SOFTALK

VOLUME 2 AUGUST 1982 $2.50

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Interactive Museum
Peeking at the III
Summer Review Special

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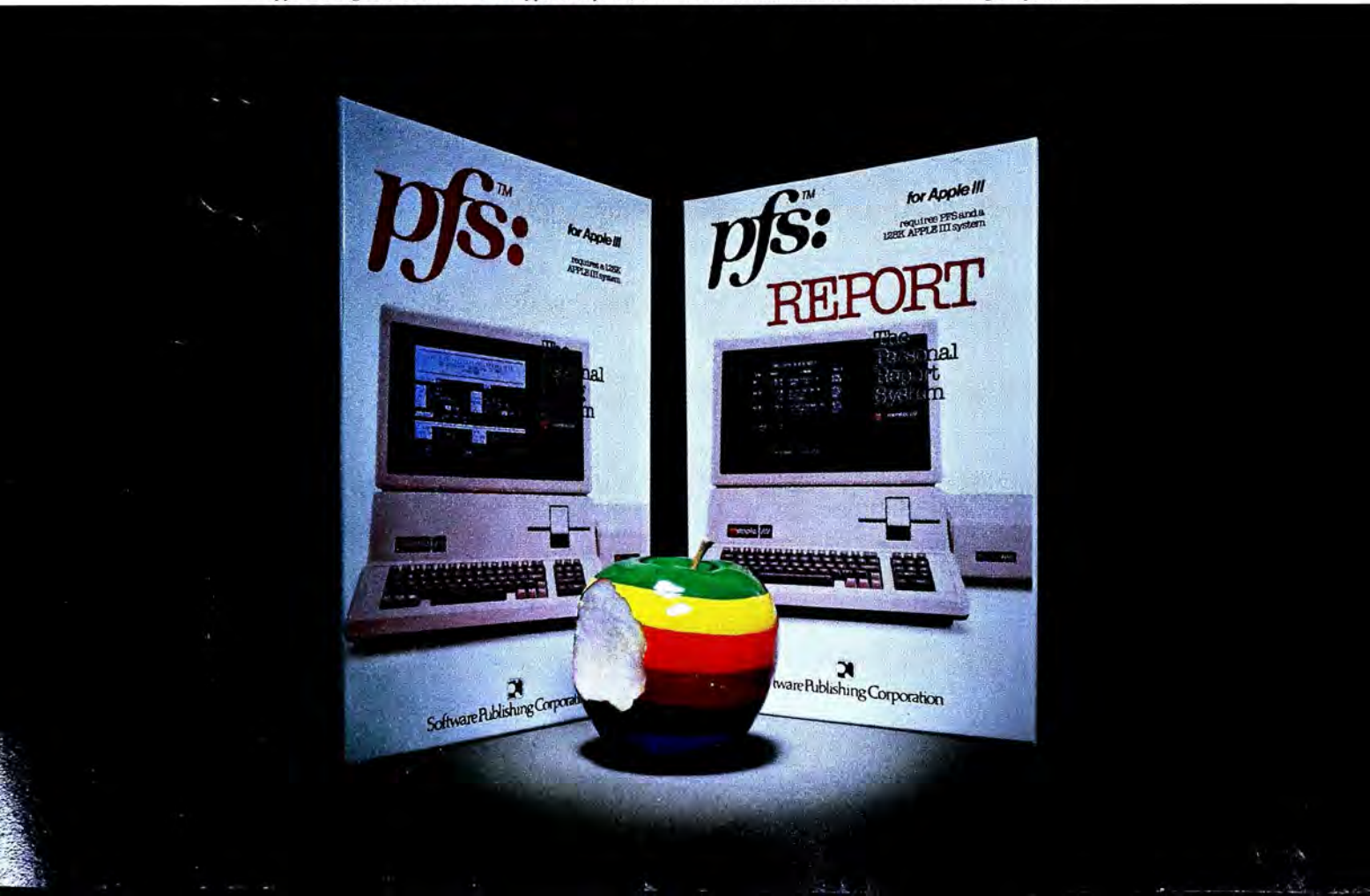
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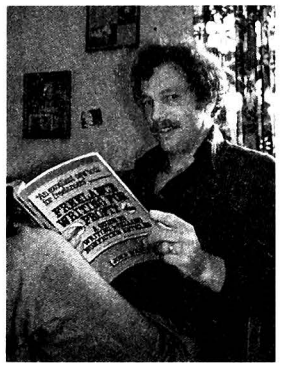
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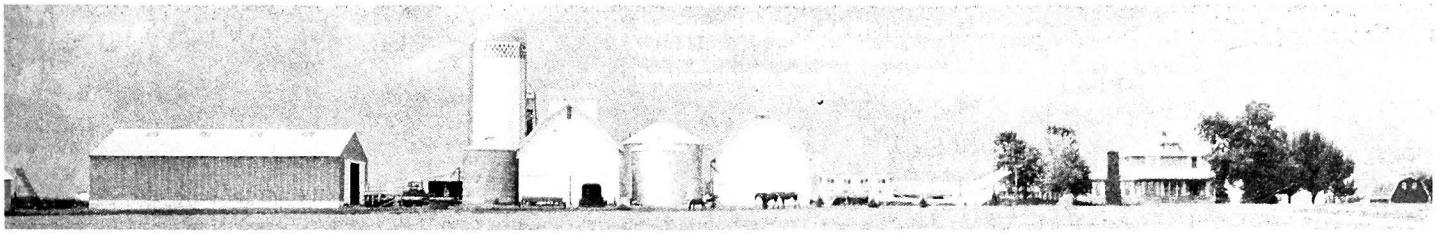
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Moving? Send new address and old to Softalk Circulation, 11021 Magnolia Boulevard, North Hollywood, CA 91601; telephone (213) 980-5074.

CONTEST: WHY NOT KUMQUAT?

Last month we brought you the origins of some of those apparently off-the-wall names that companies give themselves and their products, but one name was suspiciously missing. Apple! What the heck is this magazine all about, anyway?

How anyone can use an Apple and not wonder where the name came from is beyond us. This month's contest invites you to provide an answer. Quite simply, tell us your version of how the Apple got its name.

If you've read articles about the Apple or its creators in other newspapers, magazines, or journals, you probably have an idea of how Woz and Jobs decided on such a whimsical name for such a fanciful creation. Forget them. We're not interested in truth for this contest; we want to see how creative you can be.

For those of you with a creative flair who missed out on last November's Art Gallery contest because: (a) you weren't a *Softalk* reader back then, (b) you can't draw, or (c) you thought HGR meant "handy game routines," here's your chance to shine.

And we do mean shine. Really let yourself go! If you're good with rhymes, you might write your answer in a poem, a song (include sheet music, if you like), a limerick, or a sonnet done in iambic pentameter. Monologues, dialogues, essays, and dramatic scenarios are equally acceptable. Whatever form you decide on, decide fast, because September 15 is coming up soon, and that's when all entries must be in the mail.

This month the random number generator gets a rest; *Softalk*'s contest staff will judge all entries and come up with one winner. Entries will be judged on imagination and creativity. (In the case of a tie, the contest staff will fight it out.)

The winner will receive $100 worth of goods from *Softalk* advertisers, to be collected at the winner's local computer store.

Entries must be at least twenty-five words long, but not longer than two double-spaced pages. If you can't type (via printer or typewriter), then print neatly. Verrry neatly. We can't be responsible if we can't read your writing.

Sound like fun? You bet. So get those creative juices flowing, and send us your fantasy version of why your computer isn't a Kumquat II Plus.

All entries must be postmarked by midnight, September 15, 1982.

Name: _____
Address: _____
City, State, Zip: _____
Phone: _____
Dealer: _____
If I win, I want: _____
and I want it now!
Yours truly, _____
(signature)

Mail this entry form or a facsimile with your entry to *Softalk* Kumquats, 11021 Magnolia Boulevard, North Hollywood, CA 91601, by September 15, 1982. ◨

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Contest Winners: Trivia Trump Wins Second Drive

The First Great AppleTrivia Contest. We have a winner! Carl Webb of Vista, California, is now a two-drive man. Webb responded correctly to thirty-three of the fifty "devilishly hard" trivia questions to win the March contest. On a straight curve, that's a D+, and in this case the D stands for "disk drive."

"The fiendish contest drove me out of my mind for months," Webb wrote on his entry. But Webb will be the one doing the driving from now on with his new Apple disk drive.

Ken Karleskint from San Luis Obispo, California, was Trivia's runner-up, and he will receive $50 worth of goods by *Softalk*'s advertisers. Karleskint was not far behind the winner, having answered twenty-seven questions correctly.

The third, fourth, and fifth place winners were Harvest Collier, Midland, Michigan; Joseph C. Garner, Blackduck, Minnesota; and Judson Cohan, Los Angeles, California. They each will receive an extra year's free subscription to *Softalk*.

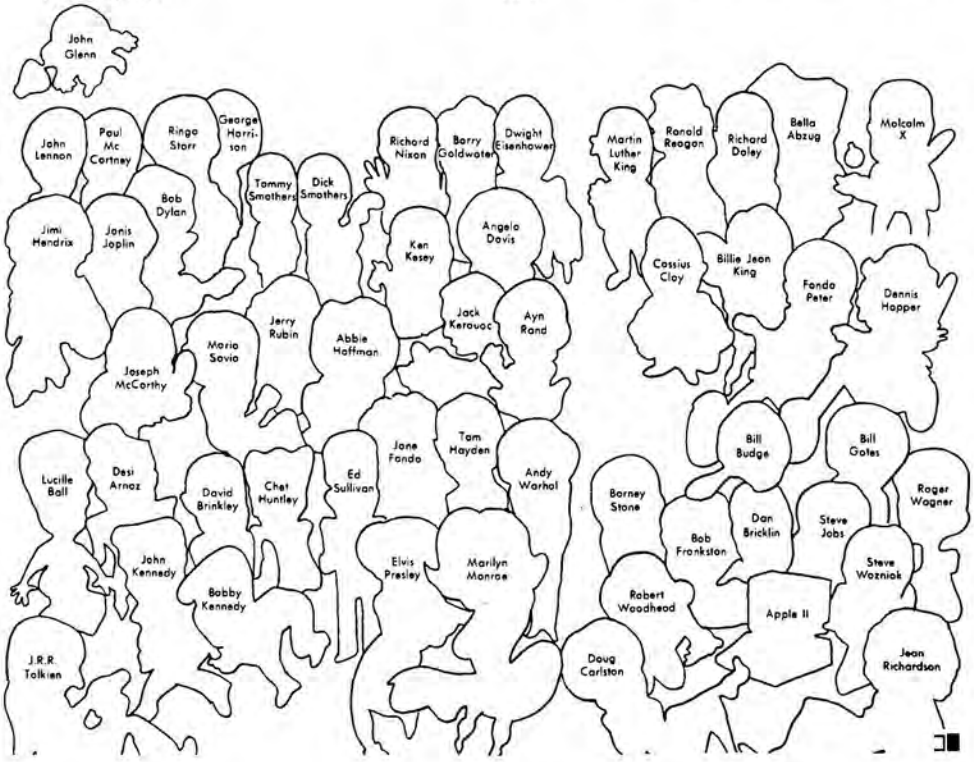
Here are the correct answers to the trivia quiz:

1. Brotherhood
2. Spiders, Lips, Wolves, and Fuzzballs
3. Yellow
4. The Apple; the computer
5. BOS, NYC, PHL, BAL, WSH, RCH
6. Blaise
7. Greg Bloom
8. John Updike
9. ^ or upward arrow
10. Clockwise
11. −12V
12. Underline and vertical bar
13. Inventors, founders of Apple
14. Firetrucks
15. Torricella, Molinetto, Fontanile, Santa Paravia, and Fiumaccio
16. Fourteen
17. muMath−80
18. "Summertime"
19. Pink
20. Klarnons
21. Eddie's Dragon Beast
22. Apples
23. Two dogs
24. A bird
25. *Imponderable*
26. Twenty-four
27. X Hook
28. Nothing
29. Monkeys unlock the door
30. Bill Depew
31. Trident
32. Scarab
33. Haka, Keetse, Juma, and Lanai
34. Invisible
35. Fishhead
36. Four
37. Notre Dame
38. * (asterisk)
39. 50 MPH
40. ! (exclamation mark)
41. 40 seconds
42. Shirley Chisholm
43. Drassa 2
44. Mark Allen
45. Heaves
46. "Yoho"
47. Twenty-six
48. Clears the screen and sends cursor to upper left corner
49. 23,487
50. Trendcom

Dig the Decades. Brian Crowley of Hawthorne, California, correctly identified all fifty-five caricatures from the "Fritz the Cat" story to win the May contest. Of the twenty perfect entries that were run through the random number generator, Crowley's surfaced as the winner.

Crowley will receive $100 worth of goods through his local dealer, Value Sales of Lawndale, California. His shopping list includes Verbatim disks and the Epson graphics chip. Crowley says he worked for about five hours on the contest and had to search through old copies of *Softalk* to identify the Apple personalities.

Many entries fell just one short of being perfect. Shame on those of you who failed to identify number fifty-five! In case you're still wondering about the identities of the caricatures, here they are:



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for the Artist

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for the Programmer

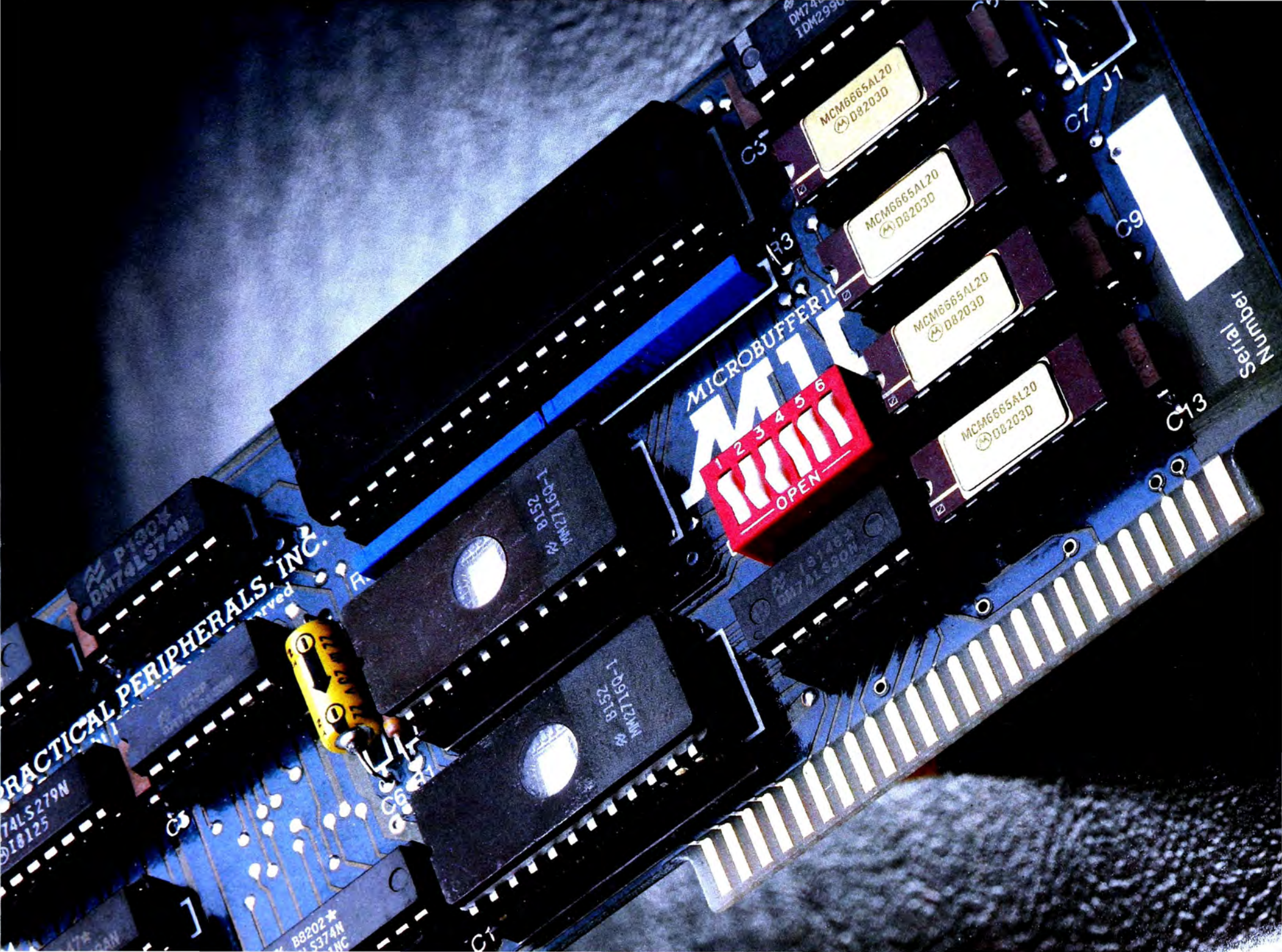
The Graphics Magician

by Mark Pelczarski, David Lubar, and Chris Jochumson

Add fast, smooth animation and hundreds of pictures to your programs. Create animated shapes and draw paths; have up to 32 independently controlled figures on screen. Use a special palette of over 100 colors to create pictures and objects in highly compressed format. Easy to use, and includes a special programming tutorial. Has saved months in development time for several games already on the market. Paddle/joystick $59.95, Apple Graphics Tablet $69.95.

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FOR EPSON PRINTERS, Microbuffer starts at $159 in either an 8K serial or a 16K parallel version. The serial buffer supports both hardware handshaking and XON-XOFF/ETX-ACK software handshaking at baud rates up to 19,200. Both Epson interfaces are compatible with all Epson commands including GRAFTRAX-80. Both are user-expandable to 32K.

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FASTALK

Fastalk is your quick guide to popular, specialized, or classic software. Programs appearing in Fastalk must meet one or more of the following criteria: (1) equal or surpass in sales the least-selling program to appear on any of the current bestseller lists; (2) relate to a specialized subject area and be in general distribution (more specialized packages and areas will be included as Fastalk matures); (3) be new and of professional quality (such programs will be carried for one month only—after that, they must meet other criteria for inclusion); (4) stand out as extraordinary.

Designation as a classic is noted by a bullet preceding a program's title.

Where opinion is expressed. *Softalk* has seen the software in question; the date of *Softalk*'s review, if any, is given at the end of the item.

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

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. Solving problems takes precedence over life/death peril. Several publishers: Microsoft, 10700 Northup Way, Bellevue, WA 98004. $28.95. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $35. Frontier Computing, Box 402, 666 N. Main, Logan, UT 84321. $10.

Cyborg. Berlyn. Text adventure with brief action skill game hidden in plot. As a futuristic cyborg—half human, half computer—you're lost in a strange forest, desperately needing food and power; find them while seeking clues to your location and purpose—not unlike real life. None of the happenings are random; the game contains the pleasures of a good book. In its realism and use of true plot, it represents one of the most significant advances in adventuring since the original *Adventure* began the genre. Sentient, Box 4929, Aspen, CO 81612. $32.95. *11/81.*

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.

Escape from Rungistan. 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.

• **Hi-Res Adventure #1: Mystery House.** Williams. Whodunit in a Victorian mansion. First adventure with pictures. More than 300-word vocabulary. 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. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $32.95. *11/80.*

Hi-Res Adventure #3: Cranston Manor. DeWitz/Williams. More full-color adventuring involving the redistribution of wealth. Long on great riddles, short on plot. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95. *9/81.*

Hi-Res Adventure #4: Ulysses and the Golden Fleece. Davis/Williams. Re-creation of the Greek legend, featuring graphics advances and ability to communicate with the characters. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95. *12/81.*

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.

• **The Prisoner.** Mullich. Superb TV series captured in computer game. 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. $29.95. *3/81.*

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

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. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $99.95. *1/82.*

Zork. 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.*

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, 3975 E. Bayshore Dr., Palo Alto, CA 94303. $995.

Apple Plot. Converts numerical data into graphs; stores on hi-res page or prints out. *VisiCalc* interface. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $70.

Asset Manager. Calculates depreciation using current balance; chooses depreciation representing greatest savings. Handles up to 999 assets. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $200.

BPI Accounts Receivable. Ferguson. Operates as open item or balance forward system for statement preparation, aging reports, and extensive credit analysis. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $395.

BPI General Ledger. Accounting system for small businesses automates posting of ledgers, financial statements preparation, and closing of books. Includes integrated accounts receivable and payable and all subsidiary ledgers for payroll accounting. Customized set of books can be constructed from available journals and ledgers. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $395.

Creative Financing. Evaluates loans and investments, provides R-O-I projections, payment tables, and objective decisions. Howard Software, 8008 Girard Ave., Ste. 310, La Jolla, CA 92037. $195.

Datadex. General purpose database manager able to perform specific applications. File generation and report utilities allow definition of file structure and appearance of reports. Information Unlimited Software, 281 Arlington Ave., Berkeley, CA 94707. $150. *9/81.*

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, 3218 Skokie Valley Rd., Highland Park, IL 60035. $150. *8/81.*

Data Reporter. Allows plotting of data in various charts and graphs; stores data segmented by up to thirty-five fields. Machine language search and sort. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $220.

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.*

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

Desktop Planner. Models and analyzes budgets, profits and losses, sales forecasts, cash flow; "what if?" calculations. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250.

General Ledger. Automatic double entry, complete audit trails. Menu driven. Continental Software, 11223 S. Hindry Ave., Los Angeles, CA 90045. $175.

General Manager. Database program that allows economic projections, search and select options, and screen formatting for data entry. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $99.95.

Information Master. Database management program that can keep records sorted in five separate orders simultaneously. High Technology, Box S-14665, Oklahoma City, OK 73113. $150.

