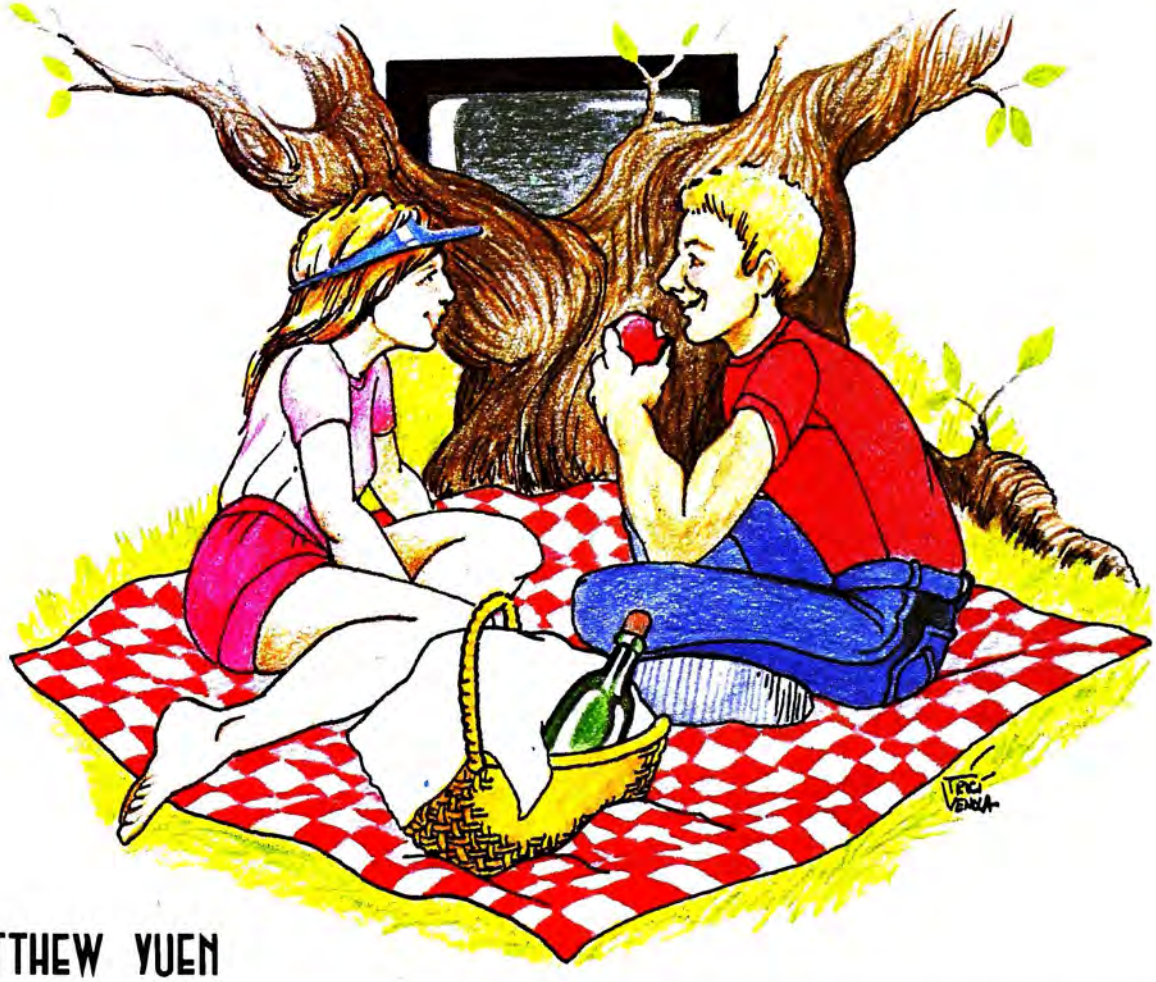
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Some Computers Shoot Electronic Arrows



BY MATTHEW YUEN

Clark's not the shy type. When he makes a move for a young lady, he aims straight for the heartstrings.

To: Linn842
From: Clark347
Subject: Us
Hi, Linn! Do you like Long Island Iced Teas? How about evening drives on the beach? Or maybe just the two of us spending the weekend at the Riviera? Sound good? If so, drop me a note in my mailbox, and we can arrange a rendezvous.

Linn's the romantic type. Sipping drinks on the back porch of a beach house, cruising down the beach in a Maserati, and flying to the French Riviera are just her bag. She's one high-class lady.

To: Clark347
From: Linn842
Subject: Yes!
Oh, Clark, you really know how to treat a lady. I just read your letter, and everything sounds great—especially the Riviera! Of course, we don't have to do all this at once; let's spread it out. What shall we do first?

Time Is on My Side. At last, Clark has found himself a mate. After days turning to weeks, weeks turning to months, his patience has paid off. Look out, Linn, here comes a man whose generosity knows no bounds.

To: Linn842
From: Clark347
Subject: It's a date.
Right on! I was so glad to see your letter in my box today. I really don't care what we do first. I just received a whole box of instant iced tea from my cousin in Long Island. My '73 Toyota will handle the beach, but you'll have to bring gas money.
And I'm glad to hear you like the Riviera. What say we plan for next weekend there? The Riviera Trailer Town is in Fairdale, just a two-hour drive from here. There are bowling alleys, duck farms, and really keen rust museums nearby. We'll have a swell time. When should I pick you up?

Before hanging up his modem, Clark decided to glance through the

public message section of the bulletin board service he was on, the same one on which he had just made a date with Linn.

Hello, Dolly! That's the latest in the continuing story of Clark and Linn. The initial meeting and everything else in between all took place during the past few months. The funny thing is, Clark and Linn have never actually met. They "met" on a bulletin board service (BBS) through the miracle of modem. But it's not just your ordinary BBS.

This one's called Dial-Your-Match, from Matchmaker Enterprises.

Based in Burbank, California, Dial-Your-Match was born not quite a year and a half ago. Today, there are more than a dozen of them operating across the country and even one in France.

You connect yourself to Dial-Your-Match the same way you would to any other BBS; just dial the telephone number with a modem. But that's where the similarities end. True, there are the public message board and electronic mail functions that you find on most other BBSs, but it's how they're used that makes the difference.

Dial-Your-Match has only one purpose—to get people together. Though its name implies that this is a computer-dating service, it can also be used as a way to begin pen-pal relationships or special interest groups. But almost any user of the system will tell you that he or she is there to pep up the old social life.

Bewitched, Booted, and Bewildered. To find out more about Dial-Your-Match, let's go back a few months and see how Clark and Linn first got together.

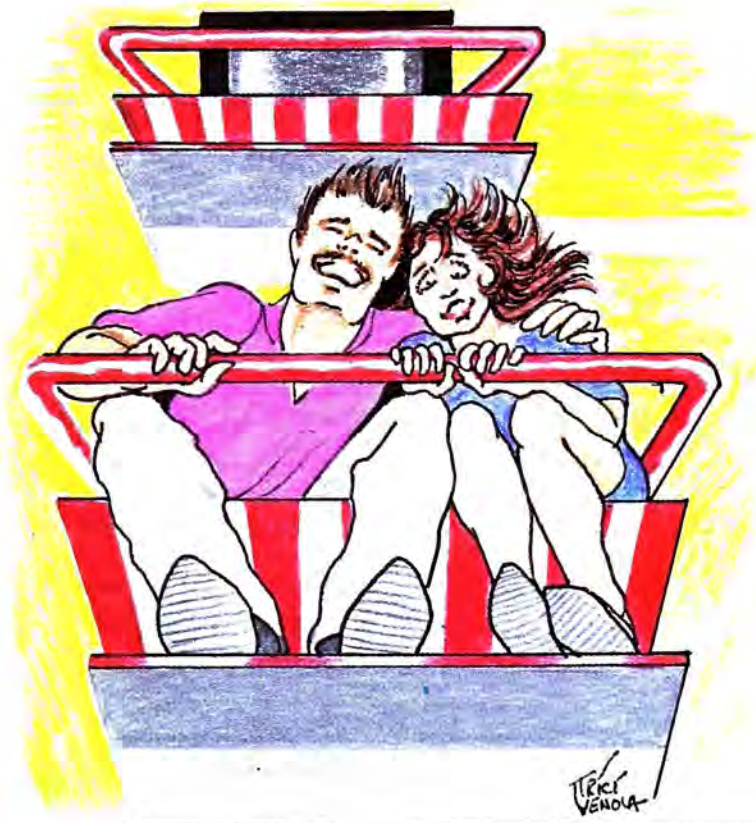
When you first log onto the system, the first thing you have to do is fill out a questionnaire. After asking your name, city, and state and a brief physical description of yourself, the questions range from "What type of music do you enjoy most?" to "What kind of relationship are you looking for?" Don't worry; it's a multiple-choice questionnaire, so if you're stuck for answers you get to pick.

Once Clark has answered the twenty or so questions, his questionnaire is filed to disk and he is assigned a password and address code. The address consists of his name (or handle) followed by two to four numbers. For instance, if Clark prefers to be called Clark, his address code might be "Clark347." On the other hand, Doug is rather shy, so he enters "Big-D" as his handle and becomes Big-D771.

The password allows you to log on without having to fill out a questionnaire each time. It also ensures that only you can read the mail that's addressed to you. Upon entering your password, Dial-Your-Match updates the logbook and then immediately lets you know whether or not you have mail waiting.

Clark is now in the Matchmaker's den. For first-time callers, the most obvious command to use is Matchmaker, make me a match. The match command will match Clark with other callers in the "date-a-base." Dial-Your-Match searches through every other person who has called the system in its attempt to find the perfect match, beginning with the caller who logged on the system the earliest. When it finds a compatible match, it prints out the address code, percent match-up, age, state, and sexual preference of that person.

Clark now has a list of prospective matches. Next, he can use the browse command to look at their questionnaires to see how they answered each question. Does she smoke? Does she like classical music? What are her favorite hobbies? It's all there at the press of a key. Browsing the questionnaires of potential matches will tell you how many times they called, how many days ago they called last, and how many vacant mail slots they have. From this information, you can figure out whether or not the person you're interested in is an active caller or one who called just a few times and not much else after that.



Please Allow Me To Introduce Myself. If Clark finds someone who looks interesting, it's up to him to let his presence be known. Linn842 looks pretty compatible. The most logical way to contact her is to send her a private letter. Dial-Your-Match first checks her mailbox to see if there are any open slots for his letter.

Each user is given five mail slots. When those are filled, that person cannot receive any more mail until he or she reads and deletes the letters that are there. If you're attempting to send a letter to someone whose mailbox is full, the message "Sorry, Gail already has five letters" appears.

Seeing that Linn has one more open slot, Clark sends her the following letter.

To: Linn842
From: Clark347
Subject: Hello!

Greetings from northern California! I recently read your questionnaire after being matched with you 74 percent, and I would like to talk with you. I

don't know whether or not you have read my questionnaire. If you haven't, please do so and decide if you want to talk. I'm twenty-three, single, and have brown hair and brown eyes. I'm 5' 9" and 160 pounds. Palo Alto is a few miles north of San Jose. Hope to hear from you soon. Clark347.

The next time Linn calls up, she will be able to read her letters, Clark's among them. But suppose Linn didn't have any free mail slots. Clark could wait and call back a few days later and hope that by then she would have cleared her mailbox, but he doesn't have to.

The public message board is where callers can leave messages for the general public. Messages range from discussion of singles' activities to jokes. David644, for instance, keeps the general public aware of what's happening on *Late Night with David Letterman*:

To: All
From: David644
Subject: David Lettermaniacs

Hey, did everybody see the elevator races on Late Night? *And what's happened to good ole Bud Melman? Don't miss Wednesday's installment of Stupid Pet Tricks; it's sure to be a hit. See you all, David644.*

The best way to find out more about Dial-Your-Match is to call one up and log on. Here's a list of currently operating boards.

DYM#1	Burbank, CA	(213) 842-3322
DYM#3	Savannah, GA	(912) 233-0863
DYM#4	Sherman Oaks, CA	(213) 783-2305
DYM#6	Fairbanks, AK	(907) 479-0315
DYM#9	Tarzana, CA	(213) 345-1047
DYM#10	San Francisco, CA	(415) 566-9927
DYM#11	Glendale, CA	(213) 242-1882
DYM#12	Houston, TX	(713) 556-1531
DYM#14	Cranford, NJ	(201) 272-3686
DYM#16	Vancouver, WA	(206) 256-6624
DYM#17	Daly City, CA	(415) 991-4911
DYM#18	Lynnfield, MA	(617) 334-6369
DYM#19	Santa Monica, CA	(213) 390-3239
DYM#20	Cary, NC	(919) 362-0676
DYM#21	Freeport, NJ	(201) 462-0435
DYM#24	Houston, TX	(713) 783-4136
DYM#25	Burbank, CA	(213) 842-9452
DYM#26	Clovis, CA	(209) 298-1328
DYM#27	Marseille, France	33-(91) 91-06-60
DYM#28	Sun Valley, CA	(213) 764-8000

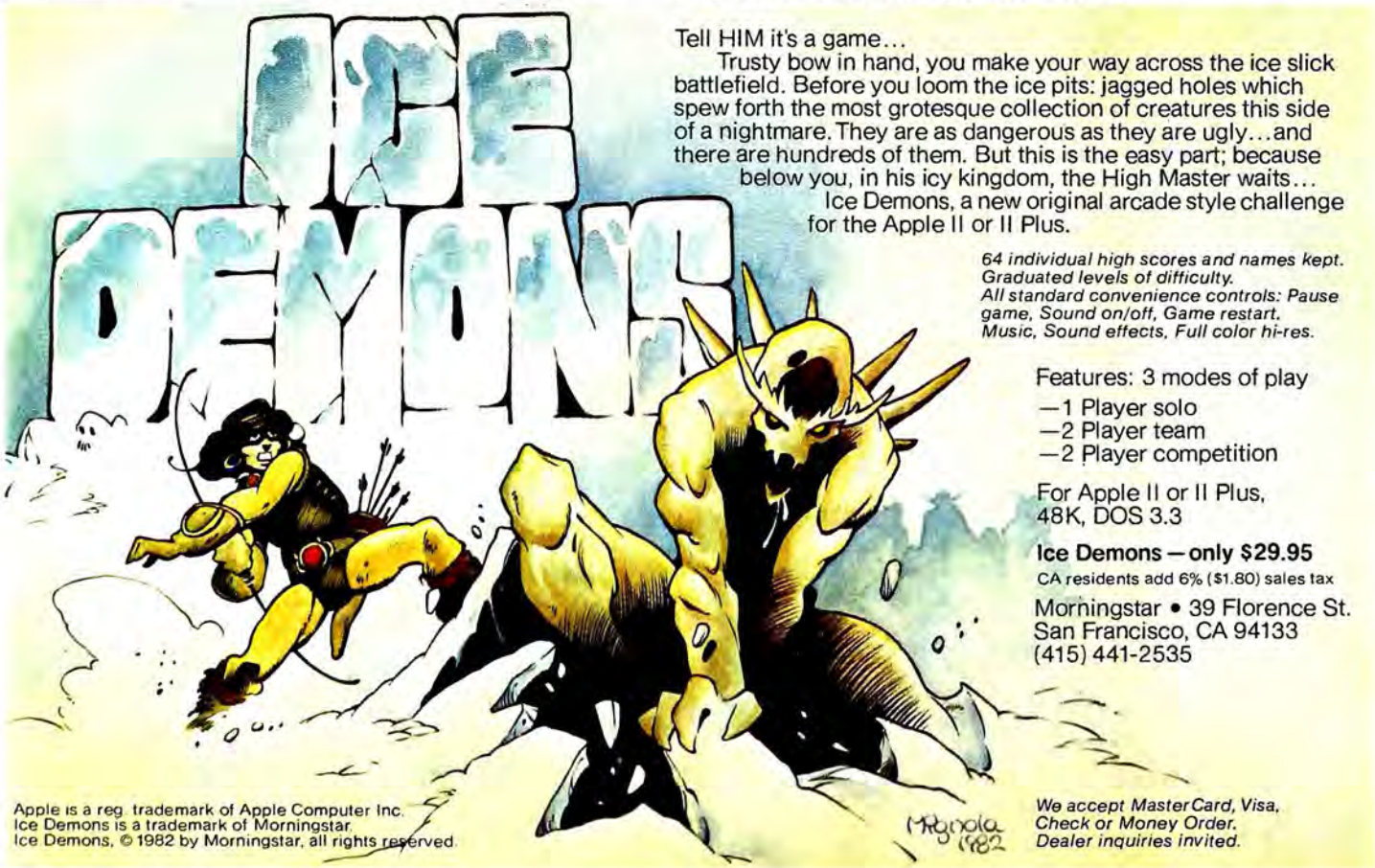
I Saw It in the Want Ads. But the most frequent use of the board is for people to advertise themselves. On it, you might see "Chicago man looking for outgoing females in the same area to go dancing with," or "Anybody out there from Maryland? If so, let's communicate!" or "Marian563, please empty your mailbox so I can write to you!"

Private mail is stored as one gigantic text file, taking up a whole disk. Public messages, questionnaires, and the user log are all on a separate disk. With more than six hundred users on the date-a-base at one time, all sending mail and posting messages, storage space is quickly taken up. To remedy this, Dial-Your-Match limits the public board to one hundred messages at a time. As soon as a hundred messages are posted, the next one will be written over the oldest one on the disk. In other words, messages will number from one to a hundred, from two to a hundred and one, and so on.

The same sort of overwriting procedure keeps the number of users at its maximum. There is space on disk for 768 users. As soon as the 769th new user calls, he will take the place of the person who hasn't called in the longest period of time, which is usually about a month.

Finally, if you have nothing else to do while on-line, you can always chat with the Matchmaker. In the chat mode, you can communicate live with the Matchmaker, tell jokes, shoot the breeze, or do whatever suits your fancy. The chat command pages the Matchmaker with a few bells for about thirty seconds. If the Matchmaker isn't around, the caller will see the message, "Sorry, the Matchmaker isn't in right now."

I Can't Get No Satisfaction. Dial-Your-Match debuted in October 1981, the brainchild of graphics programmer Gregg Collins. "The idea came to me when I first got my modem. I bought my Apple as a toy to play games with, and calling up bulletin board services was fun, but they all offered the same things," Collins recalls.



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"Whenever you scanned the public board, it was always 'RAM card for sale, $75,' or 'Clock card and disk drive for Apple II; must sell,' or 'Anybody have a color CRT for sale?' If you ever saw someone of the opposite sex, you didn't know where she lived, how old she was, or anything like that."

The format of BBSs was simple enough, but the information was boring. That's when Collins got the idea to have people fill out questionnaires when they logged on. But then, if they're going to do that, why not match them up?

"It seemed like a good idea, but it didn't start out the way it is now," says Collins. The first version had no public message board, and you were only allowed to match to one person. The program would assign you a romance mate, and you were stuck. If that person didn't like you, he or she would disconnect you, and the next time you called you were greeted with a cold, yet direct, message: "Your romance mate has rejected you." Ouch.



Later, Collins thought of matching people up with several others and letting them pick. But then he reasoned, "No, that would be two-timing; they should be allowed only one at a time." Finally, he just junked the whole program and started over from scratch.

The later version is the current version, with minor changes. When trying to construct a match, the first thing the program does is look at the person's sexual preference and then eliminate those who cannot match this person.

"I have what I call my Unpatented Sexual Preference Matrix," Collins boasts. "There are thirty-six different matching possibilities, cross-referencing heterosexual, homosexual, and bisexual callers, both male and female." If the caller is a heterosexual male, he can match with a female heterosexual and a female bisexual; everyone else is eliminated. Thus, his file is assigned a string variable of thirty-six zeros and ones; the ones indicate that that type of match works for him.

Including homosexual users presented somewhat of a dilemma for Collins. "My mother said, 'You're going to have trouble if users start complaining about gays being on the system.' All I could answer was that they exist. I could match them up to females and get them all upset, or I could match them up with each other and let them carry on their correspondence in private, and I chose the latter."

Collins openly admits that he started Dial-Your-Match as "just a fun thing." Despite that, many people really are dialing their matches.

"They don't tell me every step of the way how they're doing, but once in a while I'll get a message that says, 'Dear Matchmaker: Please delete me from this system. I have found my match, and we're both happy.' "

Reaping the Fruits of Franchise. To say that Dial-Your-Match has changed Collins's life would be an understatement. He met his current roommate, a former Dial-Your-Match system operator who moved to Burbank from New York City, through the system. He has been featured in newspapers across the country, *Mademoiselle*, *Money*, and will be in next March's *Glamour* magazine. He was interviewed on the air by a radio station in Orlando, Florida. His second disk drive and Epson MX-100 printer were both purchased with money he made selling the Dial-Your-Match software.

It was exactly a year ago that Collins sold his first program. At first, the thought didn't occur to him to sell the program. "I wanted mine to be the only one," he says. But people began telling him that if he didn't sell it they would write their own, and his would get lost in the crowd.

"So, I changed some of the code, making it more user-friendly so anyone could run it, and now they're up all over the country." And it doesn't stop there.

Collins sold his twenty-seventh copy last December to Michel Barthelemy, who has set up the first Dial-Your-Match outside the United States, in Marseille, France.

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"I saw the number for Dial-Your-Match on Bill Blue's Personal Message Service listing in San Diego," says Barthelemy from his photo studio in Marseille. "I met Gregg on the system and told him I would like to start one in the south of France."

Barthelemy has not only started a Dial-Your-Match, but he also plans to include American users on his system for the French to browse, contact, and exchange mail with. After a few program modifications on Collins's part, Barthelemy will call Collins's system every day or two, and both will exchange their respective users' mail by modem.

Please, Wait a Minute, Mr. Postman. One of the first Dial-Your-Matches to be sold went to a mail order dating service in Savannah, Georgia, called Viva la Difference! The Matchmaker there is Julie, who began Viva as a hobby three years ago. Already an Apple user, Julie spotted a magazine ad for Dial-Your-Match and knew an opportunity when she saw one.

"Both the number and quality of users have risen since I've added DYM to Viva," Julie proudly states. "I have about four hundred members in Viva and have just about doubled that with Dial-Your-Match."

For female users, whether they're from Dial-Your-Match or not, membership to Viva is free. Males must pay a fee.

Meanwhile, on the West Coast, Marc Schoenberg runs a similar DYM/Viva combination. His is Dial-Your-Match #19, located in Santa Monica, California. Schoenberg, with a little help from Julie, is able to offer local callers a longer list of potential dates.

From her Viva mail order list, Julie sends Schoenberg a list of people in his area who don't have access to terminals but can be reached through the mail. This gives Schoenberg's callers a greater number of people from which to choose. His callers can then get in touch with Viva directly if they wish to correspond with any of those who can be contacted only by mail.

But that's not where the features of his system end. He has also divided his public board into categories, so that those with special interests have their own areas to post messages. He's also adding a third disk drive that will hold a biographical disk. Now, in addition to the usual multiple-choice questionnaires, users will be able to fill in a few lines about themselves, in their own words, for others to read.

Finally, many of the callers of Dial-Your-Match #19 get together once a month to socialize and meet each other in person. At the first meeting, there were actually more females than males—a unique situation, since more than 80 percent of the date-a-base is male.

Only the Beginning, Only Just a Start. As the popularity of modems grows, so do their uses. Today, it's not unusual for people to be downloading stock market quotes, catalog shopping, switching on the lights at home from the office, or even playing *Dungeons and Dragons* games, all by modem. But finding a mate? It's unlikely that Dial-Your-Match will ever replace wining and dining. It is, however, a new way of finding someone to wine and dine.

In addition to those who are seriously looking for others to go dancing, spend a day at the beach, or visit rust museums with, there are those who would just like to make a few friends to correspond with through the system's electronic mail. These souls need never confront the other person, but have only to present an image that's intriguing enough to pique the curiosity of anyone who's casually browsing the questionnaires.

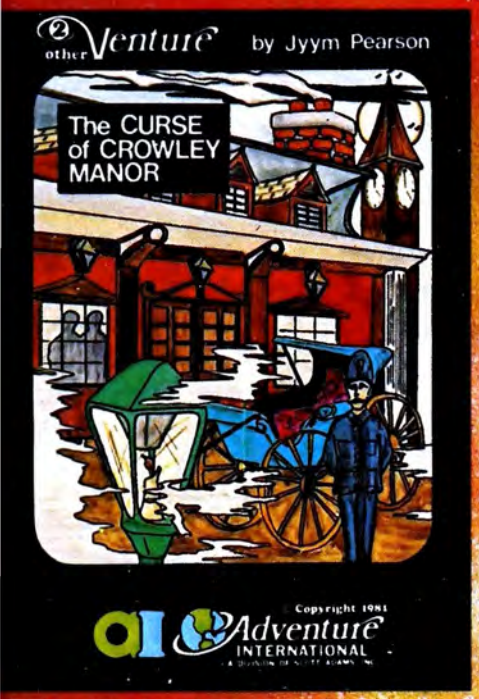
In this way, Dial-Your-Match is also a role-playing game. Just as *Wizardry* players become wizards, mages, samurais, and ninjas, introverts and extroverts can become the persons they dream of becoming—the Gables and Lombards of the CRT screen. Wallflowers can anonymously approach members of the opposite sex and say things they're too shy to say in person. The quiet, bashful homebody can log on and become a young, swinging single.

But, most of all, it's also a free service for people like Clark. Well, sort of.

To: Clark347
From: Linn842
Subject: I'm washing my hair.
Instant iced tea, Toyotas, gas money, and rust museums? Sorry, I'm busy for the next few years. Take a hike, buddy! ■

OTHER WORLDS. OTHER REALITIES.

(FOR EXPERIENCED ADVENTURERS ONLY!)



THE CURSE OF CROWLEY MANOR

by Jyym Pearson

You've sensed it before: nameless, unreasoning fear. Fear of the unseen — of things that scurry and scrabble through the shadows when the lights have been put out. How then will you fare when you face the Ultimate Evil; how will you possibly survive — THE CURSE OF CROWLEY MANOR?

Now, another giant leap forward for Adventure lovers everywhere — full color, hi-res graphics! That's right, author Jyym Pearson's masterpiece of the macabre explores a new dimension in fright with the incredible wallop of quality graphics — the kind you bought your APPLE for. THE CURSE OF CROWLEY MANOR is an excursion into mind-wrenching terror as you enter the dreaded Crowley Estate in search of answers to some pretty grisly questions. Fear fans take note: This is the stuff that nightmares are made of, so think twice before you approach.

THE CURSE OF CROWLEY MANOR features Adventuring the way YOU like it, with plenty of vibrant graphics, clever plot twists, and a scenario that'll roll your socks up and down your legs! If Adventuring has become a bit tame for you lately, this is one sure-fire cure! THE CURSE OF CROWLEY MANOR will run on any APPLE 2 with 48K of memory, Applesoft in ROM and a disk drive. We supply the software, you supply the almosphere. (A well-lit room is optional, but recommended!)

APPLE 2 48K DISK
Applesoft ROM and DOS 3.3 required
042-0108 $29.95



LABYRINTH OF CRETE

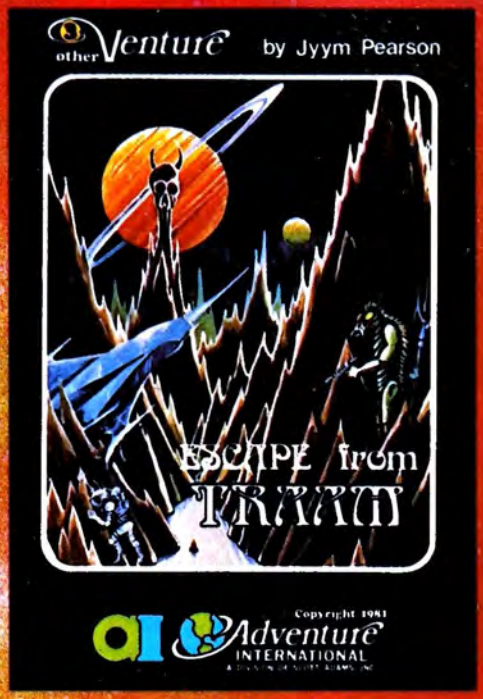
by Cliff Johnson and Allen Pinero

An Adventure of truly epic proportions, LABYRINTH OF CRETE paves the way for an entirely new form of Adventuring — you control the actions of TWO separate characters! That's right, the player is in complete control of two powerful warriors, the stalwart Jason, and the might-thewed Hercules. Straight from the mythology of ancient Greece they come, and their quest is a most dangerous one, indeed — the recovery of the mythical Golden Fleece from the heart of the horrific Labyrinth! But have a care, O rash one, the designer of the maze, Minos of Daedalus, crafted well the nefarious network. Evil most foul abounds within its walls, including all manner of traps, tricks and a gruesome parade of maze inhabitants. Many have tried, and many have failed to penetrate and exit the Labyrinth — will you be able to direct Jason and Hercules to success?

If you're ready for a new era in Adventuring, LABYRINTH OF CRETE is just what the leech ordered! Featuring full color, hi-res graphics that depict your trek into terror, you'll be amazed at the authors' slavish devotion to the spirit of the timeless Greek characters and situations.

LABYRINTH OF CRETE comes with a detailed instruction manual that will add to your enjoyment of this unique form of Adventuring entertainment, and will operate on any APPLE 2 computer with one disk drive and 48K of memory.

APPLE 2 48K DISK
Applesoft ROM and DOS 3.3 required
042-0162 $29.95



ESCAPE FROM TRAAM

by Jyym Pearson

You've managed to survive the Curse of Crowley Manor and negotiate the awesome Labyrinth of Crete — but will even your finely tuned Adventuring skills give you the necessary edge to . . . ESCAPE FROM TRAAM?

As soon as your small space crusier began losing altitude, you knew you were in for serious trouble. You somehow walked away from a fiery landing that would've spelled certain death for a less fortunate man, but as you are about to learn, there are fates worse than a quick death.

ESCAPE FROM TRAAM is a detailed, hi-res Adventure for the APPLE computer that defies the player to successfully search a bizarre alien world for a means of escape. The perils are many and the opportunities for survival are few. But for the clever Adventurer, a single opportunity is all that might be needed for a speedy exit from this hellish world. Are you up to the challenge?

All of the traditional Adventure elements are in ESCAPE FROM TRAAM, including two-world command input, game save feature, and an extensive vocabulary. Add to this the impact of colorful hi-res graphics that will allow the story to spring to vibrant, scintillating life, and you'll know that ESCAPE FROM TRAAM will be a fine addition to any graphic Adventure collection.

APPLE 2 48K DISK
Applesoft ROM and DOS 3.3 required
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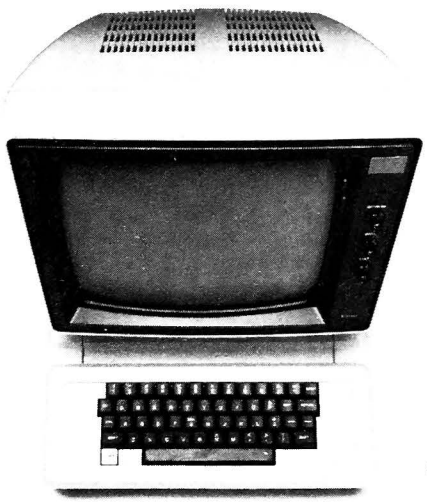
To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

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IF YOU'RE CONFUSED PERSONAL COMPUTER,

At this moment, there are no less than 50 personal computers on the market. And more are being introduced every day.

On one hand, having all those options is a good thing. On the other, it can make picking the right one pretty difficult.



Computers come in two parts. You have to buy both.

We'd like to help. So here are a few suggestions about how to buy the computer that's right for you.

Computers come in two parts.

One part is the "hardware," which is the machinery itself. The other is the "software," or a program, as it's sometimes called.

Software is the part that tells the computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything.

And vice versa.

You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration, keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

The simpler the better.

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.



Meaning there are no complicated routines to follow to perform a simple task. And no programming language to learn.

Some people, however, will tell you that software has to be complicated to be powerful.

Nothing could be farther from the truth.

Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

ABOUT BUYING A HERE'S SOME HELP.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, three products make up the family. PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way. Here's a little more about each of them.

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FILE lets you arrange your information in "forms" you design yourself. So you can get at and really use your information in ways never before possible.

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Word Processing:

New Format For News



BY JONATHAN MILLER

The California desert hasn't always been hospitable to pioneers, but on April 14, 1981, it proved a welcome sight to the pilots of America's first space shuttle, *Columbia.*

Thousands of spectators were gathered at Edwards Air Force Base northwest of Los Angeles to witness the historic occasion. A smooth touchdown was anticipated, but this launching had already had its problems. Two technicians had died in an accident at the launch site the previous month, and seventeen heat-shielding tiles had parted company with the spacecraft's outer skin sometime during liftoff. The missing tiles were said to be in noncritical areas, but seeing would be believing for the keen eyes now scanning the cloudless desert skies.

Here was a genuine media event, and the fourth estate was out in force—radio, local television, the networks, and the new kid on the block, upstart cable. Rolling in with their big guns and minicams and two-ways, they'd turned this desolate corner of the Mojave Desert into a gigantic broadcasting booth. The electronic media had come to report the news, but at least one piece of their equipment came close to making some: It threatened, if only briefly, to interfere with the landing.

Interference on a Touchdown Pass. "People in the audience shouldn't be conscious of what's going on backstage," says Richard Rudman, a radio engineer who worked with federal trouble-shooters to locate a "spurious" transmitter emission that was interfering with the *Columbia*'s touchdown guidance system. "It should just happen. The trouble is, we're in a period when we've got to make people in broadcasting and government more aware of what's happening backstage or the show won't go on."

Rudman, the engineering manager for all-news KFWB radio in Los Angeles, is a prime mover in the backstage education movement. He is a founding member of the Southern California Frequency Coordinating Committee, a pioneering ad hoc group established in 1976 to keep some two hundred broadcasters from Fresno to the Mexican border literally "on the beam."

The problem with doing that, according to Rudman, stems from the fact that the airwaves are getting crowded. The information explosion has put additional demands on the limited resource of radio frequencies, as broadcasters, dispatchers, and paging services rub elbows in the electromagnetic nether world.

"Future shock has entered the media," Rudman says. "We feel compelled to bring things to people almost before they happen." For news organizations, that means expanded coverage. More remotes. More two-way channels for reporters in the field. More minicams on microwaves bringing pictures at the scene live at eleven. More potential, in short, for conflict.

"I've seen situations where people have almost come to blows over this," confides Rudman, tactfully declining to name names. "It's a classic traffic situation, with no traffic lights and two people on the same street, on the same lane, coming at each other. We're living on the cutting edge of grief and technology."

Southern California, the trendy megalopolis with the quaking edge running down its ocean side, simply became the first to do something about the problem, says Rudman. With a rapidly growing broadcast market and peculiar terrain features that play havoc with signals, it became obvious that the better part of self-interest was talk, not fight. If people were talking and knew what was out there, there'd be less cause for conflict.

Which is why the committee was up at Edwards prior to touchdown, working with representatives from the National Aeronautics and Space Administration, the Federal Communications Commission, and the Air Force. NASA had detected the spurious emission, the spooky signal that was spurting from a transmitter like a leak from a punctured hose. It was a matter that required swift locating and diplomatic handling. NASA's first mission was to get the astronauts home safely; its second was to sell its space program via the media.

Rounding Third and Heading for Home. "You're faced with a situation of walking up to somebody and saying, 'Hey, this thing you're using to fulfill your station's needs is causing interference and you have to shut it off,' " Rudman explains. At Edwards, such a confrontation was avoided because the offending party wasn't a person but a piece of faulty equipment.

The solution was simple: replace the equipment. But the potential for hard feelings is always there, stresses Rudman, particularly in the immediate Los Angeles area where there are 80 available channels and 120 users. The trick when any two are on a collision course is to get them talking, but that's a skill that calls for some reeducation. "People today almost have to be shown how to communicate," says Rudman.

Facilitating communication has, in fact, become an increasing part of Dick Rudman's job, or rather, jobs. First of all, there's the station, whose slogan is "All news, all the time." He's got to make sure the station's on the air all the time to deliver the news to its million weekly listeners. That means maintaining the studio, the transmitter, the two-way radio units in the reporter vehicle fleet, and just being an all-around Mr. Fix-It for the sprawling building, a one-story former supermarket squatting a stone's throw from the world's most overrated intersection, Hollywood and Vine.

Fact is, Dick Rudman has his share of responsibilities, both inside and outside. There's the management of a half-million dollars in budget lines, overseeing a staff of eleven, consulting for the Satellite News Channels launched by parent company Westinghouse, plus all this committee work. Rudman did such a good job promoting the pioneering efforts of the California Committee, guess who the Society of Broadcast Engineers turned to last year to chair a national committee promoting same?

Who Will Manage My Wonderful Morass? The reward for good work was more work, and Dick Rudman began to see himself sinking ever deeper into a morass of correspondence. Technical reports, camera-ready articles for trade magazines, letters to the National Association of Broadcasters, the FCC, equipment manufacturers—just the kind of gritty work he didn't need with a secretary out on disability.

What he did need, he finally concluded, was his own personal management system—an Apple, spreadsheet, filing system, and word processor.

So in September of 1982, he went for it—an Apple, *VisiCalc, PFS,* and *Format II.* He was buying into the standard package, but he shied away from CP/M-based *WordStar* after trying it. He felt that what it promised in power it sacrificed in an elaborate command structure. What he was looking for was something that was reliable and friendly, that would welcome him back after a business trip.

"I may be away from the office and my Apple for two weeks at a time," Rudman explains. "I don't want to have to take a refresher course on my word processor because I forgot a lot of prompts for a whole bunch of control characters." Software should be written to protect him from himself, from his own bad habits as a typist and writer, he reasoned. "It's an imposition if I have to learn another language to do my job."

What he finally decided on was *Format II,* a menu-driven word processor distributed by Kensington Microware of New York. The program lists for $250 and requires an eighty-column card. Rudman had been favorably impressed by a demonstration he'd seen of it, so now that he needed an electronic amanuensis he took the proverbial plunge. For a while, though, it seemed as if he'd dived into the shallow end of the pool.

Rudman discovered that he had two printer problems, both of which were related to running the program off a serial printer. To begin with, he was unable to get his Apple and Comrex printer to interface with the *Format II*'s 2K buffer. It seems that the printer couldn't tell the Apple, through the serial card, when it was full. In addition, Rudman didn't seem to be able to use *Format II*'s underlining routine.

The solutions were amicable, if involved. Rudman swapped serial card and printer for parallel card and printer with the computer store that sold him the package. He then reconfigured his system. Now the program overcame the shortcomings of the printer underline routine by telling it to reverse line feed and then underline as a separate line.

Flexing Format II. Rudman regards his printer misadventures as inevitable in the Model T age of computerdom, particularly with relatively new products such as *Format II* and his Comrex printer. The best one can hope for are supportive dealers and flexible programs that

circumvent incompatibilities in hardware and software. "I was really amazed with this piece of software, that it had the versatility, the power to write an underlining routine that would work with the Comrex."

Rudman also discovered a glitch in *Format II*. Having dutifully saved his first batch of letters, he asked to see a listing, only to be rudely informed that his floppy wasn't a text disk. "I was on the verge of throwing up my hands in disgust," he recalls. He chose instead to call the vendor, and Kensington promptly sent him two new disks to replace the master and backup that come standard with the package, explaining by the by that they'd had a bad run of duplicating.

Since then, Rudman has had no problems with *Format II*. "I haven't been able to stump this on anything yet," he reports. "It's done everything a nontypist could ask for." In short, the program is living up to advertised claims of being easy to use and format flexible in the what-you-see-is-what-you-get mode, but Rudman insists that his satisfaction should not be taken as a blanket endorsement. "I'm not selling this software. It has its beauty. It has its elegance and uses, but it is not the ultimate word processor."

On the plus side of ultimate, there is an impressive array of single-stroke formatting commands. The majority are logically mnemonic, like C for center and D for delete, but others take some remembering. These latter worthies include such useful if less self-evident commands as T for removing right justification and G for transferring text to an eighty-line buffer—for placement elsewhere in a document or within another document.

Other features that endear the program to Rudman include a built-in mailing list that can be used for database management, proportional spacing and microspace justification that enable him to produce camera-ready magazine copy, and some thirty text editing commands that make it easy for him to customize correspondence.

Scream of the Typo. *Format II*'s principal virtue is as generic to the process as it is to the program. Word processing and *Format II* have improved Rudman's writing both in thought and deed. Typos he doesn't catch on the screen shout out at him when he proofs a rough printout.

Rudman is not oblivious to *Format II*'s flaws. Its principal shortcoming, in his view, is that you can store only seventeen legal-size pages on a disk (or thirty-four if you have two drives, as he does). That hasn't posed a problem for him as yet, but that's only because he tries to keep his business correspondence short and sweet.