MicroFinesse. Pascal-based spreadsheet from England. Handles models of up to 5,000 cells, makes automatic "what if?" calculations. Easy to use. Osborne/McGraw Hill, 630 Bancroft Way, Berkeley, CA 94710. $495. *7/82.*

Personal Filing System. User controls data in totally unstructured database. Up to thirty-two pages (screens) of information in each record. Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94043. $95. *10/80.*

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 Corp., 1901 Landings Dr., Mountain View, CA 94043. $125.

PFS:Report. Powerful report generator designed for use with *PFS*. Sorts, calculates, totals, formats, prints presentation-quality columnar reports. Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94043. $95. *10/81.*

Systems II EX. Fully integrated, eleven-module business accounting package. Sorts and updates accounts: general ledger, payroll, inventory. Optional modules. Westware, 2455 S.W. 4th St., Ontario, OR 97914. $1,495.

VC-Manager. Chapman. *VisiCalc* utility enabling performance of arithmetic operations on up to fifteen models at once and addition of one model to another. Micro Decision Systems, Box 1392, Pittsburgh, PA 15219. $65.

VersaForm. Business forms generator for invoicing, mailing lists, sales analysis, inventory. Hard disk compatible. Applied Software Technology, 15985 Greenwood Rd., Monte Sereno, CA 95030. $389.

• **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 Format Aids. Four programs any *VisiCalc* user would welcome: label splitter, formula reader, print-file reader, and variable-width reader. Data Security Concepts, Box 31044, Des Peres, MO 63131. $44.95.

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.

VisiPlot. Kapor. Hi-res plotting and graphics package. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $179.95. *7/81.*

VisiTran. Use to create Basic exec files to transfer variables to *VisiCalc*. Requires some Applesoft programming. ADC Associates, 960 San Antonio Rd., Palo Alto, CA 94303. $99.

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.*

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

Communications

ASCII Express. 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, Box 582, Santee, CA 92071. $79.95. *9/81.*

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

VisiTerm. Well-planned, comprehensive. Hi-res sixty-character display; wide range of protocols for sending text. VisiCorp, 2895 Zanker Road, 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, Box 582, Santee, CA 92071. $99.95. *5/81.*

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. Even in lo-res, it still stands up. Quality, 6660 Reseda Blvd., Ste. 105, Reseda, CA 91335. $19.95.

Curse of Ra. Expansion module to (and requires) *Temple of Apshai.* Find the magic treasure guarded by the demons of Ra; overcome the curse. Automated Simulations, Box 4247, Mountain View, CA 94040. $19.95.

Crush, Crumble and Chomp. Freeman/Connelley/Farren. Choose your persona from among six made-in-Japan-type monsters or grow your own, place it in one of world's major cities, and select game objective. Losing is odd sensation; since you're the monster, it's an emotional tradeoff. Automated Simulations, Box 4247, Mountain View, CA 94040. $29.95.

Danger in Drindisti. Expansion module to (and requires) *Hellfire Warrior.* Find the pattern to the glass wizard's maze; steal his magical staff. Automated Simulations, Box 4247, Mountain View, CA 94040. $19.95.

Hellfire Warrior. Freeman/Johnson. Part two of *Temple of Apshai;* faster, with more options and specific goal. Automated Simulations, 1901 Old Middlefield, Mountain View, CA 94043. $29.95. *12/80.*

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.*

• **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. Automated Simulations, 1901 Old Middlefield, Mountain View, CA 94043. $39.95.

Trailblazer. Metagaming. Multiplayer adaptation of the space exploration and commerce game. Good lesson in resource management. Zeta Systems, 1725 Adelaide Blvd., Akron, OH 44305. $29.95. *7/82.*

Ultima. British. Hi-res color adventure, progressing from Middle Ages to beyond the space age. A masterpiece. California Pacific, 1615 Fifth St., Davis, CA 95616. $39.95. *6/81.*

• **Wilderness Campaign.** Clardy. First fantasy game to leave the dungeon for the great outdoors; first in hi-res; first to bargain with merchants; and more. Synergistic, 830 N. Riverside Dr., 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

Accu-Shapes. Generates Apple shape tables. Uses lo-res to shape and edit, displays in hi-res. Accent, 3750 Wright Pl., Palo Alto, CA 94306. $49.95.

Apple World. Projects and rotates 3-D color images on screen in true perspective, drawing up to 65,000 points per side. Includes screen-oriented text editor for image formation. United Software of America, 750 Third Ave., New York, NY 10017. $59.95.

Bill Budge's 3-D Graphics System. Budge. Interactive graphics system allowing game programmers to add 2-D or 3-D animation to their programs. California Pacific, 1615 5th St., Davis, CA 95616. $39.95.

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, non-destructive, 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. Paddle-joystick version, $69.95; Apple Graphics Tablet version, $119.95. *7/81.*

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.

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.

Graphics A2-3D1. High-speed 3-D animation package to guide beginner through scene creation, storage, retrieval, movement, and advanced applications. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $59.95.

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. Paddle-joystick version. $59.95; Apple Graphics Tablet version, $69.95. *5/82.*

Hi-Res Secrets. Fudge. Complete graphics tutorial covering all hi-res graphics subjects except 3-D animation. Background in Basic and assembly language assumed; good starting point for aspiring game programmers. Avant-Garde, Box 30160, Eugene, OR 97403. $125. *4/82.*

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 Software, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $39.95. *2/82.*

Home-Arcade

- **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 can crawl out, fill in holes, jump on your head, and devour you. Extremely addictive, excellent hi-res graphics and play. Broderbund, 1938 Fourth St., San Rafael, CA 94901. $29.95. *9/81.*

Bandits. Ngo. Fight off waves of multiple menaces intent on killing you and stealing your supplies. Delirious non-stop action, animated to the hilt. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95.

Beer Run. Turmell. Catch falling cans of beer as you wend your tortuous way to the thirtieth floor of the Sirius building, evade guzzlers and bouncers through savvy use of ladders and one-way elevators. At the top, catch a blimp to the Olympia Beer building, wherein you repeat the process in reverse. Some benighted souls are still looking for the Artesians. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *1/82.*

Bug Attack. Nitchals. Sing along with dagger-wielding ants, blue worms, swarming med-flies, a millipede, the 1812 Overture, lots of bright colors, terrific hi-res animation, and bouncy style. Cavalier, Box 2032, Del Mar, CA 92014. $29.95. *11/81.*

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

Ceiling Zero. Warady. Three kinds of alien ships getting smaller and faster and bouncing all over the screen. Fast, smooth, and challenging shoot-'em-up with classy hi-res color and sound effects. Turnkey, 13708 Mindanao Way, Ste. 314, Marina del Rey, CA 90291. $29.95. *2/82.*

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.*

Congo. Berlyn/Wilker. River search and rescue, with funky graphics, and emphasis on avoidance of obstacles. Sentient Software, Box 4929, Aspen, CO 81612. $34.95. *5/82.*

County Fair. Illowsky. Shooting gallery with hungry ducks and multiplying rabbits. Data-Most, 19273 Kenya St., Northridge, CA 91326. $29.95.

Cricketeer. Nelsen. Help Mister Cricket safely across the highway and over the river to his home. Be chivalrous to lady crickets; hazards of hungry birds and unstable floating popsicle sticks. Software Farm, 3901 S. Elkhart St., Aurora, CO 80014. $29.95.

Crossfire. Sullivan. Aliens come at you from three directions on a grid laid out like city blocks. You can move four directions, shoot in four directions independent of moving. Each alien has four lives and metamorphoses into its next one when shot. Strategy and intense concentration required to monitor continuous action on entire screen and maneuver through alien hordes to bonuses and an ammunition supply. Superb, smooth animation of a dozen pieces simultaneously. One of the great ones. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $29.95. *1/82.*

Cyclod. Hancock. Snakes versus eyeballs, using bricks for weaponry. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

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

Dogfight. Basham. Elaborate sixteen-level air battle against up to seven jets and helicopters. Up to eight players. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $29.95. *1/81.*

The Eliminator. Anderson. Pit your hi-res space fighter against numerous adversaries. Plenty of action. Adventure International, Box 3435, Longwood, FL 32750. $29.95. *7/82.*

Firebug. Sizzling action as you race through mazes eating gas cans, your fuse tail igniting the walls. Crackling good fun. Muse, 347 Charles St., Baltimore, MD 21201. $24.95.

Fly Wars. Trap fly fighters in your web, score with exploding cocoons. Beware the beetle and bug spray. Simple, addicting. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *7/82.*

Gold Rush. Berlyn/Wilker. Transport the gold from the train through the forest to waiting hoppers; avoiding bears, Indians, bandits, and random troublemakers. Sentient Software, Box 4929, Aspen, CO 81612. $34.95. *6/82.*

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 Software, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *8/81.*

Guardian. Tom & Jerry. Blast your way out of six levels of mazes surrounded by hostile-alien types. Fast and tricky; two levels of play. Continental Software, 11223 S. Hindry Ave., Los Angeles, CA 90045. $29.95. *7/82.*

Hadron. Miller. Superior 3-D space shoot-'em-up. Battle abstract shapes as in Miller's *Epoch.* Beautiful to watch, fun to play. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95.

Hungry Boy. Early eat-the-dots game for the personal computer. Astar, 5675 Francis Ave., Chino, CA 91710. $24.95.

Jawbreaker. Lubeck. Candy store oriented eat-the-dots game with automatically escalated skill levels. A courtroom favorite. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $29.95.

Jellyfish. Burek. You attempt to retrieve deadly nuclear waste from the ocean floor, torpedoing all marine life that gets in your way. Sirius Software, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

Juggler. Nice little circus game requiring Pong-type skills. IDSI, Box 1658, Las Cruces, NM 88004. $29.95. *5/82.*

Labyrinth. Schram. Save your comrades amid *Crossfire*-style foes, in a constantly shifting maze pattern. Challenging, excellent, lasting fun. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *6/82.*

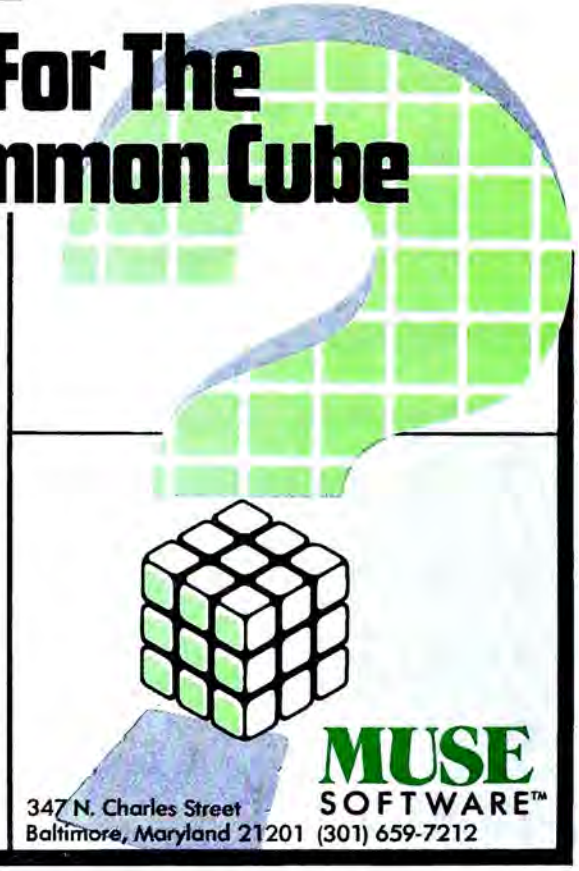
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Lemmings. Thompson. Round up and detain mass-reproducing rodents, detaining nonbreeding pairs, before they migrate into the sea. Sirius Software, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *6/82.*

• **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.

Microwave. Nitchals. Brightly colored, highly addictive maze game featuring continuous looney-tunes musical accompaniment. Cavalier Computer, Box 2032, Del Mar, CA 92014. $34.95. *5/82.*

Minotaur. Miller. Incorporates adventure elements and thirty-two four-level mazes. Surprises. Sirius Software, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95 *5/82.*

Mouskattack. Lay pipe through the maze, avoiding mice. Alas, cats and traps won't save you from Super Mouse. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95.

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

Pig Pen. TMQ. Latest wrinkle in drop-the-dots, featuring hi-res swine and instant hams. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95.

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.*

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.*

Quadrant 6112. Hold your space alone against a fleet of rebel invaders. Sensible, 6619 Perham Dr., West Bloomfield, MI 48033. $34.95.

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.*

Rear Guard. Home-arcade rocket run over scrolling terrain. Has advanced play levels, real time, running high score. Adventure International, Box 3435, Longwood, FL 32750. $29.95.

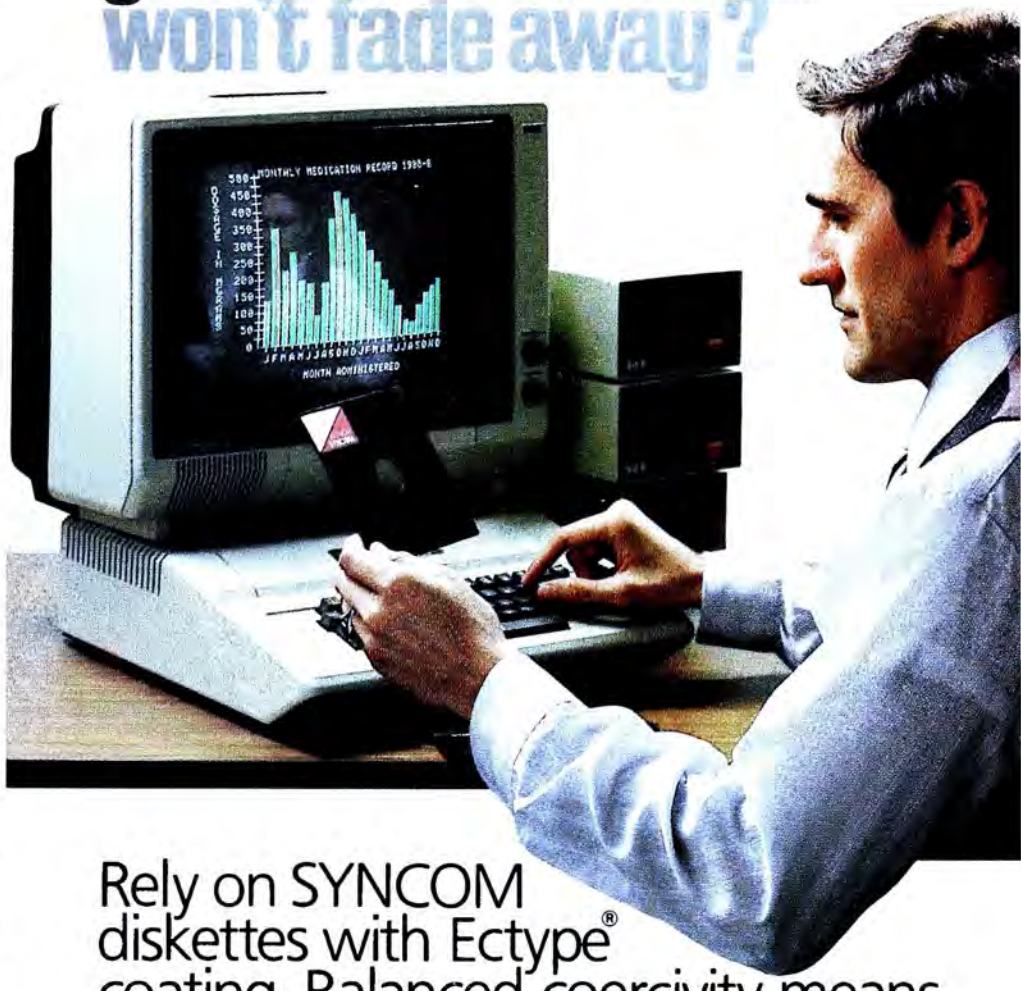
Ribbit. Help froggie across freeway and over river to get him safely to his home. Piccadilly, 89 Summit Ave., Summit, NJ 07901. $29.95.

Ricochet. Abstract action strategy game, a combination of chess and snooker. Five variants and four skill levels. Automated Simulations, Box 4247, Mountain View, CA 94040. $19.95.

Sabotage. Allen. Your gun emplacement must shoot down enemy bombers and helicopters; parachuting saboteurs can amass on the ground and knock out your battle station. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $24.95. *7/81.*

Sheila. Fitzgerald. Highly adventure-flavored, five-level, real time maze game with weapons, commands, and spells—acquired with increasing point totals. H.A.L. Labs,

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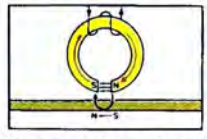
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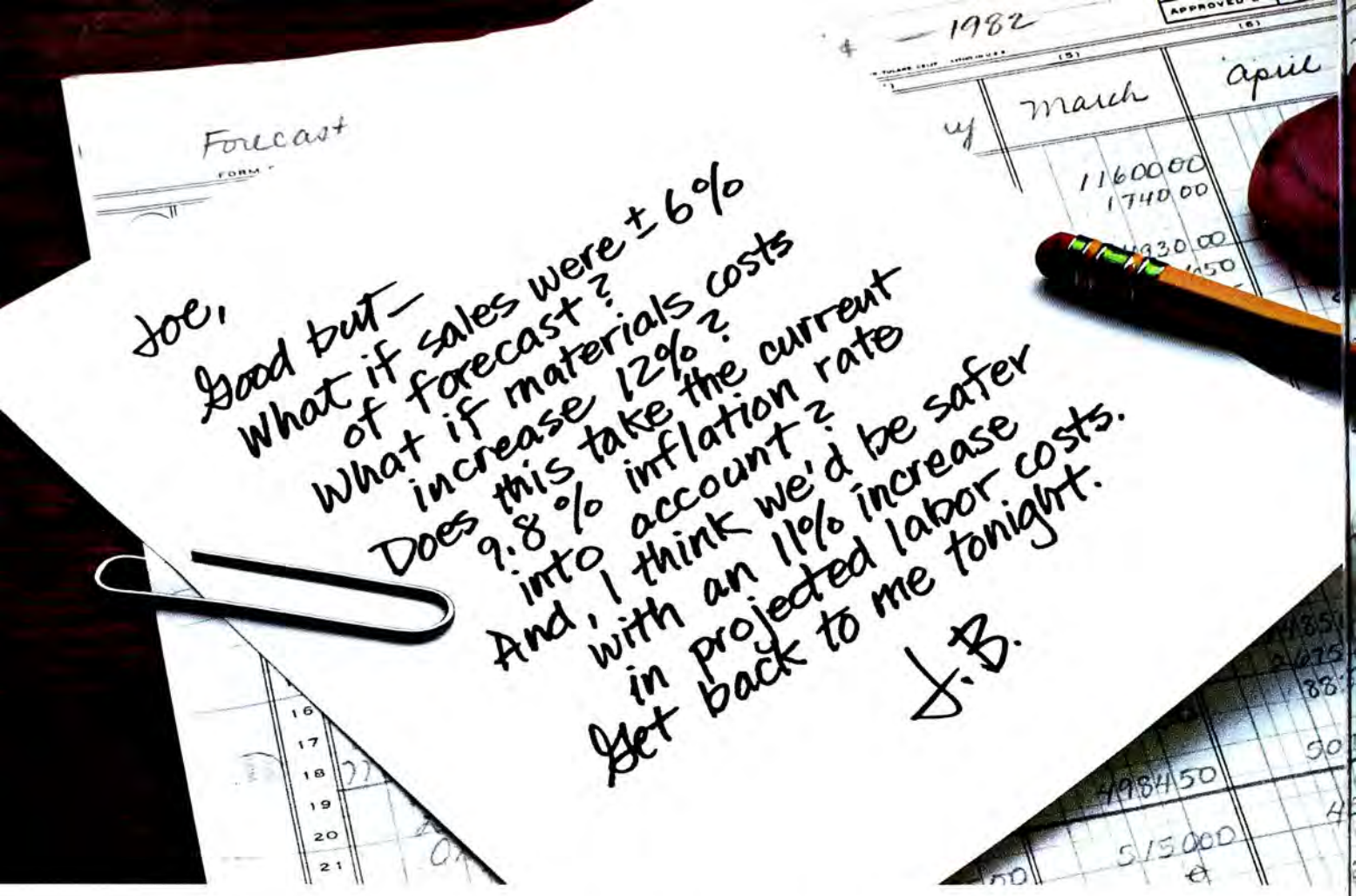
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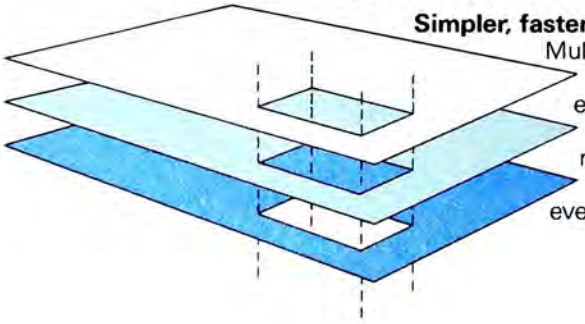


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Simpler, faster, more powerful. Multiplan is a completely interactive electronic worksheet. Change one number or formula, and you change every number that depends on it. Instantly. Furthermore, Multiplan is several worksheets deep. You can pass information from sheet to sheet automatically. A change on your cash and receivables sheet is reflected on your balance sheet, for instance.



Computing for non-computer people. You can use Multiplan on a reasonably priced personal computer... even if you've never used a computer before. Plain English "prompts" direct you through each step. If you need additional help, just press the "?" key. Information that addresses your specific question will appear on the screen. Get your answer and return to the problem. Without leafing through a manual.

Logical problem solving. Multiplan allows you to assign English names to represent one or more cells on the worksheet. That way, you can refer to items the way you think of them. Profit equals "Sales minus Expenses" for instance. Instead of "L14 minus M17."