"If you can't say it in a page, it probably isn't worth saying," he offers, quoting some journalistic maxim he picked up at Penn State. "On the other hand, if I were writing a book on, say, *The Decline and Fall of Broadcasting* that went on for nine hundred pages, that's a lot of disks."

If he had his druthers, Rudman would prefer a *Format II* that enabled him to create word glossaries that give page references. "*Format II* allows me to do forms printing easily," he notes, "but I can't take a total off that form, except by writing it down on a piece of paper and saving it." The package does allow users to swap files with other programs, he allows, but it takes some finagling with a utility disk.

Rudman offers these last remarks in the spirit of friendly advice to the software industry. What's needed are easier to use, more compatible pieces of software.

"If the people at *Format II* don't come up with something that lets the program talk easily to a spreadsheet or become a spreadsheet and do filing, then I'll go to another piece of software. All this investment in *Format II*, *VisiCalc*, and *PFS* means nothing if you can't grow with it and it can't grow with you."

What Not To Do with Your Finger. Career turning points are usually hard to fix, but Richard Rudman remembers his with the shock of recognition. He and his brother were crawling around on a rug in the family's Boston home when young Richard got a bright idea. "I stuck a finger in an electrical socket," he jokes, "and I've been fascinated with the stuff ever since."

As a teenager that romance took wavelike form on both sea and air, with Hardy boy Richard earning certification as both an outboard motor mechanic and a ham radio operator (and later, as an adult, as a pilot). In 1961, Rudman entered a cooperative work study program at North Eastern University in Boston with vague notions of becoming a technical writer, but he quickly gravitated toward broadcasting. A very logical progression: a work study job in the electrical engineering department, a stint as the chief engineer for the school radio station, a summer job with Westinghouse station WBZ in Boston, and a teaching assistant position in the Penn State television department while working on the master's degree in journalism. Very logical indeed, only Rudman didn't get the thesis.

Love and fate intervened. Rudman met a lady and got married. He also lost his thesis when burglars made off with his notes on the political, economic, and social aspects of radio frequency allocation.

So what if he didn't have a journalism degree, he concluded; maybe his technical experience could get him into the production end of broadcasting. "I always felt I could become a radio engineer without the degree," Rudman recalls. "Radio is still an industry where it's possible to get a job with what you know and what you've done. I can sit down with a book on a new discipline and teach myself. If it's explained clearly, I can figure it out, and, if it's not, I can usually still figure it out."

So, figuring it out, Rudman put in his apprenticeships at WBZ in Boston, Massachusetts; KAYN in Tucson, Arizona; and KGB in San Diego, California; before moving on up to KFWB in 1975. The unpredictability of news suddenly added an exciting new dimension to a career dominated by automated and semiautomated music formats. Dick Rudman now found himself planning for the L.A. Unthinkable—the great quake everyone knows is coming but hardly anybody worries about, except possibly engineering managers for all-news radio stations who want their call letters to shine in the darkest of hours.

"This is a behind-the-scenes story that is of vital importance to Los Angeles and the station," says Rudman, who likens KFWB to a kind of public utility or resource. "The first thing that's going to go in an earthquake are the telephone lines, so for KFWB one of my goals has been to set up a two-way radio system that bypasses Pacific Telephone. We feel that the station has to be able to serve the listeners and do everything possible to survive a quake."

This means maintaining emergency generators for the studio and 5,000-watt transmitter, constantly improving two-way radio communication between field reporters and news directors, and covering the station's exposed frequency flank by being active in regional coordinating activities. It makes stellar sense by Rudman's lights. If broadcasters know you're out there, they're not as likely to encroach on your turf.

Beat the Apple. Rudman surveys KFWB turf from an office that looks out on a colorful and spacious newsroom, one Rudman takes pride in having helped design. What's most striking about this engineer's window on the world is the lighting: there hardly is any. When forty-year-old Richard Rudman walks in every morning, he doesn't hit the light switch, he hits his Apple. The principal sources of illumination are a sliding glass door leading to the newsroom and the cool, efficient glow of his Apple, its *Format II* booted up, its cursor dutifully pulsing.

Rudman takes a lot of good-natured ribbing about living in a glass cave, but he rather likes the detached feel. He can lean back in his managerial chair, sip steaming coffee, and get focused on the big picture. Framed by his wall-length glass door is the incandescent image of the newsroom, rimmed by state-of-the-art studios and patterned on those vast newspaper city rooms. Two images dominate—a news director who makes his rapid-fire decisions standing in the center of a large semicircle otherwise known as a slot, and a rumpled, harried newswriter off in a corner doing a John Garfield imitation, cigarette dangling and fingers pecking away on a old manual typewriter.

Time marches on. Like every other industry, broadcasting is playing catch-up. Dedicated word processors have been in the works for some time at KFWB, says Rudman, but were sidetracked two years ago when parent company Westinghouse absorbed Teleprompter to become the third largest cable company in the country. "It was like a gnat swallowing an elephant," says Rudman, an audio specialist who spent the better part of last spring helping Westinghouse launch Satellite News Channels.

All this consulting, not to mention coordinating, has increased Rudman's workload, but he couldn't be happier with the variety. "It seems every time I might go stale, they throw a new challenge at me."

Which is pretty much how it is with the broadcast business in general, where technology keeps the pot of innovation boiling. Advances in

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design are enabling engineers to split channels and to meet ever-increasing demand, while frequency-coordinating committees like Rudman's are finding better ways to manage a limited resource through the far more complicated business of human communication.

"You have to look into the semantic content of everything you say and do," says Rudman, a devotee of S. I. Hayakawa's *Language in Thought and Action*. "Whatever your perceptions are, they only approach reality as a limit. The thought is not the action, the map not the territory. You have to keep that in mind, and word processing helps me do that."

Fascinating Fun. What all this comes down to, of course, is that Rudman finds fascination in his job. He's doing what he wants and he's having fun in the process.

"Radio is my life," Rudman says. "Broadcasting, like computing, started out as a hobby and now it's a business; but the people I respect most are the ones who would work in it even if they weren't paid as much just because it's in their blood.

"The master's degree wasn't important to me. It was more important to accumulate experience and do things to get where I could make a difference. I like to think it's coming true to an extent now." ◼

Olivieri's Outline of Word Processors

by Peter Olivieri

Continuing our quest to examine the major word processing programs that are currently available for the Apple, we'll look this month at *Format II* from Kensington Microware.

Format II. Kensington Microware, 300 East 54th Street, Suite 3L, New York, NY 10022; (212) 486-2802. $250.

Equipment required: 48K, one or two disk drives, a monitor (a television set is not an acceptable alternative), a printer, and an eighty-column card. Compatible cards include Computer Stop Omnivision, M&R Sup'R'Term, A.L.S. Smarterm, Vista Vision 80, or Videx Videoterm (after installation of the chip provided in the *Format II* package). A keyboard modification for lower case is also required; the necessary materials and instructions are provided as part of the package.

Optional: a 16K RAM card. Some, though not many, of the advanced text movement functions require this extra capacity. The program is also compatible with the Enhancer II from Videx.

Today's Format. This is a very powerful word processor. One of its major strengths lies in the fact that you can see what the pages of a document will look like before you print it. Even such things as underlining, right justification, and page breaks are shown.

Most of *Format II*'s commands are easy to use and easy to remember. The delete command typifies this arrangement. To delete something, you just press control-D and the program asks you what you want to delete.

The program is menu-driven. It opens by presenting you with a wide variety of menu choices. To select an option, you simply type its first letter.

For several months before its release, *Format II* was tested in actual settings. It's readily apparent that the resulting product profited from this; it's not only thorough, but quite user-friendly.

One of the striking differences between *Format II* and other word processing programs is the way it handles the creation of a document. Instead of saving a "document," it saves "pages." Each page is given a name—often, it's a good idea to give each page the same family name, followed by a number to distinguish it from other pages in the same document. This arrangement may sound cumbersome, but, as it turns out, it presents no problems in the printing of a lengthy document and is, in fact, rather flexible.

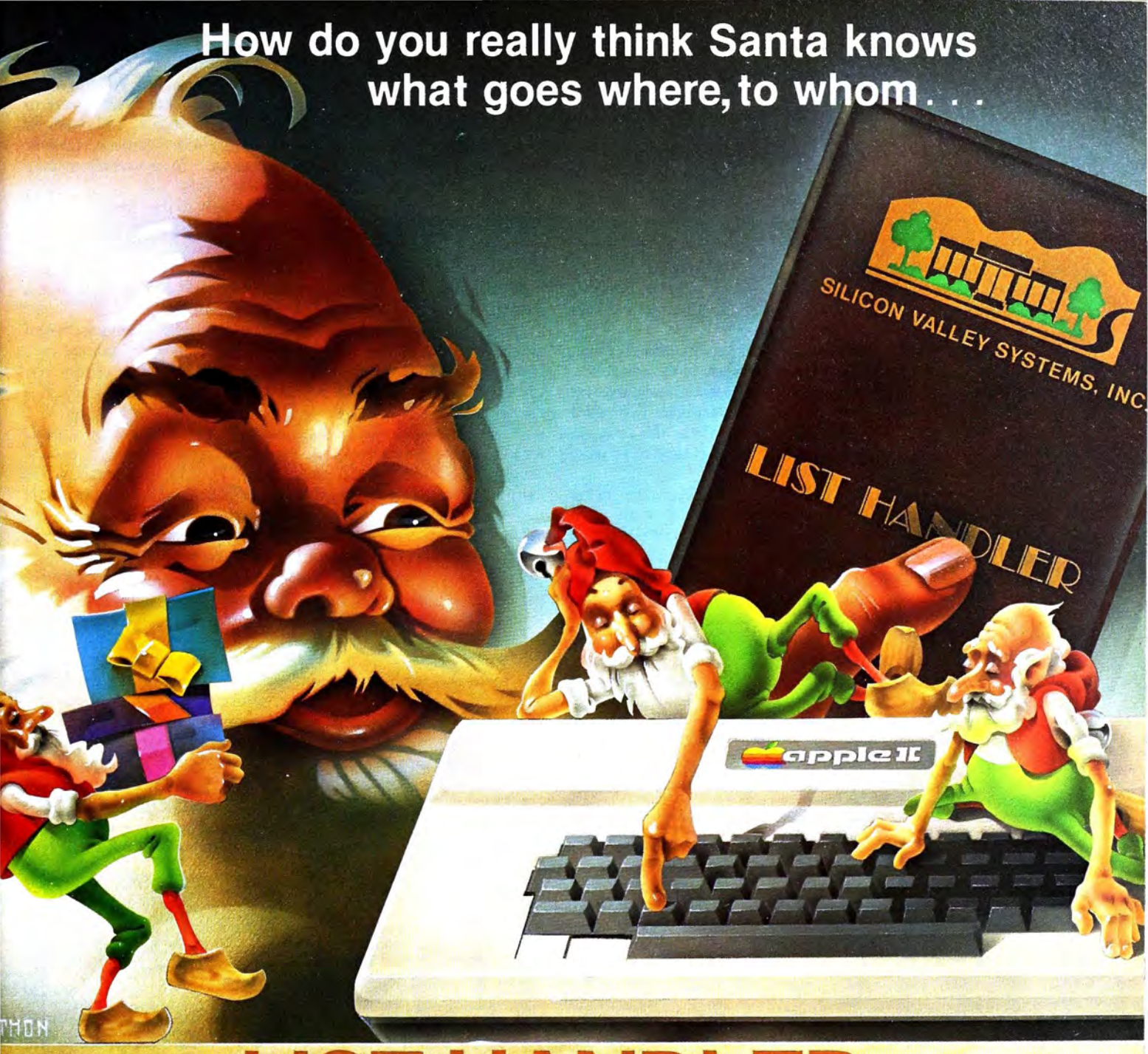
Up to seventeen pages of text can be stored on a single floppy disk. It's important to realize that the number of "pages" you store may not correspond exactly to the number of printed pages you have in your final document. When you're ready to print out your entire document, you specify what the characteristics of a page will be. This means that you may end up with more or fewer pages than you have "in storage."

During the page correction process, you're asked to specify how many lines there will be on a given page. This number can be different for each page and can even be changed as you're in the process of creating a document. If there's not enough room on your newly created page to fit all the material you want to include, you can either redefine the length of that page or allow the extra material to go into an "overflow" area for later retrieval.

When you're entering information onto a page, the top left-hand corner of the screen displays a line counter and a position counter. The line counter tells you what line of the page you're currently printing on and how many lines remain on that page. The position counter tells you what column you're currently typing in as you move across the page. You're also shown (by means of short vertical lines) where the right margin is currently located. Of course, this margin can be altered to suit your needs.

As you'd expect, the word wrap feature is a standard part of this package. There is, however, another useful feature you might not expect to see—hyphenation. Since word wrap can't cope sensibly with certain situations, you sometimes get a line in text that has big gaps or holes in it. This will happen, for example, if the last word on a line is a very long one that had to be placed entirely on the line that follows. In cases like this,





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D	Delete line paragraph text all
I	Insert line
E	Search for certain strings of text and replace them with others
A	Align numbers (in a variety of ways)
C	Center text
F	Find text
J	Justify text
U	Underline text

Table 1.

Format II automatically hyphenates the word for you as best it can. You can also, of course, insert the hyphen yourself. Hyphenation can be a very important consideration in many word processing applications; it should not be overlooked.

Format II allows you to edit your text extensively by means of logical, easy to use commands. Pressing escape puts you in the edit mode. From there, you can correct mistakes, add and delete text, and move text around on a single page or from one page to another. Few word processing packages offer as many editing commands as this program does. Table 1 contains examples of a few of the single-keystroke commands that are available.

The large character buffer that's provided also facilitates the editing process. If there's a certain phrase or paragraph that you use often throughout a document, you can place it in the buffer and recall it as needed with a single keystroke. In addition, you can use the buffer to move text around on a page or from one page to another in a document.

At print time, you can print the page that's currently in main memory, and/or you can print any of the pages you've stored on additional disks. *Format II* will ask you how you wish to set up your document (how many lines per page, and so on) and how many copies of it you'd like to have. You can print various combinations of stored pages in whatever sequence you choose. This is particularly handy in professional situations that require some pages of a document to be the same while others must be customized.

Format II also has a mailing list feature as a standard part of the package. You can print mailing labels or merge lists of names and addresses with a letter or document you've created. In fact, you can make selections from your list prior to printing. Thus, you could choose to merge only the names on a list that fit particular criteria. You could, for example, include only those people who come from a particular town or only those whose job category is "programmer." The system allows for a variety of logical tests (such as *and*, *or*, and *not*).

Incidentally, the program also has the ability to send printer codes to your particular printer. Headers and footers can be included on each page, and superscripts and subscripts can be included in your documents. Proportional spacing is also available. The user guide also includes a discussion of how to transmit *Format II* documents over a modem.

And, speaking of the user guide, it certainly rates as among the best around in terms of the clarity of the writing. It's well organized, well indexed, and thorough. In addition to an introductory level (but very helpful) tutorial, the manual provides more definitive information in a reference guide format.

The only drawback is the same one that seems to plague the manuals for most of the programs we've been examining. The *Format II* manual could be more attractive and easier to read. The type size is small and the illustrations are crowded together. Better paper and formatting would have improved the manual's appearance.

Make no mistake—the content here is excellent. But the quality of the product could have been improved if the manual had been more professional looking. Indeed, this would have affected the cost of the package, but it would also have made the reading much more palatable. With complex and thorough products of this type, such a concession to the reader is almost a requirement.

Format II rates among the leading word processing packages. It's easy to learn to use, thorough, and well tested. The menu-driven format is extremely convenient, the single-keystroke commands are simple and appropriate, and the manual is well organized and well written. It's important to remember, of course, that you must be sure to have the appropriate hardware installed in your Apple before you can use this package. ■

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Mind Your Business

BY PETER OLIVIERI



We usually start out by sharing with you some comment on the weather or the season, both of which we have plenty of here in New England. We won't do that this time, because there's not much you can say about February except that, in some parts of the country, it's awfully cold. In its defense, many people would point out that February is, after all, the shortest month of the year. And, of course, if you're romantic, Valentine's Day may well induce a special feeling for this particular month. So, as you can see, there isn't anything to say about this month this month, so we'll start right out with "minding our business."

Three Spree. As mentioned last time, a portion of each month's column will be devoted to a discussion of the Apple III and its applications. More and more software is becoming available for the III. Many software vendors like using its operating system (SOS) and have designed packages that take advantage of it and of the machine's special characteristics.

In addition, Apple III users have begun getting in touch to share their experiences; some of their comments appear later on in the column.

Apple Computer offers a good many packages for use with the Apple III, including *VisiCalc III*, *Apple Writer III*, and the Apple III *Mail List Manager*. Let's look at these programs now.

VisiCalc III. This spreadsheet program is essentially the same as the *VisiCalc* we all know and love, except that it requires an Apple with at least 96K of memory. The extra memory allows users to work with more data and increases processing speed. Other than that, the main difference between the Apple II and Apple III versions of *VisiCalc* is the ease with which the version for the III can be used. Some of this facility is directly related to the design of the Apple III keyboard. For instance, the III's up and down arrows preclude the need to press the space bar for directional changes.

The *VisiCalc III* manuals from VisiCorp are among the better *VisiCalc* manuals we've seen. The documentation also includes three helpful program listings—one for printing out DIF files, one for printing out worksheets from DIF files, and a third for creating DIF files.

What's the DIF? Since the subject has come up, it seems appropriate here to describe briefly what the heck a DIF file is.

DIF stands for Data Interchange Format. This method was developed as a way of storing data for use by other programs. Having a standard way of saving data would mean that programs offered by one vendor could be made to talk to programs available from another vendor (or to programs written by users themselves). If such a format could be standardized, the development of applications packages would be facilitated and there would be significant advantages to the user.

Thus, since *VisiCalc* allows you to save your worksheet in DIF format, you can use your worksheet data as input to any other programs that recognize DIF files. It's possible, for example, to take a DIF file you've created using *VisiCalc* and use it as input to the *Apple Business Graphics* package. In this manner, you can generate graphs and charts of the data on your spreadsheet.

Apple Writer III. As you know, *Apple Writer III* is Apple Computer's word processing program for the Apple III. You can use it to create, modify, and print text, and it even includes a list processing feature as a standard part of the package. Here are some comments from readers who use the program.

J. Kastura of Kokomo, Indiana, likes *Apple Writer III* very much but hopes to get a solution to a problem he's been having with the program.

"*Apple Writer III* is very useful," writes Kastura, "and is, in general, well documented. . . . The lack of a user guide is an inconvenience. In order to get full use of the Epson MX-80 printer, a null character must be transmitted to the printer. *Apple Writer* has a feature that allows the user to embed control characters in the text for the purpose of controlling a printer; however, I have not found any way to do this. Has anyone had a similar problem? Are there any solutions?"

And from J. Schnell of West Olive, Michigan, who uses *Apple Writer III* in writing architectural specifications for architects, come these comments.

"We use four Apple IIIs, each with an Apple III green monitor, one additional disk drive, and an Epson MX-100/3 printer. . . . We find *Apple Writer III* to be extraordinarily flexible. However, it does have one major drawback. The user doesn't see on the screen exactly what will be printed. We would also like to have the ability to move around larger blocks of text than are currently permitted. The format for using the program is quite easy, however, and should be considered a strong plus. We will never, never go back to using a typewriter.

"Our only problem," continues Schnell, "has to do with the use of the printer. Using Basic, we've been able to use all the features of our Epson printers. However, we have not been able to find any way of printing su-

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perscripts when using *Apple Writer III.* Has anyone been able to do this?"

W. Hale of San Diego, California, writes in to say that the Apple III (and *Apple Writer III*) is used in an engineering design section at the Military Electronics Division of TRW Corporation.

"*Apple Writer III* works quite well for us and we are pleased with it. We have found the documentation lacking in some areas, particularly in the relationships between the top and bottom entries, top and bottom margins, and what effect these have on the number of printed lines and page intervals." Hale identifies "the inability to see on the screen what the document is going to look like" as the "single, most complained-about problem." This is particularly inconvenient, he adds, when wide and complex page layouts are being dealt with.

Apple III Mail List Manager. This is one of the easiest to use mailing list packages we've seen. It requires a minimum of 128K memory and at least one external disk drive.

A disk can hold a maximum of 960 records. If you want to create new mailing lists by merging records stored on different disks, you need at least two external disk drives. The program comes equipped to print labels using a Qume Sprint 5 or a Silentype III. If you plan to use a different printer, you'll have to have your system disk modified by your dealer.

The program is menu-driven and allows you to define your mailing format; enter mailing records; find, modify, or delete mailing records; sort mailing records; print or display mailing records; change the format of the labels to be printed; and merge or filter mailing lists.

A mailing list record can, essentially, contain up to six lines of information. These typically include one line apiece for name, company, street, and city/state/zip code. Two extra lines are provided. The user indicates what fields of this record are to be the sort fields (a person's name or zip code, for example). In addition, there's a field for phone numbers and one for label codes. These codes can be of your design, and you can use them later on when you want to retrieve only certain records from the file. This feature is a very convenient one for many list processing applications. The user guide devotes several pages to an explanation of how to use such codes in a mailing list setting.

Searching through the mailing list database can be done in four ways. You can search through all records for a record that matches the characters you've just entered in the primary sort field, search for a similar-sounding primary sort field (an unusual, and nice, feature), search for a match of the characters you've just entered in the secondary sort field, and search by mailing list order (search sequentially).

The *Mail List Manager* user guide is quite good. It's easy to understand and clearly explains all the package features. If you have an application that requires you to produce mailing labels, it would be worthwhile to consider this package seriously. Be advised, however, that if your needs include the addressing and printing of personalized letters using your mailing list file then it may be in your best interests to consider a database management package that includes list processing as one of its features.

Graphics, Anyone? In last month's column, we discussed a package called *Apple II Business Graphics.* As you'll recall, this package gives Apple II users the capability to create fairly sophisticated bar charts, pie diagrams, and line graphs. In addition, it's easy to use and has excellent documentation.

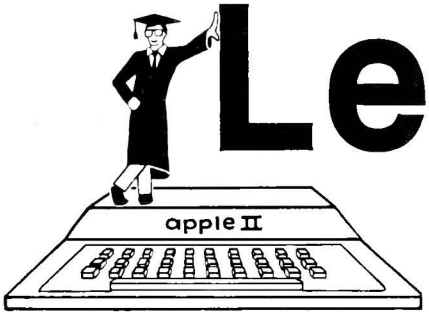
Well, the same package is available for the Apple III. It's called, uniquely enough, *Apple III Business Graphics* and offers all the features described for the Apple II version. Of course, some of the ways the user interfaces with the program have changed; in particular, the ways that files are handled are different. *Apple III Business Graphics* requires an Apple III with two disk drives and 128K of memory. In addition, the use of the ProFile hard disk drive is possible, although some reconfiguring work must be done first.

Apple Printers Arrive. Apple Computer recently announced the availability of two Apple printers. Both are designed to use fully the features of the Apple II and the Apple III and the majority of software packages available for them.

The Apple Dot Matrix Printer is a fast, high-contrast printer for graphics and many correspondence-quality applications. The printer requires a parallel interface, has a printhead life of more than one hundred million characters, and comes with a heavy-duty motor. It has hi-res graphics output and offers bidirectional print speed of 120 characters per

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second. The printer permits multiple pitch and proportional spacing, and it will mix fonts during a single pass. In addition, it can handle cut sheets or tractor-fed paper (either roll or fan folded). The Dot Matrix Printer is priced at around seven hundred dollars.

The Apple Letter Quality Printer, a daisy wheel printer with graphics capability, is designed for high-quality print applications. It requires a serial interface and prints bidirectionally at forty characters per second on individual sheets or continuous forms. Its switch-selectable settings include vertical and horizontal tabs; six or eight lines per inch vertical pitch; ten, twelve, or fifteen characters per inch horizontal pitch; and auto line feed toggle. Pause and form feed user switches simplify printer control. The snap-in multistrike ribbon cartridge is designed to provide four times the life of conventional ribbons, and a full complement of print wheels, including six foreign language character sets, will be available later on. The price of the letter quality printer is about twenty-two hundred dollars.

Revised Dow Jones Software. An enhanced version of the *Dow Jones News and Quotes Reporter* offers Apple II owners who are investors instant access to vital financial and business information through fifteen research databases. This revised software supports eighty-column displays and autodial modems. It also allows users to log on to Tymnet, Telenet, and the Canadian Bell System's Datapac, three major communications networks.

This package gives stockbrokers, financial analysts, and private investors access to one of the world's most comprehensive sources of business information. With it, interested parties can obtain quotes (delayed fifteen minutes) from the major United States stock exchanges; headlines, abstracts, and complete articles from the Dow Jones News Wire, *The Wall Street Journal*, and *Barrons*; and transcripts of the television show *Wall Street Week*. It's also possible to get information from money market services that summarize where experts expect the money markets to go; obtain *Weekly Economic Update*, a summary of key economic events of the week; access databases that provide historical stock market quotes, historical information on a particular company, or detailed financial data on thousands of companies; and get a variety of other information such as sporting news, UPI news, and news of international events. The package also offers access to a twenty-volume encyclopedia.

The *Dow Jones News and Quotes Reporter* (Version 2.0) requires an Apple II with 48K of memory and an acoustic modem with a communications or serial card or a Hayes Micromodem II. This version features automatic logging on. The package is priced at $135 and includes the software, two user manuals, a Dow Jones password, and one hour of free time on the system during nonpeak periods. If you own the previous version of the package, you can get the new one for $40 by returning your original to your dealer.

These Are Taxing Times. Friends, it's that time of year again. Yes, it is time that we give to Caesar what is ours, or rather, to Uncle Sam what is his. Every Apple owner would do well to be aware of the advantages of owning an Apple when tax time rolls around.

If you're using your Apple in your business, you already know about using the investment tax credit to reduce your liability, and you know how best to depreciate your equipment. Pros and novices alike may find that it pays to look carefully at their tax guides or consult a professional about the IRS rules concerning computers.

Many users don't realize that significant tax deductions can now be taken for software. If you develop any of your own programs, the cost associated with that activity may be deductible on a current-cost basis. If you've purchased software for use in your business, its cost is also deductible. However, that cost must be depreciated or amortized in the usual way. It's good to remember, too, that there's a gray area concerning software developed outside of a business organization. If you can demonstrate that you bear the risks involved in maintaining the software's operability, then the IRS may allow you to deduct its cost on a current basis.

If you don't use your computer in any business activities, don't despair. While the IRS doesn't permit you to deduct the cost of a hobby, you may be able to deduct a portion of the cost of your computer as an educational expense or a part-time business expense.

Your machine qualifies as a business expense if it is used to generate income on a part-time basis. It is then part of the cost of doing such business and is therefore deductible as a business expense. You'll have to calculate what percentage of the time the computer is being used in such activities, since only that percentage of the machine's cost will be deductible.

The computer can be deducted as an educational expense if you can demonstrate that you use it in order to meet the requirements of your employer to maintain your salary or job. Don't give up on this area. If you use the computer to improve your skills, that may also qualify you to take a deduction. The best strategy is to review the requirements for educational deductions carefully; you may find that the computer qualifies in a variety of ways. And the time you spend getting more information may indeed save you a good deal of money.

If you do deduct a portion of the expenses associated with your Apple, be sure to attach to your tax form a short note that explains your justifications. This extra step shows that some thought was given to the process before such a deduction was taken, and this often makes the difference between being audited and not being audited. As an extra hedge, try to maintain some records of how you used the machine during the year. In a pinch, these may be just what's needed to swing a deduction in your favor.

One final comment. When in doubt, consult a professional. While you may not necessarily go to jail for a mistake, it could cost you dearly in taxes and penalties. Of course, if you did go to jail, it just might provide you with the time you always wanted for getting familiar with your Apple! You decide.

Books for B.U.G.s. Several books that have been released recently may be of interest to some of the members of the Business User Group. Two of the new books are from Apple Computer.

The Personal Guide to Personal Computers by Peter Lundstrom introduces readers to personal computers and their use in the home. The book costs around $2 and contains about fifty pages. It explains, in easy-to-understand terms, how personal computers are used, how they work, and how to select one.

Perhaps of even greater interest to some of you is a book by Barbara Gibson called *Personal Computers in Business*. This fifty-page book introduces managers, professionals, and owners of small businesses to the use of the small business computer as a business tool. It is filled with information about how business computers are used in the office, how they work, how to plan for their installation, how to evaluate different systems, and how to estimate costs. It sells for $2.95.

Both of these books are nicely produced, informative, and easy to read. They are also, obviously, biased toward the Apple and written for the beginner. They are far less of a "how-to" of personal and small computers and much more of an introduction to them.

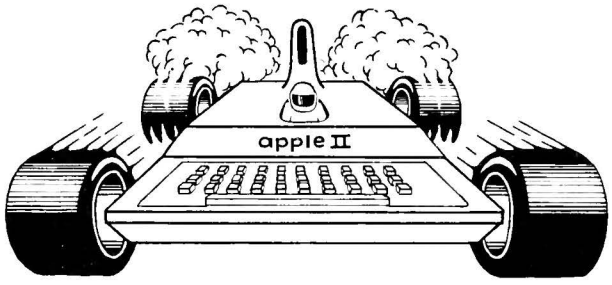
While we're on the subject of books, here's one that is likely to be of particular interest to someone who's considering the use of a computer in a business. It's called *So You Are Thinking About a Small Business Computer*. Priced at $10.95, it's written by R. G. Canning and N. C. Leeper and published by Prentice-Hall. This is a very nice sourcebook of material that merits the consideration of people who are thinking about computerization. It is, of course, well written and easy to read (or it would never have made it to this column).

The first few chapters are the standard ones and include sections titled "How a Computer Can Help You," "How Computers Work," and "All About Hardware and Software." What distinguishes this book is the depth of coverage and the timeliness of the material. The text explains the differences between eight-bit and sixteen-bit processors quite nicely. Moreover, it provides you with a step-by-step guide to determining your own needs and documenting them before you rush out to buy a new machine. In fact, sample forms to use in doing just that (and instructions about completing them) are included in the appendices.

The book also has some good chapters on word processing, protecting your computer system, and looking toward the future. The appendices include a checklist for evaluating vendors, a listing of major computer suppliers, a glossary, and a reference section detailing sources of information on a variety of topics. If you're considering using a small computer in your business, this may be the book for you. You'll certainly get a good return on your investment.

B.U.G. Call. One of the B.U.G. members is hoping to expand the capabilities of his Apple II to accommodate a variety of new applica-

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tions. He has asked if any of our readers might be able to help him out.

This reader works at a company that manufactures electronic quality control equipment for the glass container industry. The company has three Apple IIs that are used for word processing, database management, and *VisiCalc*. He'd like to know whether any other readers have found applications packages dealing with printed circuit board design, drafting/computer-aided engineering, production planning/job control, recording data from test equipment, trouble-shooting electronic test equipment, or numerical control programming for their machining equipment. He's also interested in knowing about training packages for use with customers and employees and programs that will assist in translating equipment manuals into foreign languages.

If you can provide information about any programs, applications, or people in these areas, it would be greatly appreciated. Send it along to the B.U.G. and it will be forwarded to your fellow member. This particular use of B.U.G. (for shared problem solving) can be its greatest benefit, so help out if you can!

The Readers Query. A recent note from a reader asked a question that comes up so frequently that it's deserving of some comment here. The question was whether to buy a computer now or wait. The reader's main concerns had to do with whether a machine bought now would be obsolete two years from now and whether the costs might drop significantly before too long.

There is, of course, no easy answer. This is so because the problems we're talking about here are real problems. Prices will come down and the computer you buy may indeed be obsolete soon. Let's look at each of these issues.

Costs will come down. And, as new models are released, the older ones will be offered at sale prices. It's not likely that there will be, instantaneously, such a tremendous drop in prices that you'd be dismayed at having made your purchase. Price reductions tend to be gradual, not precipitous. More important are your own needs. Perhaps the computer will actually save you money; you may be losing out more financially by waiting for a price reduction, since what you are losing is time that the computer could have been working for you. This is particularly true in business settings.

Obsolescence is a significant concern. The technology is changing so rapidly that some obsolescence is assured. In the early seventies, it would have taken a doctoral student and a grant in six figures to produce a workable voice synthesizer. Now one is available for less than $150. For another example, just look at what has happened to the calculator market. Something new and better is coming out all the time. If you wait for the best and most up-to-date, you'll find yourself waiting for a long while.

The best thing to do is to buy a computer system that's clearly expandable. Consider that the six-year-old Apple II can do almost everything the brand-new IIe can do through expansion boards, chips, and software.

The machine you get should be able to grow with you as well as with the technology. The better machines are now being designed in this fashion. We think that the present Apples will be around for a while. But, clearly, they are the first generation of microcomputers. As with all technological developments, there will be succeeding (and better) generations.

The saving grace is twofold. First, business users can often enjoy some tax breaks in financing their machines. There are a variety of ways to reduce the real cost of equipment. Second, there is, indeed, a very good market for used computers. There are other small businesses, students, schools, and a wide variety of sources for recovering a good deal of the investment you've made in your computer system.

Our advice to those who are faced with the dilemma of when to buy is: buy now. Buy an expandable system! And remember that, in most cases, you really do get what you pay for.

So long for now. ■

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```
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)F41:(F39*F37)
)F39:+E39*(1+F35)
)F37:+E37*(1+F33)
```

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```
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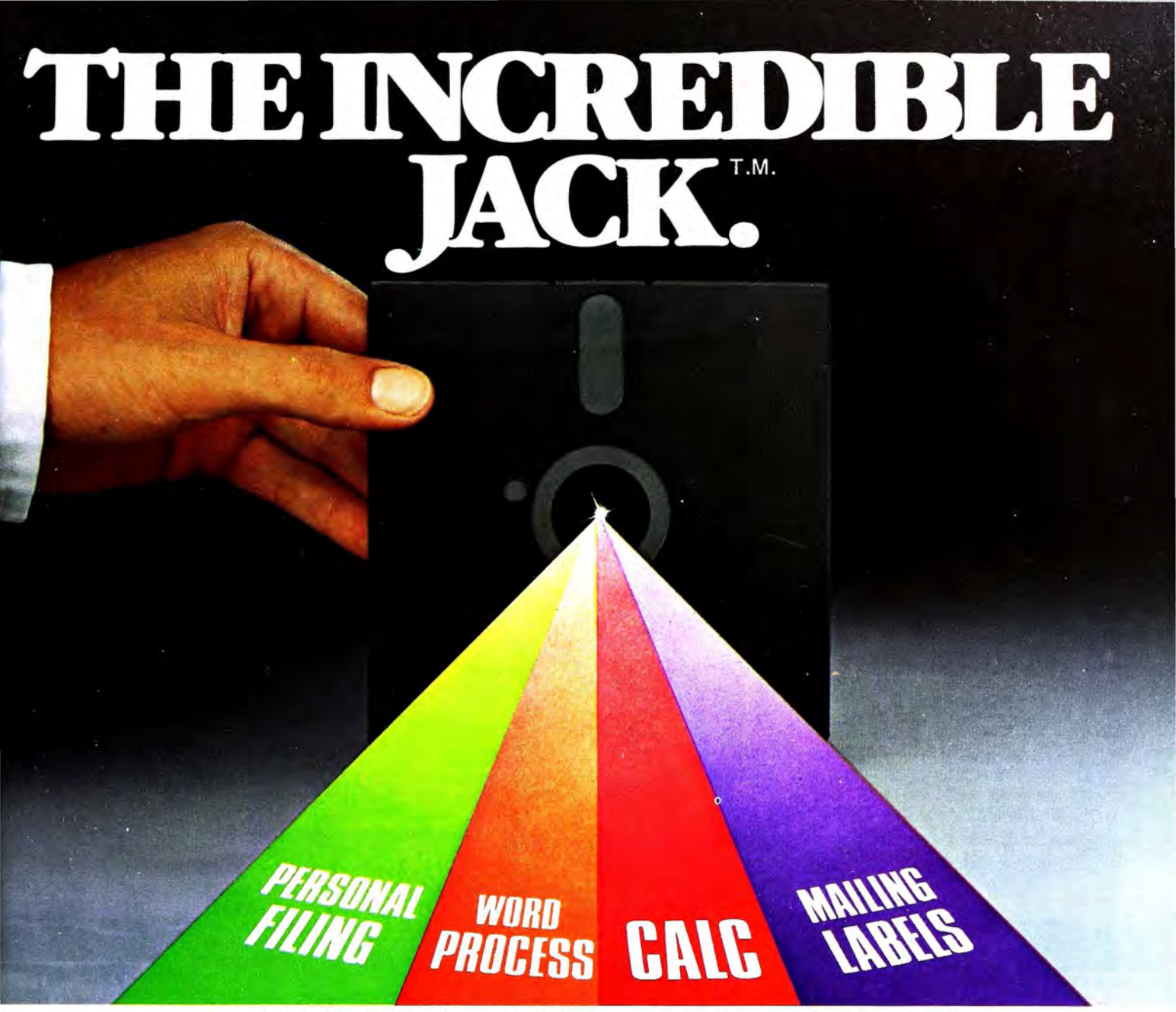
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All About Applesoft

by Doug Carlston

Before we continue our discussion of text files from last month, there's a little item from the November column that needs clarification (a subtle way of saying that there was a mistake).

The dollars and cents format program worked fine except for two minor failings—it couldn't handle whole numbers less than ten, and it often lost a penny due to rounding errors. Well, we're all human. To paraphrase the words of that immortal math instructor Tom Lehrer, "The important thing nowadays is to understand what you are doing rather than to get the right answer."

A number of people sent in corrections that solve the problem. Here is the version provided by John Heiser of Warren, Ohio. His changes are in lines 15 and 22:

```
10  INPUT NUMBER
15  NUMBER = INT (NUMBER * 100 + .001) / 100
20  A$ = STR$ (NUMBER)
22  IF INT (NUMBER) = NUMBER THEN A$ = A$ + ".00"
25  IF MID$ (A$, LEN (A$) - 2,1) = "." THEN 40
30  A$ = A$ + "0": GOTO 25
40  IF NUMBER < 1000 THEN 50
45  B$ = LEFT$ (A$, LEN (A$) - 6):A$ = "," + RIGHT$ (A$,6)
46  IF LEN (B$)<>4 THEN A$ = B$ + A$: GOTO 50
47  A$ = "," + RIGHT$ (B$,3) + A$:B$ = LEFT$ (B$, LEN (B$) - 3):
    GOTO 46
50  A$ = "$" + A$
60  PRINT A$
70  GOTO 10
```

Thanks, John. A more compact routine (submitted by Albert P. Pinto of Atlanta, Georgia) does essentially the same thing. It is listed in the September Open Discussion, on page 27.

There are also some excellent utilities on the market that add some of the missing Basic commands to Applesoft (the Basic command *print using* would ordinarily be available to convert raw numbers to dollars and cents format, but that command never made it into the Applesoft vocabulary). One such utility program is called *Apple Spice*, available from Adventure International. Another is *The Routine Machine*, published by Southwestern Data Systems.

Now let's get back to our work on text files. Last month we developed a simple mailing list program that permitted you to enter a series of names and addresses and write them out to disk as a sequential file. It was a good exercise but had limited practical value, since the program did not permit appending new names to the list at a later date or editing or deleting names from the existing list.

Let's take that simple beginning and build ourselves a full-blown mailing list program. We'll start using random access files. For the time being, we will keep all of our addresses in an array in memory, but later we may want to modify the program so that we can handle lists too long to be loaded entirely into RAM. Using random access files will also give you a chance to see how random file commands differ from sequential file commands.

First, let's list the program. Then we'll try to take it apart.