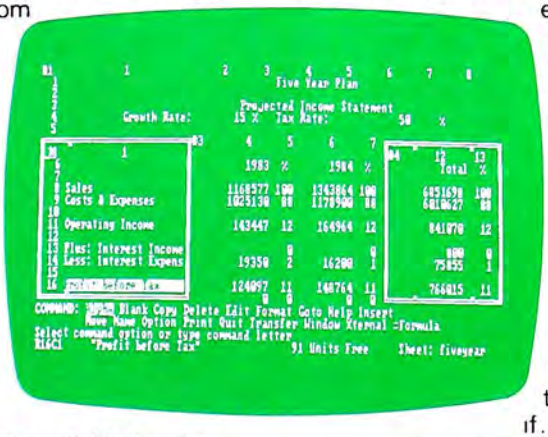
Watch what's happening. The computer screen displays a portion of a giant worksheet that's 63 columns wide by 255 rows deep. In addition, you can open multiple "windows" to other areas of the worksheet. That capability allows you



Fast answers to some of the in business.

to watch what the effect of changing a number or formula in one area will be on other areas of the worksheet. How a change in sales will effect the bottom line, for instance. It's a particularly valuable feature when you're solving "What if..." problems.

When time is money. For managers and professionals, time is the most valuable asset. Thinking time. That's the concept behind Multiplan. By assigning the time-consuming aspects of planning, forecasting, interpreting, recording and reworking data to the computer, Multiplan gives you time to think. Result: Not only faster answers... better answers.



Apple II® or CP/M-80®. Multiplan is available for the Apple II Personal Computer (in 40 and 80 column versions), and microcomputers utilizing the CP/M-80 operating system.

Leading edge software. Claiming quality is one thing. Delivering quality is another. Microsoft has been at the leading edge of microcomputer software since we put BASIC on the first microcomputer. Today, Microsoft offers an extensive range of fully-supported microcomputer languages, operating systems and applications software. Software like Multiplan... easy-to-use, yet powerful software that makes computers become tools for people.

Ask for a demonstration. Ask your computer dealer to demonstrate Multiplan's powerful, user-oriented Multi-Tool™ features. They'll show you how Multiplan's unique capabilities provide you time-saving tools that help you answer the toughest question in business, "What if..." And still get back to J. B., tonight.

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4074 Midland Rd., Ste. 23, Riverside, CA 92505. $23. *7/82.*

Snack Attack. Illowsky. A three-maze eat-'em-up; starts at any of five speed levels. Nonfattening. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *1/82.*

Snake Byte. Arcade action featuring fruit and serpents. Sirius Software, 10364 Rockingham Dr., Sacramento, CA $29.95.

The Snapper. Different. Eat the *Blots* while the Whirlers slowly consume the maze. Takes strategy and quick thinking as you travel slippery speedways, avoiding the ever-tossing sticks of the Gamma Field. Nine levels. Silicon Valley Systems, 1625 El Camino Real, Ste. 4, Belmont, CA 94002. $32.95.

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.*

Star Blaster. Mines, fireballs, space tunnels, general obstructions, and unfriendlies waylay your starship. Piccadilly, 89 Summit Ave., Summit, NJ 07901. $29.95.

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

• **Super Invader.** Hata. The daddy of home-arcades. Still good hi-res, still a challenge. *Softalk* readers' Most Popular Program of 1978-1980. Astar International through California Pacific, 1615 5th St., Davis, CA 95616, and Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950. $19.95.

Swashbuckler. Stephenson. Hi-res sword-fighting with realistic pirates, snakes, rats, and other scum. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $34.95.

Taxman. Fitzgerald. Very smooth, fast-moving eat-the-dots, all you expect from fruit to nuts. Keyboard control returns excellent expert-pleasing response; turn on a *Sheila*-sized dime. H.A.L. Labs, 4074 Midland Rd., Ste. 23, Riverside, CA 92505. $29.95.

Threshold. Schwader/Williams. Another shoot-'em-up. Hi-res graphics, animation, and accurate collisions. Targets include everything from flying maple trees to Volkswagen Bugs, at every speed and flight pattern. Frustratingly small fuel supply. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $39.95. *12/81.*

Track Attack. Jochumson. Three-level train robbery chase game requiring considerable dexterity. Broderbund, 1938 Fourth St., San Rafael, CA 94901. $29.95. *4/82.*

Tumble Bugs. Bishop. Very silly, enjoyably frustrating eating game with excellent graphics and animation. Magnifying glass enlarges where you are, blocks part around you. Datasoft, 19519 Business Center Dr., Northridge, CA 91324. $29.95. *5/82.*

Twerps. Thompson. Home-arcade game with plot, elaborate animation and audio, and severe fuel shortage. Links several different style games together. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

Voyage of the Valkyrie. Black and white shoot-'em-up with eleven levels and an impressive Wagnerian score. Advanced Operating Systems, 450 St. John Rd., Michigan City, IN 46360. $29.95.

Zenith. Similar to *Horizon V;* 3-D scrolling over planetoid. Build city while fighting off aliens. Gebelli, 1771 Tribute Rd., Ste. A, Sacramento, CA 95815. $34.95.

Home/Hobby

The Accountant. Forman. Double-entry finance system features seven integrated files and a set of automatic transactions. Decision Support, 1438 Ironwood Dr., McLean, VA 22101. $129.95. *1/82.*

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.

Apple-Cillin. Hardware diagnostic tests for all RAM and ROM, plug-in cards, cp registers, disks; nine video test patterns. XPS, 323 York Rd., Carlisle, PA 17013. $49.95.

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

Apple Spice. Koak/Fox. Powerful Applesoft expansion utility using *&* and *usr* functions. Easily incorporated programming routines. Adventure International, Box 3435, Longwood, FL 32750. $29.95. *5/82.*

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

Bag of Tricks. Worth/Lechner. Four utility programs for dumping and examining a raw track, sector editing, reformatting tracks, and repairing damaged disk catalogs. Quality Software, 6660 Reseda Blvd., Ste. 105, Reseda, CA 91335. $39.95.

Cashbook 2.0. Very friendly personal and small business single-entry accounting system. Zofarry Enterprises, 35 Northcote St., Haberfield, N.S.W., Australia. $149. *5/82.*

Ceemac. Boering. Visual composition language. Compose-execute-compose swapping by single key commands. Interpreter released as *Fire Organ.* Vagabondo Enterprises, 1300 E. Algonquin, Ste. 36, Schaumburg, IL 60195. $75.

Crossword Magic. Crossword 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.

Datafax. Database utilizing unstructured keyword classification system for categorizing and cross-referencing by any method. No programming required; hard disk compatible. Link Systems, 1640 19th St., Santa Monica, CA 90404. $199.

Data Perfect. Assembly language database companion to *Letter Perfect*; compatible with lower case in 40-column, most 80-column boards. Lay out, revise own screen, record design. Excellent built-in editor besides ability to be edited by word processor. Searches, sorts, generates reports. LJK, Box 10827, St. Louis, MO 63129. $99.95.

Dietician. Assembles dietary menus from diet formula you decide on, using foods of your own choice in developing nutritional program. Daily menu variation. Dietware, Box 503, Spring, TX 77373. $59.95.

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

DOS Tool Kit. Excellent utility package; Apple II Assembler/Editor System and Applesoft Toolkit. Edit, assemble machine language programs; write, edit Basic programs. Simplifies graphics, includes character generator. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $75. *10/81.*

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. *7/82.*

Expediter II. Einstein/Goodrow. Applesoft compiler translates Basic programs into machine language. Will display or print a running list of source program lines and compiled addresses; compiled program size reduced up to 50 percent. No stop on fatal errors. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $99.95. *9/81.*

File Whiz. Goss. Quickly learned database management program with six command modes. Files generated are accessible from Basic programs. Fast, easy, and convenient for home uses and users. SoftHouse, Box 6383, Rochester, MN 55903. $59. *12/81.*

Financial Management System II. Home finance management; maintains multiple accounts, generates complete audit reports, and stores unlimited files. Computerized Management Systems, 1039-S Cadiz Dr., Simi, CA 93065. $64.95. *5/81.*

First 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.*

Graphtrix. Matrix graphics system designed to add graphics, footnotes, and chapter capabilities to *Apple Writer* text editing system. Data Transforms, 906 E. Fifth Ave., Denver, CO 80218. $65.

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, 16724 Hawthorne Blvd., Lawndale, CA 90260. $74.95. *4/82.*

The Inspector. Sefton. Fast, flexible utility for examination of disk sectors, directory, and track/sector lists. Salvage blown disks, change data, delete DOS. Omega, 222 S. Riverside Plaza, Chicago, IL 60606. $49.95. *11/81.*

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

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

Menu Generator. Compiles inputs and writes menu programs in Basic. Involves filing in several forms on screen. Excellent documentation. Crane Software, 16835 Algonquin, Ste. 611, Huntington Beach, CA 92649. $39.95. *1/82.*

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., West Bloomfield, MI 48033. $25. *10/81.*

Nutrichec. Thurman/Parkey. Diet analysis program compares nutritional value of your diet with RDA for a person of your physical characteristics and habits; suggested intake, nutrient sources. WIMS, 6723 E. 66th

Pl., Tulsa, OK 74133. $59.95.

Personal Finance Manager. Gold/Software Dimensions. Handles up to 200 entries a month from maximum of fourteen separate accounts. Search/sort/edit routine. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $75. *11/81.*

Personal Finance Master. Personal and small business financial system; covers all types of accounts. Spectrum, 142 Carlow, Box 2084, Sunnyvale, CA 94087. $74.95.

• **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.

Psort. Long. Pascal utility for programmers permitting (slow) alphabetic sorting and merging of files. Source codes can be recompiled and usually must be for program to run. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $85. *5/82.*

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.

Soft-Step. Applesoft Basic interactive debugger. Steps through programs, breaks at any point; trace and list functions are improvements over originals. Accent, 3750 Wright Pl., Palo Alto, CA 94306. $49.95.

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

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

Turbocharger. Gustafsson. Simple disk utility that cuts access time in half, shortens DOS codes, and copies disks fast. Silicon Valley Systems, 1625 El Camino Real, Ste. 4, Belmont, CA 94002. $29.95.

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

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

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

World's Greatest Blackjack Program. Irwin/Cooper/Humble. Teaches basic strategy card-counting technique for advantage over house. Play mode takes up to six hands. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $50. *11/82.*

Strategy

Air Sim-1. 3-D machine language flight simulator with six landing fields and optional instrument flying mode. Mind Systems, Box 506, Northampton, MA 01061. $40.

Battle of Shiloh. Landry/Kroegel. Fast, simple game (as these go) with adjustable risk levels, strategy types, and army ratings to reflect players' abilities. Save option. Strategic Simulations, 465 Fairchild Dr., Mountain View, CA 94043. $39.95.