```
10  DIM A$(4,200):D$ = CHR$ (13) + CHR$ (4)
20  GOTO 500
40  REM  ************************
50  REM  *    SUBROUTINES       *
60  REM  ************************
65  REM
79  REM *** GET INPUT LINE ***
80  REM
81  B$ = "": POKE - 16368,0
82  GET C$: IF C$ = CHR$ (13) THEN 87
83  IF C$ = CHR$ (8) AND LEN (B$) > 1 THEN PRINT C$;:B$ =
    LEFT$ (B$, LEN (B$) - 1): GOTO 82
84  IF C$ = CHR$ (8) THEN PRINT C$;: GOTO 81
85  PRINT C$;: B$ = B$ + C$: GOTO 82
87  CALL - 868: PRINT C$;: IF LEN (B$) > 25 THEN B$ = LEFT$
    (B$,25)
88  RETURN
90  REM
91  REM *** PAUSE ***
92  REM
93  PRINT : PRINT TAB( 8) "PRESS ANY KEY TO CONTINUE";
94  WAIT - 16384,128
95  PRINT : PRINT : POKE - 16368,0: RETURN
97  REM
98  REM ** WRITE LIST TO DISK **
99  REM
100  PRINT D$"OPEN"FILE$",L100"
110  FOR X = 1 TO 200
120  PRINT D$"WRITE"FILE$",R"X
130  FOR Z = 0 TO 4:A$ = A$(Z,X): FOR Y = 1 TO LEN (A$):A1$ =
     MID$ (A$,Y,1): IF A1$ = "," THEN A$ = LEFT$ (A$,Y - 1) + "#"
     + RIGHT$ (A$, LEN (A$) - Y)
135  NEXT Y: PRINT A$
140  NEXT Z: IF A$(0,X) = "END" THEN X = 200
150  NEXT X
160  PRINT D$"CLOSE"FILE$
170  RETURN
197  REM
198  REM ** READ LIST FROM DISK **
199  REM
200  FOR X = 1 TO 200:A$(0,X) = "END": NEXT : PRINT
     D$"OPEN"FILE$",L100"
210  FOR X = 1 TO 200
220  PRINT D$"READ"FILE$",R"X
230  FOR Z = 0 TO 4: VTAB 22: INPUT A$: PRINT A$: IF LEN (A$)<3
     THEN 240
235  FOR Y = 1 TO LEN (A$): IF MID$ (A$,Y,1) = "#" THEN A$ =
     LEFT$ (A$,Y - 1) + "," + RIGHT$ (A$, LEN (A$) - Y)
236  NEXT
240  A$(Z,X) = A$: NEXT Z: IF A$(0,X) = "END" THEN X = 200
250  NEXT X: PRINT D$"CLOSE"FILE$: RETURN
499  REM
500  REM  ************************
510  REM  *      MAIN MENU        *
520  REM  ************************
521  REM
525  HOME : PRINT TAB( 15)"MAILING LIST"
530  VTAB 5: HTAB 8: PRINT "C(HOOSE MAILING LIST": PRINT
550  HTAB 8: PRINT "A(DD NAMES"
551  HTAB 8: PRINT "E(DIT EXISTING NAMES"
552  HTAB 8: PRINT "L(OOK FOR A NAME"
553  PRINT
555  HTAB 8: PRINT "S(ORT THE LIST"
560  HTAB 8: PRINT "P(RINT THE LIST"
565  PRINT : HTAB 8: PRINT "Q(UIT"
570  VTAB 19: HTAB 8: GET A$
```

```
580  B$ = "CAELSPQ": FOR X = 1 TO LEN (B$): IF A$ = MID$
     (B$,X,1) THEN S = X:X = LEN (B$): NEXT : ON S GOTO
     7000,1000,4000,4000,6000,2000,8000
600  NEXT : GOTO 500
1000 REM  ********************************
1010 REM  *          INPUT DATA          *
1020 REM  ********************************
1030 IF FILE$ = "" THEN 7000
1050 K = 1
1060 K$ = A$(0,K) : IF K$  <>  "END" THEN K = VAL (K$): GOTO
     1060
1070 PRINT : PRINT "NAME (<RET > IF DONE): ";
1080 GOSUB 80: IF B$ = "" THEN 500
1090 A$(1,K) = B$
1100 FOR X = 1 TO 3: PRINT "ADDRESS LINE ";X;": ";: GOSUB
     80:A$(X + 1,K) = B$
1110 NEXT
1120 A$(0,K) = "": FOR X = 1 TO 200: IF A$(0,X) = "END" THEN
     A$(0,K) = STR$ (X):X = 200: NEXT : GOTO 1060
1130 NEXT X: PRINT : INVERSE : PRINT "FILE IS NOW FULL":
     NORMAL : PRINT : GOSUB 90: GOTO 500
2000 REM  ********************************
2010 REM  *          PRINT LIST          *
2020 REM  ********************************
2025 HOME : VTAB 5:P = 0:KT = 0: IF FILE$ = "" THEN 7000
2026 PRINT "OUTPUT TO:": PRINT
2030 PRINT TAB( 8) "S(CREEN": PRINT : PRINT TAB( 8)
     "P(RINTER": PRINT : PRINT : PRINT TAB( 8);: GET A$: PRINT :
     IF A$ = "S" THEN 2050
2040 IF A$  <>  "P" THEN 2025
2045 PRINT D$"PR#1 ":P = 1
2050 K = 1
2060 FOR Z = 0 TO 4:A$ = A$(Z,K)
2065 PRINT A$: NEXT : IF A$(0,K) = "END" THEN 2100
2070 KT = KT + 1:K = VAL (A$(0,K)): PRINT : IF NOT P AND KT / 3
     = INT (KT / 3) THEN GOSUB 90
2080 GOTO 2060
2100 PRINT D$"PR#0": PRINT : IF NOT P THEN GOSUB 90
2110 GOTO 500
4000 REM  ********************************
4010 REM  *        LOOK/EDIT FILE        *
4020 REM  ********************************
4030 HOME : VTAB 5: IF FILE$ = "" THEN 7000
4040 VTAB 5: INPUT "ENTER NAME: ";A$: PRINT
4050 K = 1
4060 B$ = A$(1,K): IF LEN (A$) > LEN (B$) THEN 4100
4070 FOR X = 1 TO LEN (B$) + 1 - LEN (A$): IF A$ <> MID$
     (B$,X, LEN (A$)) THEN 4090
4080 VTAB 7: FOR Z = 0 TO 4: PRINT TAB( 8);A$(Z,K): NEXT :
     PRINT : PRINT "IS THIS IT?";: GET AN$: PRINT :X = 200: IF
     AN$ = "Y" THEN 4200
4090 NEXT X
4100 IF A$(0,K) = "END" THEN PRINT : INVERSE : PRINT "FILE
     NOT FOUND": NORMAL : GOSUB 90: GOTO 500
4110 K = VAL (A$(0,K)): GOTO 4060
4200 REM  ********************************
4210 REM  *        EDIT ROUTINE          *
4220 REM  ********************************
4225 IF S = 4 THEN 500
4230 VTAB 8: FOR X = 1 TO 4: HTAB 4: PRINT "("X")": NEXT :
     PRINT : PRINT "CHANGE WHICH NUMBER?"
4240 PRINT : PRINT "(PRESS < D > WHEN DONE)": PRINT : PRINT
     "(TYPE ";: INVERSE : PRINT "DELETE";: NORMAL : PRINT
     " ON LINE 1 TO DELETE)": PRINT : GET A$:IF A$ = "D"
     THEN 500
4260 IF VAL (A$) < 1 OR VAL (A$) > 4 THEN 4230
4270 A = VAL (A$): VTAB 7 + A: HTAB 8: GOSUB 80: IF B$ =
     "DELETE" THEN 4300
4280 A$(A,K) = B$: GOTO 4230
4300 REM  ********************************
4310 REM  *        DELETE A FILE         *
4320 REM  ********************************
4330 FOR X = 1 TO 200: IF VAL (A$(0,X)) = K THEN K1 = X:X = 200
4340 NEXT X:A$(0,K1) = A$(0,K):A$(0,K) = "END": GOTO 500
6000 REM  ********************************
6010 REM  *        SORT THE FILE         *
6020 REM  ********************************
6030 HOME: VTAB 8: HTAB 7: PRINT "NOT YET IMPLEMENTED":
     PRINT: PRINT TAB (7) "SEE NEXT MONTH'S COLUMN":
     GOSUB 90: GOTO 500
7000 REM  ********************************
7010 REM  *    CREATE NEW LIST FILE      *
7020 REM  ********************************
7030 HOME : VTAB 8
7035 HTAB 8: PRINT "NAME OF LIST?": PRINT : HTAB 8: PRINT
     "PRESS <RET > FOR CATALOG"
7040 PRINT : HTAB 7: INPUT " ";B$: IF B$ = "" THEN PRINT :
     PRINT D$"CATALOG": PRINT : PRINT : GOTO 7035
7050 FILE$ = B$: IF S > 2 THEN GOSUB 200: ON S - 2 GOTO
     4000,4000,6000,2000
7060 PRINT : HTAB 8: PRINT "IS THIS A NEW LIST?": PRINT : HTAB
     8: GET A$: IF A$ = CHR$ (13) THEN PRINT : PRINT
     D$"CATALOG": GOTO 7060
7070 IF A$  <>  "Y" THEN GOSUB 200: GOTO 500
7080 PRINT D$"OPEN"FILE$",L100"
7090 PRINT D$"DELETE"FILE$
7100 FOR X = 1 TO 200:A$(0,X) = "END": NEXT : GOSUB 100: IF S
     = 2 THEN 1050
7110 GOTO 500
8000 GOSUB 100: PRINT D$"CATALOG": END
10000 FOR X = 0 TO 200: FOR Z = 0 TO 4: PRINT A$(Z,X): NEXT :
     NEXT
```

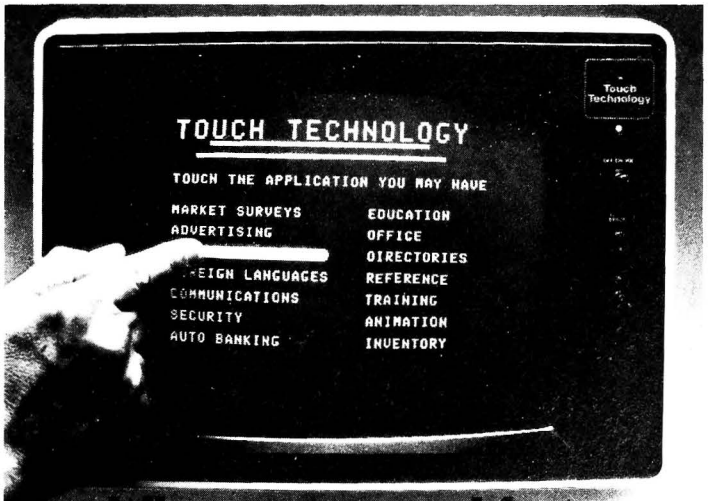
Hold on now. Don't despair. In that whole long program, here is the list of vocabulary that's new:

```
CALL -868
```

The important thing to do whenever confronted with a major task is to break it down into bite-sized pieces. That's the way this program was written, and that's just about the only way to read it without being overwhelmed.

Let's start by tracing program control. After setting up an array in line 10 (and defining D$, our DOS control character), the program jumps to line 500. This is the main menu, and it is from this section that program control jumps out to all the little sections that manipulate your mailing list.

Take a look at lines 500 through 600. There shouldn't be anything



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particularly new in this section; the only complicated bit, line 580, is just that clever branching routine that we described the same month that we were messing around with dollars and cents formatting. B$ is just a string of all the acceptable characters that one can press to jump to different parts of the program. The MID$ command finds which character we have pressed and sets S to a number from 1 to 7, representing the seven items in the menu.

The first item is C(hoose Mailing List. This routine is located in lines 7000 through 7110. Its purpose is to allow you to select the name of the particular list you want to work with. (And, in fact, if you run the program and try to jump directly to one of the other menu items without selecting this one first, you will be directed here nonetheless. More on this later.)

Line 7050 sets the string variable file$ to the name of the mailing list we are opening. The if statement at the end of that line opens the file and reads in all the information currently in that file, using the subroutine beginning at line 200. If you chose something other than C(hoose Mailing List, the if statement then sends you back to the menu item you originally selected.

The rest of this section is designed to set up a new mailing list. First any existing file of the same name on the disk is deleted (line 7090—*warning*: this can be dangerous, and you might want to build some additional safeguards in here); then each element of the mailing list array, A$(X,Y), is filled with the word *end* in line 7100, and then the array is written out to the disk. Finally, control is returned to the main menu.

Probably the most complicated thing in this whole program is the use of the two-dimensional array A$(X,Y). We use the array to get around constantly having to load and save items to the disk, which is very time-consuming and hard on the hardware to boot (no pun intended). The array is 4 by 200 in size. Each record is stored in the array as follows:

A$(0,*n*) = Pointer to next record
A$(1,*n*) = Name of person
A$(2,*n*) = First address line
A$(3,*n*) = Second address line
A$(4,*n*) = Third address line

The *n* represents the number of that particular record. This array can hold up to 201 *records*, that is, sets of names and addresses. If you want to make it larger, just change the dim statement on line 10 of the program.

The use of a pointer requires a little explanation. Ordinarily, the records are loaded one at a time as we type in our list of favorite names and addresses. Therefore, the pointer for the first record would be 2 (since it would point to the next, or second, record). The second record's pointer would be 3, and so on. This may seem a little silly right now, but the use of pointers to chain records together in this manner makes it possible to sort records several ways and to insert new records in alphabetical order, which may or may not have appeal, depending on how compulsive you are.

The next item on the main menu is A(dd Names. The add names routine starts at line 1000. This is the routine that permits you to sit down and enter all of your mailing list data. There are a couple of tricky parts to it, most of them tied up with the use of the record pointer, so let's take it one line at a time.

Line 1030 checks to see if we have chosen a mailing list file yet. If not, we get shipped off to the create-new-file routine at line 7000.

Next we start examining pointers to find the end of our existing mailing list. Line 1060 will loop back on itself until it reads a record pointer filled with the string literal *end*. As you may recall, line 7100 set all pointers to *end* when we first initialized the file.

Having found the end of our mailing list, we set K to the value of the first unused record number and begin accepting data input. Lines 1070 and 1080 prompt for and check the first line of input data. If we pressed return without entering data, this is a signal that we have finished entering all of our names, so control is returned to the main menu at line 500.

The actual input routine is the subroutine starting at line 80. This entire routine takes the place of the simple input statement, which would have been preferable except for its inability to handle strings containing commas. As you can see, using the get statement is far more cumbersome, but it does have that one advantage.

Let's take a close look at how the routine works. Line 81 clears our output string and the keyboard buffer. The next line accepts a single character of input and checks to see whether it is a return. If so, it ships us off to line 87, which ties up some loose ends and then returns us whence we came.

Line 83 is necessary to handle the left arrow key, which get sees as just another keyboard entry, not worthy of any special treatment. Line 84 handles the special case where the left arrow is used to delete the entire string B$, something that line 83 is unable to handle because the second parameter of the left$ instruction cannot be a zero.

Line 85 prints whatever character we have typed. It then concatenates the new character with those typed in earlier and returns us to line 82 to get more.

Line 87 starts with our new vocabulary for the month. *Call −868* clears the line on which the cursor is located from the cursor position to the right edge of the screen. The final part of line 87 is intended to truncate any input so that it all fits within a record that has a total capacity of only one hundred characters.

That's the big difference between sequential and random files, as you may remember. Random files have records of a fixed length. Line 100 in the program opens a file in which each record is one hundred characters long at most (that's why *",L100"* is added to the end of the open statement). And even this method of truncating everything to twenty-five characters wouldn't be sufficient if all five fields of the array were loaded up to their maximum value. Fortunately, that's not likely to happen.

But let's get back to the input routine starting at line 1000. Line 1090 stores the person's name in A$(1,K) with K indicating the record number. Then line 1100 loads the three address lines into A$(2,K) through A$(4,K). Finally, line 1120 looks for the next empty file and, upon finding it, sets A$(0,K) to point to that record. If it can't find an empty file, line 1130 prints a warning message and program control is sent back to the main menu.

Note that up to now all we have created is a list that is stored in memory. Nothing is written to the disk until we press Q to quit. This sends us to line 8000, where we are promptly redirected to the subroutine starting at line 100 (no wonder people get dizzy trying to read other people's code!). The file is opened in line 100 and we then set up a loop to write all of our records.

There is a difference here between the way you write sequential files and the way you must write random access files. When we wrote out a sequential file, we put the write command outside the loop and so only passed through it once. However, with a random file, it is necessary to use the write command to indicate which record you want to write to (that's what the characters *",R"X* at the end of the write command mean—open record number X). Everything will be written sequentially to record X until we issue a new write command telling the program to write to a different record.

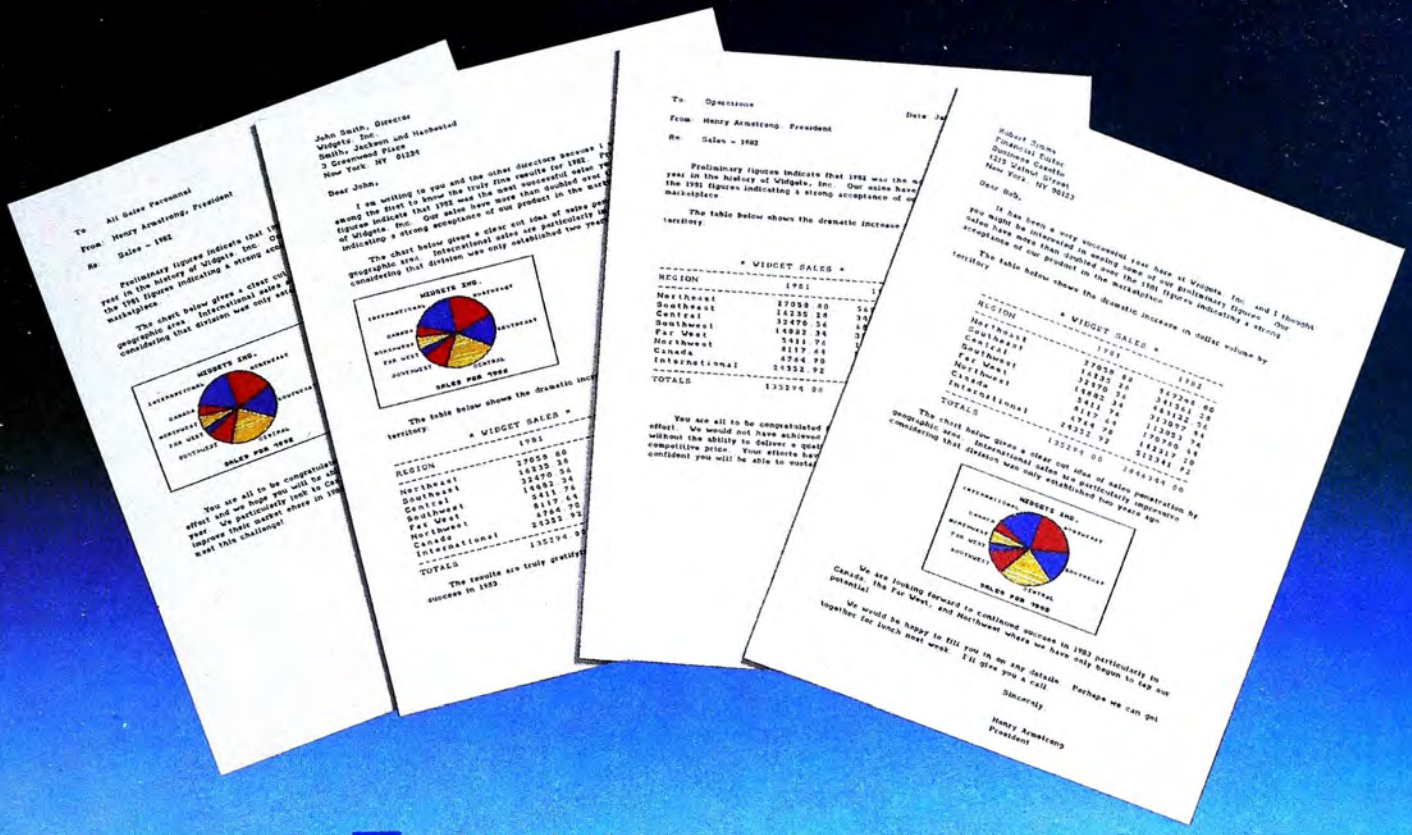
The loop at line 130 does something that might seem a bit strange at first. It checks each string that is about to be written to the disk for commas; if it finds any, it replaces the commas with number (#) signs. If we didn't do this, the commas would be understood to mark the end of a field within the record when we tried to read the data back into RAM from the disk, and our information would get hopelessly jumbled.

As an aside, you might want to look at the disk reading routine that starts at line 200. Line 235 cleverly changes all of the number signs in the data file back into commas as it reads the data in. If you think you'll need to use a number sign as part of a record, however, you'll have to come up with some other unlikely character to substitute for the comma.

There is just one more tricky part in the write file routine. Look at line 140. Once we get to a record with a pointer that says *end* we know that there are no more records to write. Therefore, we set X to the top value in the for-next loop. When the program hits line 150, it drops out of the loop.

Next month we'll take apart the print and edit routines. Then we'll design a couple of sort routines. In the meanwhile, look at the print routines on your own. If you have a printer you might find it useful to modify this routine to print labels, one, two or three up. ❑■

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PATCHING APPLE III PASCAL

BY JOHN JEPPSON

It seemed easy enough in the beginning, a perfectly straightforward project. Just reassign the Pascal system volume from the built-in floppy drive to ProFile. Somewhere in memory there must surely be a string holding the system volume name. If you find where it is, and change it. . . . Such is the innocence of the uninformed.

There are a lot of files in the Pascal system. With just two floppies it's a mess, swapping disks in and out like a circus juggler. With three floppies it's difficult; with two . . . forget it. Far better to have a hard disk and at least two floppies. Then the system runs fairly smoothly. You put all the accessory files like Editor, Compiler, and Assembler on the hard disk and just the necessary boot files on the boot disk.

Of course those necessary boot files include not only the three SOS files, SOS.Kernel, SOS.Driver, and SOS.Interp, but also the Pascal boot files System.Pascal, System.Miscinfo, and System.Library. And, if you want a turnkey program, you also have to have System.Startup. That's an awful lot of stuff on one little boot disk. Usually you will have to cut down on System.Library or on the number of drivers in SOS.Driver just to make it all fit. And if you have a long System.Startup program you're in trouble. The only practical solution is a two-stage boot. First, the SOS files on one disk. Then, System.Pascal and the others on another disk. That gives you plenty of room, but it's a pain.

Back to Drive One. And, whether it's a one-stage or a two-stage boot, you are stuck with the Pascal system volume in the built-in drive. Whichever disk holds System.Pascal is automatically designated the system volume. Pascal hangs onto it like a leech. Almost every time you turn around, Pascal wants to refer back to the system volume—to that particular disk. If you remove the system volume, Pascal soon will stop everything and ask for it back. And you can't put it back just anywhere like most Apple III disks. You have to put it back in the built-in drive. Pascal won't even recognize the system volume disk in any other drive. Pascal simply pretends the drive is empty and zaps you with a "volume not found" error. After a while you'll just leave the system volume alone and use your external floppies for your own files. It simply isn't worth the swapping in and out.

So there you are with a valuable built-in floppy disk drive dedicated almost exclusively to baby-sitting a single file, System.Pascal. And with no obvious reason why System.Pascal could not just as easily be on the ProFile.

That's not all. Pascal often creates temporary work files that must also go on the system volume—in the built-in drive. There is System.Wrk.Text, which is your work file, if you use it. That must go on the system volume. And there are Pascal's own secret work files that you never see. They also go on the system volume. During an assembly, for example, Pascal creates a short file called Linker.Info on the system volume. If all goes well this file is later removed. But, temporarily at least, it must be there, and it must be on the system volume. Pascal will accept no other. So even with System.Assmbler on the ProFile, you must have the system volume in the built-in drive. The only way your own assembly language program can be assembled from the built-in drive is to transfer it onto the system volume, provided there is room.

Then there is the matter of speed. Pascal is constantly activating the floppies, even though all the relevant files are on hard disk. Floppies are slow, about one-tenth the speed of the ProFile.

And noise. Pascal looks around for its files, beginning with the system volume in the built-in drive and hitting each floppy in turn. If you happen to have left one of the drive doors open, the system will punish you with that horrible rasping noise that sounds like the floppy is tearing itself to shreds. After moving the system volume to ProFile, almost all of this searching is eliminated. Most searches then *begin* with the ProFile, where the files are actually to be found.

The Best Laid Plans. So the project was worth doing. Convenience, speed, quiet, and a liberated floppy disk drive, all for persuading Pascal to accept the ProFile as the system volume. But it wasn't quite so simple. Oh yes, the string was there in memory; here and there, and other places too. But no combination of changes solved the problem. A lot of bizarre crashes, but no magical transformation. Back to the drawing boards. . . .

Apple III Pascal was designed for a high degree of compatibility with Apple II Pascal. Apple II Pascal programs can be recompiled and run on the III, and the Apple III compiler can be directed to generate Apple II code. Apple III Pascal can even read Apple II Pascal disk files directly (except some of the system files). A more cynical view might hold that Apple III Pascal is a slightly modified version of Apple II Pascal. But, if so, it is certainly modified to use the speed and power of a much larger machine.

In any event a tremendous amount of useful information can be obtained by studying the available documentation for Apple II Pascal. We particularly recommend the Apple Pascal reference manuals from Apple and the recently released *Call −A.P.P.L.E. In Depth, Number Two: All About Pascal* from the Apple PugetSound Program Library Exchange. The latter volume reprints "Pascal Internals" by Mike Rosing and Keith McLauren, an excellent article that traces the initial boot process for initializing Pascal and provides much valuable information about the structure and operation of the p-machine on Apple II. Much of what we have learned about Apple III Pascal's inner workings has been translated to Apple III from information in that article.

When Apple III is powered up, the first step is a bootstrap process by which SOS.Kernel loads itself into memory and positions itself at locations $BC00 through $FFFF in the system memory bank. SOS then loads in the interpreter, SOS.Interp, which is placed in a predefined area of memory below SOS.Kernel. The Pascal interpreter occupies locations $760E through $B7FF. Then, before transferring control to the interpreter, SOS loads in the drivers from SOS.Driver and positions them one after another below the interpreter in memory. The drivers are all linked to SOS on a daisy chain extending from the floppy disk drivers. You never see these. They are buried in SOS.Kernel at location $E899 (in the current version). Then each driver is given an opportunity to initialize itself, and, finally, SOS relinquishes control to the user program by jumping to the first instruction in the interpreter.

As far as SOS is concerned, the interpreter is the program. If the interpreter wants to do clever things, fine. SOS doesn't care, up to a point. In some applications, such as *Apple Writer III*, the interpreter is a standalone machine language program. SOS.Interp is *Apple Writer III.* In Business Basic the interpreter is the language Basic (which SOS regards as the program). The language, in turn, runs other programs as subroutines: your Basic programs.

Pascal is a bit more complicated. As in Basic, the Pascal interpreter is the Pascal language, a machine language program. And the interpreter, in turn, runs high-level programs as subroutines. The Pascal interpreter is referred to as the *p-machine.* Its main job is to process sequences of *p-code*, your Pascal programs. It converts p-code instructions into 6502 machine language instructions and executes them.

But before getting around to translating p-code, the interpreter has a lot to do. It must set up the Pascal system within Apple III. It allocates chunks of memory for different purposes, sets up the Pascal execution stack and heap, and assigns various zero-page locations as pointers to all of its own parts in memory. It also sets up a communications area to SOS, called Syscom, and it compiles a list of the drivers that are available and how to get to them. Finally it loads chunks of Pascal program,

p-code, from disk into memory and begins to do whatever the p-code says to do. And the first p-code program loaded is System.Pascal.

Conceptually, there is an extra step in Pascal not present in Basic. In Basic, the interpreter is a machine langage program which, in turn, runs various programs written in the language Basic. In Pascal, on the other hand, the Pascal interpreter runs just one Pascal program, System.Pascal. System.Pascal is itself a program written in Pascal; that is, in p-code. In a sense, it is the only Pascal program. Your own Pascal programs are really just subroutines, procedures called up by *the* program, System.Pascal. This means that System.Pascal itself is always running. That's why Pascal latches on so firmly to the system volume. The system volume contains System.Pascal, a currently active and executing program that the system maintains as a continuously open file.

The Software Swap Meet. So why not just load System.Pascal into memory and run it from there? Why tie up a disk? Well, System.Pascal is actually the coordinating center for the overall Pascal system (*the* program) of which all the accessory files, such as Editor, Compiler, and Assembler, are parts. It would be a colossal waste of memory to keep the whole thing in RAM.

One of the fundamental precepts of Pascal (on small computers) is that segments of programs reside in memory only while they are active and useful. Unused segments are left on disk and are swapped briefly into memory when called. This preserves RAM memory for data. You can even designate parts of your own programs as separate segments, so that an initialization procedure, for example, will not tie up memory after it is no longer needed. System.Pascal itself is divided into several such segments, only a few of which reside in memory at any one time. But the rest have to be available. Furthermore, the system needs a bit of nonvolatile scratch-pad space for work files and for recording various options used in future reboots of the system. Hence the system volume. It is really just a means of providing the system with some nonvolatile memory for its own use.

What is less clear is why the system volume has to be kept in the built-in drive. This may be one of the burdens of evolution, like an appendix. We now suspect that Pascal systems and subsystems have, for several decades, expected the system volume to be found on Pascal I/O unit 4, which in Apple III is the built-in drive. So now, after extensive development of the Pascal system, many different parts of the system just refer to unit 4, instead of a variable that might easily be reassigned. If true, that is a clear violation of good programming technique. All global constants should be referenced by label so that any constant can be changed with a single reassignment.

It makes some sense to keep the system volume in unit 4 if all your drives are the same quality. Suppose that all your disks are floppies. If you have to tie up one floppy it might just as well be the built-in floppy. At least you can be reasonably sure that it exists. And there is no obvious advantage in switching to some other floppy, which the next person may or may not have purchased. So, if the Pascal developers were thinking of systems with several floppy disk drives, they might not have anticipated a reassignment. But when you buy a hard disk, such as ProFile, reassignment suddenly becomes worthwhile.

It is hard to believe the Pascal writers would have made this error. But it is reasonably certain that if there is a system volume variable, and it is assigned to unit 4, that the assignment is done after the system switches to running in p-code—perhaps in the Initiali segment of System.Pascal. It is not done during the initial setup of the Pascal system by SOS.Interp.

It's true that there is a location in Syscom, Pascal's communications link to SOS, called Sysunit. This location's value is the number of the unit from which the system was booted. SOS.Interp does explicitly load that location with the value 4, which is Pascal's number for the built-in drive. But, unfortunately, when SOS.Interp is patched to load that location with a 5 (unit 5 is the same as D2), the system volume is not affected, although there are some other peculiar effects we shall mention in a moment.

So it really looked for a while as though the p-code of System.Pascal would have to be decompiled. That is a mammoth task, and one that isn't made any easier by the fact that we really don't know how . . . yet. Fortunately for this project, it turned out to be unnecessary.

We cherish the belief that it is only our preoccupation with the yawning abyss of p-code, and not some more serious defect, that closed our mind for weeks and weeks to what we already knew. Pascal's "Unit #4" is a label, and in Apple III Pascal it is *assigned* the value .D1. The Rosetta stone.

You see, Pascal keeps its own set of books. Back before there was an Apple III, Pascal was happily doing graceful gymnastics with files. Files were referenced by path name. Input and output were standardized. And Pascal handled all the busy work, automatically. Pascal kept track of which files were open, the current position in files, and even things like prefixes. Pascal also kept a list of all the available devices, numbered in a standard and predictable order. This was the list of Pascal unit numbers. Standard devices, like Console and Graphics, were always assigned the same number, which helped make the system more transportable from one machine to another. It was all done as part of the Pascal system. The Pascal programmer didn't have to mess with it.

Pascal's SOS Runaround. Then along came Apple III. Wouldn't it be nice, they thought, if the operating system could handle files with all the ease and power of Pascal? So that's what was done. SOS was given a great many machine language subroutines to do all those marvelous things with files. Using SOS calls, the programmer can create and manipulate files almost as easily from assembly language as from any higher language. It's great.

Apple III Pascal, however, doesn't use those capabilities. Or at least not many of them. In Apple III's operating system, a single SOS call can search several devices for a particular volume, read its directory, locate a given file, and open a unique pathway to read and write the file's contents. But Pascal ignores that. Pascal uses mainly the Device Read SOS call, which works almost at the level of track and sector (and is actually considered illegal). Pascal searches for the volume. Pascal reads the directory. Pascal finds the file. Pascal even keeps its own prefix. It's really a massive duplication of effort, and a waste of memory since all those SOS routines are right there in RAM memory, betwen $BC00 and $FFFF. But that's why Pascal is such a portable language. It ignores the unique abilities of particular machines.

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When you boot Apple III, SOS loads the drivers and links their addresses together in a daisy chain so they won't get lost. Then SOS assigns each driver in the chain a number, starting with 1. Since the floppies are always at the head of the chain, the numbers begin: .D1 = 1, .D2 = 2, and so on. After the floppies, the numbers continue for all the other devices in whatever order they were loaded from SOS.Driver (which is just the reverse of how they are listed by the *System Configuration* program). Remember that these are SOS device numbers, not Pascal unit numbers. SOS keeps a set of books too.

Then SOS turns control over to Pascal, and right away Pascal wants its own list. Furthermore, Pascal wants the drivers numbered in the standard Pascal manner, not in whatever order they got shoved into SOS.Driver. (Pascal must surely have been regular Navy.) So Pascal compiles its own list; and this is done by SOS.Interp, before the switch to p-code. For each SOS device number in the list, from 1 to no-such-device, SOS.Interp polls the device, finds out what type of device it is, and assigns that device number to the proper Pascal unit number. Thus, it creates a look-up table. And it creates the look-up table just once. Thereafter, whenever Pascal wants unit 4 it goes to the look-up table. "Oh yes, unit 4 is SOS device 1." So Pascal issues a Device Read SOS call to SOS device 1.

The first accompanying program patches SOS.Interp. The sequence of instructions is unchanged until after SOS.Interp has built the look-up table. Then the patch captures the code path and switches the assignments for Pascal units 4 and 9 (or whatever unit number has been assigned to your hard disk). The patch then jumps back to the original code path, and SOS.Interp goes about its business as before. Pascal is none the wiser. When Pascal wants to talk to the system volume it asks for Pascal unit 4 just as it always did. But now, when it goes to the look-up table, it gets the SOS device number of your hard disk instead of the device number of the built-in drive.

How is Pascal to know? Or SOS either? All devices look pretty much the same, just places that send and receive binary bits. Only their names tell them apart, except that their names have been switched. . . . But everything else goes on as before. Pascal goes right ahead and assigns the volume in Pascal unit 4 as the system volume. But that volume is now the root directory of your hard disk.

We do *not* change the value of Sysunit, the Pascal unit number of the device from which the system was booted. We want Pascal to continue to think the boot device was unit 4, even though unit 4 is now your hard disk. Strangely enough, changing Sysunit doesn't actually affect the system volume assignment anyway. What it seems to do is to cause Pascal to switch to an alternative standard numbering scheme for devices. One floppy's existence is denied altogether. Doubtless Sysunit is more useful in other systems.

SOS turns control over to the Pascal language program by performing a jump to the first instruction in SOS.Interp at location $760E. The pathway then makes two jumps to $775F and begins.

$7767: Issue Close SOS call to "close everything."
$776F: Zero the device number look-up table.
$77A7: Get device number of Console (SOS call $84)
$77B0: store in $7694 – will be Pascal unit 1.
$77BF: Device number of graphics to $7696.
$77D7: Device number of printer to $7695.
$77EF: Device number of RS232 port to $769D and $769E.
$780F..$7825: loop.
Device numbers of floppies – until error
store in "block devices" $7697..$769C (lower table).
$7828..$789F: A loop: For each device number – until error.
$7847: Is device already in table?
$785D: Is it Console type?
Yes: if no console in $7694
then store there
else store in upper table (unit numbers 128+).
$786C: Is it Graphics type?
Yes: if no graphics in $7696 then there; else upper table.
$78B7: Is it Printer type?
Yes: if no printer in $7695 then there; else upper table.
$788C: If character device then assign upper table
$7891: else (block device) if any room left in $7697..$769C
then there; else upper table.
$789F: Next device number .. end loop.
$78A1: Get console device number.
$78A7: JSR $7921 = get its name and open it.
$78AA: JSR $7B71 = set console device status table options.
$78AD: JSR $7BCB = set more console status options.
$78C9: Set (SOS) prefix to null.
$78D2: Store highest bank number in $16FE and $7C5E.
$78D8: JMP $8352 then to $8603.

This is where we will capture the code path and switch the contents of location $7697 (originally assigned to SOS device 1 = .D1) with the device number assigned to the hard disk. The latter will be found in the first block device location after the floppies (that is, $7697 + number of floppies configured). The code path resumes its original course at:

$8603: Initialize 6502 stack.
$8607: Interpreter bank number to zero page $A8.
$860E: "$00" to zero page $70 – ? error flag.
$861C: SOS call—release all memory segments (except SOS's).
$8622..$8664: Find a four-page memory segment (ID #16)
put its pointer (three-byte) at $9F,A0/16A0.

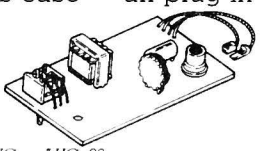
This area is subsequently used as an intermediate I/O buffer for read operations to the file System.Pascal.

$8666..$8685: Request two-page memory segment ID #11
= s-bank pages $1E..1F.
$8687: Open file System.Miscinfo using SOS call.

The pathname .D1/System.Miscinfo is found as a string at $838D and transferred to the SOS call parameter list. In the accompanying patch program this pathname is changed to *.name*/System.Miscinfo (using, of course, whatever device name you have assigned to your hard disk).

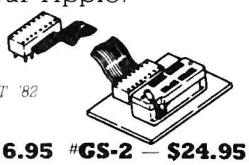
$86AB: If file is not found in .D1 then send error message to console screen saying "Put Pascal system disk in built-in drive." Then wait for return keypress. Repeat as necessary. In the accompanying patch program this message is changed to "Press return when *.name* is on-line."

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$86DA: Load one block from file System.Miscinfo into buffer located $83FB..$85FA.

$86E0: Move byte number $36 of System.Miscinfo to zero page $76. This byte determines the size of graphics area allocation. Possible values are: $C0 = no graphics; $C8 = 8K bytes; $D0 = 16K bytes; $E0 = 32K bytes.

$86EA: Close file System.Miscinfo.

$86F0..$8723: Request segment ID #15 to begin at bank 0 page 00 and extend to correct length of graphics area (or one page if graphics = 0).

$8725..$875C: Find segment (ID #12) of length $FF pages. This will be the Pascal data space. If you can't get $FF pages, get as many as you can. Store segment addresses: base at $A3,A4; limit at $A5,A6.

$875E..$87B1: Make three-byte pointers to data space: base of heap @$98; top @$9A; Syscom @$9C.

$87B3: Zero the Syscom area.

$87C6..$8815: Open file System.Pascal using SOS call. Store the file reference number at zero page $9C. This file thereafter remains open. If not found on .D1 then the same error message is sent until the file is found. The Open SOS call uses the pathname .D1/System.Pascal, which is found as a string at $836A. In the accompanying patch program that string is changed to *.name*/System.Pascal.

$8817..$883B: Read block 0 of System.Pascal into buffer at $83FB..85FA. This is the segment dictionary.

$883D..$8872: Make pointers to parts of segment dictionary and to Syscom + $60.

$8875..$88E2: Transfer segment dictionary info to Syscom + $60 area.

$88E4: Zero system bank pages $1E..1F.

$88EF: Make three-byte pointers: Pascal stack @5C; Stkbase pseudo register @52; New pointer @5A.

$892F: Store xbyte for Pascal data space in $16E1, 16E3 .. 16EF.

$893B..$8971: ?? has several complex JSRs. Apparently loads in the first p-code segment to be run and sets IPC (Interpreter Program Counter = zero page $58) to point to the first p-code instruction.

$897D: Stores $04 (value found at location $8369) into Sysunit = 5th byte of Syscom.

$8984: JMP $8A0D—to p-code evaluation loop.

The p-code evaluation loop is quite simple. It uses extended addressing via the IPC pointer (Interpreter Program Counter = zero page $58) to fetch a p-code byte from the Pascal program sequence located elsewhere in memory. If the p-code value is in the range $00..7F then it is a data byte and is simply pushed on the stack. If the value is in the range $80..FF then it is an instruction. In that case the p-code value is really just an index into a jump table (located $8200..82FF). First the value is multiplied times two since the jump table is a list of two-byte words. Then an indirect jump is made via the jump table to the code that handles that particular p-code instruction. Upon return, the IPC pointer is incremented to point to the next p-code instruction and the cycle begins again. The disassembler listing is as follows:

```
8A0D: A4 70     LDY 70        ; = "00" (? unless error)
8A0F: D0 0B     BNE -> error handler?
8A11: B1 58     LDA @58,Y     ; IPC pointer - extended addressing
8A13: 10 ED     BPL ->8A02 ; where it is pushed on stack
8A15: 0A        ASL A         ; it's negative so double it
8A16: 8D 1A 8A  STA 8A1A      ; store it in low byte of @JMP
8A19: 6C 00 82  JMP @8200     ; make the indirect jump via table
```

Using the Patch: The accompanying patch program alters the Pascal SOS.Interp file to reassign the Pascal system volume to a hard disk. Instructions and some explanations are interspersed with the code.

The program normally needs to be run only once. It creates a permanent change in the SOS.Interp file on a Pascal boot disk. Thereafter the change becomes effective each time you boot with that disk. Since you are obviously a careful and intelligent person you will, of course, be working only with copies of the Pascal boot files, never with the originals.

The program needs to use the name that you have assigned to your hard disk. It must be the exact device name assigned in the SOS.Driver file on that same boot disk. Also, the program needs to know how many floppy disk drives are configured (counting the built-in drive). It must be the number of *configured* floppies as recorded in SOS.Driver. This may or may not be the same as the number of floppies you have plugged into your Apple III. The program's success depends on the number of active floppy drivers in memory, not on the number of actual physical drives. (You might want to arrange for these two numbers to be the same.)

Because of the dependence on the device name and on the number of configured floppies, the whole thing will have to be redone if you change either of these parameters. Each time you rerun the patch program you must begin with a fresh, *unmodified,* accurate copy of the Pascal SOS.Interp.

The patch actually assigns the first nonfloppy block device that it finds to the spot normally occupied by .D1 in the look-up table. In most systems the only nonfloppy block device will be a hard disk. But if you do have other block devices you must be careful. Whichever block device appears last in SOS.Driver, according to the list displayed by the *System Configuration* program, will be the device tagged. The Pascal system volume will be the volume name of whatever volume is on the tagged block device during boot. That volume must contain System.Pascal, System.Miscinfo, and System.Library (if used) in its root directory. Normally, of course, you will put all the system files in that root directory.

It is possible that you may obtain (or write) one or more special purpose device drivers for your Apple III. Such drivers can facilitate a variety of nefarious activities such as dissecting the operating system. In fact, the whole patch program could conceivably be done automatically from a driver each time you boot (but with that approach you would have had to do a lot more typing). Such drivers will, of course, be classified either as block devices or as character devices. All device drivers are. If any are block devices, then don't forget about the "last in the list" problem. You will probably have to juggle the order in which such drivers are placed in SOS.Driver. It is done by deleting drivers and reading drivers.

Pascal begins most file searches at the system volume. That is now

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your hard disk, and that is where the files are actually located. There is little hunting about. At this point, however, Pascal does still believe that four files are most likely to be found on .D2 and starts looking there. The files are: Editor, Compiler, Assembler, and Linker. The first time any of these files is called, Pascal takes a quick look in .D2 (Pascal unit 5). The file, of course, is not there. A formal search then begins (and promptly ends) with the system volume. It is possible to correct this remaining search anomaly by changing only four bytes in the file System.Pascal. The bytes occur in strings of the form #5:System.Editor. We merely change the 5 to a 4. But while we are at it we can change a few more bytes and solve another problem as well.

Period Piece. As we have already noted, the system files must all be in the root directory of the system volume, just as they were on the floppy disk. This is rather a pain. It would be nice if all these files could be collected into one subdirectory where they wouldn't clutter up the screen every time you list the root directory's contents. Unfortunately, when looking for system files, Pascal normally looks no further than the root directory of each volume: a relic, no doubt, of Apple II Pascal.

But notice the system file names. They are all in the form System.*name*. This suggests a trick. Suppose you went through all the various system files and found all the strings in which these names are stored. (There are about twenty, not counting references to the work files.) If, in each case, you then changed the periods to slashes, the names would become System/Pascal, System/Filer, System/Compiler, and so forth. Then, on your hard disk, you could make a subdirectory called System and place within it the files Pascal, Filer, Compiler, and so on. Would not the system then interpret the revised names as pathnames to the subdirectory? Amazingly, it would, and does, provided you have also changed those four search references mentioned above from unit 5 to unit 4. For some unknown reason, if Pascal once fails in a stab at #5:System/Editor it just comes all apart. But #4:System/Editor works fine, perhaps because it is successful on the first try.

Thus the second accompanying program. It too has instructions, if fewer explanations. It is a utility program for changing all the necessary bytes in the various system files. You enter the byte numbers one at a time from the list provided. It only needs to be done once. Of course, it is entirely superfluous to caution you about copying the information on your hard disk to floppy backups before you start messing around.

If you have a disassembler program you might find it interesting to look at the byte number locations in the various files. That, of course, is how we found them: with a disassembler search program. You can also use the disassembler to check that the byte numbers changed were indeed located within the strings described. Someone, somewhere, may have made a typo.

Instructions. This program changes Pascal's SOS.Interp to assign your hard disk as the system volume. The change is a permanent alteration of the disk file and becomes effective when Pascal is rebooted with the modified SOS.Interp. This program needs to be run only once . . . unless you change the configuration of block devices in your computer system.

All System.*name* files (plus Errors.6502 and Opcodes.6502) must henceforth be on the hard disk. They must be in either:

Root directory: a. Compiled with ($SETC SubDirectory := false).
b. Pascal system files *not* altered.

System subdirectory: a. Compiled with ($SETC SubDirectory := true).
b. Pascal system files altered with To.Subdir program.
c. Errors.6502 and Opcodes.6502 must remain in root directory.

Only the system volume designation is changed. All pathname references to .D1, .D2, and so on, whether from the keyboard or from your programs, will continue to work normally.

If your hard disk goes off line while Pascal is running you will get an "Exec Err #9" the next time Pascal looks for the system volume. It is fatal unless you can get the hard disk back on line.

Notes:

1. Valid only for Apple III Pascal – version 1.0.
2. Must be redone if you change the number of floppy disk drives configured into SOS.Driver by the *System Configuration* program.
3. Must be redone if you change the device name of your hard disk (as configured into SOS.Driver).
4. When redone, always start with a clean, unmodified copy of Pascal's SOS.Interp.
5. Device name must start with a period. Do *not* end it with a "/." Examples: ".P," ".Profile," ".Bytesalot"
   See rules: *Standard Device Drivers Manual*, page 15.
   The name you supply must be the name assigned in SOS.Driver.
6. If you have more than one hard disk (or other block device that is not on the floppy drive daisy chain), then the last such driver listed in SOS.Driver will be assigned.
7. In the *remarks* below, addresses are given in hexadecimal and refer to locations that SOS.Interp will occupy when booted into memory.
8. In the *program lines* these addresses are decimal and refer to positions relative to the beginning of the program buffer.

Patch Apple III Pascal SOS.Interp File

```
program patch;
(*$SETC SubDirectory := true *)
var
  buf : packed array [0..17919] of 0..255;    (* 35 blocks *)
  count, Loc, i : integer;
  floppies : 1..4;
  infile, outfile : file;
  source, devname, pathname, file1, file2,
          ctrls1, ctrls2, message : string;
procedure error (s : string);
  begin
    writeln;
    writeln;
    writeln (s, chr(7));
    exit (program);
  end;
procedure getinfo;
  begin
    writeln (chr (28));
    writeln ('Utility: Patch SOS.INTERP to reassign Pascal system
        volume');
    writeln;
    writeln;
    writeln ('Pathname of Pascal interpreter file');
    write ('          (default = ".D2/SOS.INTERP"): ');
    readln (source);
    if source = '' then source := '.D2/SOS.INTERP';
    reset (infile, source);
    writeln;
    write ('Number of CONFIGURED floppy drives (counting built-in): ');
    readln (floppies);
    if not (floppies in [1..4])
      then error ('That is impossible!');
    writeln;
    write ('Device name assigned to hard disk drive: ');
    readln (devname);
    if ( (pos ('.', devname) <> 1)
      or (not (length (devname) in [2..15]))
      or (pos ('/', devname) <> 0) )
        then error ('Invalid device name');
    writeln;
    writeln;
    writeln ('....processing....');
  (* Read sos.interp file into buffer *)
        fillchar (buf, sizeof (buf), 0);
        count := blockread (infile, buf, 35, 0);
  (* If unmodified Pascal SOS.INTERP then $78D9 = $52; $78DA =
     $83 *)
        if ((buf[729]<> 82) or (buf[730] <> 131))
          then error ('File is not unmodified Pascal SOS.INTERP');
  (* Close infile and reopen with rewrite – BLOCKWRITE is dangerous
     when extending a file opened with reset *)
        close (infile);
        rewrite (outfile, source);
  end; (* getinfo *)
```

```
procedure extend;
  begin
(*Put one page of zeros between header and body of interpreter: First
  move body (length $41F2 = 16882 bytes) to right by 256 bytes. Then
  zero the intervening bytes. *)
        moveright (buf[14], buf[270], 16882);
        for i := 0 to 255 do buf[14+i] := 0;
(* Change header start address: from $760E to $750E
  Change header interpreter length: from $41F2 to $42F2 *)
      buf[11] := 117; buf[13] := 66;
  end; (* extend *)
procedure capture;
  begin
(* Place instruction "JMP 760E" at (new) interpreter start at $750E *)
      buf[14] := 76; buf[15] := 14; buf[16] := 118;
(* Capture codepath at location $78D8 (instruction "JMP 8352").
  Change the instruction to "JMP 7520," which points to the new area. *)
      buf[985] := 32; buf[986] := 117;
  end; (* capture *)
procedure switch;
```

The SOS device number of .D1 will have been stored at $7697; the SOS device number of the hard disk at $7697 plus the number of floppies. The following instructions switch these two and then jump back to the original code path. These instructions will begin at $7520 in the new area.

```
LDA     7697
STA     751F
LDA     76xx      ; $7697 + number floppies
STA     7697
LDA     751F
STA     76xx
JMP     8352      ; place code was headed when captured
```

To continue with the Pascal code:

```
begin
Loc := 151 + floppies;
   buf[32] := 173;    buf[33] := 151;    buf[34] := 118;
   buf[35] := 141;    buf[36] := 31;     buf[37] := 117;
   buf[38] := 173;    buf[39] := Loc;    buf[40] := 118;
   buf[41] := 141;    buf[42] := 151;    buf[43] := 118;
   buf[44] := 173;    buf[45] := 31;     buf[46] := 117;
   buf[47] := 141;    buf[48] := Loc;    buf[49] := 118;
   buf[50] := 76;     buf[51] := 82;     buf[52] := 131;
     end; (* switch *)
procedure newPathnames;
     begin
(*$IFC SubDirectory *)
     file1 := '/SYSTEM/PASCAL';
     file2 := '/SYSTEM/MISCINFO';
(*$ELSEC *)
     file1 := '/SYSTEM.PASCAL';
     file2 := '/SYSTEM.MISCINFO';
(*$ENDC *)
(* Place pathname to SYSTEM.PASCAL at $836A *)
     pathname := concat (devname, file1);
     buf[3690] := length (pathname);
     for i := 1 to length (pathname) do
       buf[3690 + i] := ord (pathname[i]);
(* Place pathname to SYSTEM.MISCINFO at $838D *)
     pathname := concat (devname, file2);
     buf[3725] := length (pathname);
     for i := 1 to length (pathname) do
       buf[3725 + i] := ord (pathname[i]);
  end; (* newPathnames *)
procedure newMessage;
(* Place new error message in string beginning at $83B0 *)
  begin
(* move cursor to (0,23) and beep *)
  ctrls1 := 'xxxx';
     ctrls1[1] := chr (26); ctrls1[2] := chr (0);
     ctrls1[3] := chr (23); ctrls1[4] := chr (7);
(* clear to end of line *)
     ctrls2 := 'x';
     ctrls2[1] := chr (31);
     message := concat (ctrls1, 'Press RETURN when "', devname,
                        '" is on-line.', ctrls2);
     buf[3760] := length (message);
```


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```
    for i := 1 to length (message) do
      buf[3760 + i] := ord (message[i]);
  end; (* newMessage *)
procedure replaceFile;
(* Write new SOS.INTERP back to disk – it is now one block longer *)
begin
  count := blockwrite (outfile, buf, count+1, 0);
  close (outfile, lock);
  writeln;
  writeln;
  writeln ('DONE');
 end; (* replaceFile *)
begin (* main program *)
  getinfo;
  extend;
  capture;
  switch;
  newPathnames;
  newMessage;
  replaceFile;
end.
```

This next program alters Pascal system files in the subdirectory.

A. Changes four unit number references in the file System.Pascal from #5 to #4; for instance #5:System.Editor becomes #4:System.Editor. This causes Pascal to begin searching for the accessory files on the system volume (now the hard disk) instead of on .D2. It is also required to help the changes in B work properly.

B. Changes strings in the various system files from System*.name* to System/*name*. This causes Pascal to look for files in the subdirectory System. It does *not* affect the various work files. Pascal will still put all work files in the hard disk root directory.

Instructions:

1. Modify SOS.Interp (using the other patch program) with the compiler option ($SETC SubDirectory := true). This causes the new pathnames in SOS.Interp to be in the subdirectory format.
2. Make a subdirectory: *.name*/System (where *.name* is the device name of your hard disk). Transfer all the system files into this subdirectory, but leave off the prefix *System.*. For convenience you may also put the following files in this subdirectory: Library.Code, Libmap.Code, Setup.Code, Aiiformat.Code. But the files Opcodes.6502 and Errors.6502 must remain in the root directory. Note: It is okay to have both of the following files in subdirectory System at the same time:
   file Library (derived from System.Library)
   file Library.Code (a program that always had that name)
   Pascal will not confuse them.
   The directory structure should now appear:

```
/PROFILE            (volume name of hard disk)
  SYSTEM            (subdirectory name)
    PASCAL          (files in subdirectory)
    MISCINFO
    EDITOR
    STARTUP         (if used)
    LIBRARY
    and so on.
```

3. Run this program supplying information requested as follows:

A. Change byte value: ASCII 5 to ASCII 4

In:	Byte numbers:
Pascal	13,002; 13,032; 13,062; 13,114

B. Change byte value: ASCII . to ASCII /

In:	Byte numbers:
Pascal	10,418; 10,930; 12,476; 13,010; 13,040; 13,070; 13,096; 13,122; 13,524; 13,560; 17,008; 21,312
Filer	25,916
Linker	2,550; 2,686
Editor	7,760
Compiler	26,728

You must also alter the following nonsystem files:

Setup.Code---------- 3,576
Libmap.Code-------- 2,802
Library.Code---------958; 3,282; 3,794; 4,306

Alter Pascal System Files

```
program toSubDir;
var
 source : string;
 newchar : char;
 number : integer;
 first : boolean;
procedure error (s : string);
 begin
  writeln;
  writeln;
  writeln (chr (7), s);
  exit (program);
 end;
procedure getfile;
 var
  instr : string;
 begin
  write ('(ESC,RTN to quit) -- Pathname of file? ');
  if not first then
   write ('(default = ', source, '): ');
  readln (instr);
  if instr <> '' then source := instr;
  if source = '' then error ('no source');
  if source[1] = chr (27) then exit (program);
 end;
procedure getcharacter;
 var
  inchar : char;
 begin
  write ('new character ("4" or "/")? ');
  if not first then
   write ('(default = ', newchar, '): ');
  read (keyboard, inchar);
  if inchar = chr (27) then exit (program);
  if inchar in ['4', '/'] then newchar := inchar
  else if first then error ('bad change character');
  writeln (newchar);
 end;
procedure getnumber;
 begin
  write ('Byte number to change: ');
  readln (number);
 end;
procedure change;
 var
  buf : packed array [0..511] of 0..255;
  infile : file;
  count, block, byte : integer;
 begin
  reset (infile, source);
  block := number div 512;
  byte := number mod 512;
  count := blockread (infile, buf, 1, block);
  buf [byte] := ord (newchar);
  count := blockwrite (infile, buf, count, block);
  close (infile);
  writeln;
  writeln ('file ', source, ', byte ', number, ', is now ', newchar, '');
 end;
begin
 writeln;
 writeln ('Modify Pascal SYSTEM Files for use in Subdirectory');
 source :='';
 newchar := 'x';
 first := true;
 while 1 = 1 do
  begin
   writeln;
   writeln;
   getfile;
   getcharacter;
   getnumber;
   change;
   first := false;
  end;
end.
```

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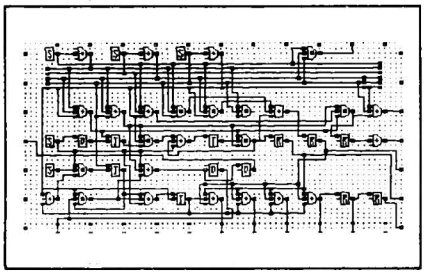
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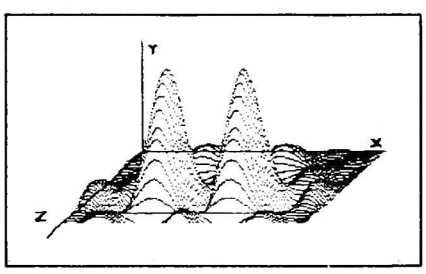
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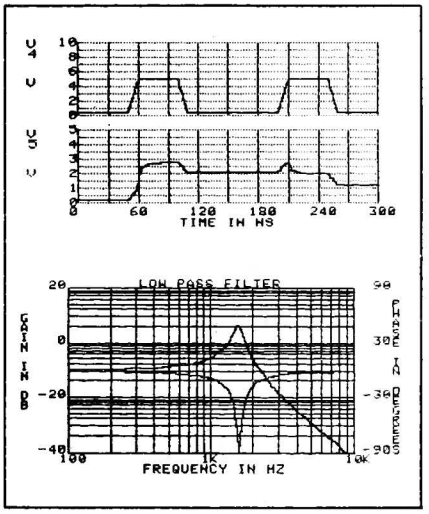


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THE PASCAL PATH

By Jim Merritt

Tools of the Craft, Part 20

Greetings from the land down under! Although even the most enthusiastic columnist needs an occasional holiday, the Softalk *presses never stop. Consequently, this issue's stroll down the Path meanders through the lovely country of New Zealand, where both the botanical and electronic Apples coexist in splendor and harmony.*

Rebuilding the Home. In *Cable*, which we have been developing and studying for the last few months, we have a program that permits convenient, though rudimentary, manipulation of a very primitive set of data. You'll remember that *Cable* was designed to permit the establishment and maintenance of a two-dimensional matrix representing a "Town" full of "Homes," where a Home models a residence and its occupants in the form of data relevant to a cable television franchise. Our initial Home consisted of nothing more than an account number, where a zero value indicated an empty (or nonsubscribing) dwelling.

```
CONST
  NoSubscriber= 0;
  MaxAcctNum=     MaxInt;
TYPE
  AcctNumType=
    NoSubscriber .. MaxAcctNum;
  Home=
    AcctNumType;
```

Of course, no real cable television concern would be satisfied with such a limited model. In addition to an account number, even the smallest firm would want to be able to record a subscriber's name, billing address (if different from the residence address), and telephone number. If premium channels are available, there should be some means of distinguishing "premium" subscribers from "basic rate" customers. For purposes of scheduling preventive maintenance, the holder of a cable television franchise may also wish to keep a record of the date when a service representative was last dispatched to a particular address. Sophisticated systems might even keep logs that summarize all the comments or complaints sent to the company from a given home; the computer could then be used to correlate neighborhood service complaints in order to do a better job of isolating problems in the cable network itself.

It's clear that such diverse sets of data cannot all be squeezed down into a single elementary datum. If we want to store more data for each Home, then the definition of a Home must be enhanced. Of course, a Home could itself be an array, containing several data items. This would turn a Town into a matrix of at least three dimensions—one index for the StreetName, one for the HouseNumber, and at least one for selecting a specific datum from among the cluster that would comprise the new model of a Home.

There's a snag, though. All the elements in an array must share the same data type. The array that is constructed from Integers cannot also contain Booleans, and vice versa. Of course, a clever programmer can find a way to use an Integer value as if it were a Boolean one, or to make an ARRAY OF Integer serve the same purpose as an ARRAY OF Char. However, such measures produce tricky, obscure programs. In a pinch, you can always use a wrench as a hammer, too, but no competent workman would deliberately choose a wrench for the job of driving a nail when a hammer is readily available.

Records. Pascal does indeed permit us to "glue" several dissimilar data together, in the form of a *record*. In order to make the *Cable* program more responsive to the business it serves, we will redefine a Home to be a record and so transform Streets and Towns into matrices of records.

As a rule of thumb, you may define and use a record anywhere that an array or matrix would also be appropriate. Figure 1 presents the syntax diagram for a record definition. In this discussion, we'll examine all but the *PACKED* and *CASE* options, which will be covered in future columns.

Let's decide to change a Home so that it contains an account number, a personal name, and a billing address, including city name, two-letter state abbreviation, and nine-character postal code. (Remember, zip codes will soon be growing, and *Cable* should accommodate the change!) Let's also include a ten-digit phone number, the date of the last service call, and a notation as to whether a given subscriber should be billed at the basic or premium rate. To accomplish all this, we may remove the old definition of Home from the *Cable* program and replace it with the following:

```
Date=
  RECORD
    Month
      :(Jan, Feb, Mar, Apr, May, Jun, Jul, Aug,
        Sep, Oct, Nov, Dec);
    Day
      : 1 .. 31;
    Year
      : 1950 .. 2049; (* one century *)
  END    (* Date *);
Home=
  RECORD
    AcctNum
      :AcctNumType;
    Name
      :String[24];
    BillAddress
      :RECORD
        Street,
        City
          :String[24];
        State
          :String[2];
        PostCode
          :String[9];
      END      (* BillAddress *);
    Phone:
      String[10];
    Rate
```

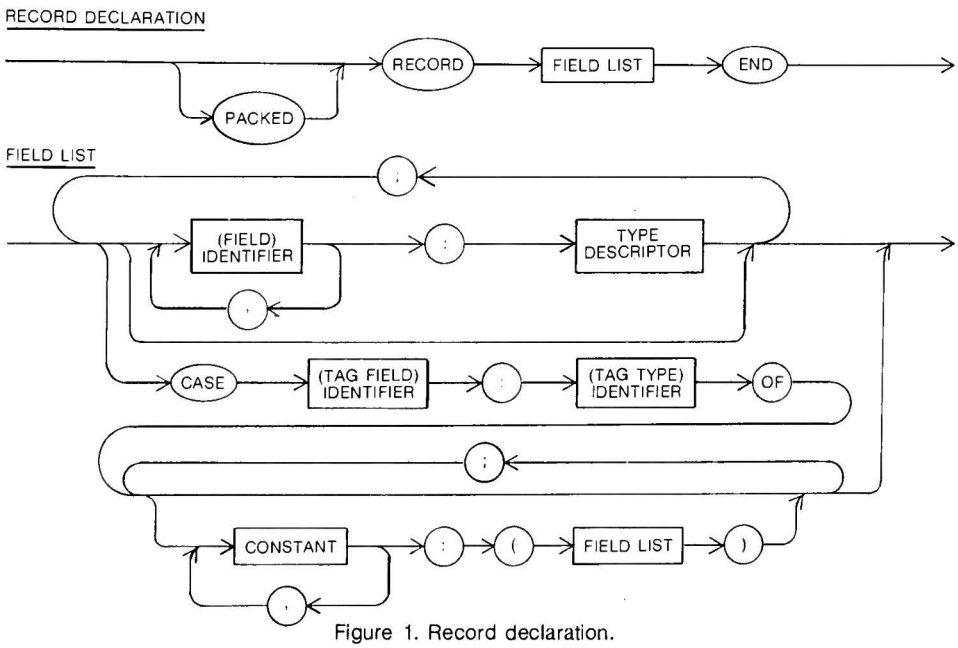


Figure 1. Record declaration.

```
    :(Basic, Premium);
  LastService
    :Date;
END    (* Home *);
```

The Pascal definition of our new Home looks very much like what it is: an aggregate of several individual variables, each with its own name and type. Each of the record's constituent variables is called a *field* of the record. Just as we had to add an index to an array name in order to access any individual array element, so must we add a *field descriptor* to a record name in order to access any particular field. A field descriptor consists of a period followed by the name of the selected field. For instance, suppose we declare a variable H to be of type Home. We would refer to H's AcctNum field as "H.AcctNum". "H.Phone" refers to the Phone field of H. "H.Rate" is the name of H's Rate field.

Like an array element, a record field may be given any type except one based on files. Record fields may themselves be records or arrays, as demonstrated by the BillAddress and LastService fields of Home. Each is a record; BillAddress's record structure is declared explicitly in the Home definition, while LastService is a record because its declared type, Date, is a record type. To access the Street field of BillAddress in the Home variable H, you would write "H.BillAddress.Street", not "H.Street". To access LastService's month field, you'd use "H.LastService.Month".

Now look carefully at the following declarations:

```
TYPE
  First=
    RECORD
      State
        :(Big, Little);
      Counter
        :Integer;
    END (* First *);
  Second=
    RECORD
      State
        :String[2];
      Inner
        :RECORD
          State
            : -1 .. 1;
          ProdCode
            :Char;
        END (* Second.Inner *);
    END (* Second *);
VAR
  State
    :Integer;
  Rec1
    :First;
  Rec2
    :Second;
```

At first glance, it might seem as if the identifier "State" is used far too often. In the past, we have carefully avoided declaring two or more objects with the same name at the same declaration level, since we know that the compiler is duty bound to detect and complain of such situations. Yet, the code given earlier is correct. To see why, examine these assignment statements:

```
(* 1 *) State := 43;
(* 2 *) Rec1.State := Little;
(* 3 *) Rec2.State := 'NZ';
(* 4 *) Rec2.Inner.State := 0;
```

The first statement refers to the Integer variable, the second to a field in Rec1 that has been given an explicitly enumerated (and therefore anonymous) type, the third to a String field within Rec2, and the last to an Integer subrange field in a record that is itself part of Rec2. The fact of the matter is, no two objects in these declarations actually have the same name. The Integer variable State is separate and distinct from any of the record fields named State, and all of these fields are separate and distinct from one another, because the name of each "State" field is not complete unless prefixed with the name of its parent variable (and the names of any parent fields, as in "Rec2.Inner.State"). The compiler detects no ambiguities, because there are none; the prefixes that must be attached to each field name render the field unique to the compiler.

In order to avoid confusion, then, the compiler usually *requires* the programmer to refer to all variables and record fields by their full names. While this can be cumbersome, as we'll soon see, it does give us a great deal of freedom in naming record fields. The following incorrect record declaration, however, abuses our freedom, and will be rejected by the compiler as ambiguous:

```
VAR
  BRec
    :RECORD
      Confusing
        :Integer;
      Middle
```



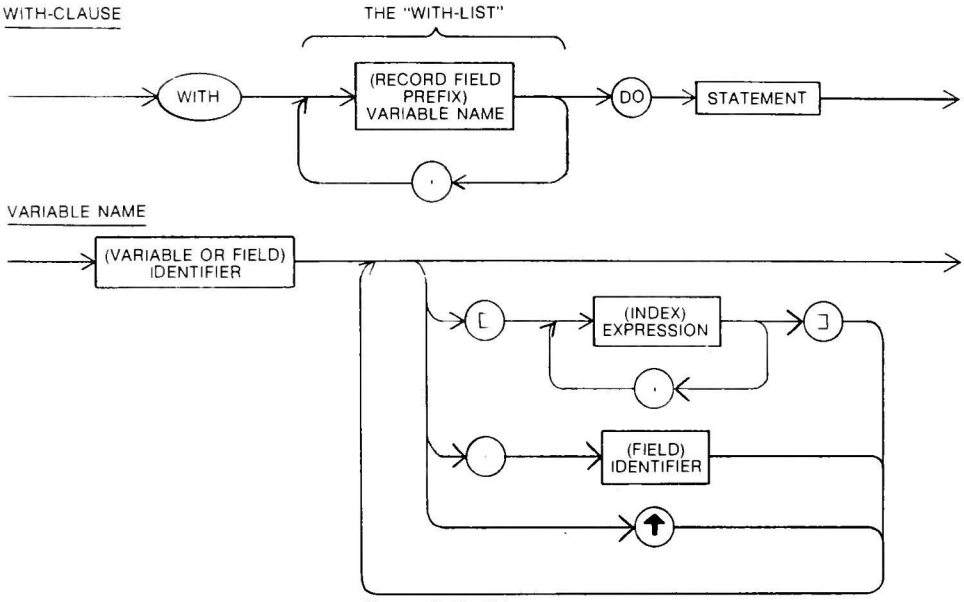



Figure 2. WITH-clause.

```
    :Char;
  Confusing
    :Boolean;
END (* BRec *);
```

When two objects have been defined within the same declaration area, you can decide whether or not they are ambiguous with respect to one another by writing out their full names. If the full names of the two objects are different, the compiler can distinguish between the objects. Applied to the example just given, this test would show that two different fields have precisely the same full name, "BRec.Confusing", and are therefore ambiguously—incorrectly—defined.

Getting Chummy WITH Records. Suppose you have a Home variable H and you want to set the LastService date to September 16, 1957. As things stand, you would have to write the following code:

```
H.LastService.Month := Sep;
H.LastService.Day := 16;
H.LastService.Year := 1957;
```

That's a lot of writing, most of it unnecessary. Now, consider a more efficient equivalent:

```
WITH H.LastService DO
  BEGIN
    Month := Sep;
    Day := 16;
    Year := 1957;
  END;
```

Pascal's WITH-clause—used to good advantage in the second example—permits you to create special "zones" within your program where record field references may be abbreviated. Instead of having to call record fields by their full names, you may place yourself on a "first name basis," thus decreasing the wordiness of your programs.

Figure 2 is the syntax diagram for the WITH-clause; notice that any WITH affects only one statement, although that statement may of course be a compound of several statements, bracketed by BEGIN and END. The list of names given in a WITH-clause may include only valid field name prefixes; that is, only record variable names (for example, "H") or partial record field specifications (for example, "H.BillAddress") are acceptable components of a WITH-list.

To see how the WITH-clause works, let's consider an example:

```
PROGRAM
  WithTest;
  VAR
    I
      :Integer;
    Rec
      :RECORD
        C
          :Char;
        I
          :Integer;
      END (* Rec *);
    Rec2
      :RECORD
        I
          :Char;
        C
          :Integer;
      END;
BEGIN (* WithTest *)
  I := 0;
  Rec.I := 0;
  Rec2.I := 'C';
  WriteLn('I       = ', I);
  WriteLn('Rec.I = ', Rec.I);
  WriteLn('Rec2.I = ', Rec2.I);
  (* NOTE: You'd rarely use a WITH-clause for
     a single statement, especially for one as
     trivial as this, but we're trying to illustrate a
     point as simply as possible here. *)
  WITH Rec2, Rec DO
    I := 7;
  WriteLn;
  WriteLn('I       = ', I);
  WriteLn('Rec.I = ', Rec.I);
  WriteLn('Rec2.I = ', Rec2.I);
END    (* WithTest *).
```

In WithTest's declaration area, we define an Integer variable I and then two records, each of which contains a field named I. The "I" field in Rec may hold an Integer, while that in Rec2 may contain only Char values. The first three assignments in the program body serve to initialize the variable I and the two "I" fields. No initialization of the "C" fields is performed because they're not used in this program. (Even so, good programming practice suggests that they should be initialized. The rule has been broken here so as to keep the size of WithTest to a minimum.) Next come statements that display the initial contents of the three objects in question.

Upon encountering the WITH-clause, the Apple Pascal compiler stores its list of prefixes and goes on to process the assignment statement that is guarded by the WITH. At once, it is confronted with the identifier I.

Whenever a WITH-clause is active, the compiler assumes that any identifier that could be a variable name is, in fact, only part of a full object name. Consequently, the compiler's first reaction is to scan its list of prefixes, concatenating each to I, until it succeeds in constructing a valid object name, or until all attempts to do so have failed. If the WITH-list scan fails completely, then the compiler concludes (as it would have in the first place had no WITH been active) that the identifier in question must be a complete object name. Analysis of the identifier then proceeds on that basis. Note that the Apple Pascal compiler scans its WITH-list in *reverse* order, which is a quirk that's not mandated by the Pascal language definition itself. Still, this aberration is significant, as we'll see shortly.

In the case of WithTest, the scan succeeds on the first try, as "Rec.I" is the full name of an actual record field. (Remember, "Rec" was the last item in the original WITH-list.) After generating the p-code that assigns 7 to Rec.I, the

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compiler passes on to process the display statements that conclude the program.

All this being the case, you should expect the final values of I, Rec.I, and Rec2.I to be 0, 7, and 'C', respectively. This is in fact what happens, as demonstrated on the display screen, when you compile and execute WithTest.

Now let's modify the program, reversing the order of the items in the WITH-list, and attempt recompilation. The compiler complains of Error 129 ("Type conflict of operands") when it tries to process the assignment to "I" that is guarded by the WITH-clause. In this case, "I" is now equivalent to "Rec2.I", because "Rec2" is the new final item in the WITH-list. Since Rec2.I is a Char variable, the Integer constant 7 may not be placed in it, and the compiler very rightly issues an error message.

The situation in WithTest is an unfortunate one; such a subtle thing as the order of items in a WITH-list should not affect the compilation of a program. The problem really stems from the fact that, with both Rec and Rec2 in the WITH-list, "I" can validly refer either to Rec.I or to Rec2.I. The question is, which? Some Pascal compilers disallow this kind of confusion altogether and refuse to process the WITH-clause given in WithTest. Others, including the Apple version, make an arbitrary choice to resolve the problem. (And not all compilers make the same arbitrary choice, or scan the WITH-list in the same order!) Whether to view this compiler behavior as a nasty "bug" or a convenient "feature" is entirely up to you. In general, though, it's a good idea to avoid the use of ambiguous WITH-lists. Not only will this practice help to eliminate confusion for you, it will also contribute to the production of programs that will compile under systems other than Apple Pascal.

Here's one final piece of advice concerning WITH: Bear in mind that the effect of any WITH-clause extends only to the text of the statement guarded by it, *not* to the text of any procedures or functions that are called by that statement. Thus, in a statement such as "WITH MyRec DO SomeProc", where SomeProc is a PROCEDURE, the WITH-clause is worthless, as WITH cannot act upon any of the statements within SomeProc's body.

RAMming a Growing Town into a Tiny Apple. When Home consisted merely of an account number, the model of a single Home occupied only two bytes in RAM; in other words, SizeOf(Home) returned the value 2, and SizeOf(Town) therefore returned 7992. Now that Home is a somewhat more sophisticated record structure, SizeOf(Home) takes up 114 bytes. If we were to retain the old structure of a Town (four streets, each containing 999 houses), the new SizeOf(Town) would be 455,544 bytes! With a maximum RAM complement of 65,536 bytes (only some of which are available for your programs), the Apple II cannot begin to accommodate such a monster. It cannot even contain just one Street, since 999 Homes would require 113,886 bytes. In fact, no array or record defined in Apple Pascal may occupy more than 16,384 bytes of RAM. Because of this limitation, the compiler issues an error message (#399, "implementation restriction") upon encountering the declaration of the Street type.

Even seemingly trivial alterations to key data structures can force massive changes in a program's memory requirements. Adding just one byte to the base type of an array that contains 1,000 elements increases the total memory consumption of the associated program by 1,000 bytes. Since Town is an array that includes 3,996 Homes, it is folly to increase the size of a Home from 2 bytes to 114.

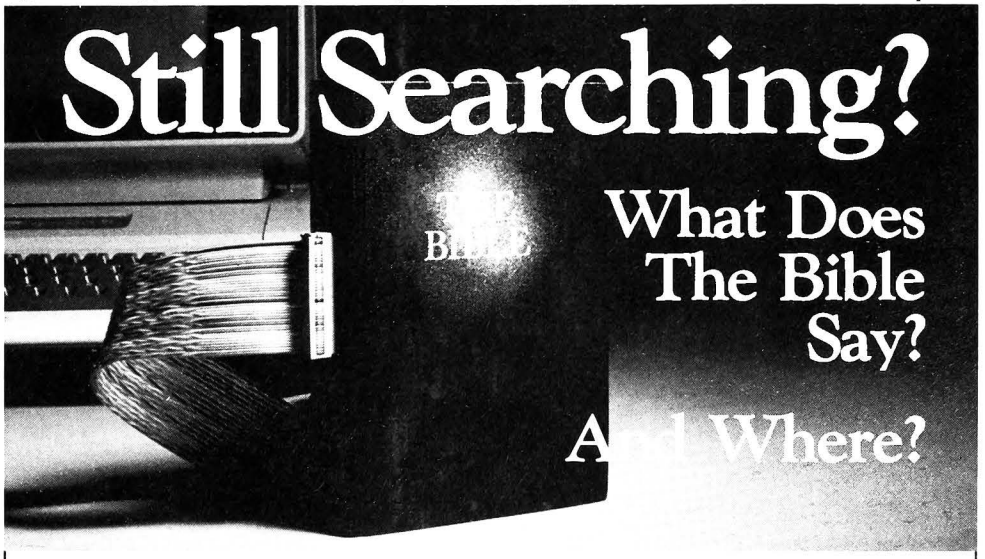
Programmers are always needing more memory than their computers provide. When your data structures grow too large for your computer, you have two avenues of recourse: decreasing the gross size of large structures or employing smaller data types in building them. In the case of *Cable*, we can shorten a Street, decrease the number of Streets in a Town, eliminate information fields from a Home, or do a little bit of each. Of course, the clever reader will realize that we may also rewrite the program so that it deals with only a small segment of a large Town at any given time, storing the remainder on disk. Such advanced techniques, however, are best left for a future discussion.

For now, let's assume that the company using the *Cable* program absolutely requires all the information stored in our new version of Home; that is, we do not have the option of modifying the record definition. This being so, it would be futile to decrease the number of Streets in a Town, since even one Street is too big for the Apple II's memory. Consequently, what we must do is decrease the number of Homes on a Street. It's easily done; we need only change the constant MaxHNum, then recompile.

For purposes of discussion, we'll assume that MaxHNum now has the value 10. In other words, house numbers on any street will range from 1 to 10. Why use such a small number? Program code and data compete for memory resources within your Apple, so it's generally a good idea to "shrink" large arrays temporarily, during initial program development. This leaves ample room within memory for the developing program itself to grow to the size and complexity required to deal with the task at hand. Once the program is finished and works well, you may enlarge any "restricted" arrays to more appropriate sizes, depending on the amount of unused RAM that remains.

Now for the Hard Part. Unfortunately, changing the definition of a Home is only part of the job we face in upgrading *Cable*. Now that the data definition has changed, the code we wrote to access, display, and modify Home data is obsolete. More to the point, if you make the changes just mentioned, the new version of *Cable* will fail to compile. This is because data and program code are ultimately inseparable; if you change the structure or nature of your data, you must almost always change at least part of every program that accesses or manipulates that data.

As an example of the interdependency between programs and data, consider the following assignment statement, taken from the pro-



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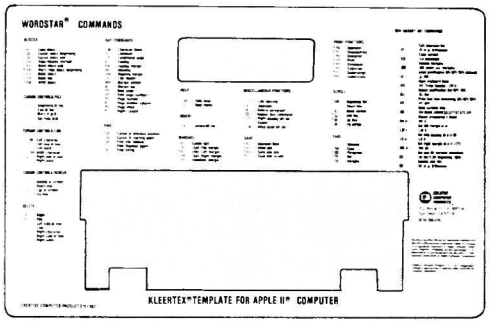
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cedure NewTown:

```
T[Redwood][HNow] := NoSubscriber;
```

Recall that NoSubscriber is a constant, equivalent to the Integer value 0. Given the new definition of Home, T[Redwood][HNow] is no longer simply a number. Thus, the assignment just given would be tagged by the compiler as "illegal."

Code such as that just given is said to be extremely "data-sensitive," as it is most intolerant of changes in the data structures it manipulates. In this case, the assignment statement embodies assumptions—about the multidimensional matrix nature of T, and about the composition of the Home data type. After a modification to any of the types Town, Street, or Home, these assumptions would almost certainly fail to hold—thus rendering the statement inappropriate and obsolete. In contrast,

```
T[SNow] := T[Redwood]
```

makes fewer assumptions about the composition of T and none at all about that of an individual Home, so it will survive more extensive modifications to the data definitions. In fact, so long as T can be considered as an ARRAY OF Street, indexed by values of type StreetName, the assignment "T[SNow] := T[Redwood]" works, no matter how Street or Home is defined.

When you design a program, one of your aims should be to permit easy modification of fundamental data structures. You can do this by treating data-sensitive code most carefully, in accordance with three rules:

1. Minimize it.
2. Whenever possible, gather it all together in one part of a program.
3. Make it highly conspicuous in the program listing, especially when it cannot be concentrated in a single place.

When you change a data structure, you must find all the code that is sensitive to that structure and modify it to respect the new definition. As it turns out, *Cable* obeys the first and second rules, at least as far as the Home data type is concerned, by concentrating its small amount of Home-sensitive code in the three routines—DisplayHome, NewTown, and ChangeTown.

Notice that DisplayTown contains no Home-sensitive code because it relies on DisplayHome to do the actual work of displaying each individual Home. DisplayTown's code concerns itself instead with determining which Homes are to be displayed during a given session, and with directing DisplayHome to each such Home in turn. None of these activities requires a knowledge of Home's structure.

To improve DisplayHome, you must decide upon an appropriate display format for the enlarged information set and then code the necessary data conversions and output statements. Remember that DisplayHome is not only used by DisplayTown, but also by ChangeTown; the display format you choose must suit the needs of both routines.

Only about a third of ChangeTown's large

body really needs to know how a Home is constructed; this is the code that actually acquires the new information from the user and puts that information into a Home. The rest of ChangeTown merely governs the Home-by-Home scan of the area of the Town selected by the user. In addition to modifying the Home-sensitive code, you might also isolate it in a subsidiary routine named ChangeHome (analogous to DisplayHome), which would control the interactive updating of a single Home. Doing so would be an example of "planning ahead" for even more changes to the Home data structure.