Castle Wolfenstein. Warner. First game to fuse successfully best elements of home-arcade and adventure. With naught but a smuggled pistol, you must escape from Nazi stronghold, finding and taking secret plans if you can. Saving game will not help keep you alive, but the pleasures outweigh this minor inconvenience. Room layout changes with each new game. Enemy speaks, in German. Muse, 330 N. Charles St., Baltimore, MD 21201. $29.95. *10/81.*

Computer Baseball. Merrow/Avery. Remarkable programming feat, simulating individual player abilities from the teams of thirteen famous World Series. Can enter and play teams of your own creation. Strategic Simulations Inc., 465 Fairchild Dr., Mountain View, CA 94043. $39.95. *9/81.*

Dark Forest. Jewell/Mornini. In cartoony combination of war gaming and fantasy, up to six players try to overcome ubiquitous Gruds to locate treasures in castles. Begins slowly but picks up fast; territorial battle strategies are frequently interrupted by a hungry serpent, a random wizard, and trolls. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

Dnieper River Line. Replay of tactical W.W. II battle; Germany repels Russian thrust. Fifteen types of units, on-map and off-map artillery support, and 3-D map included. Avalon Hill, 517 Harford Rd., Baltimore, MD 21214. $30.

• **Flight Simulator.** Artwick. Utilizes aerodynamic equations and airfoil characteristics for realistic simulation of take-off, flight, and landing. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $33.50.

Gin Rummy. Carpet. Play against computer. Hi-res cards can change position in hand; your entire hand visible. Space bar allows you to change your mind when discarding. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *6/82.*

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piece 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.*

Hi-Res Cribbage. Schwader. One-peg type; discarding to crib and playing to peg. Spiral board, skunking, automatic counting. Solid, challenging game. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $24.95. *4/81.*

Hi-Res Football. Sullivan/Williams. Make play decisions in coach and quarterback positions. Players and field in hi-res animated graphics. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $39.95.

• **Microgammon II.** Competition program for learning, practice, and improvement of backgammon skills. Tournament play. Softape, 10432 Burbank Blvd., North Hollywood, CA 91601. $19.95. *2/81.*

Pursuit of the Graf Spee. The 1939 engagements of the German pocket battleship off South America. Visibility and sighting system; separate ranges for each gun turret. Strategic Simulations, 465 Fairchild Dr., Mountain View, CA 94043. $59.95.

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. EduWare, Box 22222, Agoura, CA 91301. $39.95. *7/82.*

RobotWar. Warner. Strategy game with battling robots is teaching device for programming. Muse, 330 N. Charles St., Baltimore, MD 21201. $39.95. *1/81.*

Sargon II. Spracklen/Spracklen. Computer chess game with seven levels of play. Hayden, 50 Essex St., Rochelle Park, NJ 07662. $34.95.

Southern Command. Keating. Battalion-level Arab/Israeli war game in hi-res color. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $59.95.

VisiCrop. Stukk. Business simulation expansion module to Slipshod's *Crop Duster.* Save your spreadsheet from the bean moths; spare the hi-res cows. Don't laugh or your disk will crash. Requires joystick or hammer. Slipshod Software, General Delivery, Bad Nation, SD. $4.95.

Warp Factor. Space war game featuring twelve starship designs representing five galactic empires, with possible scenarios ranging from skirmishes to galactic war. Extremely challenging. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $39.95. *7/81.*

Word Processing

Apple Speller. Spell-checking program sports listable 31,000 words, extensible up to 5,000 words plus additional volumes. Recognizes contractions, gives file word counts, incidence of a single word, and number of unique words. High marks for clear, logically organized documentation, user friendliness, and simplicity of operation. Sensible, 6619 Perham Dr., West Bloomfield, MI 48033. $75. *1/82.*

Apple Writer. The most popular word processing program in town. Type, erase, move words around, save and insert segments from disk, and print out. Easy to use. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $75.

Apple Writer II. Lutus/Finstead. Written in word processing language. Additional editing features and functions menu; continuous readout of character count and length. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $150.

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.*

Easy Writer. Word processor; choose 40 or 80-column version. Information Unlimited, 281 Arlington Ave., Berkeley, CA 94707. $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. $375.

Goodspell. Fourteen-thousand-word dictionary companion disk to *Apple Writer.* Flags words not listed when printing out. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $60.

Gutenberg. User-definable character set, split-screen hi-res and lo-res text editing for text, program files. Performs text block moves and deletes; paint program produces large illustrations integrated with text. Micromation, Yorkdale Place, 1 Yorkdate Rd., Ste. 406, Toronto, Ont., Canada M6A3A1. $315.

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

Magic Window. Word processing program simulates standard typewriter; 80-column text scrolls across 40-column screen. Three modes of disk file storage. Softape, 10432 Burbank Blvd., North Hollywood, CA 91601. $99.95.

Magic Words. Proofreads files of word processors that use standard DOS and no character encryption techniques for saving files. 14,000-word dictionary. Artsci, 10432 Burbank Blvd., North Hollywood, CA 91601. $69.95.

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

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. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $129.95.

Super-Text 40/56/70. Zaron. Get forty, fifty-six, or seventy columns without hardware. Design your own character sets. Basics of text editing plus split screen. Character-oriented, floating cursor edit with add, change, math, print, and preview modes. Muse, 347 N. Charles St., Baltimore, MD 21201. $150.

Super-Text 40/80. Zaron. Latest *Super-Text* update; letter documentation, footers and headers, expandable math mode. Muse, 347 N. Charles St., Baltimore, MD 21201. $175.

Word Handler. Elekman. Wonderfully simple program with straightforward documentation. Allows folded paper printout for two-sided printing. Silicon Valley Software, 652 Bair Island Rd., Redwood City, CA 94063. $249. *10/81.*

WordStar. Screen-oriented, integrated word processing system in CP/M. Requires Z-80 card. MicroPro, 1299 Fourth St., San Rafael, CA 94901. $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. Available in the U.S. through Action-Research Northwest, 11442 Marine View Drive S.W., Seattle, WA 98146. $295. *5/82.*

Apple III

Access III. Communications program for time sharing and stand-alone tasks; accesses remote information services, minis, and mainframes. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $150.

Apple Business Basic. High-level structured programming language for the III. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $125.

Apple III Business Graphics. Converts numerical information into charts and graphs; only graphics program to take advantage of the III's capabilities. Apple Computer, 10260 Bandley Dr., 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 Computer, 10260 Bandley Dr., Cupertino, CA 95014. $225.

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.

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

Hardisk Accounting System. General ledger, accounts receivable, and accounts payable each handle up to 9,999 customers or accounts; inventory features five methods of evaluation. Also payroll, fixed asset management, and mailing labels. Great Plains Software, 123 N. 15th St., Fargo, ND 58102. $395 to $595 per module.

Mail List Manager. Generates, stores, sorts, edits, and prints database files. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $150.

Personal Filing System. Page. Form-oriented information management system allows storage and retrieval of up to 32,000 entries. Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94043. $145.

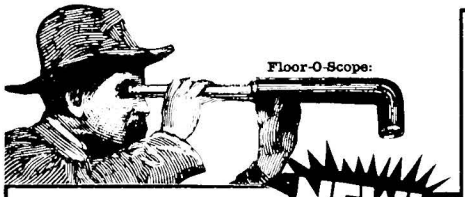
PFS: Report. Page. Generates reports; performs functions that require sorting, calculating, and manipulating data filed with *PFS.* Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94043. $175.

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

Word Juggler. Gill. Word processor makes use of upper/lower case keyboard, eighty-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. ❑■

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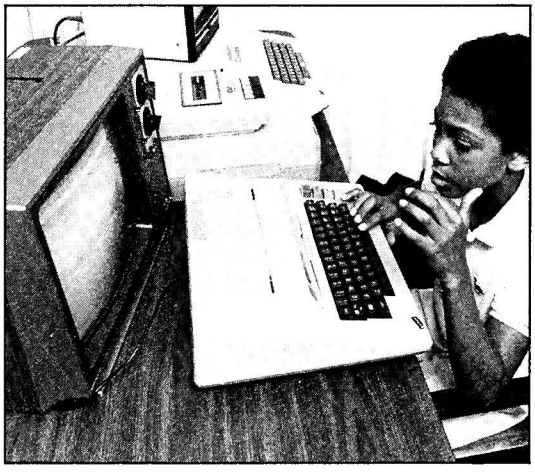
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*From a review in the "Instructional Computing Newsletter"; MECC, May 1982.

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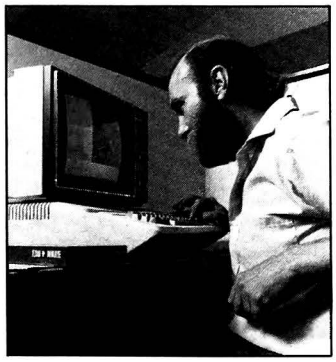
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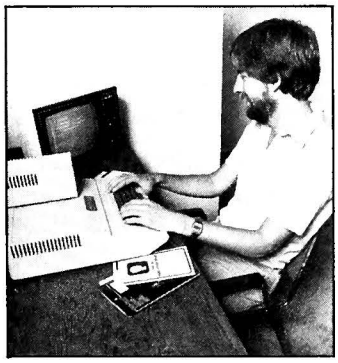
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A Eulogy for the Ace

Jonathan Livingston Seagull is dead. I know. I went to his funeral. He died a year or two before the first Apples ripened in the fertile minds of Jobs and Woz. They buried him on flat ground, a few miles from here, a very long way from the sea.

There really was a Jonathan Livingston who flew away to glory beyond the doubts and reproaches of his straight-laced hometown. That he chose flight was a mere accident of being born at the same time as airplanes. He would have done *something*.

Jonathan was from Cedar Falls, Iowa. He longed to fly and found his way into the cockpit at an early age. I never did get the full story of how it was, though I think Richard Bach probably came pretty close to the truth.

Jonathan was an ace in World War I, back when that made people proud to know you. He flew mail. He barnstormed. He did everything you had to do in those days to stay in the air. He devoted his life to the advancement of aviation. The last two true stories that can be told about him are these:

A friend had recently bought an aerobatic biplane. He had flown it to Florida, where Jonathan Livingston lived, and asked the 70-plus-year-old veteran ace to test fly it. Jonathan put the plane through its paces in a dizzying hour of loops, rolls, spins, dives, and soaring climbs. He tested it the only way he knew: push it beyond the limits and see if it still holds together. That's how you learned what something could do. Know it beyond what the landlocked safety-crabs would allow. Back on the ground, he climbed from the cockpit.

"It's a fine plane," he told the happy new owner. And then he fell dead on the tarmac of the airport ramp, beneath the still-warm strut of the plane that had carried him on his last flight. That's a true story.

The other story is that many of his friends from young manhood were not at the preacher's part of the funeral, which happened at the Dahl Van Hoof Schoof Funeral Home back in Cedar Falls, Iowa. They did not come to walk by his coffin inside a building; to look at his peaceful, frozen face; to listen to murmured platitudes made loud by stilled room air. They were all out at the airport, warming up their biplanes. The entire time the coffin remained above ground at the cemetery, they flew, one by one, low, loud, fast through the tugging wind, catching their friend's drift, and whirling it with them on and up behind a cloud, then wheeling and diving again. They maintained no formal configuration that the eye could see. The Ancient Birdmen, as they call themselves still, knew that no map was needed nor appropriate to follow Jonathan's free course that day.

His leather flying suit, boots, and wooden propeller stand in a glass case at the Waterloo, Iowa, airport, which was recently renamed Livingston Field. The business flyers who get bored waiting for their jet to Chicago or Dallas sometimes wander over to look at what is left of him. They usually look uncomfortable, as if they don't know what to do with their hands. They usually don't look too long.

Softalk, when it is at its best, pushes young Jonathan Livingston programmers from their safe nests, to take the risks and devote the time to make today's infernal, infant, dangerous-in-their-own-way computers part of the boring world that the shore birds demand, lest they feel unsafe. Jonathan Livingston, his flying togs stuffed and mounted in a glass case at an airport that bears his name in the middle of the prairie, would understand. He would approve.

David G. Sparks, Waterloo, IA

A Twisted Solution

Still plagued by the tear-away covers of *Softalk*? Quit complaining, I've got the answer. Simply turn the magazine inside out. The paper for those On-Line ads is really top quality!

Michael Ching, Honolulu, HI

Slippery Disks and Suntan Lotion

I am a Navy submarine radioman and electronics instructor with a mind that tends to understand both the operational and technical side of things. I bought my Apple a year ago and started my own business as a writer and photographer. No one had to tell me twice to back up my disks. Nonetheless, tragedy struck.

In a recent move, the box containing my disks (originals and backups) fell out of the truck, onto the freeway, and was run over. My disks were scattered by passing cars. It looked sort of like a dust storm. To make matters worse I had packed other household items in the same box including several tubes of suntan lotion. We stopped and gathered as many of the disks as we could find. Many of them were covered with suntan lotion. I figured the data on the disks was as lost as my voice by then. I tossed all the disks into a plastic bag and we finished the job of moving.

Two days later I finally felt calm enough to investigate the damage. To my surprise the disks without suntan lotion on them verified. I quickly transferred their files to new disks, but there was no way I was going to stick any of the suntan lotion coated disks into my precious drives. The following weekend, a friend (who knew nothing at all about computers) suggested I try cleaning them with cotton swabs and alcohol. I tried it, slipped the disk into the drive, and held my breath.

It worked! I wrote Verbatim and heaped the praise high. Paul Moriconi wrote back to make sure I had made duplicate copies of the alcohol treated disks, because the alcohol can have an adverse effect on the magnetic coating, causing it to come off onto the drive heads. Some friends of his in marketing read my letter and sent two free boxes of disks to help defray the expense of all the duplicates.

I'm not the only one who has had good experiences with Verbatim disks. At one of the Honolulu Apple Users Society's (HAUS) last meetings, our president

Protection for the Apple II

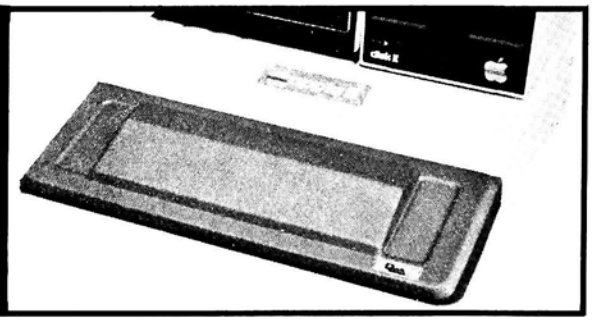
Your Apple is an expensive investment worth protecting from dust and debris with a distinctive, professional keyboard cover. Qwk is that protection. Made of high impact, textured black plastic, the Qwk keyboard cover holds itself snuggly in place on padded arms, requiring no attachments to the Apple chassis. It is quickly removed.

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asked if anybody in the club had ever had any problems with Verbatim disks, or knew anyone who had. The packed auditorium was silent, except for the stir of folks peering around the room. Soon everybody began to smile and nod their heads. Not a hand was raised!
J. Burford Fields III, Honolulu, HI

Manual Dexterity
I got off a rasping complaint to Apple Special Delivery Software last week about the atrocious documentation of the *Utopia Graphics* program, then two things happened. I read Todd Rundgren's letter in June *Softalk* about the history of the program. Secondly, two twelve-year-olds came to visit and to try out the Apple. I had been plodding through the *Utopia* manual in true retired engineer fashion, making notes of all the unanswered questions. I showed the kids how to turn the Apple on and off, which drive to put the disk in, how to make circles and squares, etc. I also handed them the manual as an afterthought. Half an hour later, I returned to find they had created a masterpiece. Now I only hope they can teach me how they did it. I can only conclude that this is a great program.
Harold Fowler, Mercer Island, WA

Venturing a Reevaluation
I, too, was disappointed in Reed Hubbard's evaluation of On-Line's *Cranston Manor* (April, Open Discussion). I feel it is the best adventure program of the many I have. Possibly some of my reasons for liking it are those which led Mr. Hubbard to state it is a beginner's game and not worth his money.

The puzzles in the game have more logic to their solution than I have encountered in other adventures. The clues are out in the open and no obscure vocabulary is required to progress. Contrast this with the same company's *Ulysses* program, which expects a "bribe guard" input (obscure verb) to get a necessary map when there is no hint a map exists, or that the guard might have it. A further highlight of *Cranston Manor* is careful attention to graphic detail. This is especially evident in that the directions open to travel are visible in each picture. Exceptions to this are noted. Few graphic adventures are consistent in screen orientation.

It's probably because of these features that the program can be solved in a reasonable time. Mr. Hubbard took five days and felt it was a waste of his money. I did it in less time and found it a delight. I feel the game sets a standard for the genre. It is the one I haul out at parties.

Mr. Hubbard states he found several bugs in his copy. Besides an implication in the documentation about a nonexistent list of treasures, I found no bugs in mine. I did get a bug-filled copy of another On-Line product. I sent it back and it was promptly replaced at no cost. My experiences with this outfit make me respect them. Their software products are the only ones I will buy without trying them first.
Earl Johnson, Medford, OR

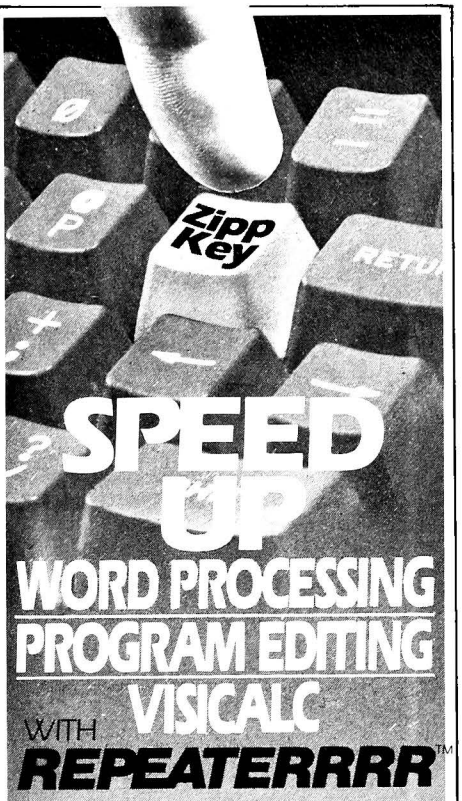
News That's Fit To Print
I would like to extend my sincere appreciation to the folks at Sof/Sys for their excellent program *Executive Secretary*, and to the folks at Videx for their excellent service. We searched for quite a while for a program that would match the needs of a medium-sized publishing company that was used to using very sophisticated multiterminal text processing systems. *Executive Secretary* meets our needs for promotional letters and general correspondence, and it's quite easy to use. We did have some questions, which Doug Ford at Sof/Sys answered promptly. He even called back to make sure things worked right. Videx was equally helpful with a misunderstanding on our part about one of their products. We recommend both *Executive Secretary* and Videx without reservation.
Dan Gringas, publisher,
The Manchester Journal,
Manchester, NH

Comply or Fry
With remorse, I confess. When fellow hemi-hacker Bredhoft begged for information on how to mate his Apple II Plus and his G.E. Terminet 300 printer I callously ignored the plea, figuring it was so simple that someone else would answer him. Now I have a couple of easy questions too, so it seems best to share before asking others to come through for me.

My Apple and G.E. communicate very nicely via a CCS Asynchronous Serial Interface (#7710A) connected according to the directions that came with both. Just be sure to use a grounded line plug for both computer and printer or you may get mucho juice through the card and fry it. We like the fine letter quality print at bargain prices for use with *Apple Writer*.

This brings me to my first question: For versatile word processing for the home, is it better to stick with *Apple Writer* and buy one of the add-on programs, look for a new edition to be released soon, or just switch to something else like *Screenwriter II*? Anyone out there who has done it all please advise.
George S. Forde, Jr., Philadelphia, PA

Service a la Carte
The courteous, professional, and prompt service I received from C & H Video demands public praise. I had previously purchased *The Menu* and upgraded to their most recent version. There was one bug which was quickly corrected after two long-distance phone calls. I was told to always call collect, and calls were returned promptly. There was no need to return the software for correction because the program is not copy protected.



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I have traded programs with my friends on numerous occasions and all were protected software. I would not think of giving away a copy of this software because I was not locked out of the program and they asked me to please respect their copyright. It's surprising what the honor system can accomplish. I highly recommend this program to Mrs. Ray Gada, Jr. (June, Open Discussion). It will store recipes, a menu, produce a shopping list, and, in addition, allow for two user-defined variables.
Joseph Malin, Richland, WA

Musing on Modifications
It's been about a year now since Muse released *RobotWar*. I remember reading about it in a feature article your magazine ran in the January 1981 issue. I could hardly wait for its release. I had visions of little *RobotWar* clubs springing up here and there, people submitting their robot programs to magazines, and local tournaments being held as often as possible.

The program arrived and became the center of attention for my friends and myself for about a month and a half, and then it took its place in my file of disks and has never been seen since. What happened? It had so much promise. Well, one day one of my friends came up with a robot that boxed itself into one of the four corners of the arena and shot at everything it saw. Given the limitations and design of the game, this robot was virtually invincible. Any robot that could overcome this one ended up being too specialized and would get killed by some other rampaging battle machine. So ended our interest in *RobotWar*, and as far as the rest of the world is concerned, their interest seems to have been lost also. To this date, I have only seen one magazine article, excluding reviews, about *RobotWar*.

I think that *RobotWar* could be one of the best games yet for the Apple, if not the very best, if only a few modifications were made. Namely, the battle language used to program the robots is a bit too limited. It would make things a lot more interesting if the robots could be programmed to detect what direction the shot that hit them came from, and also to repair their own damage. Making the arena a hexagon or octagon might also help matters a bit. I don't want it to be thought that I don't appreciate Silas Warner's efforts; the game is a great accomplishment, but I hope that perhaps an updated version might be considered.
Edward Badasov, San Francisco, CA

Disk Diagnostics
Before I get to the subject that inspired this letter, I would like to thank all those who were instrumental in making *Wizardry* as dynamic as it is.