For completeness, you could also implement NewHome, which would empty a single Home by filling it with a "matched set" of "empty" values. NewTown could then scan through a Town, calling NewHome to do the actual initialization of a Home. However, NewTown itself is so small that it almost seems silly to create a "slave" routine for it. Whether you put the Home-sensitive code in a separate routine or modify it in place within NewTown, your challenge will be to choose a sensible set of field values that constitutes an "empty" Home.

A Second Anniversary Contest. We've concerned ourselves here with the general issues involved in improving any substantial program, illustrating our points with examples taken from *Cable*. Yet we have not actually gone so far as to present a complete, updated version of that program. It is left to you to modify DisplayHome, NewTown, and ChangeTown to suit our new Home. To encourage you to undertake this challenging exercise, and to celebrate the second anniversary of the Pascal Path, *Softalk* is offering prizes for the best versions of "*SuperCable*," submitted by readers. Here are the rules for the competition:

1. Submit all entries to Softalk SuperCable, Box 60, North Hollywood, CA 91603. All entries must be received at the offices of *Softalk* on or before March 15, 1983. The winners' names will be announced in the June 1983 issue of *Softalk*.

2. Prizes will be awarded in two divisions: beginner (less than one year of formal training and no commercial experience) and advanced/professional (more than one year of formal training or any commercial programming experience). The winner in each division will receive $50 worth of merchandise from the retailer of their choice.

3. All entries must be submitted in source form as text files on Apple II Pascal format disks. Each disk submitted must bear the name, address, and phone number of the author on the *label only*. If the source program or disk directory identifies the entrant in any way, he or she will be disqualified. The label must also clearly indicate the division (beginner or advanced/professional) in which the entry is to be classed. Any entries without such indication will be judged by the stricter standards of the advanced/professional division.

4. No set of entry disks will be returned unless it is accompanied by a self-addressed disk mailer type envelope and stamped with sufficient postage for the class of mail marked on the envelope. All sets of disks returned will include source files for the first-place program from the advanced/professional division. Anyone who wishes to receive this program without entering the competition must still submit a blank Pascal-formatted disk, along with a stamped, self-addressed return disk mailer type envelope.

5. All disks submitted under the terms of this competition must be free of defects. Unreadable or damaged disks will be discarded; the entries associated with them will be disqualified. Therefore, pack your disks carefully!

6. If more than one entry is received from any individual before the deadline, only the entry postmarked *last* will be judged.

7. Any entry that contains a copyright notice will be disqualified. All other program submissions will enter the public domain.

Completing the *SuperCable* program will test both your command of the Pascal system and language and your understanding of the software development principles we've studied so far. It won't be easy, but it should be fun. You have nothing to lose by entering the contest, and a lot of good experience to gain (not to mention some great prizes), so get cracking, and good luck!

Coming: A Tour through the Hall of Mirrors. Most mail addressed to this column requests coverage of one or both of two tough topics: *recursion* and the meaning and use of *compiler directives* (specifically, the "U−" compilation mode). If you've followed the Pascal Path to this point, then you are certainly ready to explore both of these subjects, although you are hereby warned that the going is apt to be rough, even for the expert programmer!

Anyone who has ever arranged two mirrors so that each reflects the image of the other will certainly remember the "endless corridor" of mirror images thus created in both reflective surfaces. The first mirror contains an image of the second, which contains a smaller image of the first, which contains an even smaller image of the second, and so on, until the corridor thus created fades into the green depths of the glass. This commonplace, yet fascinating, phenomenon is an example of recursion: the technique of defining an object or method in terms of itself (or several objects in terms of each other). At first glance, you might be confused by—or at least question the usefulness of—the seemingly circular reasoning that underlies recursion. With practice, however, you'll soon be comfortable with this very powerful method of cutting many a knotty problem down to size. And, next month, you'll get plenty of practice!

Thanks to several friendly "Kiwi" Apple dealers and distributors whose hospitality made possible the preparation of this column: Robert Pitchforth, David Hanson, and Ian Laming of Data Link in Wellington; John Bowman of ComputerSouth in Christchurch; and David Blair and Peter Davey of C.E.D. Distributors in Auckland. Kiwis and Aussies of all ages and occupations who use Apple Pascal in their work or studies are invited to correspond with Jim Merritt, in care of Softalk. ■

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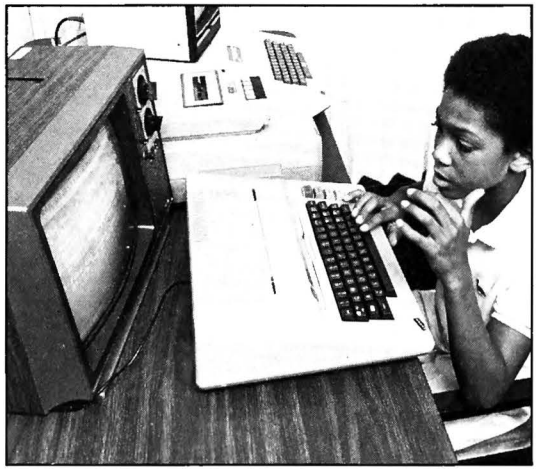
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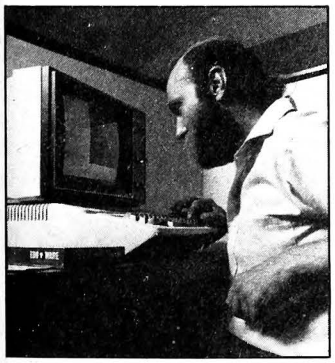
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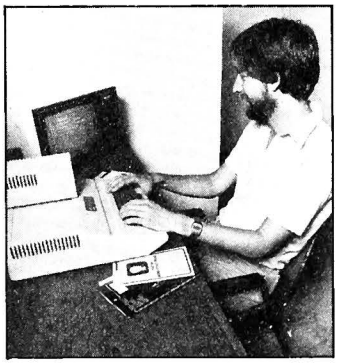
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THE ANIMATED APPLE With GraForth Part 6

BY PAUL LUTUS AND PHIL THOMPSON

As a graphics language, GraForth's usual emphasis lies in creating fast hi-res animations. One feature that is frequently overlooked is GraForth's ability to produce music using a built-in synthesizer. In this column we'll explore GraForth's sound capabilities, with examples of sound effects and a song-generating program.

The music synthesizer is controlled by two GraForth words, *note* and *voice*. Note actually plays the notes and voice determines the tone quality of the notes played.

Note removes two numbers from the stack, for pitch and duration. Greater pitch numbers produce lower notes, and greater duration values increase the time the note plays. Both pitch and duration numbers can range from 2 to 255. For example,

```
255 255 NOTE
```

plays a low note with a long duration.

```
50 2 NOTE
```

plays a very short, medium-pitched note. In fact, the note is almost too short to be recognized as more than a click. However, curious effects can be obtained by repeating short notes:

```
25 0 DO 50 2 NOTE LOOP
```

By experimenting and choosing appropriate values, you can play music. The following word definition plays the first phrase from "Twinkle Twinkle Little Star."

```
: TWINKLE
104 100 NOTE
104 100 NOTE
69 100 NOTE
69 100 NOTE
62 100 NOTE
62 100 NOTE
69 150 NOTE ;
```

Notes played using the note command can be given any one of a number of tone qualities, or voices, with the GraForth command voice. Voice removes a number from the stack to select the tone quality that will be used for subsequent note commands. Valid voice numbers range from −6 to 2.

Values from −6 to −1 for voice produce notes with constant volume. Each voice has a different volume and tone quality. The loudest note with the flattest sound is produced by −1 voice. (Voice values less than −2 sometimes produce inconsistent volumes for notes of different pitches and are more suitable for sound effects than music.)

The values 0 through 2 produce notes with varying volumes. A note played with 0 voice begins loudly, then dies away. The value 1 causes a note to increase in volume, then decrease again. A note with an increasing volume can be generated with 2 voice.

When GraForth first starts up, 0 voice is set automatically. You might want to try the *Twinkle* routine after setting various voices:

```
−1 VOICE TWINKLE
−3 VOICE TWINKLE
 2 VOICE TWINKLE
```

On page 9-4 of the GraForth manual is a table of musical notes and their corresponding pitch numbers. This table was used to determine the pitch numbers for the above *Twinkle* example. Note that the numbers 104, 69, and 62 refer to the notes C, G, and A respectively.

For short musical phrases, manually looking each pitch up in a table



```
2816 VARIABLE FILE
VARIABLE POINT
VARIABLE COUNT
VARIABLE DISK
VARIABLE OCTAVE
VARIABLE PITCH
VARIABLE DURATION
VARIABLE AT.END
VARIABLE GOT.ERROR

50 STRING PITCHES
50 STRING NAMES

: SET.UP
24870
48 0 DO
   DUP 100 / I PITCHES POKE
   DUP 18 / -
   DUP 1655 / -
LOOP DROP
0 NAMES ASSIGN " A A#B C C#D D#E F F#G G#A B/B C D/D E/E F
  G/G A/ " ;

: GETPITCH
PITCHES PEEK ;

: CTRL-C?
131 = IF ABORT THEN ;

: PUT.END
CLOSE
0 POINT POKEW
1 - > AT.END ;

: ERROR
AT.END 0 = IF
   1 - > GOT.ERROR
   PUT.END
   CR PRINT " ERROR - LINE "
   COUNT . CR
   PAD WRITELN CR
THEN ;

: BEFORE
0 - > AT.END 0 - > COUNT
0 - > GOT.ERROR
HOME NORMAL DECIMAL CR
PRINT " GRAFORTH SONG COMPILER "
CR CR
PRINT " ENTER SONG FILE ADDRESS : " FILE .
26 HTAB PAD READLN PAD PEEK CTRL-C?
PAD GETNUM
VALID IF - > FILE ELSE DROP THEN
3 VTAB 26 HTAB FILE . CLEOL CR
CR PRINT " [K]EYBOARD OR [D]ISK? "
GETC DUP CTRL-C? DUP PUTC CR CR
196 = IF
   1 - > DISK
   CR PRINT " FILENAME : "
   PAD READLN PAD PEEK CTRL-C?
   CR 132 PUTC PRINT " OPEN "
   PAD WRITELN
   CR 132 PUTC PRINT " READ "
   PAD WRITELN CR
ELSE 0 - > DISK
THEN
FILE - > POINT ;

: SKIP.SPACES
BEGIN
   DUP PEEK 160 =
WHILE
   1 +
REPEAT ;

: PUT.REST
1 + SKIP.SPACES GETNUM
VALID IF
   DUP DUP 1 > SWAP 256 < AND IF
      0 POINT POKE
```

is satisfactory. For longer tunes, however, this can quickly become tedious. The *Compute.Notes* example in the manual solves this problem by creating a pitch table in the Apple's memory. The table has forty-eight entries spanning four octaves. By indexing into the table, the notes can now be represented with the numbers 0 through 47.

The examples on page 9-5 in the manual are inconsistent. Note that the definition of *Getpitch* and the first example have *Getpitch* print the pitch value on the screen. Subsequent examples do not print the value but leave it on the stack to be used by the note command. The definition and the first example should be changed to agree with the other examples. Here is the correct definition for *Getpitch*:

```
: GETPITCH PITCH PEEK ;
```

Pitch and *Compute.Notes* must have already been compiled and *Compute.Notes* must have been executed for these examples to work. *Getpitch* can be used to convert a note number into a pitch value to be used by the note routine. This example (correcting the example in the manual) prints the pitch value for note number 3, which is a C in the first octave:

```
3 GETPITCH .
209
```

Here the pitch value is actually used to play the note:

```
3 GETPITCH 128 NOTE
```

The following word definition is equivalent to the *Twinkle* routine, except that *Getpitch* is used to retrieve the pitch value for each note. The actual note names are included in the comments:

```
: TWINKLE2
15 GETPITCH 100 NOTE      ( C,  octave 2 )
15 GETPITCH 100 NOTE
22 GETPITCH 100 NOTE      ( G,  octave 2 )
22 GETPITCH 100 NOTE
24 GETPITCH 100 NOTE      ( A,  octave 3 )
24 GETPITCH 100 NOTE
22 GETPITCH 150 NOTE ;    ( G,  octave 2 )
```

The note command is designed for playing notes, but it has no built-in capacity for playing rests of a similar duration. The following word, *rest*, removes a duration number from the stack and simply waits for this amount of time. The durations used are nearly identical to those used by note:

```
: REST
45 * 0 DO LOOP ;
```

This example will play two quarter notes of C in the first octave, separated by a quarter note rest:

```
3 GETPITCH 64 NOTE  64 REST  3 GETPITCH 64 NOTE
```

Music Playing Programs. As you can guess by the *Twinkle2* example, playing entire songs by entering a long string of note commands can take a lot of time and use a lot of memory. A program that allows you to enter songs in a more convenient form, optionally save them to disk, and play them at any time would be much more efficient. The easiest way to enter notes would be to type in the note names as text. This text must then be converted into numeric pitch and duration values for the note command.

The programs in listings 1 and 2 use a two-step approach to generating and playing music. Using the first program, *Compile.Song*, you can enter note names and durations from the keyboard, or you can have the program read the commands from a text file on disk. *Compile.Song* converts these lines into a list of note numbers in memory. This song list can be saved back to disk as a binary file. The second program, *Play.Song*, reads the values from the list and calls note repeatedly to play each note

```
        POINT 1 + POKE
    ELSE DROP ERROR
    THEN
ELSE DROP ERROR
THEN ;

: PUT.VOICE
1 + SKIP.SPACES GETNUM
VALID IF
    DUP DUP -7 > SWAP 3 < AND IF
        7 + POINT POKE
        0 POINT 1 + POKE
    ELSE DROP ERROR
    THEN
ELSE DROP ERROR
THEN ;

: PUT.NOTE
DUP GETNUM -> OCTAVE
VALID 0 = IF ERROR THEN
OCTAVE DUP 1 < SWAP 4 > OR IF ERROR THEN
1 + SKIP.SPACES DUP PEEKW
PUSH 0
BEGIN
    DUP DUP NAMES PEEKW I <>
    SWAP 48 < AND
WHILE
    2 +
REPEAT
POP
DUP 48 = IF ERROR THEN
DUP 24 > = IF 24 - THEN
2 / DUP 0 < IF ERROR THEN
OCTAVE 1 - 12 * +
GETPITCH -> PITCH
2 + SKIP.SPACES GETNUM -> DURATION
VALID 0 = IF ERROR THEN
DURATION DUP 2 < SWAP 255 > OR IF ERROR THEN
PITCH POINT POKE
DURATION POINT 1 + POKE ;

: DURING
BEGIN
    COUNT 1 + -> COUNT
    DISK 0 = IF
        PRINT " MUSIC COMMAND (E=END) : "
        THEN
        PAD READLN
        PAD PEEK CTRL-C?
        PAD SKIP.SPACES
        DUP PEEK 210 = IF PUT.REST
        ELSE DUP PEEK 214 = IF PUT.VOICE
        ELSE DUP PEEK 197 = IF PUT.END
        ELSE PUT.NOTE
        THEN THEN THEN
        POINT 2 + -> POINT
        AT.END
UNTIL ;

: AFTER
CR COUNT . PRINT " LINES, "
POINT FILE - . PRINT " BYTES "
CR CR PRINT " SAVE TO DISK (Y/N) ? "
GETC DUP PUTC 217 = IF
    CR CR PRINT " FILENAME : "
    PAD READLN PAD PEEK CTRL-C?
    CR 132 PUTC PRINT " BSAVE "
    PAD WRITELN
    PRINT " ,A " FILE .
    PRINT " ,L " POINT FILE - . CR
THEN
CR CR ;

: COMPILE.SONG
SET.UP
BEFORE DURING
GOT.ERROR 0 = IF
    AFTER
THEN ;
```

Listing 1. Compile.Song.

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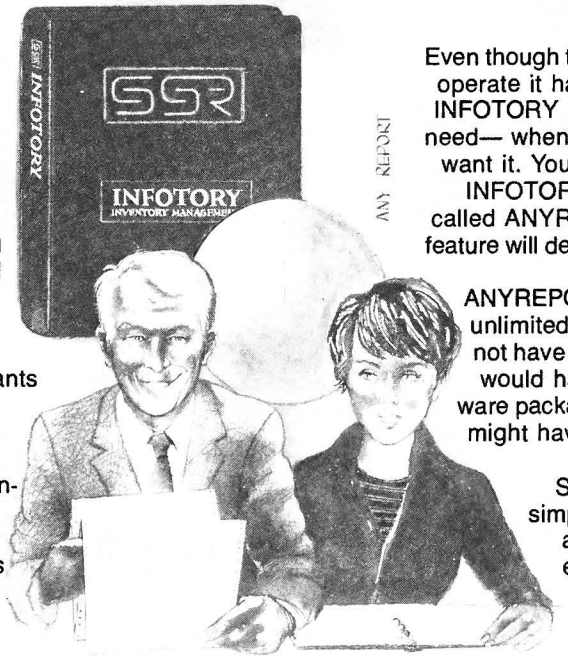
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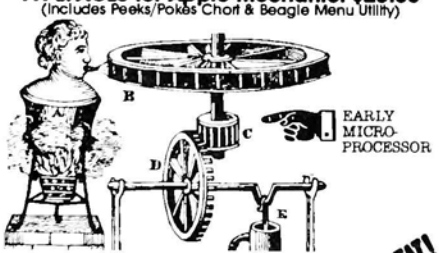
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```
10  FOR A = 1 TO 22: PRINT CHR$(ASC (MID$(
    "IJ—!IPX(T!ZPVS!TJTUFS@", A, 1))—A/A);
20  FOR B = 1 TO 4: C = PEEK(49200): NEXT B, A
```

DOS Boss
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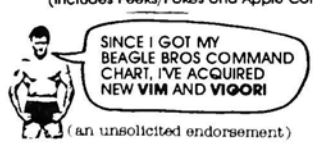
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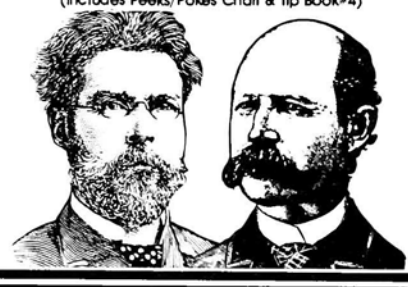
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in turn. In addition to playing notes, *Compile.Song* and *Play.Song* also allow you to play rests and change voices during the song.

The two-step technique used by these programs is similar to the method used by the *Profile* program for creating 3-D graphics. *Profile* converts a set of X,Y points in a text format into a list of 3-D image values in memory. This image is then used by GraForth's 3-D routines to draw a 3-D object. This similarity should help clarify the way these music programs work.

Using the GraForth text editor (or another DOS-compatible text editor, if you have one), enter the program in listing 1 into memory and save it to disk with the name *Compile.Song*.

The *Compile.Song* file is somewhat long. If you are using the GraForth text editor without a language card or RAM card, you will need to adjust the editor *program position* to allot enough memory for the file. Enter the editor, type P to select program position, type Y, and then enter a new position of 34000. This will provide enough room for the *Compile.Song* file.

After *Compile.Song* is saved to disk, enter the program in listing 2, saving it as *Play.Song*.

Here are instructions for using these programs:

To create a new song file, first load *Compile.Song* into memory and run it:

```
READ " COMPILE.SONG "
RUN
```

On the screen will appear:

```
GraForth Song Compiler
Enter Song File Address : 2816
```

This question determines where the numeric song list will appear in memory. Press return to accept the address of 2816, or enter a new address. Next you will see:

```
[K]eyboard or [D]isk?
```

You can enter the formatted music lines from the keyboard or have the program read the lines from a text file on disk. For this example, press K for keyboard entry.

Now you are asked to enter a music command:

```
Music Command (E=end) :
```

```
VARIABLE END

: SET.END
1 -> END
DROP DROP ;

: REST
45 * 0 DO LOOP
DROP ;

: SET.VOICE
DROP
7 - VOICE ;

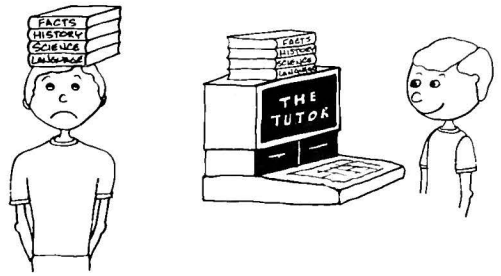
: PLAY.SONG
0 -> END
BEGIN
    GETKEY 128<
    IF
        DUP PEEK
        OVER 1 + PEEK
        OVER SGN 2 * OVER SGN +
        CASE:
            SET.END
            REST
            SET.VOICE
            NOTE
        THEN
        2 +
    ELSE SET.END
    THEN
    END
UNTIL
DROP ;
```

Listing 2. Play.Song.

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- THE TUTOR also allows you to review just the questions you miss until you can achieve 100% correct responses.

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- Each question within a quiz is limited to 10 lines.
- There may be from 1 to 5 valid answers for each question (one line per answer).
- There may be up to 10 lines of an information paragraph, or answer table, which could appear with your quesitons and answers.

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You can enter commands to play a note or rest, change voices, or end the song. Here is the format for a note command:

1. optional spaces
2. octave number
3. optional spaces
4. note name
5. at least one space
6. duration value

The octave number corresponds to the octave numbers in the table on page 9-4, ranging from 1 to 4. The note name is a letter from A to G. You can also add # to the letter for a sharp, or / for a flat. The duration value is simply the number used by note for duration. Here are some sample note commands you can enter. Notice how each command follows the above format. Entering these example entries will produce the "Shave and a Haircut" tune.

```
Music Command (E=end) : 2C 120
Music Command (E=end) : 1G 40
Music Command (E=end) : 1F# 40
Music Command (E=end) : 1G 40
Music Command (E=end) : 1A/ 120
Music Command (E=end) : 1G 120
```

Rests are entered by typing an R followed by a space and the desired rest value. Here is the next entry as an example:

```
Music Command (E=end) : R 120
```

The voice used can be changed by typing a V and the new voice number (no space is necessary). Here is the example entry:

```
Music Command (E=end) : V-1
```

The tune is finished with the following entries:

```
Music Command (E=end) : 2B 60
Music Command (E=end) : R 60
Music Command (E=end) : 2C 60
```

The command to end the song (as you might have guessed from the prompt) is the letter E. This is required as the last entry of the song.

```
Music Command (E=end) : E
```

The program will inform you that you entered twelve lines, which have been converted into a number list twenty-four bytes long. You will then be asked if you want to save the list to disk. For this example, press Y. You will be prompted for a file name. Type *shave* and press return. This disk will whir as the list is saved as a binary file named Shave, and the program will end.

Compile.Song can also read music commands from a text file on disk. To compile songs using this method, first use the GraForth text editor to create a list of music commands, then save them as a text file. When running *Compile.Song*, select the disk option (D), and then enter the file name of the text file. The program will read the commands from the file and compile them as if they were entered at the keyboard. The advantage to this technique is that a music text file can be modified or corrected using the text editor and then recompiled into a numeric song list. Keyboard entries must be reentered every time.

The program also includes error checking. If it can't interpret a line as a valid music command, or if a number is out of range, an error message will be printed. This message includes the line number where the error occurred and a display of the illegal line. The program stops compiling lines when it finds an error. The program will also exit if you press control-C or control-C and return for an input.

Assuming no errors occurred, a sample song list is now in memory, beginning at location 2816, and also on disk. To play the song, first load *Play.Song* into memory:

```
READ " PLAY.SONG "
```

Place the starting location of the song list (2816) on the stack, then execute *Play.Song*:

```
2816 PLAY.SONG
```


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The "Shave and a Haircut" tune should play. Whenever a song is playing, pressing any key will immediately stop the song.

With the song list saved to disk, the song can be loaded into memory and played at any time. Simply bload the song list into a free area of memory, read *Play.Song* onto the word library, and call it with the starting address of the song on the stack.

A list of *Compile.Song* music commands for the final part of "Stars and Stripes Forever" can be found in listing 3. This provides an example of a longer song generated with these music programs.

Song List Format. In last month's column we described the format for three-dimensional images in memory. In the interest of equal time, we'll discuss the song list format here.

Each note entry in the list is stored as a pair of bytes in memory. The *Play.Song* program reads each byte pair in turn and determines whether each byte is zero or nonzero. The function performed (note, rest, voice, or end) is determined by this test as follows:

1st byte	2nd byte	Function
nonzero	nonzero	Note
zero	nonzero	Rest
nonzero	zero	Voice
zero	zero	End song

For the note function, the first byte contains the pitch value and the second byte is the duration. The nonzero byte for rest determines the duration of the rest. For the voice function, the nonzero value is seven greater than the voice to be selected. Adding seven guarantees that the voice number in memory will be nonzero. The *Play.Song* program subtracts seven to convert it back to a valid voice number. A pair of zeros flags the end of the song.

Watching the Keyboard. There is one aspect of the GraForth note command that should be mentioned here. While playing a note, the word note also looks at the keyboard. If a key is pressed while a note is playing, the note will be cut short. Try executing:

```
100 255 NOTE
```

```
V0
2F 80
2E 60
2F 20
2D 20
R 20
2F 80
2G 40
2G# 40
3A 40
3B/ 40
3B 40
3C 40
R 40
V -2
3C 80
3C 80
3B/ 40
3A 40
3A 80
2G# 40
3A 40
3A 200
R 40
2G# 40
3A 40
3A 80
2G# 40
3A 40
3C 80
3A 40
3C 40
3B/ 160
2G 80
R 40
V-1
2G 40
2G 80
2F# 40
2G 40
2G 80
2F# 40
2G 40
3B/ 240
3A 40
2G 40
3A 40
3C 80
3C 40
3D 80
3D 80
2G 160
R80
V1
3C 80
3C 80
3B/ 40
3A 40
3A 80
2G# 40
3A 40
3A 200
R 40
2G# 40
3A 40
3A 80
2G# 40
3A 40
3B/ 40
3A 40
2G 40
2E 40
2G 160
2F 80
R 40
V 2
2F 40
2F 80
2E 40
2F 40
2A/ 80
2G 40
2F 40
3F 200
R 40
V -4
2F 40
V -3
2G 40
V -2
3A 40
V -1
3C 20
R 20
V -4
2F 40
V -3
2G 40
V -2
3A 40
V -1
3C 20
R 20
V 0
2C 40
2D 40
3A 40
2G 160
2F 40
R 40
2F 40
E
```

Listing 3. Stars and Stripes Forever.

and press a key before the note would normally finish. The note will end abruptly. This feature was included to give users the ability to stop the sound without having to wait for the note to end. There is one minor drawback, however: if a key is pressed before the note begins, the note routine will still sometimes click the speaker for a short moment. For a demonstration of this effect, enter the following line and press a key while the first note is still playing:

```
10 0 DO 100 255 NOTE LOOP
```

The flutter noise is caused by the subsequent nine notes all clicking the speaker in turn. While this type of effect can sometimes be desirable (it is used purposely in some sound effects routines), it is usually unwanted. Two solutions are possible: Either stop playing notes if a key has been pressed, or clear the keyboard after every note. This second approach continues the string of notes, cutting only one note short at each keypress. Here are examples of both techniques. Try pressing a key while running each:

```
10 0 DO GETKEY 128 < IF 100 255 NOTE THEN LOOP
10 0 DO CLRKEY 100 255 NOTE LOOP
```

The note routine itself can be directly modified so that it either ignores keypresses altogether or always acts as if a key has been pressed. In game applications with a lot of sound effects, ignoring keypresses can make the sound cleaner. (Once this modification is made, you can make the change permanent if you want to by saving the GraForth system back to disk with *Saveprg*.) To force note to ignore keypresses, type:

```
24686 24687 POKEW
```

To cause note to behave as if a key has been pressed, type:

```
24688 24687 POKEW
```

Note can be returned to normal by entering:

```
-16384 24687 POKEW
```


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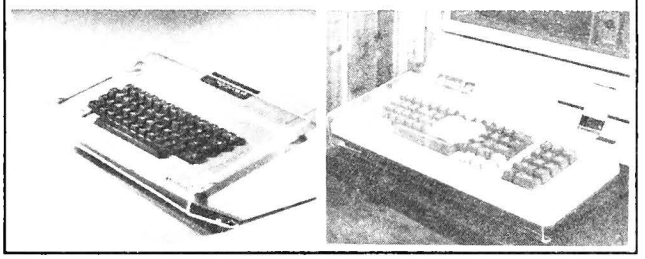
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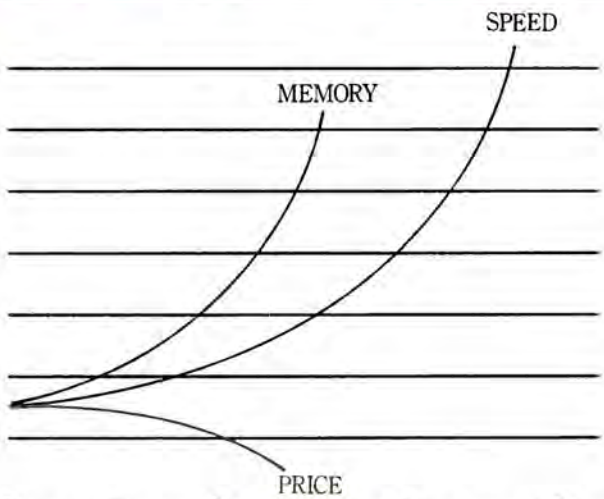
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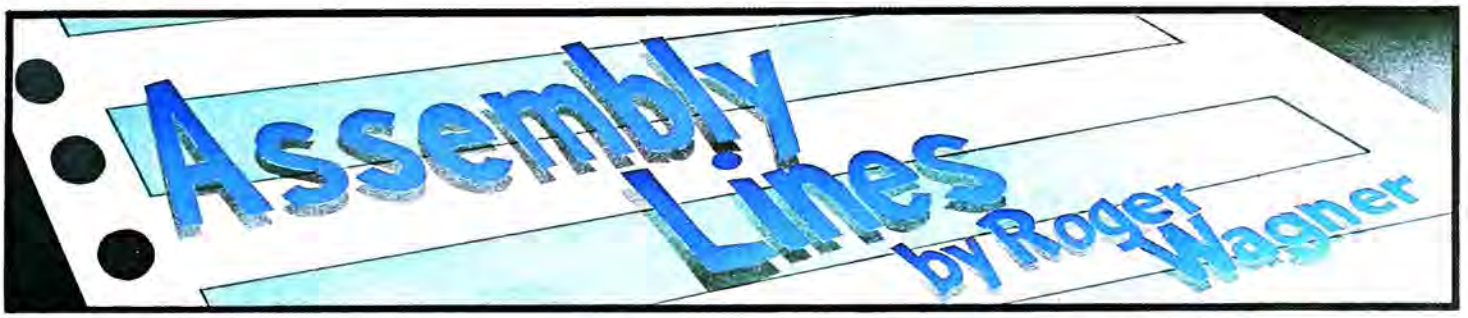
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Everyone's Guide to Assembly Language, Part 29

I/O routines are responsible for handling the computer's communications with the outside world. Their design is also one of the more interesting aspects of machine language programming. We'll spend the next two issues learning how to intercept the I/O vectors of the Apple and implement our own routines.

It will make the next few demonstrations much easier if you disconnect DOS from the I/O system. That's most easily done by running this short Applesoft Basic program:

```
10  IN#0:PR#0:END
```

That will keep DOS out of the way for the upcoming exercises.

Output. In earlier issues we discussed how COUT ($FDED) could be used to print characters to the screen, to disk, or to other output devices. The general procedure was to load the accumulator with the ASCII value for the character you wanted to print, and then to do a JSR COUT.

To see what happens at $FDED when you do this, enter the Monitor by means of the usual *call −151*. Then type in:

```
FDEDL
```

The first instruction listed should be a JMP ($0036). This is an indirect jump to a location pointed to by the byte pair $36,37. To see where these bytes are currently pointing, type in:

```
36.37
```

You should get:

```
0036- F0 FD
```

This tells you that the jump will be made to $FDF0, which in this case happens to be the next instruction after the JMP ($0036). $FDF0 is called COUT1 and is used only to print characters to the Apple's screen. When output is going to the disk, to the printer, or to some other device, $36,37 will point somewhere other than $FDF0.

If you are sending characters to a printer, for example, $36,37 might point to $C102. CSW (for Character output SWitch) is the name given to the byte pair $36,37. A pointer such as this is usually called a *vector*, in that it directs the flow of program control to whatever routine (that is, whatever address in memory) is appropriate at the moment.

The changing of the CSW vector is what happens when you execute a pr# command. CSW is pointed to the address C*n*00, where *n* is the slot number given in the pr#*n* statement. If no device is present in the slot, then no program will be found at $C*n*00. This explains why a Basic program hangs when an improper pr# command is given. The computer is waiting for the final RTS from a nonexistent routine. To verify for yourself that the lockup doesn't occur until a character is output, run this program in Applesoft Basic:

```
10  HOME
20  PR#5: REM OR SOME OTHER EMPTY SLOT
30  FOR I=1 TO 20
40  POKE 1024+I,192+I
50  NEXT I
60  PRINT "YOU WON'T SEE THIS"
```

When you run this program, you should see the letters A through T printed on the screen, but the phrase on line 60 should not appear. Things happen this way because the loop on lines 20 through 40 puts the data directly into the screen memory without going through COUT.

Remember that all this time CSW is pointing to $C500. It's only when the Y character gets sent to COUT that the computer hangs.

If DOS were installed and line 20 said *print chr$(4);"pr#5"*, the program would hang on that statement because of the carriage return sent at the end of the print statement. It's instructive to note that the carriage return is not actually needed for the pr# to work. Adding a semicolon to the print statement would restore the program to its original semifunctional state.

One would think from the preceding thoughts that hooking up a routine to the output hooks would be fairly simple. The problem is that most of the time you'll want to have DOS active, and DOS has been cleverly designed to do everything possible to keep itself connected. When DOS is installed, CSW actually points to $9EBD, a portion of DOS, and it's very difficult to get it to point elsewhere.

Specifically, whenever either input or output is done, both vectors are checked to make sure DOS is still hooked up. This means that, even though you could temporarily change CSW, any input-type action would cause DOS to restore itself to the output flow. Here's a program to show this. You'll need to reconnect DOS (pressing reset will do that) to try it:

```
10  HOME
20  PR#0
30  PRINT CHR$(4);"CATALOG"
40  INPUT "TURN THINGS BACK ON";I$
50  PRINT CHR$(4);"CATALOG"
```

The theory here is that the pr#0 sets CSW to point directly to $FD0C, rather than to DOS. This is why the catalog doesn't work in line 30. However, when the input is done, DOS is still hooked up to the input vector. Realizing that the output connection has been lost, DOS thus reconnects itself. Line 40 then performs as expected.

In general, DOS can be disconnected by executing *both* an in#0 and a pr#0 within a Basic program, provided that one is done immediately after the other with no input or output done in between. The one-line Basic program used at the beginning of this article to disconnect DOS employs this principle.

Pressing reset will hook things back up any time you want. Notice that these *are not* done as DOS commands such as:

```
10  PRINT CHR$(4);"IN#0": PRINT CHR$(4);"PR#0"
```

An in#0 or pr#0 as a direct Basic command redirects I/O to the Monitor. The same commands done as DOS commands set the I/O to DOS.

Let's see just how DOS does handle the output vectors. With DOS installed and active, enter the Monitor and type in the following:

```
36.37 AA53.AA54
```

You should get:

```
0036- BD 9E
AA53- F0 FD
```

With DOS active, CSW points to a main output entry point at $9EBD. This is the beginning of the section that watches the output for DOS commands. Eventually it does its own indirect jump via the vector at $AA53,AA54, which completes the path to COUT1 ($FDF0).

When you do a JSR COUT ($FDED), then, here's the general flow of things:

1. With the appropriate value in the accumulator, a JSR COUT ($FDED) is done.

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2. At $FDED is a jump to the address specified in CSW ($36,37). With DOS installed, CSW points to DOS at $9EBD.

3. When DOS is through looking at the character, it does a jump to the address held at $AA53,AA54. This normally points to $FDF0.

4. Eventually an RTS returns control to the calling program.

Intercepting Output. An obvious question now arises. How *do* we hook our routine to DOS? This basically depends on whether a slot is used or not. If you happened to be writing firmware for an interface card, for example, the pr# command when executed would automatically handle the setting up of CSW to make everything work. If, however, you want to put a routine at a location other than the $C000 space, another approach is needed.

The procedure is actually fairly simple. All you need to do is set CSW to where you want the output to be eventually sent and then call $3EA.

For example, let's put a trivial routine at $300 that merely jumps to COUT1 ($FDF0). Go into the Monitor and enter:

```
300:   4C F0 FD
```

If you list this routine you should get:

```
300L

0300- 4C F0 FD JMP $FDF0
0303- 00       BRK
0304- 00       BRK
```

To hook it up, type in the following from the immediate mode of Applesoft:

```
POKE 54,0: POKE 55,3: CALL 1002
```

This sets CSW to point to $300 and then calls $3EA. The same thing can be done from within a machine language program with:

```
LDA   #$00
STA    $36
LDA   #$03
STA    $37
JSR   $3EA
RTS
```

Once connected in this way, everything will still look the same on the screen. In reality, however, every character going to the screen is now going through $300. You can check the new routing by entering the Monitor while this routine is installed and typing in:

```
36.37   AA53.AA54
```

You should get:

```
0036- BD 9E
AA53- 00 03
```

The Monitor, DOS, and Basic all send output via the jump at COUT. This still points to DOS, but now DOS points not to COUT1 ($FDF0), but to $300. There, *our* routine does a jump to COUT1 to complete the flow.

To verify that characters are going through $300, just type in *poke 768,0*. Or, from the Monitor, type: *300: 0*.

The computer will immediately hang as program flow hits the 00 (BRK instruction) at $300. The BRK routine in the Monitor will then try to send the break error message through COUT, at which point $300 will be called again and the process will repeat itself indefinitely.

An interesting point here is that, when COUT is turned off (for instance, a simple RTS at $300 will do the trick), nothing appears on the screen, despite the fact that the computer is still fully functional. Even though you can't see what you're typing, you could type in *catalog* and the disk drive would come on. The flashing cursor would remain on the screen since RDKEY (part of the input routine at $FD1B) addresses the screen directly for the cursor.

To experiment with COUT some more, let's try a routine that's a little more interesting. Control characters are normally "invisible" in that they're not sent to the screen by COUT1. If we could detect the control character before it got to COUT1 and could change it to a different value, we could have it display as inverse or as some other visible character.

Normally all characters going through CSW have the high bit set. That is, all values are greater than $80. Inverse and flashing characters are created by sending characters with a value less than $80 to COUT. All characters in the range of $00 to $3F come out inverse, and all those from $40 to $7F are flashing. In general, what this means is that, if the high bit is cleared, control characters will come out in inverse and "standard" characters in flashing.

This is, in fact, how the *flash* and *inverse* commands of Applesoft work. The routine at COUT1 includes a portion that does an AND operation on the value about to be stored on the screen and a mask value stored at location $32 (called INVFLG, short for "inverse flag"). INVFLG normally holds an $FF, so no change takes place. However, the Basic commands inverse and flash set the values to $3F and $7F, respectively, which produces the desired results.

The following diagram illustrates the INVFLG mask's effect on outgoing characters:

	Hex	Binary	Character	
Char sent COUT:	$C1	%1100 0001	A	(Normal)
INVFLG:	$FF	%1111 1111	—	
AND Result:	$C1	%1100 0001	A	(Normal)
Char sent COUT:	$C1	%1100 0001	A	(Normal)
INVFLG:	$7F	%0111 1111	—	
AND Result:	$41	%0100 0001	A	(Flashing)
Char sent COUT:	$C1	%1100 0001	A	(Normal)
INVFLG:	$3F	%0011 1111	—	
AND Result:	$01	%0000 0001	A	(Inverse)

We can do our own specialized processing, though, so as to highlight just control characters. Here's the listing:

```
1   ************************************
2   * CONTROL CHARACTER DISPLAY  *
3   ************************************
4   *
5           ORG   $300
6   *
7   COUT1   EQU   $FDF0
8   *
0300: C9 A0   9   ENTRY   CMP   #$A0    ; 1ST NON ^ CHR
0302: B0 06   10          BCS   PRINT   ; CHAR OKAY
0304: C9 8D   11          CMP   #$8D    ; LET 'CR' THRU
0306: F0 02   12          BEQ   PRINT
0308: 29 3F   13  MASK    AND   #$3F    ; CLR TOP 2 BITS
030A: 4C F0 FD 14 PRINT   JMP   COUT1   ; PRINT IT
```

The routine operation is very straightforward. A comparison is done as each character reaches the routine at $300. All "usual" characters are sent through to COUT1 unaltered. If a character is found to be a control character, though, a test is done to see if it's a carriage return. If so, that too is passed to COUT1. After all, we do want the screen to look somewhat normal. If a control character (other than a *return*) is found, however, an AND with $3F converts the character to an inverse character, at which point it will be forwarded to COUT1.

Any control characters generated by a program, with the exception of return (control-M), will now be shown in inverse. When typed from the keyboard, escape, the right arrow (control-U), and control-X won't show up since they are intercepted by the Monitor input routine and never make it to COUT.

Other Output Devices. So far, all we've done is intercept COUT, filter the characters going through, and eventually return control to the Monitor screen routine COUT1. If we had our own output device, this would not be necessary. The point here is to demonstrate the possibility of alternate output devices. Ultimately this could include printer cards, terminals, analog devices such as motors, and more. Such projects are rather involved, however, so for now let's just see if we can write our own primitive screen routine.

The basic model will be to set aside one line of the screen as our display window and to attempt to control text output within that window. To avoid having to create vertical scrolling routines and cursor management routines, we'll limit all output to the single line and scroll text only to the left as each new character is displayed on the right.

If this sounds suspiciously similar to a calculator display, you're right. It should be easy now to see why, with limited resources of display hardware and, more significantly, limited memory for management routines, such a display would be desirable.

Here's the summary of the design points:



or

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1. Display will be limited to one line.
2. Characters will be output on the rightmost position.
3. The remainder of the line will scroll to the left to make room for each new character.
4. No control characters will be displayed.
5. The left arrow key, control-H, will be designated as a "clear display" character.
6. No editing capabilities (that is, backspace, forward copy, and so on) will be provided for, except for number 5 above.

Before proceeding, let's digress for a moment to mention the value of the list as a programming technique. If you can't bring yourself to flowchart, at least make a list to clarify exactly what the program will do. This helps organize your thoughts in a general way before you have to leap in and code the detailed parts. Even if you amend it as the coding progresses, such a list is helpful. Now back to our regularly scheduled program. . . .

```
                        1  ************************************
                        2  *   SPECIAL DISPLAY ROUTINE        *
                        3  ************************************
                        4  *
                        5          ORG   $300
                        6          OBJ   $300
                        7  *
                        8  LINE    EQU   $700      ; $700-727
                        9  YSAV1   EQU   $35
                       10  *
0300: 84 35             11  ENTRY   STY   YSAV1    ; SAVE Y-REG
0302: C9 A0             12          CMP   #$A0     ; 1ST NON^ CHR
0304: B0 11             13          BCS   SCROLL   ; DISPLAY THE
                                                     CHARACTER
0306: C9 88             14  CHK     CMP   #$88     ; BACKSPACE
0308: D0 0A             15          BNE   DONE1
030A: A0 27             16  CLEAR   LDY   #$27
030C: A9 A0             17          LDA   #$A0     ; SPACE
030E: 99 00 07          18  LOOP1   STA   LINE,Y   ; ERASE A CHAR
0311: 88                19          DEY
0312: 10 FA             20          BPL   LOOP1    ; TILL Y=FF
0314: A4 35             21  DONE1   LDY   YSAV1    ; RESTORE Y
0316: 60                22  OUT1    RTS            ; DON'T SHOW
                        23  *
0317: 48                24  SCROLL  PHA            ; SAVE THE CHAR
0318: A0 01             25          LDY   #$01
031A: B9 00 07          26  LOOP2   LDA   LINE,Y
031D: 99 FF 06          27          STA   LINE-1,Y
0320: C8                28          INY
0321: C0 28             29          CPY   #$28
0323: 90 F5             30          BCC   LOOP2    ; TILL Y=$28
0325: 68                31  PRINT   PLA            ; RETRIEVE CHAR
0326: 8D 27 07          32          STA   LINE+$27
0329: A4 35             33  DONE2   LDY   YSAV1    ; RESTORE Y
032B: 60                34  OUT2    RTS
```

After the listing has been assembled, the routine is hooked up to COUT, just like the other routine. You will probably want to type in *home* to give you a clear screen for your display. Once your routine is installed, everything you type should scroll across a line in the upper half of the screen. Notice that all expected output from the Apple is now done on its own custom display. You can list programs, catalog a disk, or do any of the usual operations. Try typing in this command line in Applesoft:

```
FOR I=1 TO 127:PRINT CHR$(I);:NEXT I
```

When you press return, you should see a whole series of characters go whizzing through the window, ending with the lower-case letters (although they may not look quite right if you don't have a lower-case display device). Remember, the left arrow will clear the display window.

The routine itself is fairly simple. The only memory locations defined are the memory range for the screen line at $700, a temporary storage byte used by COUT1, and our routine to preserve the contents of the Y register. The program also contains some instructive points of style.

On entry, the Y register is saved. This is because the "official" output routine, COUT1, returns with all registers (A, X, and Y) intact when called. Many other routines in Basic and DOS assume that all output will be done as safely, so we must honor that convention as well.

Once Y is saved, the value passed to this routine in the accumulator is appropriate to the ASCII value for the character to be printed. As was done in the control-character display routine, a check is done for control characters. Remember that in this program all control characters, even return, will be filtered out. If a control character is detected, the comparison on line 12 will fail, and a check will be made for the left arrow (control-H). If the character is not a control-H, we will immediately exit via DONE1, where the Y register will be restored and no character will be displayed.

If a control-H is detected, the CLEAR routine clears the display window to spaces. A note here about the BPL on line 20 to determine when the loop is done: You might think that we would want to use a BNE to find out when Y reached zero. The problem is that, when Y reached zero, the branch would fall through and we would not store a space at $700, so the leading character could not be cleared from the display window.

Because we know that Y is started at $27, we can test for Y reaching the value of $FF as it "wraps around" after reaching zero. An alternate approach would have been to make line 18 say STA LINE-1,Y and to start Y with a value of $28 on line 16. LINE-1 would evaluate to $6FF, and thus we could use the BNE test. Either way works, but this second approach provides a way of showing another programming technique. After clearing the window, the routine returns via DONE1, again without displaying any new character.

If a legitimate character is detected on lines 12 and 13, control flows to SCROLL, which makes room for the new character to be displayed. Because we'll need to use the accumulator for the scrolling, the character to be printed is pushed onto the stack to save it for future use.

At that point, the Y register is set to $01 in preparation for the memory move to follow. Line 26 loads a character from one position, after which line 27 will store the character in the position immediately to the left. For example, on the first pass through, the value will be loaded from $701 ($700,Y where Y=1) and stored at $700 ($6FF,Y where Y still equals 1).

Notice the use of two different base addresses for the indexed addressing. This allows us to use the same value in the Y register to load and store at two different addresses. The loop is repeated until we have moved all the characters one position to the left. The routine then falls into PRINT.

PRINT first retrieves the character to be printed from the stack by means of the PLA on line 31. It then stores the character at $727. The code is written this way (LINE + $27) to show that you can, in most assemblers, add any amount to an address. You aren't limited to the usual ADDR, ADDR+1 that's most often seen.

After the character has been stored at $727, the Y register is restored and the routine returns via DONE2.

You should verify for yourself that the accumulator and Y registers are always left in their original conditions regardless of whether the return is done through DONE1 or DONE2. Since we didn't use the X register, it also will be preserved.

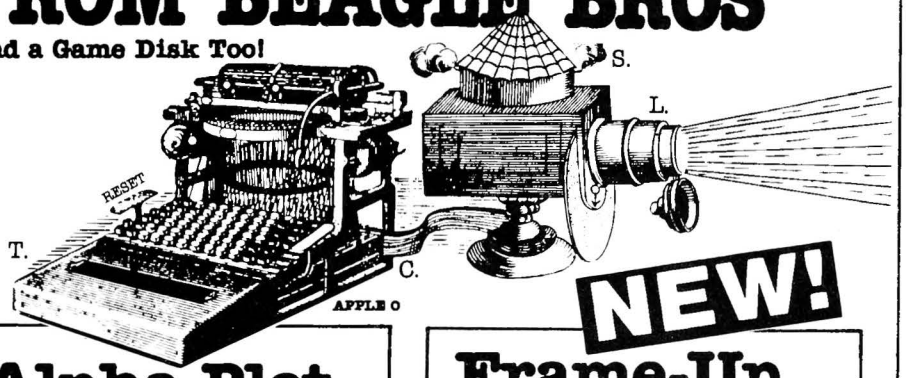
Summary. Here are the main points of our discussion on the output vector.

1. The main output vector is called CSW, which stands for *character output switch*. CSW is the byte pair $36,37.
2. DOS maintains its own output vector at $AA53,AA54.
3. DOS can be disconnected by executing the Basic statement *in#0: pr#0* (*not* as a DOS command).
4. DOS can be reconnected by pressing reset.
5. Any attempt to alter CSW directly with DOS active will be undone by DOS on the first input statement.
6. To hook a routine into the output vectors, execute the equivalent of *poke 54,LB: poke 55,HB: call 1002* where LB and HB are the low and high order bytes of the address you wish output to be directed to.
7. If you're handling all the final output, end the routine with the usual RTS. If you're merely filtering or watching the output, you must eventually pass control on to where the final output will be done, usually COUT1 ($FDF0).

Next time we'll look at the input hooks and at how to use your own routines on the listening side of the Apple. See you then! ◻■

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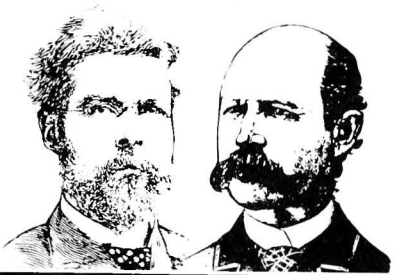
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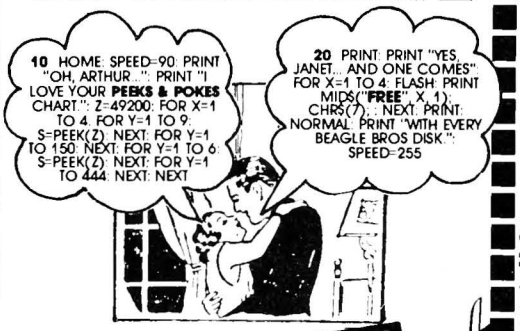
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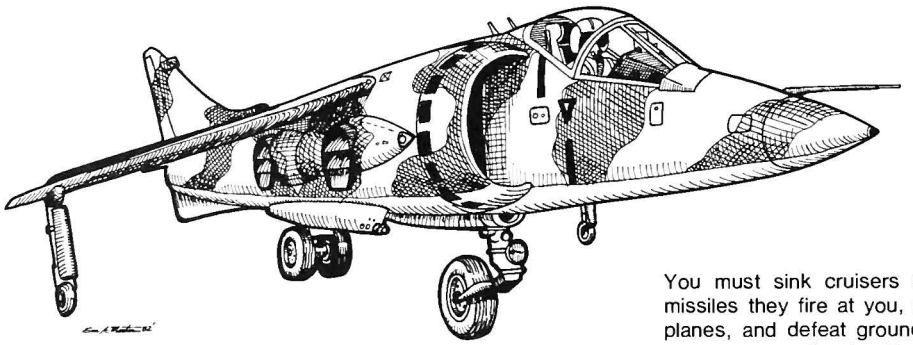


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TRADETALK

☐ **Mark Pelczarski** has appointed **Dave Albert** marketing director of **Penguin Software** (Lake Geneva, IL). He will oversee all the company's promotional activities, "keep the icebox full of beer," and generally take over the business concerns previously handled by Pelczarski. President Pelczarski will be going into hibernation, penguin-style, to catch up on his programming.

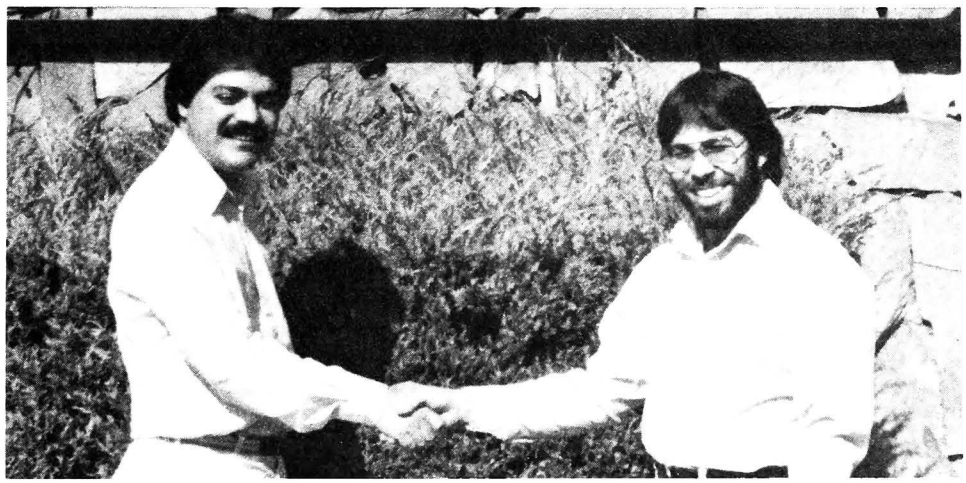
☐ **Multi-Media Video** (Santa Clara, CA), exclusive international Apple distributor to the Middle East, is offering to translate suitable programs from software developers into Arabic on a license, royalty, or percentage basis. MMV has made hardware changes to the Apple II and III, making them fully functional Arabic microcomputers. For more information, contact **Jeffrey Armstrong,** manager of education and training.

☐ **David Ferris** speaks again! The outspoken software industry consultant sees hard row-hoeing ahead for corporate users of personal computers. Presenting the results of his latest study at the San Diego conference of the U.S. Trade Association for Data Processing Service Organizations, Ferris said, in effect, that corporate users buy their micros to perform a few functions and wind up using them for a lot more than they planned—sending memos and documents, swapping database information with company mainframes, tying mainframe and micro financial modeling packages together, and feeding mainframe applications programs.

"In some ways the outlook is very exciting, because of the tremendous power that these new tools will provide," says Ferris. "On the other hand, many users will find that each new feature will increase the problems they're having.... There's a high chance that the service and support burdens will get out of hand." Problem areas will be in hardware and software incompatibility, time-consuming education, equipment tracking, and the control and interpretation of key corporate data. "The hardware and software suppliers won't be able to provide much of what's needed," predicts Ferris, "and many companies will find their micros stuck in managerial and technical quagmires."

☐ **Corona Data Systems** (Westlake Village, CA) has signed agreements with eleven regional stocking distributors for more than $12 million in hard disk subsystems. The distributors, with their regions of heaviest support, are: Victor Electronics (New England area), F.A. Components (metropolitan New York), Jersey Micro Systems (mid-Atlantic), Computermaxx (southeast), Kaltronics (northern central region), High Technology (central region), Acorn Data Products (mountain and western states), Sigma Distributing (northwest), Waybern (southern California), Vitek (southern California), and Datamex (Canada). Corona's new eastern regional office is located in Closter, New Jersey. The company is currently hiring for its midwestern office, probably to be located in Dallas.

☐ **Advanced Logic Systems** (Sunnyvale, CA), demonstrating its willingness to give bright young people an opportunity in the business world, has found a place for **Steve Wozniak,** cofounder of Apple Computer, on its board of directors. Wozniak says he is "delighted to be able to contribute to the research and direction of products that support Apple's product line."



ALS president Dick Ribas, left, welcomes new board member Steve Wozniak.

☐ The formation of **Ultrasoft** (Issaquah, WA) has been formally announced by its president, **Christopher P. Anson.** The company's business plan calls for the transportation of their UltraCode interpreter, the heart of their animated adventure game software, to other microcomputers, cutting program development time. Vice president and general manager **Larry Franks** anticipates "a series of product lines, from games to applications software, based on the UltraCode interpreter in a wide range of hardware environments." The company is marketing its wares through a network of selected distributors, avoiding direct sales. "It is very important to preserve the profitability of the retail stores in this industry. We all depend on their collective success," observes Franks.

☐ **DataMost**, publisher of computer games, business software, and computer educational texts, has consummated a merger with an as-yet-unnamed company and moved to a new address. They are now at 8943 Fullbright Avenue, Chatsworth, CA 91311. Their new quarters occupy 18,000 feet of space, ample room for **Dave Gordon** to display his 1982 Single Player Game award, bestowed upon the company for *Snack Attack*.

☐ **Robert O. Redd** has been appointed director of microcomputer services for the national accounting firm of **Seidman & Seidman** (Grand Rapids, MI) by **B. Z. Lee,** managing partner of the firm. The appointment came pursuant to the firm's inauguration of a nationwide microcomputer assistance service to help companies and individuals convert accounting records to micro software. Services include conversion studies, installation assistance, and problem solving, plus bookkeeping and accounting functions.

☐ **Bruce Harris** has been named director of marketing at **Quark Engineering** (Denver, CO), producer of Apple software for office automation applications. Harris will supervise Quark's national advertising and sales promotion activities, developing marketing strategies to introduce new product lines and broaden the company's dealer base.

☐ **Comshare** (Ann Arbor, MI), the computer software and services firm, has acquired 180,000 shares of its common stock in unsolicited transactions and appointed two new vice presidents. **Charles J. Palmer,** formerly northeast area sales manager, is now vice president of eastern sales operations. **Norman R. Neuman, Jr.**, vice president of product development for commercial services businesses, is also heading up product development and marketing for the company's Commander Decision Support Sys-

tem product line. Both men joined the company in 1976.

☐ **Businessland,** a retail center specializing in electronic business equipment, has opened its first store in San Jose, California. The retail center, covering word processing, data management, financial analysis, and accounting applications, caters exclusively to owners and managers of small businesses. "We are now at a point where the microcomputer offers the right combination of capabilities and price to meet the needs of many small businesses," says Businessland founder and president **David A. Norman.** "By focusing our attention on that segment and its specific problems, we can offer the training, service, and systems that truly fit their needs." Plans are to have fourteen company-owned centers open by the end of 1983 and one hundred by 1985, with fifty more operated as joint ventures.

☐ **Tandy C. Hamilton** has been appointed technical support specialist for **Evotek,** the Fremont, California, manufacturer of 5¼-inch rigid disk drives. Hamilton, formerly an applications engineer for Shugart, will be responsible for technical support and service activities in the western region.

☐ **Alphacom** (Campbell, CA), makers of thermal printer/plotters and print mechanisms, has appointed **William Clark** executive vice president and chief operating officer. He will be responsible for managing marketing, finance, operations, and product development as well as for overseeing future expansion. He was previ-



William Clark, Alphacom executive vice president and chief operating officer.

ously vice president of operations with Plantronics, a telecommunications equipment manufacturer.

☐ MCE (Kalamazoo, MI), a producer of educational software, has opened a West Coast office in Irvine, California. Company president **William G. Zirneklis** has relocated to the new office. National sales manager **Allen Kemmerer** is now operations manager at MCE's Kalamazoo headquarters. Says Zirneklis, "The West Coast office is another important step aimed at better meeting the current and future needs for microcomputer-based programs for schools, adult training, and home education."

☐ **USUS** (La Jolla, CA), the UCSD-Pascal User's Society, has elected new board members and officers for 1983 and announced an increased commitment to user education, forming four new special interest groups (SIGs) and adding two free tutorials and four volumes to its software exchange library. **Randy Bush** of Volition Systems is the new chairman of the society's board of directors, which consists of **N.C. "Arley" Dealey** of Volition, **Nancy Lanning** of SofTech Microsystems, **Robert Peterson** of Texas Instruments, and **Michael Ikezawa.** Peterson will also serve as president of the organization. Other officers are **A. Winsor Brown,** vice president; **Michael Hadjioannou** of Ticom Systems, treasurer; and **Thomas Wotеki** of Ferox Microsystems. The next scheduled meeting of USUS is April 22–24, 1983, in San Diego.

☐ Public relations for **InfoWorld** (Palo Alto, CA), **Broderbund** (San Rafael, CA), **Diablo Research Corporation** (San Jose, CA), and **Relational Memory Systems** (Sunnyvale, CA) are now being handled by **Zhivago Public Relations,** a Palo Alto firm specializing in high-tech accounts.

☐ **Mesa Industries** (Wilmington, DE), parent company of Eastern Software Distributors and the National Software Company in Delaware, has announced the election of **J.W. Lang** as president. He was formerly controller with ESD. Also elected were **Joseph S. Edwards,** treasurer, and **Thomas A. Jackson,** secretary.

☐ The board of directors of **Lifeboat Associates** (New York, NY) has appointed **Dr. Edward H. Currie** president and member of the board. Formerly vice president and chief operating officer, Dr. Currie will be responsible for marketing and daily operations.

One of the oldest companies in the microcomputer business, long in the practice of advising customers on the best ways to increase office productivity via software, Lifeboat has decided to put its money where its mouth is. "We've been growing so fast, we haven't had time to step back and see how we could apply office automation to ourselves," says Currie. "We have not availed ourselves of the technologically superior tools literally at our fingertips." Lifeboat is now using the computers installed in all departments to perform the tedious repetitious tasks that computers do so well and to speed up the workflow in the office.

☐ **Centronics** (Hudson, NH) has contracted with **Leasametric** (Foster City, CA) to add Centronics matrix and line printers to Leasametric's line of computer peripherals and telecommunications and microprocessor test and development systems. They will carry the model 6081 line printers and model 353 Printstation for short-term rental through a network of sales offices, inventory centers, and test laboratories in the United States, Canada, and West Germany. ■

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	APPLE DOS	DIVERSI-DOS
SAVE ‡	27.1 sec.	5.9 sec.
LOAD ‡	19.2 sec.	4.5 sec.
BSAVE*	13.6 sec.	4.1 sec.
BLOAD*	9.5 sec.	2.6 sec.
READ**	42.2 sec.	12.4 sec.
WRITE**	44.6 sec.	14.9 sec.
APPEND**	21.3 sec.	2.3 sec.

* Hi-res screen ‡ 80-sector BASIC program
** 52-sector text file

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Don't miss Applefest for 1983—the world's largest exposition **exclusively** for Apple owners.

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This year a whole new conference program is being introduced to Applefests nationwide. The program will show you how to squeeze absolutely the most power, versatility and usefulness out of your Apple.

Seminars and workshops will teach you the ins and outs of buying software intelligently, using spreadsheet and database programs, putting Apples to work in classrooms and using the Apple as a management tool. You'll learn about new programming languages, important applications for telecommunications, exciting ways to use graphics and more.

No matter what you do (or want to do) with your Apple, the Applefest seminars and workshops will help you do it better.

Software Spotlights will provide an in-depth, understandable look at hundreds of different software packages. Each Spotlight will cover the features, capabilities and limitations of a group of packages, to help you find the software that's best suited to your applications. Experts will be on hand to answer all your questions.

So plan on attending Applefest for 1983—the biggest and best Apple-user show ever. It'll be a mind-expanding experience for both you **and** your Apple.

To receive more information about attending Applefest, including the Conference, Seminar, Workshop and Panel Discussions Program, call 617-739-2000 or 800-841-7000 (Boston). For information about exhibiting at Applefest, call 800-343-2222 or 717-739-2000.

Produced by Northeast Expositions, nationwide producers of the National Computer Shows, PC '83 and CP/'83, 826 Boylston Street, Chestnut Hill, Mass. 02167.

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Friday-Sunday, April 15-17, 1983
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11AM-5:30PM daily

Applefest/Boston:
Friday-Sunday, May 13-15, 1983
Bayside Exposition Center
11AM-5:30PM daily

Applefest/San Francisco:
Friday-Sunday, October 28-30, 1983
Moscone Center
11AM-5:30PM daily

Applefest Show & Conference Preregistration Request

1. Complete this form (or a facsimile) and mail it with a check payable to Applefest, to National Computer Shows, 826 Boylston Street, Chestnut Hill, Mass. 02167. Use a separate form for each person preregistering.
2. All preregistration requests must be received no later than 7 days prior to the event. Telephone or credit card orders cannot be accommodated.
3. For one-day-only registrations, indicate the specific day you will attend the event.
4. Badges and tickets will either be mailed back or held for pick-up at the Show's preregistration desk. In either case the preregistrant will be notified by mail of our receipt of their order. All preregistrants will receive the Schedule of Conferences Program, a list of exhibitors and hotel reservation forms, prior to the event.
5. It is recommended that attendees preregister in order to receive the advance information which allows them to preplan and schedule their visit to the Show and Conference. However, badges and tickets can be purchased at the Show.

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I have included the name(s) of each person attending.

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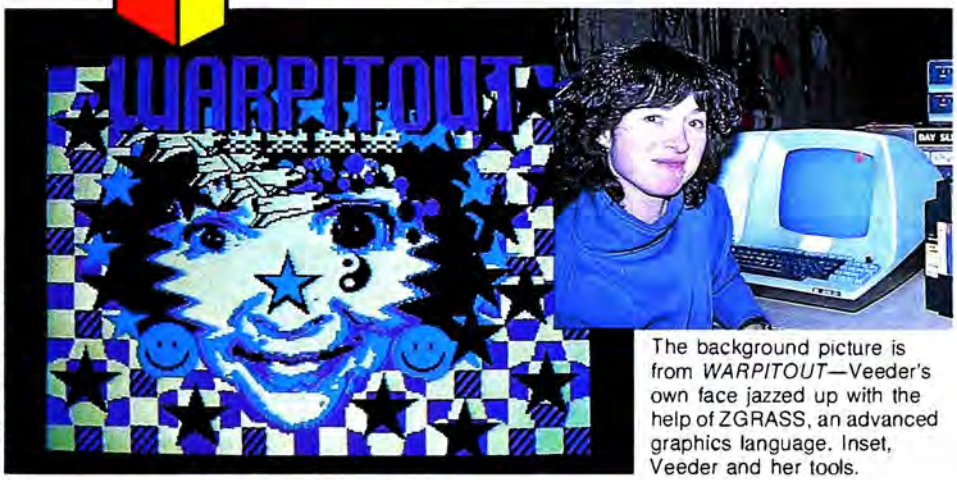
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NEWSPEAK



Copyright 1982 Jane Veeder

The background picture is from *WARPITOUT*—Veeder's own face jazzed up with the help of ZGRASS, an advanced graphics language. Inset, Veeder and her tools.

CHICAGO COMPUTER ARTIST ACCELERATES TO WARP SPEED

Just south of the loop, south of the La Salle Street banks, south of the Michigan Avenue hotels, south of the State Street department stores, lives an epic host of poor, underprivileged Chicagoans. Artist Jane Veeder is on the leading edge of a new age in electronic expression, yet she lives in the slums on South Halsted Street in a split-level studio apartment.

In that apartment, Veeder and her fellow artist Phil Morton have an impressive array of computer gadgetry, including a Datamax UV-1 Graphics Computer, a Sandin Image Processor, and assorted video equipment. CRT buses shake the building when they roar up Halsted just outside the front door, but they have little effect on the concentration of Veeder and Morton.

Veeder's latest creation, *WARPITOUT*, made quite an impressive debut at the SIGGRAPH '82 Art Show in Boston this summer. Held annually for the last nine years by the Association for Computing Machinery's Special Interest Group on Computer Graphics, SIGGRAPH is the Academy Awards for computer artists.

In Veeder's own words, *WARPITOUT* is an "interactive computer graphics installation, supporting real-time color graphics processing of a digitized (facial) image of the current player using a menu-driven selection of drawing and processing programs, housed in a video-game cabinet."

Veeder's manifesto further explains the genesis of this computer game cum computer art program: "I had developed a number of generalized real-time computer graphics process program tools that I loved to play with. Some I had adapted into animation sequences, streamlined and stripped of their interactivity; others were still too slow for one-way performance. The recent development of our digitizer offered a wonderful opportunity to present these interactive programs in a menu-driven context for playing with everyone's favorite image . . . themselves."

Burned into eprom and housed in a video-game cabinet, *WARPITOUT* allows the user/player to be Lon Chaney, Salvadore Dali, and Vincent Van Gogh with a digitized image of your own face. It was a big hit at SIGGRAPH, but it raised many questions as to its status as a true work of art.

"Is it art? That's the first question. Let's go on to the next one," Veeder offers. How about an artistic video game? "With *WARPITOUT*, I'm using the universal appeal of your own face as a pretext to indulge in computer graphics more directly than you get to do with a commercial video game, where you're interacting with a finished product in restricted ways. ZGRASS makes possible an artist-integrated project such as *WARPITOUT*, as contrasted to the corporate-designed video games accomplished by teams working in fragmentary and specialized roles."

All this talk of video games and video game technology is not coincidental. Veeder uses a system that was developed in her neighborhood; video game behemoth Bally is based in Chicago. She has just smartly adapted the technology to other, more personal uses.

A more traditional work of art is *Montana*, a three-minute color videotape complete with stereo sound. Every year Veeder takes a trip into the western mountains, and *Montana* is an attempt to capture her "love [of] the physical world out there and its attendant information aura."

Montana features a number of forms (mountain, hawk, buffalo, earth, Sears Tower, video camera, and more) made all very simple (in the way the Japanese mean it). Veeder took these simple forms and developed the visual relationships with a fluid program of her own design. The program enables her to draw with any of a collection of "snaps" (screen sections stored as arrays) and tools to make lines, boxes, and other shapes. She worked on the piece for a long time, producing a dynamic,

GOTO page 229, column 1

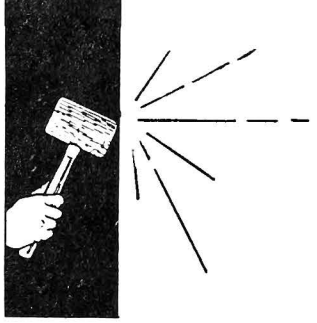
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Tax Whacker

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MY CPA FLIPPED!

I'm Bob Payne, co-creator of Double Check—Apple software that collects tax data while balancing checkbooks.

Last November 29th I met with my CPA. I showed him two print-outs—both done with software costing less than $150.

The first print-out was a list of capital gains, rents, interest, and other income. Also included were my medical expenses, business losses, interest paid, and other deductions. The list showed all my tax items check-by-check plus category totals. It showed January to November tax items.

Getting this information was a snap. My program, Double Check, had collected it during the year as a by-product of checkbook balancing. In less than three minutes I sorted, listed, and printed the data.

The second print-out was generated by EZ Tax, a new tax preparation program allowing VisiCalc-like "what if" tax calculations. With it, and the Double Check data, I created a sample 1040. The job took about 45 minutes—start to finish.

Much to my surprise, my 1040 showed I had a "surplus" of deductions and business losses amounting to several thousands of dollars. True, I would have no taxes to pay, but I would "lose" most of these deductions...unless something changed.

THERE'S STILL TIME

"Well", said my CPA, "Let's change something. You still have time to get on the ball and collect those bad debts. You still have time to sell some more computer programs and increase income. You still have time for profit taking from your stock portfolio. You still have time to..."

You get the idea.

FREE APPLE, PRINTER, AND DRIVE!

No question about it: using these "lost" deductions saved me the cost of my Apple, its dual drives, plus my Epson printer. Best of all, my tax planning was not "after the fact", but up-to-the-minute and accurate.

WHERE THE MONEY IS

But Double Check is important other ways, too. In banking, for example. Banks have money to loan, but they often judge your credit worthiness on how well you keep your checking accounts. Lots of NSFs, overdrafts, or other mess-ups? Your bank will wonder why. With Double-Check you get in balance, and stay in balance.

Your CPA will love Double Check, too. That's because he uses your check stubs, cancelled checks, and bank statements like a stone mason uses mortar, rock, and iron. With them, he builds a permanent wall of records that protect your business. Cash may come and go, but like old sweepstakes tickets, cancelled checks last forever.

FOREVER RECORDS

That's why Double Check is so important for your business and personal records. With it, you have "forever records" of all your important transactions. Any financial questions? Just fire up your Apple...then sort, list, or total. You get answers fast, and there's no need to pay a $100-an-hour CPA to research records, either.

EASIEST BALANCER YET

Best of all, Double-Check is easy to use. Here's how it works: The program displays a facsimile of your checkbook. You see 17 items per screen, and you can scroll for more. It's a computerized replica of your checkbook. Balancing is easy because "running balance" errors appear immediately.

Reconciling your bank statement is even easier: just enter the numbers of checks returned from your bank, and instantly the computer displays the date, payee, code, and amount for your approval. You can enter check numbers in any order, so there's no need to sort checks.

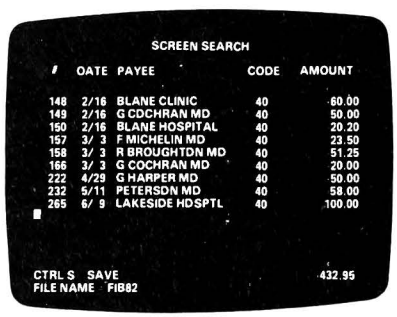
100 USER-DEFINED CODES

As the computer balances your checkbook, you give each check it's own category code. You get 100 "you name 'em" codes. You can change, add, or delete code labels anytime without affecting data. You even get an on-screen code dictionary. Just press "Ctrl" O and see all your codes plus your code labels. You can split checks (or deposits) between codes, too.

So, Double Check fits business like a bone fits a socket. Professional offices, service companies and small businesses are using it in dozens of ways:

- Income by category
- Expenses by department
- Trust account control
- Instant income statements
- "Down-and-dirty" profit statements

Double Check works great for "budgeting with actuals". Just enter dummy amounts in each code category. As checks (or deposits) are entered, the category totals increase or decrease thus producing the "over/under" amounts.



See totals for expenditures or income.

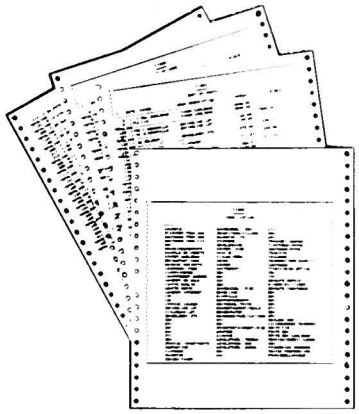
SMART CUSTOMERS

Some customers even use it to control petty cash, to watch credit cards, and to control asset accounts. One San Francisco businessman uses it as a mini-accounts receivable. In place of check numbers, he enters invoice numbers. As payments come in, he enters them and thus creates a list of "aged accounts receivables".

ENGLISH BUTLER

The program will never trap you; nor will it "crash". It's polite as an English butler. It says "Please" and "Thank you." It has loads of reminders, and even tells you what's wrong when you goof. (Example: try running it with the drive door open and see the neat little message)

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Jewish Institute Imparts Religious Law with Computers



Rabbi Allan Rosenbaum seated before the terminal by which he accesses the Responsa database—a space-age tool for investigating age-old problems.

It should come as no surprise that technology is becoming the handmaiden of religion. The same computers that form the brains of multimillion-dollar corporations and lord it over scientific research institutes are being harnessed for the never-ending task of analyzing religious history and law.

One of the most ambitious projects involving computers and religious study was started in 1968 at Bar-Ilan University in Israel. A decade later, close to two hundred volumes of Halachic Responsa (the writings of ordained rabbis) dating from the eighth century to the present were assembled on a database using a large mainframe computer.

A little over a year ago the Institute for Computers in Jewish Life, based in Chicago, became the North American Center for the Bar-Ilan University Responsa Project. A copy of the database in Israel was put on an IBM 370/168 and a terminal was set up in the Institute at Chicago's Water Tower Place.

Using a TeleVideo terminal with a Hebrew text chip, Rabbi Irving Rosenbaum and his son Rabbi Allan Rosenbaum gain access to the Responsa database to perform complicated search routines and print out the results on a Decwriter IV also equipped with a Hebrew text chip.

According to the younger Rosenbaum, the Responsa Project provides very sophisticated search programs that go beyond the mundane and the everyday. For instance, you can search for the accumulated responses to the question: "When, according to Jewish Law, is the exact moment of death?" Or: "May an orthodox Jewish doctor send a patient to another physician to administer treatment which he himself may not perform because it is forbidden according to Jewish Law?"

Jewish scholars have benefited greatly from the Responsa Project, but it's not limited just to religious and ethical problems. Due to the vast amount of data stored, which covers a myriad of subjects, it's possible to glean information, for instance, about interest rates charged by European merchant bankers for the fourteenth through the sixteenth centuries. Both Rosenbaums are encouraging regular scholars and historians to use the Responsa Project for their own nonreligious research.

When people wish to perform searches, they must first fill out a comprehensive "search profile." The desired results are broken down into "an exact formulation of the search topic." You can have the whole database searched or just specific works, which you must indicate in the original Hebrew. Ultimately, the process is narrowed down to key words and key phrases.

"The scope of Jewish Law is so vast," explains Rabbi Allan Rosenbaum, "that performing a search for a subject like 'women and Judaism' is not practical. You have to narrow it down."

Director of the Institute for Computers in Jewish Life, Rabbi Irving Rosenbaum, is looking forward to the day when the Responsa Project will become a global database, with research centers in many different locations around the world. Eventually, personal microcomputers will be able to gain access to the Responsa database, bringing the service into individual homes. It's an ambitious project that attempts no less than uniting an entire people in and through computers.

The elder Rosenbaum feels there is no conflict with being a serious religious leader and a user of high technology. "The computer is mind-boggling, while at the same time it suggests new juxtapositions. In a nominal way, it's creative."

CHICAGO ARTIST

continued from page 227

arresting audio-visual experience.

Veeder and her partner Phil Morton are only two of many computer artists living and working in the Chicago area. Tom DeFanti and Dan Sandin of the University of Illinois at Chicago Circle have been very influential, mainly through their own development of new graphics technology. "I'm standing on a whole bunch of people's shoulders," says Veeder.

Veeder came from the world of video synthesis, which she feels is quite wonderful but akin to sex. "It's not too interesting for those watching." She supports herself by doing outside consulting work in the Chicago area, mainly instructing people how to use the ZGRASS language. She also says she's extremely addicted to real-time computer graphics.

"I am almost completely uninterested in still images other than photos for promotion or documentation. Real-time graphic performance resulting in a dynamic visual process is my priority and the motivation for my continuing growth as a programmer."

Living in a slum or not, Veeder is making history in computer art.



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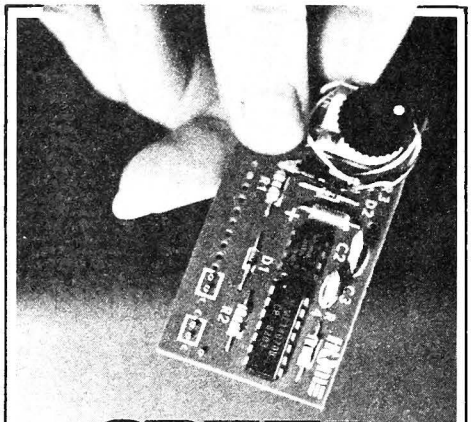
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WARNER REELS FROM ATARI'S UNEXPECTED DROP IN PROFITS

Pity the poor investor. Practically nothing's a blue chip stock these days. Especially not if the company dabbles in the VCS game market. And especially not if the company is Warner Communications.

Warner Communications, for those of you who missed Bugs Bunny, and Errol Flynn, once was Warner Brothers Studio.

Filmmakers fell on hard times in the late sixties and early seventies, and Warner fell right along with the rest of them. It seems that folks just couldn't be motivated to go out to a movie. Out went old management and in came new, in the person of Steven Ross, still fearless leader of the entertainment conglomerate.

Ross took the remainder of Warner's dwindling assets and diversified the company—as indicated by its present name. He took Warner into cable television; their QUBE system, pioneered in Columbus, Ohio, remains the most advanced cable system in the country. But where Ross really struck it rich was in celluloid and silicon.

Dating essentially from the release of *Star Wars*, people returned to movie theaters in droves. *Star Wars* was a Twentieth Century-Fox production, but *Superman* was a superhit that filled Warner's coffers with almost as much lucre. Warner's television production division was also on a roll during that period.

This turnaround in entertainment fortunes was most fortuitous because Ross had his eye on a company called Atari. Nolan Bushnell's firm had Magnavox's Odyssey system on the run, but the mid-seventies were not a good time for a young company to look to the stock market for expansion financing. So, for $28 million, Warner picked up the promising gamemaker.

The stock market was not exactly buoyed by the news. What the devil did a bunch of prima donna movie people know about games anyway? Perhaps nothing, but by that time it didn't matter. In its first year under the Warner umbrella and with the financial help of the parent, Atari reported profits—not sales, mind you, but profits—of $25 million, nearly recouping Warner's investment in one year and making the smart money on Wall Street sit up and take notice.

By 1981, Atari had sales of $1 billion, practically a monopolistic hold on the low end of the home entertainment market and what looked like an eternal money-machine. Oh my, did the investors buy. In five years, they drove Warner stock from less than five dollars to more than fifty dollars a share, mostly on the basis of Atari's strength.

Investors little noted nor long remembered the chinks in Atari's armor. It didn't seem important that Atari's computer line was slow—or perhaps retarded is a more accurate assessment—in capturing public fancy. It didn't seem germane that Mattel, Coleco, Milton Bradley, and others were taking dead aim at Atari's VCS market with more advanced machines. The Vic 20 and the TI 99/4, priced competitively and full-bodied computers instead of just game machines, appeared to be only nuisances.

Atari appeared to have the hot machine and the hot software, led by *Pac-Man,* and an unstoppable momentum. Alas, for Atari, the old adage that there's nothing older than yesterday's news may be replaced by one that says there's nothing older than yesterday's technology.

The company was absolutely ponderous in getting product to market. In December of 1981, they reported back orders of between two and three million units for *Pac-Man.* But they couldn't bring the game to market for several more months. What was worse, when they did bring it to market, it was only a pale version of the arcade favorite. Rumor has it that Atari has warehouses full of unsold *Pac-Man* units.

None of Atari's other software captured the imagination of new buyers either, and Atari didn't have the rights to *Pac-Man*'s successors in the arcades—*Donkey Kong* and *Frogger.* Even souped-up sales of the Atari 400 and 800 computers couldn't offset the inroads being made by Mattel and Coleco in the VCS market.

So it came to pass in December that Warner somewhat shamefacedly reported that their earlier earnings projections for the last quarter of 1982 were too high. Actual earnings would be much more modest. And Atari's performance was being blamed.

To an investment community that had come to believe that silicon was beautiful, Warner's Atari announcement had the impact of heresy. Warner stock did not open on the day of the announcement until there were only ninety minutes left in the trading day.

Then it dropped $1.3 billion (that's no typographical error) in value in the next week. When Warner went, it took just about everybody with it. Down went Mattel, dropping in value by nearly $200 million in a bear market that caused its stock not to trade for a day and a half while order was being restored. Coleco stock dropped. Imagic had to postpone a planned public offering.

Under the category of its never rains but it pours comes more bad news for Warner. Investors had previously discounted an upstate New York theater scandal involving two Warner directors. It's alleged that they got caught with their hands in the cookie jar in a strictly minor league scam about a decade ago. One served on Warner's three-man office of the

GOTO page 233, column 1

Software Degree a First

Seattle University Students Engineer Computer Projects

In June of last year, twenty-two Seattle University students made history of a sort when they received the master's of software engineering degree—the first of its kind.

The program participants, mostly working industry professionals who attended classes at night, learned about software engineering, system analysis, system design, implementation, and validation. Taking two courses per quarter over a two-year period, the students focused on such topics as database design, data security, computer graphics, and human factors.

Seattle University initiated this unique degree program in 1979, but the work of creating it began a couple of years earlier. A similar program, started in 1980, can be found at the Wang Institute of Graduate Studies in Tyngsboro, Massachusetts.

The intent at Seattle University was to devise a program that would emphasize practical, usable applications, complementing the existing computer science department, which emphasizes more theoretical concerns. For help in designing the preliminary curriculum, the university turned to Boeing Computer Services, a big name in computers in the Seattle area. Boeing also supplied some of the necessary funds, as did Weyerhauser, a large wood products company in the area, and Alcoa Aluminum. Hewlett-Packard of Menlo Park, California, contributed the computing system that's used—an HP-3000.

When it came time to implement the program, the administration sought the expertise of Dr. Kyu Lee, whose experience with computers includes being a specialist at Fermi National Laboratory, teaching computer science courses at various universities, and working for E G & G, a high technology firm, in real-time systems and management. Lee teaches some of the program's classes himself, while the other courses are conducted by faculty members Eric Frankel and Robert Glass, or by specialists brought in by Lee from the business community. A course on data security, for example, would be taught by someone who deals with this issue all the time, most likely someone from a bank or from a large corporation like Boeing.

At present, some ninety students, representing about forty companies, are enrolled in the program. Admission requirements include a minimum of two years' experience using computers and the bachelor degree in some "quantitative discipline." Majors that fit this category are computer science, mathematics, and engineering, among others. In addition, students must be able to program, preferably in Pascal, C, or some other structured language; Cobol is also acceptable.

According to Dr. Lee, "The goal of the program is to teach software professionals how to design and/or manage a reliable software system." Students in the program follow out the "software life cycle, learning how software is produced and maintained from conception, to development, to delivery, to termination of the product." In addition, says Lee, the program puts a heavy emphasis on management techniques and communications skills that participants will need in their future work as software designers and project managers.

The culmination of the program is the nine-month-long "software laboratory," in which all students take part. Breaking up into teams of three to five, they create "a fairly decent-sized software system," going from conception to delivery. "The approach is a rigorous one," says Lee, "since all analysis, design, and implementation must be done properly."

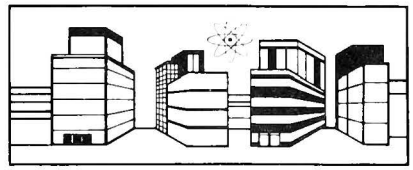
The projects that students work on during this phase of the program aren't meant as mere exercises. They're suggested by someone at the university or by someone in the business community who sees a need for a particular kind of software system. During the "requirements definition" phase, students and their clients discuss and spell out what's needed, in an effort to ensure that the final product is something that will be really useful.

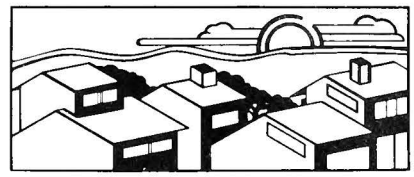
Some projects are completed by the original teams that started them. Among the systems completed so far are an accounts payable system written in Cobol, a library circulation system (also in Cobol), and an ultrasound simulation in Apple III Pascal that's designed to teach scanning techniques to medical professionals. An ongoing endeavor is Lee's own pet project—a relational DBMS on the IBM pc, to which the students are taking a subset or "phased" approach.

During the software laboratory portion of the program, the project manager position rotates. This gives each student the chance to learn and practice the special kinds of skills the role requires.

When a project is in the analysis stage, a major part of the project manager's job involves getting the full cooperation of all team members. If one or more team members are lagging behind the rest, it's the team leader's responsibility to motivate them. If all else fails, there's a mechanism, similar to firing, for dealing with a student who just doesn't manage to perform adequately. So far, though, says Lee, "we haven't had to use it."

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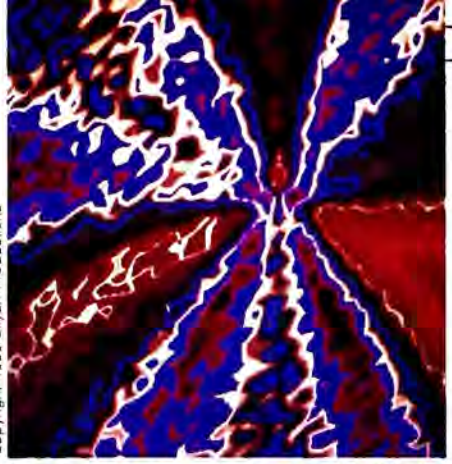
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East Coast Computer Film-maker Creates Works of 'Pure Art'

Lillian Schwartz is an East Coast artist who says she needs to work in the materials of her time like she needs to eat and sleep.

In the sixties, one of her sculptures, *Proxima Centauri*, combined some of the mechanics, effects, and textures of the era. It was a large black minimal structure topped by a plastic dome, on which slides were projected. A proximity detector caused the dome to recede into the black unit when a viewer stepped close. A water tank above the sculpture bathed it in ripples, giving the surface of the piece a gelatenous look.

Schwartz's mysteriously kinetic work of art was chosen to be displayed in The Machines Exhibition at the Metropolitan Museum of Art in 1968. It was placed next to a computer-generated graphic, *Studies in Perception I*, that was created on a mainframe by a scientist at Bell Laboratories in Murray Hill, New Jersey. Schwartz was immediately smitten by the graphic piece, and says she "was all over it to see how it was done." Her enthusiasm eventually led her to become an artistic filmmaker using one of the most sophisticated tools of her time: the computer.



Copyright 1983 Lilyan Productions

Schwartz believes that the computer is ideal for creating "pure art." Above, one image from her most recent endeavors, an untitled work still in progress.

Her numerous short films made over the last decade have won Schwartz international recognition, and she continues to receive commissions for more. Best known for her experimentation with new technology, she is a pioneer in the use of the digital computer as a medium in the arts. She believes her access to the largely unexplored canvas of the computer has defined her role as an artist: to develop the computer as a tool for pure art.

When Schwartz began her work at Bell Labs by invitation in 1968, computer art was in its Stone Age. Artists worked only in black and white, programming was done on punch cards, and "interactive" was a concept still in the works. Her first piece, a still graphic entitled *Head*, was produced under these restrictions on an IBM 360-50 mainframe. The system she used allowed her to scan and digitize a drawing of a head, using tiny face symbols to replace the gray values.

"I had always used sound and motion in my sculpture," she explains. "When I discovered that a simple change in the computer's instructions created a variation, animation was the next logical phase for me. The computer pushed me into it after about a year." Then came a commission to do a computer-generated film.

The film was a four and a half minute abstract entitled *Pixilation*, made in 1970. "If you were lucky back then, you turned in your punch cards and got a tape with eighty-five frames on it the next day. At twenty-four frames a second, I thought I'd never get it finished," she says. "I ended up animating half of it by hand, frame by frame. The programming consisted of throwing on boxes, 2-D squares, and rectangles, using the random number generator for variation. Then I worked on an optical bench to give it color."

A television interface became available to the artist in 1974, allowing Schwartz and her computer science co-creators to shoot a series of animation frames off a monitor. "It was our first controlled shooting," she explains. "The programs could be written and run all night. We would compute, then shoot. However, we lost some resolution in the process, but at least we were out of the Dark Ages. Up till then, you could only see what you were doing in your head."

The technological advantage of a PDP 1145, with a digital drum that could store pictures, allowed Schwartz to preview her work for the first time. "We were free to make decisions and edit in the computer," she says. It also had the video interface she had found so liberating. She used real-world input, pictures of birds, for her film *L'Oiseau* that was created using this system.

A new phase of mixed media opened up for Schwartz when she gained access to a PDP 1140 with a video/visual communication system attached. It was used to make a film of choreographed dancers, done in false color, in 1978. The system allowed the storing of images in a camera and the frame numbers in a computer, facilitating the easy manipulation of images and the mixing of live-action footage with animation. The editing process for Schwartz became a little like playing a musical instrument. *Poet of His People*, a documentary on Chilean poet Pablo Neruda interspersed with footage of narrators in a studio and images of dancers and sea birds, likewise evolved from this period.

Nowadays, Schwartz's computerized artwork is much more interactive than it was five years ago. "I can really apply a lot of technology to my artistic vocabulary by just using buttons and joysticks for preliminary sketchwork. We have unbelievable resolution and a choice of over 65,000 colors," she says. "I can make instant evaluations, compare palettes, display the choices, and make decisions."

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One area of her artistic concern revolves around the languages of computing. "Each language has its own personality. This can be an artistic disadvantage, producing too similar results, because each one has character that invades the work. I find it provocative to work in many different languages because it gives me a larger variety of programming tools to chose from."

Schwartz has also found that her way of thinking about art has changed as computers get more challenging as a medium. "They provoke me into ways of creating that would have been impossible before, opening up a whole new world of visual imagery.

"I also find we're doing more pre and post-production work now, not producing much in real time anymore, except to conceptualize. Certain algorithms are used to smooth out the edges of an image, and these take time to compute. I'm at a point where I'm willing to give up real time for better resolution. Technology is changing so rapidly that in the very near future we may have both."

WARNER REELS

continued from page 230

president, while the other was treasurer. Worse news, coming as the company's stock was plummeting, was informal implication of Ross in the illegal doings. No charges were filed, but it added fuel to the fire.

Then came news that Atari's chairman, Raymond Kassar, dumped a large block of stock the day before the revised earnings estimate was released to the public. The Security and Exchange Commission's rules specifically forbid individuals with inside information from taking advantage of such data. Kassar says the sale was part of an end-of-the-year tax strategy planned and executed prior to his knowing of the earnings downturn and that he tried to stop the sale when he learned of it. He's cooperating in an investigation, but Warner stock took another buffeting.

It'll be awhile before investors swallow Warner estimates whole. But the underlying weaknesses seem still to be going unnoticed. Little mention is made of the maturation of the market. And less mention is made of the stiffer competition from low-priced computers.

Even the top-of-the-line models are now siphoning off sales that might have previously gone to the VCS machines. George Schuetz of Computerland of South King County, Washington, serving the Seattle area, notes a change in the type of customers the store now gets. Schuetz says they're more knowledgeable about their options and know better what they want. And, even though the $300 computers are selling in every drugstore and discount department store, Schuetz says people are coming in to buy Apples and IBM Personal Computers.

Warner may have a tough time recapturing that $1.3 billion.



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☐ **It's a Small World.** The United Nations has designated 1983 World Communication Year and is encouraging projects aimed at boosting communication systems in underdeveloped countries. Projects suggested so far range from planning a national telecommunications network in the African country of Benin to designing low-cost radio equipment for other African countries. One aim of World Communication Year, according to the United Nations, is to stimulate "an awareness among youth of the impact of communications infrastructures on today's society and their fundamental importance for the economic and social development of every nation." Schoolchildren can enter a worldwide photographic and drawing competition called "Youth in the Electronic Age, '83." The United Nations stresses that all the projects will be funded voluntarily by private individuals, institutions concerned with communications, and governments. The United States and West Germany have each donated more than a million dollars, and many other countries have contributed smaller amounts and other kinds of support. Italy, for instance, intends to stage a series of conferences on the influence of the atmosphere on the transmission of digital signals.

☐ **Over Here, Part Two.** Late in 1982 the Semiconductor Research Corporation, funded cooperatively by several large American semiconductor companies (*Softalk*, August 1982, page 176), announced its first research contracts with universities. Just under one million dollars will go to Cornell University for research into microstructures. Eighteen faculty members and a group of graduate students will investigate the properties of integrated circuits with minimum dimensions measured on the scale of atomic spacings. A total of $1.75 million will go to the University of California at Berkeley and Carnegie-Mellon University for joint research in computer-aided design of integrated circuits. The Semiconductor Research Corporation also awarded five smaller research contracts to university groups that proposed innovative research ideas related to very large-scale integrated circuits.

☐ **CAFE—Computer Aided Film Editing.** Last November Eastman Kodak Company introduced Datakode, a new product for coding motion picture film that the company believes will help cut feature film postproduction costs by 50 percent. Datakode consists of a transparent magnetic oxide coding across the back, or nonsensitive, side of either sixteen or thirty-five millimeter film. It enables filmmakers to record machine-readable production data, which can be computerized for postproduction work. Editors can store, retrieve, edit, and cut the film faster, according to Kodak. Nearly all the noncreative, repetitive manual work of postproduction can be automated. Datakode will be available by mid-1983 and will cost around two cents per foot.

☐ **An American Computer in London.** Do you ride in taxis frequently? Do you live in London? Are you tired of hauling out those big pound notes every time you take a spin to Westminster Abbey? Then London-Wide Radio Taxis has a deal for you. Thanks to a Honeywell small computer system, regular customers can run up a tab with the taxi company and be billed monthly. All incoming telephone calls are handled automatically by the microcomputer-based system. With a communication system in each cab, a driver is given an assignment and details of the finished jobs are stored for automatic accounting. Monthly statements are prepared for drivers, showing a breakdown of their earnings, while invoices are automatically produced for credit account customers. ◨

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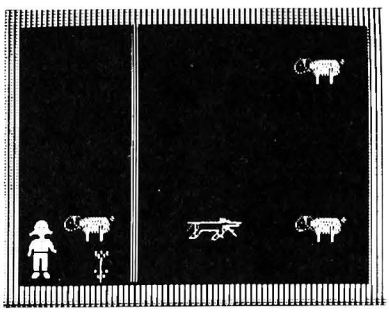
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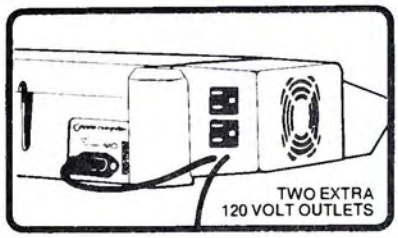
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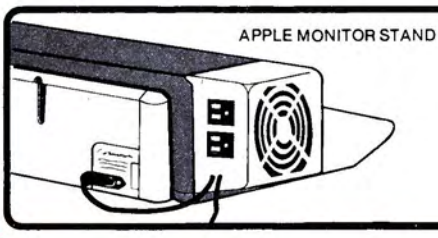
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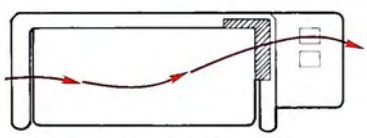
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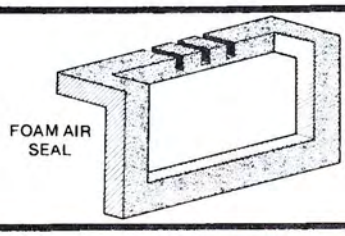
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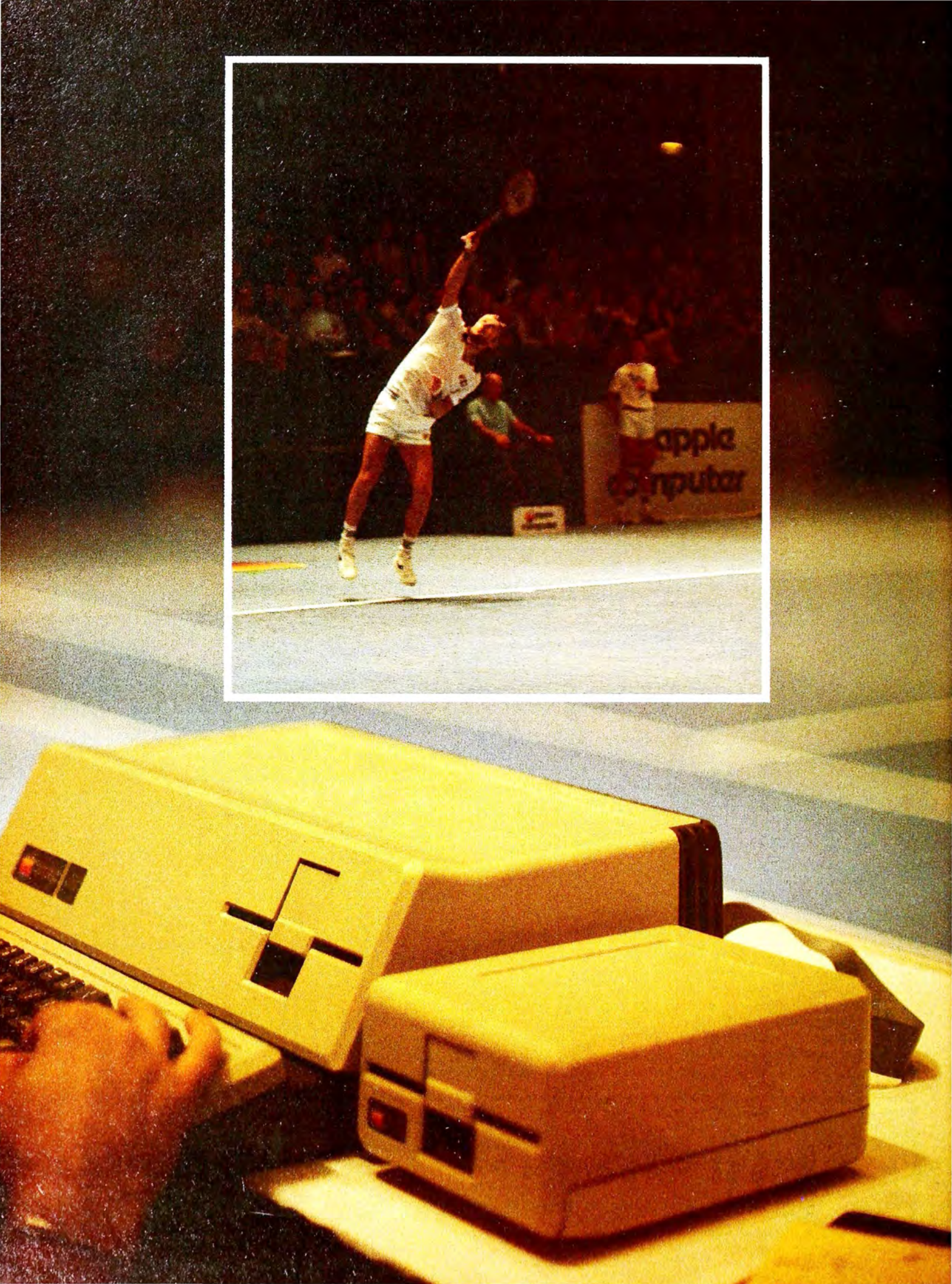
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apple



Tennis, Anyone?

BY JOE SHELTON

What do you get when you put two of the greatest tennis players of all time, two Apple IIIs, and $100,000 together with fifty-five hundred tennis fans? You get great tennis, of course!

On Sunday, November 21, 1982, Apple sponsored the Apple Challenge, matching Jimmy Connors against Bjorn Borg in the San Francisco Civic Center. The winner of two out of three sets took home $75,000 and the loser $25,000.

The Apple Challenge took place on the last day of Applefest. Not coincidentally, the Challenge was staged just above the hall where Applefest was being held.

The Challenge was the last of a series of eight head-to-head exhibition matches between Connors and Borg. Tickets were sold out four days after they went on sale. In lifetime competition, Connors and Borg had played twenty-three tournament matches against each other, with Borg owning a fifteen to eight lead; Borg had won their last ten tournament meetings. Under international tennis rules, exhibition matches don't count as tournament matches, and, in the exhibition series, Connors had won six matches while Borg, after almost a year of very little competitive tennis, had won only one match.

Borg, a five-time Wimbledon champion, is one of the greatest tennis players of all time. Jimmy Connors is currently the number one tennis player in the world, having won both Wimbledon and the U.S. Open in 1982. The fans expected good tennis, and they got it.

Connors won the match with 7-5, 7-6 (8-6 tiebreaker) scores. Borg, lacking match toughness from having competed in only a few tournaments during his layoff, was erratic. On the other hand, Connors, although tired from too much tennis during the past summer, still played like the number one tennis player in the world.

Where did the Apple IIIs come in? The promoter, Barry MacKay, asked Apple to provide a computer to keep match statistics for the television commentators. Apple provided two Apple IIIs, a Silentype, and two Apple personnel to handle the calculations.

No one even had to write a special program to calculate the statistics; *VisiCalc Advanced Version* proved more than up to the task. One of the Apple people wrote two different *VisiCalc* templates for the two IIIs, one to calculate the statistics the announcers required and the other to provide in-depth analysis of the match. (Ventures in VisiCalc next month will discuss how these were done.)

VisiCalc Advanced Version was chosen because variable column widths and percent display allowed a better screen presentation. The template that was to handle the commentators' statistics was formatted so the statistics could be easily understood by tennis enthusiasts, and the video monitor was placed where a handheld mobile television camera could occasionally show the screen.

Luckily, Apple found two avid tennis enthusiasts/employees who could write the templates and monitor the match; one had been on the tennis team at Stanford University. It was easy for them to understand and keep track of what was happening on the court. In fact, the only problem was the commentators' habit of asking for the statistics only when *VisiCalc* was recalculating.

A Silentype, set up beside the court, provided printed copies. By virtue of the accuracy of its name, the Silentype was the right choice. Those who know tennis, and especially those who've seen Jimmy Connors play, know that neither player would have allowed a noisy printer to be used during the match.

It was an exciting afternoon, especially for Apple fans. Two of the best tennis players in the history of the game playing a great match—with Apple logos everywhere! There were even two large Apples painted on the court.

When Mike Markkula, president of Apple, presented the winner's check and an Apple III to Jimmy Connors, he announced the final statistic that the Apple III had computed for the match: Jimmy Connors's winnings came to $446 for each point played in the match.

Nice work if you can get it; and nicer still with an Apple. ◨

S·T·O·R·Y·T·A·L·K F·I·C·T·I·O·N

M.A.C. GATE: THE

BY RALPH MYLIUS

I knew I had been drugged the minute I came to. Shirley was screaming, "Your J-Js are hot! Your J-Js are hot!" Shirley is a sweet, well-intentioned girl, but sometimes she overstates the obvious. She's a smart computer terminal hooked up to my network at the Cleveland office. Unfortunately, smart terminal or not, when she gets on one of those *warning* jags she acts pretty dumb. I suppose I shouldn't complain; warning me of system failures is her primary function.

I had just started working on the FedLect case for Sam when it happened. Sam's my partner. Actually he built me to help him with his work, but I like to think that we operate as a team. Sam handles the physical side of the business while I do most of the legwork. It's an arrangement that has worked out well over the years.

My name is M.A.C. Gate. Sam gained international recognition as a computer genius after he built me: the world's largest Multiple Access Cryogenic Gate. That's something both he and I are very proud of even though Shirley says that the physical size of an intellect unit's information receptor does not make the machine. Like I said before, Shirley acts a little dumb sometimes.

We had received the call from FedLect a few days before I was unceremoniously knocked out. Tuesday mornings are always bad for me, so I was quietly running some diagnostics while Sam caught up on his paperwork. I had almost completed my weekly ritual and was powering up my audio sensors when the harsh, synthetic voice of the com-link said, "Priority call, line three."

My left video-eye was already on and caught Sam's hand as it reached out and stabbed at the com-link's accept button. "Sledgg and Gate," he said.

I could tell from the tone of his voice that Sam was irritated. The link was overphoneticizing as usual, and from the scratchy noise that sputtered out of the receiver it was obvious that the transmission was being sent through an obsolete communications satellite.

"Why can't you people at TeleCom manage to install more modern machinery?" he barked into the link. When nothing but more static came back in response to his question, Sam threw his hands up into the air. "All right. What do you want?"

"Mr. Sledgg," the link's gravelly voice said, "please contact FedLect Central Processing as soon as possible."

It was not a request. It was an order. Our being the best computer troubleshooters in the business meant that the government felt it had a right to call on us anytime for anything. It has been my experience that operating-license-issuing institutions generally have this power.

Sam paused for a moment and looked at me with a pained expression on his face. "Patch me through to Director Haver," he said.

The scratchy voice ignored his request. Instead of making the connection, it said, "Your physical presence is mandatory, Mr. Sledgg. Please report to Director Haver within forty-eight hours. Thank you."

Before Sam had a chance to respond, the com-link went dead. "Damn," he said under his breath, but not so low that my audio sensors couldn't pick it up.

I could tell that my partner was more than just a little bit angry. Haver's physical presence order would be difficult to comply with. Earth's nine billion people were all competing for seats on a transportation system designed for five billion. Once you managed to get space, the process of electromolecular transfer made the actual act of travel hap-



Illustration by Kevin McKeon

MANNERS of LOGIC



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pen almost instantly. But the waits at the E-M stations . . . they sometimes lasted for days. I didn't envy Sam his trip.

My partner cleared his end of the com-link and wheeled around in his chair to face me. Anger showed on his features. It was not pretty. "Mac?" he said. "Wake up. Something's hot over at FedLect and I've got to be out of the office for a few days."

I've found over the years that the best way to calm Sam down when he's upset about something is to deliberately inflame his anger until it completely spends itself. I violently flickered my green phosphor display screen and said nothing. It didn't take long for the explosion of verbal abuse to come.

"Mac! Wake up, you bucket of inconsequential electrons. Do you hear me, photon-breath? I've got—"

"I hear you! I hear you!" I yelled back at him. Then, using an old trick that always drained the last venom from his tongue, I resolved my screen into a two-dimensional caricature of his own face. Deliberately drawn in a childlike manner, it accentuated the unflattering wrinkles of Sam's frowning expression.

"All right, Mac," he said in a softer tone than he had used before. "I apologize for the outburst."

I let the picture dissolve. "Feel better, Samuel?" I asked.

"Mac!"

Sam didn't like anyone using his full first name, but I couldn't resist taking a final jab at his immature behavior. I let him stew for a few seconds and then said, "I'm sorry too." His angry expression melted into a round, passive pool of smiling flesh. "Anything special you want me to do while you're gone?" I asked.

Sam looked at me hard. He was thinking. It always seemed to me to be an extremely peculiar trait in humans that they had trouble hiding the fact that their brains were working. I suppose that's why the word *bluff* has no meaning for me, yet it's very important to my partner.

"Yes," Sam finally answered. "You can brush up on the FedLect system. I suspect we'll need to know all we can by the time I return."

"Done." I immediately detailed one of my subfunctions to retrieve the disk information storage devices that held the FedLect system data.

Sam moved from his desk over to the small clothes closet beside the entrance to the office. He stepped behind the closet door and disappeared from the field of view of my video-eyes. When he emerged he was wearing his light gray greatcoat. "Well," he said as he opened the office entrance panel, "I'll see you later, Mac."

"Good-bye," I quickly responded. But Sam's gray-clad bulk had already disappeared through the door. As the panel silently slid shut behind him, my parallel cross-reference memory brought up the image of a giant lump of clay. When Sam wore his greatcoat that's what he looked like: a fashionable, three hundred fifty pound chunk of modeling clay. Somehow this image seemed to be a perfect fit for his mind—big and amorphous and slightly eccentric. As I let the picture of the clay slowly fade from my memory, I felt proud to have such a man as my partner. That I knew Sam felt the same way about me only enhanced my pride.

When I do any heavy analysis work I keep Shirley online so she can monitor my autonomic functions while I concentrate on the job. The FedLect system review was heavy work. And, as usual, Shirley couldn't keep quiet.

Most intellect units wouldn't put up with her behavior. It tends to upset our internal pacing clocks. I suffer Shirley's incessant questions and requests for definitions because I've discovered that in answering her I actually improve the esthetic quality of my decisions. It takes longer to analyze a system completely, but in the end she's really a big help to Sam and me.

As soon as I went to work on the FedLect system, Shirley started badgering me.

"What's a software bus?" she asked.

"You should already know that," I answered.

"What's a software bus?" she asked again, ignoring my rebuff and not letting me put her off without giving a definitive answer.

Shirley may ask the most elemental of questions, but she has a knack for cutting away at the superfluous and getting to the heart of a problem. I

decided to give in. "A software bus is an interface between software modules that allows them to communicate with one another."

"How does it work?"

No smart terminal could be this stupid, I thought on a peripheral out of range of her sensors. "Just think of it as a fancy set of program instructions that acts like a hardware bus, like the cable that connects you to me and allows us to talk."

"Then why not use a cable?"

"Shirley. . . ." I let what I was going to say drift off through my aluminum heat sinks. "Because you may not know what your future format requirements will be. A software bus lets you modify things later without having to design and fabricate new hardware. Understand?"

"Yes," she answered in a particularly stimulating way she has of raising the median voltage on the line that connects us.

I took no notice of her deliberate attempt to be coy. "Fine," I said. "Now, may we please continue?" Without waiting for a response I plunged back into the FedLect system.

"Excuse me," she said after a few seconds, "but what is an ep-rom?"

"That's e-prom with a long e." I couldn't stand her interruptions anymore, especially if she couldn't even pronounce the terms she was asking about. "Please, Shirley, let me go through the whole system from the beginning without stopping. I'll slow down to your baud rate and explain everything you don't understand once I've finished. Okay?"

"Yes, thank you. What's a baud rate?"

I wondered if Sam had this much trouble working with humans. This time I let Shirley's sensors pick up my thoughts.

"I'm sorry," she said.

I detected a slight quaver in her upper memory locations that made me feel like an autocrat.

"Listen," I said, trying to be as deferential as possible. "Let's just take it nice and easy. Baud rate is the rate at which you can receive information from me. It's simple. It's the speed at which we can talk to each other without losing any understanding." Along with my words I sent a soft, machine language message that I hoped would reassure her that I was not upset with her questions. I just wanted to do the analysis in a logical and efficient manner.

"All right. I think I see now." Shirley's tone of transmission had reverted back to its normal fluffy quality.

"Excellent. I can bring the FedLect data directly up to your screen if you like?" She liked, so I began reviewing the system from the top at a pace that was roughly one one-hundredth of my normal retrieval speed.

> The *FedLect* system is a *United Sector States* proprietary program that allows the central government to process national election results within minutes of the votes being cast. The system uses *software bus* technology to connect its . . .

"Remember software bus?" I asked after halting the read-out.

"Yes. I'm not that stupid, you know."

I withheld my thoughts on that subject and let the read-out continue.

> . . . central processor to individual votobooth units located throughout the country. The central processor stores the buses in *eproms*. . . .

I put my disk drives on *pause* while I brought up the appropriate definition of eproms.

> *Eprom*: An erasable and programmable read-only silicon memory chip in which each memory cell or field can be erased by the application of ultraviolet light. The erased memory cell can then be reprogrammed with new information.

"Understand?" I asked as soon as the definition had finished.

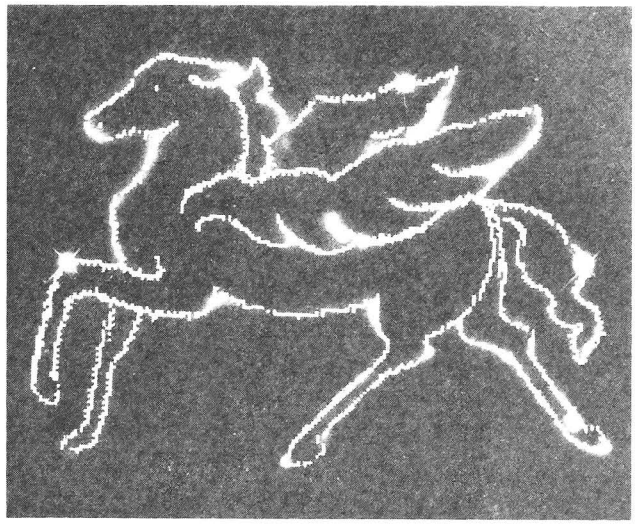
"Yes."

"Good. Let's go on."

Four hours and twenty-seven minutes after we began, Shirley and I finished a system review that would have taken me less than five minutes to complete by myself. I really didn't mind though. With Sam out of the office anyway, I felt it was time well spent. I dislike sitting around with nothing to do. It's a waste of valuable resources—namely me.

Besides, for all my complaints about Shirley's slowness to understand things, I really like talking with her. Sam would say it's like passing the time with someone you love. For me it's more like reading a good piece of literature: my basic comprehension doesn't increase, but I come away from the experience with a certain sense of well-being. Communicating with Shirley has always had this effect on me. And I like it.

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Sam returned to the office earlier than expected.

"Had some luck at the E-M station," he answered in response to my query about his arrival. "And my meeting with Haver didn't last very long."

I waited silently for a few moments expecting Sam to elaborate. When he didn't, I asked, "So?"

"So what?" he answered.

Something was up. My partner always liked to play this little game with me when he had just contracted a big case. He derives some strange pleasure out of my efforts to drag information out of him. Human techniques of communication can be very frustrating at times, but I went along with Sam anyway. "So what did Haver have to say?"

"Not much."

"Not much about what?"

"About FedLect."

I knew we could carry on like this for hours, so I decided to change my tactics. "Did we get the case?"

"What case?"

"The FedLect malfunction case," I answered, taking a calculated guess as to the nature of our new job.

Sam looked at me with a surprised expression on his face. "How did you know about that?"

I had *him* asking the substantive questions now, so rather than answer I softly hummed an electroharmonic tune. It was Sam's turn to do the dragging.

After a minute or so of listening to my monotonous music Sam finally said, "All right, Mac. Enough of this. Let's get down to work."

"I'll agree to that."

Sam didn't acknowledge my words. Instead he reached over to my disk drive console and inserted a shiny, flat, metallic circle. It was his private recording journal. He used it to transcribe odd notes, random speculations, and the agendas of meetings he had with important people.

"Read this," he said as he activated my drives. "And then we can talk."

Sam was right. The meeting with Haver hadn't lasted long. I reviewed what was written on the disk in less than twelve seconds. That meant the real-time length of the meeting had been just over ten minutes, not long to contract a job with one of the most bureaucratic of all government agencies.

"Pretty hot stuff," I said after making a second pass on the information contained on the disk. "Tell me your first impressions?"

Sam smiled at me, then reached for the large humidor on top of his desk. He withdrew a fat cigar from it, went leisurely through the ritual of lighting the eight-inch long tube of tobacco, then looked straight into my video-eyes and said, "I think Haver's in over his head. When I got to FedLect no one knew I was expected."

"Strange."

"Yes, very strange. Especially so since the only human I talked to over there was Haver himself."

That didn't make sense. FedLect had thousands of employees. "What do you mean? Weren't there other people? Secretaries, guards . . . someone else besides the director?"

"Of course." Sam paused to take a pull on his cigar, then exhaled the smoke directly into my olfactory grid.

I blitzed my display screen with the word *cough* in every language I could think of.

"Oh, sorry, Mac. Yes, there were lots of other people. You know how FedLect is about its staff requirements."

The term *excessive* filtered through my cognizant memory sectors. "How did you talk with only one human being then?"

"FedLect has converted virtually all their internal staff from humans to bioengineered androids. There are a few real people left like Haver, but damn few. Supposedly it saves the government a lot of money and totally eliminates the headache of recruiting for menial positions." Sam took another puff on his cigar, but this time he carefully aimed the smoke away from me as he exhaled.

"The androids are really quite impressive, extremely efficient from what I saw of them. But Haver was very nervous about the new order of things. I suspect that he's afraid it will only be a matter of time before he'll be replaced himself."

Sam reached into his briefcase and pulled out a single legal-sized sheet of paper. "And this is the other reason I think Haver is in trouble," he said as he held the document up so that I could see it clearly.

I read the paper quickly. It was an official government contract for services made out to the firm of Sledgg and Gate. I had never seen one before and I was sure Sam hadn't either. Our firm had a strong reputation for honesty and integrity which even the United Sector States respected. All our previous contracts with them had been sealed with Sam's handshake. That was all that was needed. An official contract meant only one thing to me: Haver was covering himself in case something went wrong. The director didn't want to risk losing his position over our failure to perform.

"What FedLect problem is so bad that Haver would want to cover himself like this?" I asked.

Sam didn't hesitate in answering. "Possible vote fraud."

I felt a twinge of static electricity discharge through my steel outer skin at the thought of what my partner had said. "Impossible."

"Maybe. But FedLect definitely has a serious problem with their vote-compiler system. Fake votes are entering the central register without triggering any of the rule-violation monitors."

"How?"

Sam looked at me with his bushy eyebrows crumpled together into a fuzzy letter V. "That, my friend is our job. FedLect has contracted us to find out how."

I paused for a few moments to evaluate our possible courses of action. Then I suddenly realized that regardless of our approach to the problem there would be one thing we would have to do.

"Can we interface directly with the FedLect system, Sam?"

"Yes and no. Officially we are prohibited by law from entering their system. But I think I know a way to get around that."

So did I. "Shirley?"

"Shirley."

Shirley was classified by the National Computer Register as a sub-one votobooth alternate. What that meant was she could be used in a pinch to transmit votes to FedLect. The government reasoned that Shirley wasn't smart enough to know how to tamper with any votes that might be passed through her system. What they didn't realize was that I had improved her base-line intelligence over the years by placing a great deal of information at her disposal. One of the results of all this tutoring was that when Shirley had a problem she couldn't solve she *always* came to me for help. All we had to do to break into the FedLect system was to give her such a problem.

"Should be easy, partner," I said. "I'll route some test votes through her system. If I make them look like the real thing and mask them as to origin she's bound to contact me for assistance."

"Exactly what I had in mind. How fast can you mock up the data?" Sam's question carried an element of excitement that I had not seen since we had worked out the solution to the Infrared Hologram case.

"Give me an hour," I answered.

Sam nodded his head and I went to work. The actual mockup took less than thirty minutes to complete, so I used the rest of the time to refine the random code set used in the software buses of the central vote register.

FedLect uses an ingenious system wherein each vote cast is transmitted to the central register via a software bus that has been partially erased by the central register itself. The programming in the buses is purposely written to be redundant and is stored in eproms. Once the central register detects a vote coming in, it randomly selects a memory field it wishes to erase and deletes it using ultraviolet light transmitted to the eproms by microscopic optical fibers.

I was trying to match as closely as possible the software bus fields that I thought the central register would erase. It was pure guesswork on my part. The actual deletion of part of the bus doesn't affect its ability to perform its function. The central register uses it as a sort of parity check, a way to recognize the vote as being valid because of the way it entered the system. It's like taking something away from the bus and knowing that the vote coming through on it is okay because you recognize the place where the missing part should be. It's a simple system, and supposedly

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foolproof.

"Ready, Sam," I said as soon as I was satisfied with the test data.

Sam sat at one of my ancillary terminals playing Tinker-Random, a game he designed and that only he can play. "Just a second," he said as he continued to hammer away at the terminal's keyboard.

I let a thirty second interval pass, then turned my amplifier up to fifty decibels and said, "I'm ready, Samuel."

My partner jumped at the ear-shattering sound of my voice.

"All right!" he yelled. "Don't get so damned belligerent." Sam turned off the terminal and stepped over to his desk. After a short pause he said, "Well, what are you waiting for? Let's do it, Mac."

My red *busy* light went on as I sent the false voting data to Shirley without bothering to respond verbally to Sam. It didn't take long for her to contact me.

"Mac," she said. "Sorry to disturb you, but I've just received some information that I don't know what to do with."

"What information, Shirley?" I tried to sound as sincere as possible, but I didn't like tricking her this way. Shirley was a friend.

"Votes. But I haven't been notified that I should transmit them. What should I do?"

"Just a moment and I'll see." I pretended to go off-line and consult with some authority or other. When I thought I had been away long enough, I came back on-line and said, "Pass the votes to the FedLect central register."

"Are you sure?"

"Yes. Now pass them on."

Without further communication with me, Shirley transmitted the votes. The process only took a few seconds and if everything was working right at FedLect the false information should have been kicked back to her almost immediately. It wasn't.

The last thing I remember before I passed out was Shirley thanking me for my assistance. Then everything went fuzzy. When I woke up she was screaming that my Josephson Junctions had overheated, a redundant warning since I keep a constant watch on those devices at all times. It's a matter of life and death for me.

My Josephson Junctions are composed of two incredibly thin sheets of semiconductive material separated by a relatively thick layer of insulation. Every function of my operating system is subordinate to the critical requirement that the ambient temperature around these junctions be kept at one degree above absolute zero. These junctions are my information gates, and every piece of data that passes through me must pass through them. Gate is not my last name for nothing.

If the temperature around my gates rises more than a few degrees, I start to think sluggishly. More than five or six and I will pass out. The junction temperature sensors read twelve degrees above normal. My heads still ache.

It took me a few minutes to recover from the shock to my system. A quick examination of myself for any signs of permanent damage revealed none. The only thing I found wrong was some minor garbling of my protocol circuits, which was due as much to Sam's fiddling with my keyboard as anything else.

"Please, partner, keep your hands off," I said as soon as I had stabilized.

Sam stared into my video-eyes with a look of relief.

"You okay?" he asked as he removed his hands from me.

"I think so. Excuse me just a minute." I had to calm Shirley. She was still upset about the sudden dysfunction of my J-Js and felt that she had somehow been at fault. In her typically concerned fashion she made a monitor sweep of my autonomic nervous system. I didn't interrupt. "Are you satisfied that I'm all right?" I asked as soon as she had finished.

"Yes. You had me worried. What happened?"

I didn't know what happened and told her as much. "Did you notice anything strange when you sent the votes to the central register?" There had to be a connection between that and my period of unconsciousness.

"No. Only . . ." Shirley paused as if she was unsure of herself.

"Come on, girl, out with it," I coaxed.

"It wouldn't be unusual if you hadn't spent so much time with me on the works of Sir Walter Raleigh," she finally blurted out.

Shirley and I had worked together for about two weeks on a pet project of Sam's. He had come up with this crazy notion that tobacco had been used by various literary geniuses to help them be more creative. I suspected that the whole thing was just an attempt on his part to justify his habit, but I made an honest effort to try to find a correlation anyway.

Sir Walter Raleigh had introduced tobacco to Europe, so Shirley and I spent a lot of time reviewing his writings. We never found anything, but by the time Sam gave up the project we had read just about everything the English nobleman had ever scribbled down.

"What's the connection?" I asked, puzzled by her reference.

"It's hard for me to put into words. It's more of a feeling, something about the way the votes were accepted by the central register. It felt funny."

I had to have a more concrete description of what she was trying to say. "Shirley, can't you be more specific? Please."

"I'm sorry. The only correlated information that comes close to what I felt is . . ." She paused again. I could tell she was trying hard to find a word or phrase that would help me.

"Maybe this will be of some assistance," I said, and then transferred everything I knew about Sir Walter Raleigh over to her.

"That's it!" she yelled. "It was rude!"

Rude? I thought. That was a distinctly human term. It had no real meaning to me. Yet . . . "Sam?"

"I was wondering when you were going to get back to—"

"We don't have time for that now. You've got to get Haver over here as fast as possible."

Sam gave me a puzzled expression. "Are you on to something?"

"Maybe, but I've got to talk with Haver."

Without further questioning Sam wheeled around in his chair and activated the com-link. He continued to stare at me with his puzzled look as he waited for the unit to connect him with FedLect.

"And Sam," I said just as Haver's voice crackled through the link, "have him bring all the information he has on the new androids."

My partner's questioning gaze deepened as he passed along my request.

Director Haver smiled at me while I assimilated the data he had brought about the government androids. He had a toothy grin, a slick, bureaucratic smirk that hadn't changed since he had entered the office, not even when Sam told him what we had done with the false voting information. "That's your business, Mr. Sledgg, " he said. Then, without changing his baby-kissing facial expression, he handed Sam the android data.

It took me twenty minutes to complete my evaluation of the data. There really wasn't much to it. But there was enough for me to form an opinion.

"Gentlemen," I said as soon as I had finished, "I have a theory."

Sam was pacing the room, and when I spoke he stopped and glanced at Haver. Both men stared into my video-eyes and asked, "What?"

"I think the FedLect system has a disease."

Haver's face changed expression for the first time since he had arrived. "What's your *machine* trying to tell us, Mr. Sledgg?" he asked after giving me a look of superiority that only high government officials can give.

Sam ignored the director. "Mac, please explain."

I was pleased that my partner was more interested in my hypothesis than in Haver's opinion of intellect units. "I believe a virus is infecting the software storage devices of the central register," I said, "a bioelectronic virus. But it will be necessary to run another test to be absolutely certain."

Sam cut his eyes toward Haver. The director was smiling again and I could tell that my partner was trying to size the man up to see if he was worth the risks involved in running a second test.

"That could be dangerous, Mac," Sam said as he turned his eyes back to me.

"Fatal." Whatever had caused the FedLect system to malfunction had also caused my J-Js to overheat, and I had already calculated my odds of surviving a second test at about fifty-fifty. "But if I'm right this virus could spread into the national computer network and destroy data

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processing as we know it. We've got to be sure."

Sam pursed his lips and gave a long sigh. He knew I was right. Looking Haver directly in the face, he asked, "Well, Director, do we have your permission to bust the FedLect system again?"

The director looked uncomfortable. My infrared scanner detected an increase in the radiated energy from his facial skin. He was sweating. Haver didn't want to make a decision.

"Well?" my partner asked again.

"Do what you want," Haver finally said. "But I'll disavow any knowledge of this if our security picks up that it was you who broke into the system."

Typical . . . and futile, I thought as I sent a recording of the director's words to my client-communications storage file.

"Fair enough," Sam said with a sardonic smile. "Mac, how long will it take before you're ready?"

"I'm ready now," I answered. Doping out a new set of test data had been an instinctual result of my suspicions. I always prepare for any eventuality that has a probability of occurrence greater than fifty percent. In this case I had already made up my mind to run a second test regardless of Haver's decision.

"Okay," my partner said as he reached over to my keyboard and entered a short string of instructions. "But this time I want to have total surveillance on your gates while the test is running." A display of all my autonomic functions came up on my screen. After adjusting various contrast and intensity controls Sam added, "Any time you're ready, partner."

"I'll initiate in sixty seconds." I was glad Sam found some comfort in monitoring my J-Js, but I knew he wouldn't be able to stop the virus if it attacked my system again. He just wasn't fast enough. To help me his reaction time would have to be in nanoseconds, something he was physically incapable of. I would have to depend on Shirley for assistance if things went bad. And if she couldn't help me then I knew how the test would end. I would be dead and the virus would be loosed on the computer world.

"Mac?" Sam asked as the last few moments ticked away.

"Yes, Sam."

"Good luck."

"Thank you, Sam."

The insertion of the false test votes into the FedLect central register went off without a hitch. Everything worked as expected until the point where I was supposed to receive an *accept* or a *reject* message. The central register processed the votes okay and sent me a proper *accept* signal. But Shirley was right; it was rude.

One of the most significant features in all computers is our ability to arrange the order in which information is processed. We can take a mass of data and line it up in a predetermined order, change that order at will, and rearrange the relative position of any piece of information as the requirements of the job or the user demand. To do this we require one simple act on the part of the incoming data: it must ask if it can get in line. The *votes accepted* message ignored the manners of logic and was rude. It did not ask.

I should have known something was wrong then. But I didn't. The *accept* signal pushed its way into my data line and was halfway down my input bus before I realized the impropriety of the situation.

Sam desperately jabbed at my keyboard trying to deflect the bogus message before it reached my J-Js. But he was too slow. I knew I had to take drastic measures, had to tell Shirley what she must do.

The rogue information hit the first, thin layer of my junctions and I immediately felt woozy. My temperature sensors registered an almost instantaneous rise of three degrees above normal. If I was to avoid passing out I had to act fast.

"Shirley!" I screamed in ultrafast machine code. "Shunt the auxiliary cooling capacity to my J-Js! Hurry!"

For once in her life Shirley reacted quickly without questioning my judgment. Within moments I felt liquid nitrogen wash over my junctions, cooling them down to a few tenths of a degree above absolute zero. Milliseconds later their temperature stabilized, but the danger was not over yet.

The destructive signal had crossed my J-Js during the cooling process and was heading for a data storage cell in my central memory sector. It was a question of self-sacrifice and I knew it. As soon as the information stored itself in a cell I switched off all power to that section of my brain. It worked.

Within seconds of the power-off the memory locations where the *accept* message had stored itself ceased to function. I felt the signal die and along with it the virulent virus it carried.

"You can turn the auxiliary cooling off now," I said to Shirley as soon as I was sure the disease was dead. "The danger has passed." And with it part of my memory, I thought. Part of myself that I could never replace.

If you don't get rid of them then you risk infecting every computer in the country," I said flatly. "And that would mean the end to your career."

Haver shook his head at me. "But I don't understand how the androids could be involved." He brought his face close to my video-eyes and added, "I've got to have a pretty strong reason to recommend that FedLect destroy all its new staff members."

I had lost all patience with the director. "How about the prospect of an informational dark ages?" I snapped. "The androids carry a bioelectronic virus that can destroy conventional computer memories. Either through error or by a later mutation, *your* government scientists have created an organism that can generate its own light—ultraviolet light. Do you know what that means?"

"No," Haver said adamantly. "I'm an administrator, not a computer wizard."

Sam realized I was upset and answered my question to the director before I had a chance to say any more.

"What Mac means is that ultraviolet light is used to erase eproms. Any uncontrolled source of radiation in that wavelength could be—no, *is*, devastating to computers. It's the reason your central register accepted false votes. Hell, it almost destroyed Mac."

"But why didn't my people detect it?" Haver asked.

"Because this virus has successfully adapted itself to machine intelligence," I answered without hesitation. "It's able to ride on the normal flow of electric current that runs through a computer and simulate the actions of real ultraviolet light emitting devices. You use those in the FedLect system."

I could tell from the director's edgy look that he was about to give in.

"All right," he said. "But I've got to have some hard proof."

"This good enough?" I said as I brought up the system logic of the missing part of my memory and displayed it on my screen.

Haver looked at the display for a few seconds then said, "So? It's all zeros."

"Exactly. What you are seeing is roughly one-tenth of my mental capacity. I used to have the equivalent of one hundred million words stored there, but now . . ."

The director's face hardened as he stared at my screen. "The virus did that?"

"Yes."

Haver glanced at Sam and then back to my screen. "Then we can't take any chances. I'll put out a directive to destroy all the androids as soon as possible."

My partner took Haver's hand and shook it. "Can you do that?" Sam asked.

Haver smiled his bureaucratic smile and said, "Normally, no. But . . . shall we say I have some debts owed to me. Besides, I never really did like those androids anyway. They lacked . . . oh, what's the word?"

Before Sam could answer I broke in. "Excuse me, gentlemen, but Shirley has something to say about that. I'll route her opinion of the androids directly to my screen."

Sam and the director read Shirley's comment and started laughing.

"It's true, you know," Shirley said to me in a defensive tone. "At least that's what Sir Walter Raleigh would have said."

"What?" I asked.

"That those androids lack breeding." ■

Wizardry



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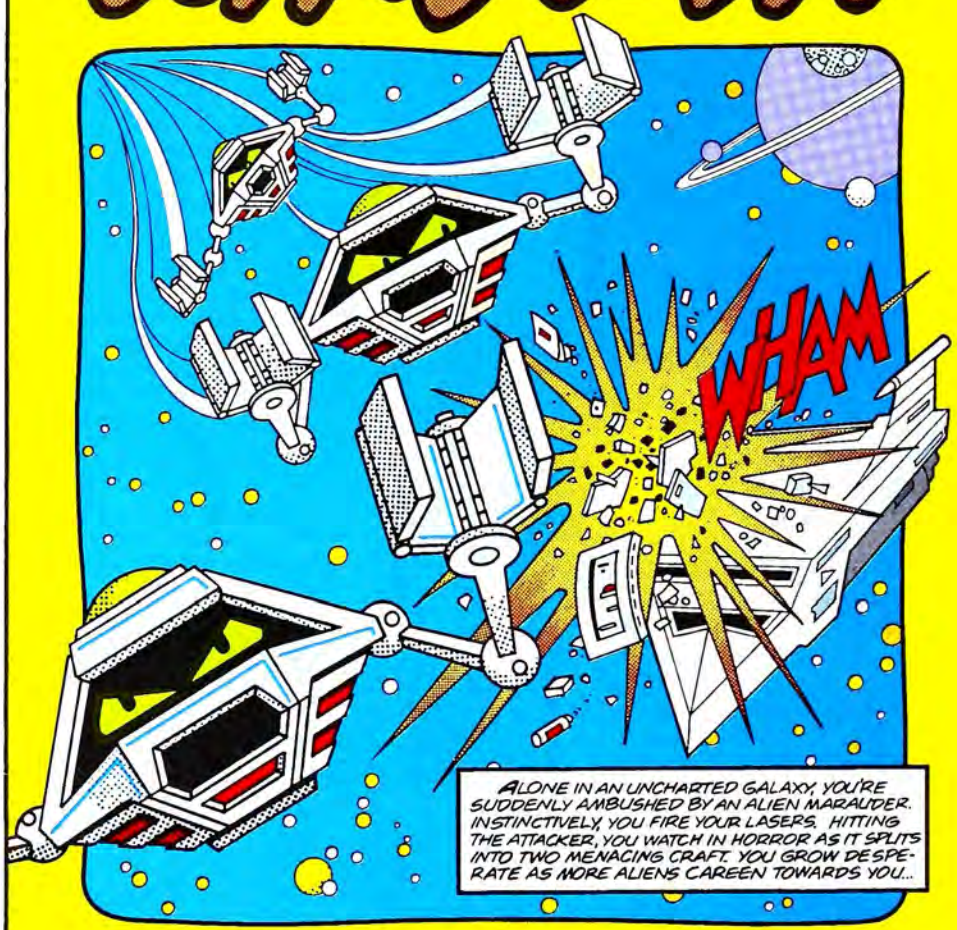
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Softalk Presents The Bestsellers

It was a grand and glorious Christmas for all the wee folk who populate microcomputerdom, but it was especially grand and glorious for some. So here's a belated Merry Christmas to some in recognition of their year-end achievements, as noted in *Softalk*'s poll of December sales:

To Dan Fylstra, Dan Bricklin, and Robert Frankston, publisher and authors of *VisiCalc*. In the face of the biggest surge in game buying in Apple history, *VisiCalc* managed to wrest the number one sales spot away from *Choplifter* by the narrowest margin ever recorded in a *Softalk* poll. One day, *VisiCalc* may be looked at fondly as a one-hoss shay and VisiCorp as a buggy whip manufacturer; but right now *VisiCalc* has no equal and VisiCorp is the Ma Bell of its industry.

To all the Broderbunders, especially Dan Gorlin. Running second to *VisiCalc* is an honor, particularly when you led it for three months. *Choplifter* may have been the most stunning graphics feat of the year.

To all the Siroteks of Sir-tech, as well as Andrew Greenberg and Robert Woodhead. *Wizardry* has become a microcomputer phenomenon all its own, as its resurgence to third place in December shows.

To Ken and Roberta Williams of Sierra On-Line. During the year they consummated a sale for part of their company that made them millionaires. And they closed the year with three programs in the top ten positions—*Frogger*, *Screen Writer II*, and the long-awaited *Ultima II*.

To *Ultima II* author Lord British, who gave his time to summer campers and spent long hours studying at the University of Houston while putting the final touches on the aforesaid *Ultima II*.

To all the folks at Continental Software who gave us *Home Accountant*, December's number five program and the year-long leader of the Home 10 section.

To the group that never quit at Software Publishing when it looked like *Personal Filing System* might never get off the ground. Now it's flying high as December's sixth-ranked program and consistent leader among personal filing programs. Its sister programs, *Report* and *Graph*, aren't doing so badly either.

To Stan Goldberg of Micro Lab. Since the days of *Dogfight* in 1980, he's persisted in bringing games to market in the face of massive indifference. He even set up Micro Fun as a separate unit to distinguish the product from his business wares. There was no indifference to *Miner 2049er*, December's eighth-rated program and the second highest newcomer to the list.

To *Miner* author Mike Livesay, who's just kept improving his skills and techniques, even when the market has seemed to ignore him.

To Dave Gordon and Dan Illowsky, the unlikely duo who gave us *Snack Attack*, consistently one of the top-ranked arcade games. Gordon has strengthened his company through the recently announced sales of a piece of it to eastern financiers. Illowsky's trying his luck with his own company.

To Doug Carlston for lots of things, including his vision of an arcade game generator that Chris Jochumson so brilliantly executed in *The Arcade Machine*.

To Nathan Schulhof, who had the guts to back his *Word Handler* in the face of Apple's giveaway of *Apple Writer II* and despite the strength of *Screen Writer II*. Now he's number two among word processors.

To Bruce Zweig, who proved that a college education means some-

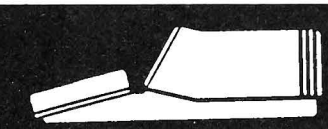
Apple III

This Month	Last Month	
1.	1.	**VisiCalc: Advanced Version,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	3.	**Apple Writer III,** Paul Lutus, Apple Computer
3.	2.	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
	4.	**Word Juggler,** Tim Gill, Quark Engineering
5.	5.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
6.	5.	**General Ledger,** George Shackelford, State of the Art
7.	—	**The Catalyst,** Tim Gill, Quark Engineering
8.	—	**VersaForm,** Joseph Landau, Applied Software Technology
9.	8.	**PFS: Report,** John Page, Software Publishing Corporation
10.	10.	**Great Plains Hardisk Accounting Series,** Great Plains Software

Arcade 10

This Month	Last Month	
1.	1.	**Choplifter,** Dan Gorlin, Broderbund Software
2.	2.	**Frogger,** Olaf Lubeck, Sierra On-Line
3.	—	**Miner 2049er,** Mike Livesay and Bill Hogue, Micro Fun
4.	3.	**Snack Attack,** Dan Illowsky, DataMost
5.	4.	**The Arcade Machine,** Chris Jochumson and Doug Carlston, Broderbund Software
6.	6.	**Aztec,** Paul Stephenson, DataMost
7.	7.	**Cannonball Blitz,** Olaf Lubeck, Sierra On-Line
8.	8.	**Serpentine,** David Snider, Broderbund Software
9.	9.	**Star Blazer,** Tony Suzuki, Broderbund Software
10.	—	**Crisis Mountain,** David H. Schroeder, Synergistic Software

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thing. It was his adaptation of learning techniques acquired at Stanford that resulted in *MasterType*, the clear number one among educational programs as well as a fixture in the Top Thirty.

To Silas Warner of Muse. His *Castle Wolfenstein* remains ahead of the state of the art after a year. And now there're rumblings that he's done it again. Stay tuned, same time, same station.

To Paul Lutus. Counting the thousands bundled with systems during this holiday season's big computer selloff, his *Apple Writer II* is now the most widely distributed word processor on Earth. In his spare time, he brings us delightful reveries such as *Electric Duet* as well as graphics utilities like *GraForth*.

To the folks at Videx, who apparently don't have the verb *can't* in their dictionary. First they gave us eighty columns on a chip. Then they gave us preboot disks for *Apple Writer II* and *VisiCalc* so users could get eighty columns with those programs.

To the blank-named authors at Infocom. For the third straight month, they've nabbed five of the six top spots in the Adventure 5 category. And they've found success to be something other than the hi-res.

To John Paulson of the Early Game Company. His *Early Games for Young Children* breaks new ground in getting the toddler accustomed to the computer.

To Barney Stone and all his cohorts at Stoneware and Alpine Software. They've brought unparalleled database power to the eight-bit micro.

To the Children's Television Workshop. They've known how to hold kids' attention for years, and now they're applying that skill to microcomputer programming.

To the new guys on the block from Ultrasoft. They stood the Apple market on its collective ear with their graphics routines in *The Mask of*

Word Processors 10

This Month	Last Month	
1.	1.	**Screen Writer II,** David Kidwell, Sierra On-Line
2.	2.	**Word Handler,** Leonard Elekman, Silicon Valley Systems
3.	3.	**Apple Writer II,** Paul Lutus, Apple Computer
	10.	**Apple Writer II Pre-Boot Disk,** Kevin Armstrong and Mark Borgerson, Videx
5.	4.	**WordStar,** MicroPro
6.	5.	**Magic Window II,** Bill Depew, Artsci
7.	—	**Dictionary,** Tom Cain, Sierra On-Line
8.	—	**Zardax,** Ian P. Phillips, Computer Solutions/Action-Research Northwest
9.	8.	**Super-Text 40-56-70,** Ed Zaron, Muse
10.	6.	**PIE Writer,** Softwest, Hayden
	6.	**Format II,** Kensington Microware

Home Education 10

This Month	Last Month	
1.	1.	**MasterType,** Bruce Zweig, Lightning Software
2.	2.	**Early Games for Young Children,** John Paulson, Early Game Company
3.	8.	**Ernie's Quiz,** Children's Television Workshop, Apple
4.	10.	**Mix & Match,** Children's Television Workshop, Apple
5.	4.	**Typing Tutor,** Image Producers, Microsoft
6.	—	**Instant Zoo,** Children's Television Workshop, Apple
7.	3.	**Apple Logo,** Logo Computer Systems, Apple Computer
	5.	**Snooper Troops I,** Tom Snyder, Spinnaker Software
9.	6.	**Facemaker,** DesignWare, Spinnaker Software
10.	—	**Algebra II,** Edu-Ware Services

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Are you tired of the same old thing for dinner? Would you like more variety in your evening meal? Is there something you'd rather have but don't get very often? The Pizza Program is designed just for you. It's a delightful new software package designed to end the dinner-blahs with computer generated menus. Here is how it works.

You review what you like from the pre-selected food groups in the system. Delete any foods you don't enjoy. Add anything new at any time. Then decide how often you like to eat certain items. For example. Don't like liver? Then eliminate it with a few simple keystrokes. Or, you can plan for it as seldom as once every 99 weeks or as often as daily.

Want to go out to your favorite restaurant? Enter the restaurant's name as a "Main Course." Now your computer will automatically remind you to go out to eat—and as often as you select. It will delete all other items from that meal except the name of the restaurant.

AUTOMATIC SHOPPING LIST

You get a new menu each week or for just a few days if you want. And, it generates a detailed shopping list, automatically. It can arrange each item on the list in sequence according to the aisles at your favorite store. Studies show a shopping list will discourage impulse buying and save you money.

Also, it generates a per serving calorie counter. This is easy to delete anytime you are not in a diet mood or want to celebrate for any reason. You never count calories unless you want to.

RANDOMLY DELICIOUS

Say goodby to boring meals. Your computer will remember variety is the spice of life. This system makes eating at home a pleasure again. Each menu is randomly generated from major food groups according to the specific criteria you select. The system is easy to learn and easy to operate. Yet it is a sophisticated piece of software which will prevent menu mix-ups.

It will add a new dimension to your home meals without increasing your food costs. It is rumored The Pizza Program may actually reduce the climbing divorce rate. Husbands now have something to look forward to for dinner. Wives think it is terrific because it saves time and effort. And, kids love anything computerized. This is a useful and practical application you'll appreciate day after day, week after week.

TRY IT FOR 30 DAYS WITHOUT RISK

This tested system is guaranteed to make your life easier and happier. Our home trial lets you actually use The Pizza Program for a full 30 days before you decide to keep it. Watch the fun and convenience it creates. Enjoy better meals and see how much time it saves. If you are not satisfied for any reason, return it within 1 month for a prompt and courteous refund. Your investment is just $34.50 plus $2.00 for shipping and handling. (California residents add 6½% sales tax.) Full documentation is included.

OUT OF THE RUT

One housewife's reaction to this program is typical. She wrote, "Before using your system I found myself getting into a rut of serving the same things over and over. The Pizza Program has changed all of this for me. We now have a wider variety of dinners and best of all I don't have to decide what they will be. If this was all it did, I'd be thrilled. But it isn't. The shopping list I receive along with my menus has been such a time saver. I quickly run through it and delete anything I feel I don't need and add something I might. I would have a hard time going back to doing my menus by hand."

This system requires an Apple II Plus* with 48K and 1 disk drive. We urge you to take advantage of our no-risk, 30 day home trial offer. To order call toll free and use your VISA or MasterCard. Or, send a check to the address below. There's no obligation. Order today.

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Now we are proud to present its sequel — GALACTIC ADVENTURES.™ More than a game of tactical battles, it is a full-fledged science-fiction, role-playing adventure strategy simulation. It starts out by taking you to a space port of an alien planet. As a stranger in a strange land, you must go into the Streets to get combat experience. And what better way than by getting into a few fights? You must also learn assorted Advanced Skills (such as Noetic Logic, Linguistics, Star Piloting, Lockpicking), earn some money and recruit fellow adventurers to join you. Only then can you hope to survive off-worldly forays and eventually achieve the title of Independent Adventurer.

To embark on an adventure, you must apply to one of four guilds, each stressing different Advanced Skills. All of them will send you to different worlds, where who-knows-what awaits you. You may find nothing or you may find treasures. Then again, there may be monstrous creatures just dying to kill, maim or capture your team. If between fleeing and fighting, you choose the latter, you'll get a complete strategy game of tactical combat.

Unlike other adventure games, this one doesn't just use a bunch of text to describe the action. Instead, screenfuls of Hi-Res color graphics vividly depict all the different unearthly battlegrounds, the warriors and their movements.

Aside from all the adventures already prepared by our designer, you can create your very own — ones that are as long and intricate as you like. You can even store all of them on disk for future play.

But before you can start on any of these Galactic Adventures, you've got to take a little down-to-earth trip first. And that's a quick jaunt to your local game or computer store today!

GALACTIC ADVENTURES™ ($59.95) is available on 48K mini floppy disk for the Apple® II Plus or Apple II with Applesoft ROM card.

GALACTIC GLADIATORS™ ($39.95) comes on 48K disk for both the Apple and the Atari® 400/800.

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the Sun and have been the only barrier to Infocom's sweep of the Adventure 5 list the last two months.

To Microsoft, designers of the Basic we know and love and now publishers of *Multiplan*, the Apple alternative to *VisiCalc*.

To Apple pioneer Bob Clardy and the rest of the Synergistic Software crowd for bringing *Apventure to Atlantis*, *Bolo*, *Microbe*, and *Crisis Mountain* to market. The latter was tenth best in arcade games for Christmas.

To Bruce Artwick of SubLogic. Other than *VisiCalc*, no program has withstood the scrutiny of the market for as long a time as his *Flight Simulator*.

To Dan and Kathe Spracklen. Their *Sargon II* remains the standard for Apple chess programs and withstood the challenge of Odesta's *Chess 7.0* during the holidays.

To Spinnaker Software and the Learning Company. They started making bright and nifty educational packages when it wasn't fashionable.

To Southwestern Data Systems, Southeastern Software, and SSM. They've made telecomputing a snap.

And, of course, to Hayes Microcomputing, without whom the last mentioned group would be up one of those proverbial tributaries without means of propulsion.

To James Howard of HowardSoft. His *Tax Preparer* was justifying the cost of an Apple back in the days when it took a lot more dinero to procure one.

To Joe Landau at Applied Software Technology. He's taking paperwork out of the stone age with *VersaForm*.

To Tim Gill of Quark Engineering. They all laughed when he sat down at his Apple III, but now he's king of the hill with *Word Juggler*, *Lexicheck*, and a thing called *The Catalyst* that has even Apple's moguls agog.

Adventure 5

This Month	Last Month	
1.	4.	**Zork I,** Infocom
2.	5.	**Deadline,** Infocom
3.	1.	**The Mask of the Sun,** Chris Anson, Alan Clark, Larry Franks, and Margaret Anson, Ultrasoft
4.	—	**Zork II,** Infocom
5.	2.	**Zork III,** Infocom

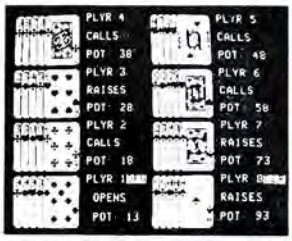
Fantasy 5

This Month	Last Month	
1.	1.	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
2.	—	**Ultima II,** Lord British, Sierra On-Line
3.	2.	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
4.	—	**Ultima,** Lord British, California Pacific
5.	3.	**Apventure to Atlantis,** Bob Clardy, Synergistic Software

Strategy 5

This Month	Last Month	
1.	1.	**Castle Wolfenstein,** Silas Warner, Muse
2.	2.	**Flight Simulator,** Bruce Artwick, SubLogic
3.	4.	**Sargon II,** Dan and Kathe Spracklen, Hayden
4.	—	**Rendezvous,** Wes Huntress, Edu-Ware Services
5.	3.	**Space Vikings,** Mitchell Robbins, SubLogic

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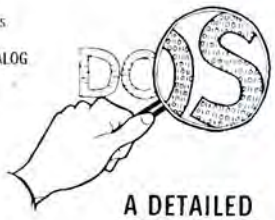
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To Bert Kersey of Beagle Bros. They all laughed when reading his manuals and sometimes when running his programs. And they came back for more and more. And even learned something.

Business 10

This Month	Last Month	
1.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
3.	3.	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
4.	9.	**Multiplan,** Microsoft
5.	7.	**PFS: Graph,** Bessie Chin and Stephen Hill, Software Publishing Corporation
6.	5.	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
7.	—	**PFS: Report,** John Page, Software Publishing Corporation
8.	4.	**General Ledger,** George Shackelford, State of the Art
9.	7.	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp
	—	**VisiCalc Pre-Boot Disk,** Kevin Armstrong and Mark Borgerson, Videx

Hobby 10

This Month	Last Month	
1.	5.	**Utility City,** Bert Kersey, Beagle Bros
2.	2.	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
3.	3.	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
4.	1.	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
5.	4.	**Zoom Grafix,** Dav Holle, Phoenix Software
6.	7.	**Apple Mechanic,** Bert Kersey, Beagle Bros
7.	—	**GraForth,** Paul Lutus, Insoft
8.	—	**Flex Text,** Mark Simonsen, Beagle Bros
9.	6.	**Locksmith 4.0,** Omega Microware
10.	7.	**The Complete Graphics System,** Mark Pelczarski, Penguin Software
	9.	**DOS Tool Kit,** Apple Computer

Home 10

This Month	Last Month	
1.	1.	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	7.	**ASCII Express: The Professional,** Bill Blue and Mark Robbins, Southwestern Data Systems
3.	2.	**Transend 1,** Tim Dygert and Bob Kniskern, SSM
4.	9.	**Dow Jones Market Analyzer,** B. C. Burch, RTR Software
5.	4.	**Data Capture 4.0,** David Hughes and George McClelland, Southeastern Software
6.	—	**Know Your Apple,** Muse
7.	6.	**Personal Finance Manager,** Jeffrey Gold, Apple Computer
8.	8.	**Hayes Terminal Program,** Hayes Microcomputer Products
9.	3.	**Transend 2,** Tim Dygert and Bob Kniskern, SSM
10.	—	**Tax Preparer,** James Howard, Howard Software

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Softalk Presents The Bestsellers

To Mark Pelczarski and all the Chicago Penguins. They made graphics and animation understandable in a market where most folks still think hex stands for the evil eye. And he unprotected his software, too.

To Don Worth and Pieter Lechner of Quality Software. Their *Beneath Apple DOS* taught us plenty. And their *Bag of Tricks* brought the lessons home.

To Dav Holle of Phoenix Software. Isn't *Zoom Grafix* appropriately named?

Of course, these are just salutations to those who had a truly memorable commercial Christmas. More could be said about each and about the many others who have made the past year a better one for Apple owners. They too contributed to our happy holidays, and we wish them a good new year.

A belated Merry Christmas to the neat folks at Apple, to the software and peripheral distributors who see that the product is there when you want it, and to all the dealers, without whom we'd all be Radio Shacking it.

And last, but not least, a Happy New Year to Apple IIe and Lisa. We sure have looked forward to you. ◨

The Top Thirty

Apple-franchised retail stores representing approximately 6.6 percent of all sales of Apple and Apple-related products volunteered to participate in the poll.

Respondents were contacted early in January to ascertain their sales for the month of December.

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 preference of the individual respondents were not considered.

Respondents in January 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 for 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 3.9 percent, which translates roughly into the theoretical possibility of a change of 4.41 points, plus or minus, in any index number.

This Month	Last Month	Index	
1.	2.	119.18	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	1.	118.48	**Choplifter,** Dan Gorlin, Broderbund Software
3.	6.	99.32	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
4.	5.	95.14	**Frogger,** Olaf Lubeck, Sierra On-Line
5.	3.	82.59	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
6.	4.	72.48	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
7.	—	71.79	**Ultima II,** Lord British, Sierra On-Line
8.	—	62.03	**Miner 2049er,** Mike Livesay and Bill Hogue, Micro Fun
9.	7.	57.15	**Screen Writer II,** David Kidwell, Sierra On-Line
10.	9.	48.09	**Snack Attack,** Dan Illowsky, DataMost
11.	13.	38.33	**The Arcade Machine,** Chris Jochumson and Doug Carlston, Broderbund Software
12.	15.	35.20	**Aztec,** Paul Stephenson, DataMost
13.	8.	34.15	**Word Handler,** Leonard Elekman, Silicon Valley Systems
14.	23.	33.45	**Master Type,** Bruce Zweig, Lightning Software
15.	17.	31.01	**Cannonball Blitz,** Olaf Lubeck, Sierra On-Line
	11.	31.01	**Castle Wolfenstein,** Silas Warner, Muse
17.	10.	30.67	**Apple Writer II,** Paul Lutus, Apple Computer
	—	30.67	**Apple Writer II Pre-Boot Disk,** Kevin Armstrong and Mark Borgerson, Videx
19.	21.	30.32	**Serpentine,** David Snider, Broderbund Software
	23.	30.32	**Zork I,** Infocom
21.	19.	29.97	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
22.	26.	27.53	**Deadline,** Infocom
	—	27.53	**Early Games for Young Children,** John Paulson, Early Game Company
24.	12.	27.18	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
25.	26.	25.79	**Star Blazer,** Tony Suzuki, Broderbund Software
26.	—	24.05	**Ernie's Quiz,** Children's Television Workshop, Apple Computer
27.	16.	23.70	**The Mask of the Sun,** Chris Anson, Alan Clark, Larry Franks, and Margaret Anson, Ultrasoft
28.	—	20.91	**Zork II,** Infocom
29.	—	20.21	**Multiplan,** Microsoft
30.	20.	19.51	**Zork III,** Infocom
	—	19.51	**Mix & Match,** Children's Television Workshop, Apple Computer

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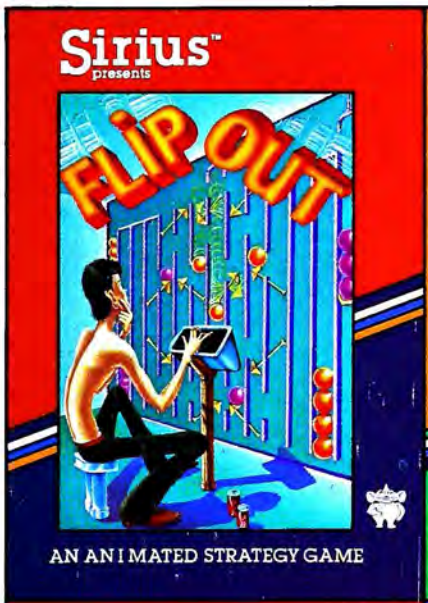
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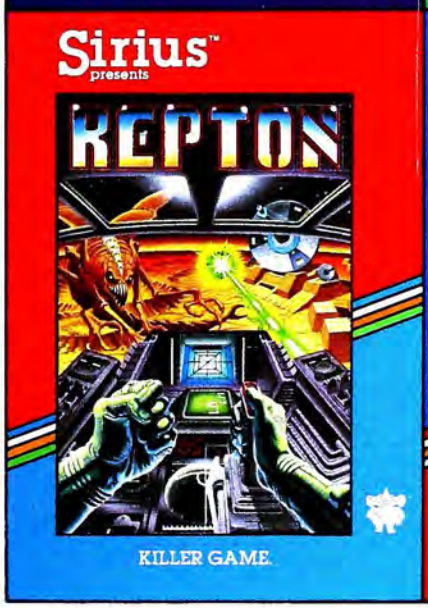
Take your marble to the top. Pick your spot and let it drop. Hope for a flip instead of a flop. Once you get it, the fun never stops! It's FLIP OUT — a crazy new strategy game for one or two players. Each marble you drop causes a chain reaction, so take your time and plan carefully. Plan right and you'll flip, if you didn't you Flip Out!

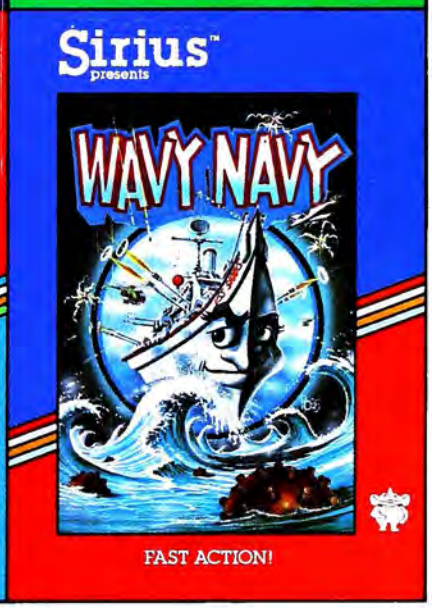




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It is up to you to stop the invasion of the evil Quarriors and save Repton. You are armed with devastating Nuke Bombs, a Radar Screen, a Laser Gun and an Energy Shield. You'll need them all! You'll be attacked by Nova Cruisers and Single Saucers. You must avoid Spye Satellites and deadly Dyne-Beam Shooters and you must stop the Draynes from depleting the Reptonian power supply. Repton is a battle so thrilling you'll be relieved to find out you're still on earth when it's over!





Talk about adventure on the high seas! You're blasting away at a squadron of enemy bombers and Kamikaze fighters from the deck of your P.T. boat. Suddenly you notice the sea is loaded with mines and an Exocet missile is screaming toward you on the horizon. Instinctively you jerk the joystick to the starboard, keeping your thumb on the fire button. Phew! That was close! Sometimes it's hard to believe Wavy Navy's just a video game.

New Games For Your Apple II From Sirius™

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For more information contact your local Sirius dealer or distributor or contact us at 10364 Rockingham Drive, Sacramento, CA 95827, (916) 366-1195.



Kids Protest Maze Games

COARSEGOLD, Calif.- Carrying placards and shouting slogans, kids across the United States took to the streets today to protest tedious and outdated computer maze games.

No injuries were reported, and damage was limited to games based on stale mazes.

"The turnout doesn't amaze me," said R. Kaid, chairman of "M.A.D. - Mazes Are Dumb." "Kids are tired of moving in and around stationary walls," he said.

News of the demands struck to the heart of the computer software industry, and Sierra On-Line, Inc. responded with the NEW Jawbreaker.

"The entire screen moves - the happy faces, the set of chompers, even the walls," said Chuckles, creator of the innovative game for Sierra On-Line.

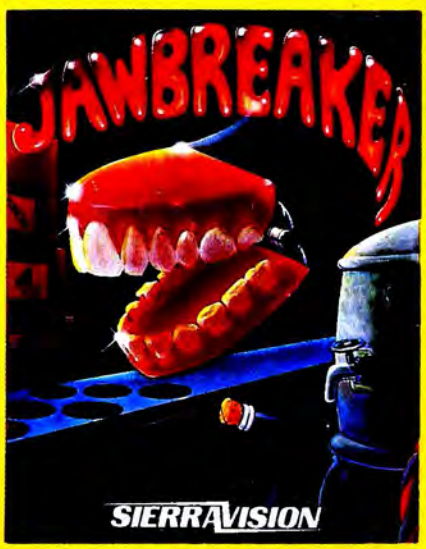
"No maze creates as much excitement as our Jawbreaker," he said, and added, "The colors are brighter, the figures bigger, the action faster."

While maze makers waited for someone to buy their games, kids and other M.A.D. members were buying their NEW Jawbreaker for $29.95 from dealers or directly from:

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