In the past, we have read several letters from consumers distressed by the poor reliability of software. We have asked our floppy disk suppliers to run a series of tests to determine precisely why disks are returned to this software company labeled defective. A sample size of three hundred disks was returned for diagnosis; with two disks, 1 percent of the sample, the problem was traced to the disk manufacturer or operator error. In forty disks, 13 percent of the sample, the problems resulted from direct physical damage to the disks. The remaining 258 disks, 86 percent, suffered from information overwrite.

To elaborate, under the diagnosis of physical damage to disk, our suppliers discovered such things as peanut butter and jam particles, pencil marks, paperclip impressions, pinholes, and severely creased disks, just to name a few. We have had customers phone to say disks were left on refrigerators and microwave ovens, only to find the program inoperative during subsequent use. Without proper disk care, there is nothing we can do to help.

The information overwrite problem deserves the most attention by consumers because, based on the above results, this is the reason why most disks are damaged. We have defined information overwrite as data read back to a wrong area of a disk. There are three principal causes for information overwrite: misaligned disk drives, disk speed problems, and the failure to use surge suppressors. For example, if your disk is turning too fast or too slow in your drive, you can't expect the computer to know which sector of the disk all new information is updated to. As the information is downloaded to the disk, other vital information related to the operation of the program is overwritten. Hence, the next time you want to use the software, it doesn't work. Unfortunately, judging from the consumer complaints, the software companies are the first blamed. I'm not buying this. For such a young industry, manufacturers are aware of quality control.

In short, it's a hostile environment that manufacturers have little control over. This firm has taken certain steps like enclosing tips on drive maintenance with all software sold. In the case of *Wizardry*, we encourage people to make backups of the scenario side using the copy utilities provided with each game. The master scenario should be used only for scenario duplication in the event that the scenario copy becomes unusable due to one of the three above stated reasons.

People have suggested that we should supply backup disks as do manufacturers of business software. The problem with this is the cost involved. Recreational software sells for considerably less than business programs, and profit margins are not there to allow for inclusion of a second backup disk. Outside of suggesting the removal of copy protection, I would be pleased to receive

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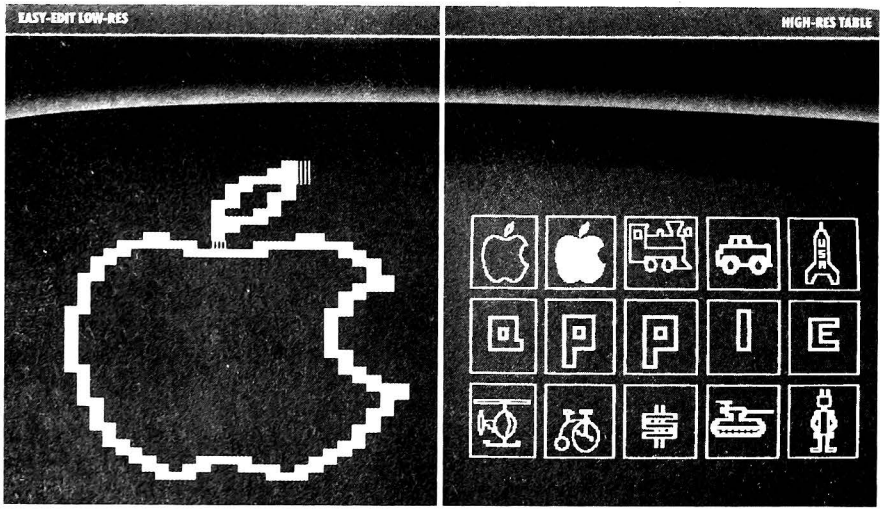
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alternative suggestions for dealing with the problems I have outlined. Please contact me by letter only. Verbal suggestions will be forgotten or inaccurately relayed to me. Address all correspondence to myself. Thank you in advance.
Robert Sirotek, Sir-tech Software,
6 Main Street, Ogdensburg, NY 13669

Picking at Locks

Much of what has appeared in Open Discussion concerning copy protection has missed the point. Cost versus retail price of a program is irrelevant when dealing with the ethical and legal issues of copying a purchased program. If a program does $500 worth of work and can justify a $500 price tag, then fine—it should sell for that. People don't go into business just to cover their costs, and cost-based pricing of a product is a quick way to end up in bankruptcy court.

I have written several programs and my initial reaction was to copy protect them. On reflection, however, it becomes apparent that copy protection is a knee-jerk reaction that is self-defeating to the software publishing industry. If you treat people like you expect them to be thieves, then they will react accordingly, while if you treat your customers with respect, they in turn will respect you and your product. Sure, some people will rip you off and copy something, but more people will buy your product because it will be far more useful to them if they can modify it to fit their needs.

Look at the book publishing industry. Have Xerox machines or public libraries cost them money? Have Xerox machines located in public libraries cost them money? Hell, no—the publishing industry has grown like a weed since the introduction and wide dissemination of the copy machines, and anyone who would outlaw libraries because the readers of the books there can copy them has to be daft.

Copy protection has some major disadvantages for the customer. Most software is sold on thirteen-sector disks so that they will boot on all systems; therefore 25 percent of the disk storage capacity is wasted. Any program that writes to its own disk (like word processors) has less value in this format than it would if it could be copied to sixteen-sector format. I am wary of buying a locked-up program because I will be frustrated when I can see how to make it better fit my needs. Most locked-up programs cannot be used together, and most cannot be used with all of the peripheral devices available to the user. I have used *Super-Text II* for some time, and have been very pleased with it. Because *Super-Text* is locked up, it cannot be used with a modem to prepare and edit files for remote transmission. What am I supposed to do, throw away my *Super-Text* and search for another word processor, investing more money and time to learn to use it?

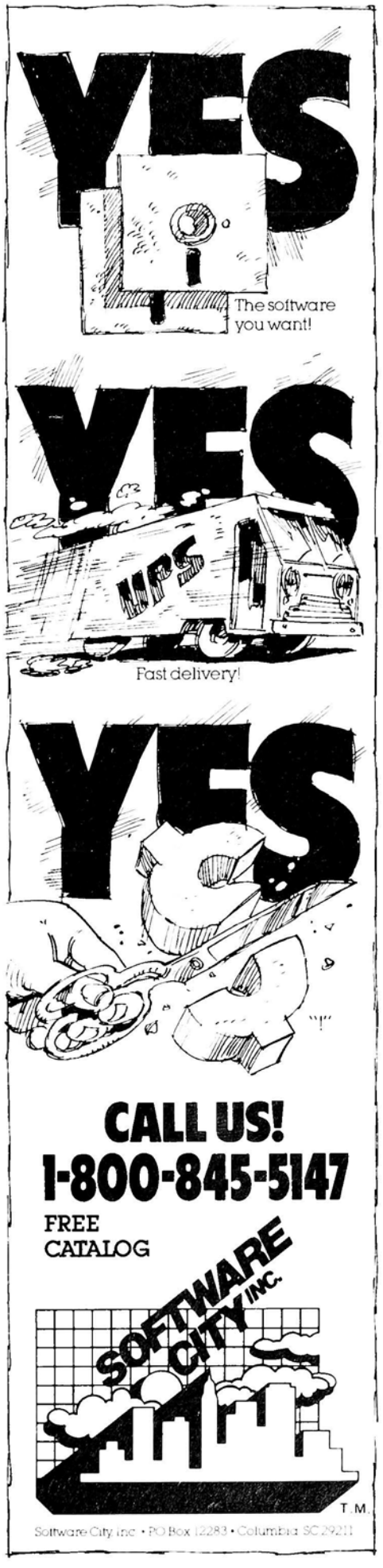
As for the disadvantages to the publisher, presuming his customers to be thieves casts a very serious, harmful attitude upon his organization. Locked-up programs are limited in their utility and lock the publisher out of many sales. Many people have limited budgets; kids are a prime example. Many would purchase more programs if they could get together and each buy one program, copy them for each other and trade, making their money go twice as far. Why try to prevent it? Two more programs have been sold. Sure the publishers feel ripped off, but they can cry all the way to the bank. What is worse: no sale at all or two sales that turn into four copies? Being able to copy programs encourages people to buy them because they know that they will get more value for their money.

The whole issue of copy protection also breeds questionable ethics among the publishers. Sensible Software sells to the public a nibble copier on the premise that it will allow its purchasers to back up copy protected disks and sells copy protection schemes to publishers that it claims cannot be copied with its own nibble copier. And if the publishers think that copy protection schemes are going to prevent large-scale duplication, they are awfully naive. They won't inhibit the large-scale pirate in the least, but only prevent the little guy, the average customer, from making a limited number of copies—presuming him to be a thief. Copy protection encourages thieving because it is a challenge to outsmart the publisher who presumes you to be a thief and then to laugh at him when you are done. Most of the illicit copies are going to people who would not have bought the program in the first place, and therefore do not represent a lost sale to the publisher.

Come on, publishers, unlock your programs. Quit looking backward and worrying about all those illegal copies and, instead, look forward and concentrate more on how to increase your sales by making programs more useful to the buying public.
Gary Griffis, Concord, MA

A Round of Applause

When we at Superior Software first introduced *The Quest for the Holy Grail,* we decided not to copy-protect our disks. We recognize and understand the arguments for protection, but we oppose uncopiable and, by their nature, unlistable and unmodifiable programs. One of the greatest pleasures of owning an Apple comes from learning, and one of the best ways to learn is to review and try to understand what others have done previously. Then you can customize programs to suit your own specific needs or write your own with the knowledge gained. A great many commercial programs would be more valuable to the user if modifications were possible, and locking the program in these instances may even reduce future sales. The risks



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involved are outweighed by the value to the user and the basic fairness of providing quality software that can be listed, understood, modified, and legitimately backed up.

We are not condoning piracy. Duplicating copyrighted work and distributing it (even for free) without permission is, and should be, illegal. Pirates are thieves who should be punished. However, we believe the vast majority of users are honest and will pay a fair price for good software. Apple's Mike Markkula stated recently that he would like to see the elimination of locked software altogether. Also, Mark Pelczarski of Penguin Software announced the decision to go unprotected with certain software. We applaud these efforts. It takes courage and trust in you, the user.
Thorne D. Harris III, president,
Superior Software, Kenner, LA

Mastering the Fine Art of Trade-Off

Much has been said about copy protection and related issues. Since a number of comments have referred, directly or indirectly, to *DB Master,* I'd like to address some of the technical and economic realities rather than hash over the same moral issues. While my remarks will refer specifically to my own software, I assume that authors of other business packages have similar concerns.

DB Master's nonstandard DOS and file structure have nothing to do with copy protection. They were developed, at no small expense, for increased performance in program chaining, data retrieval, and storage capacity. There is copy protection, but that was added much later. I should also point out that ours was one of the first major programs to offer a free backup diskette. For example, we can chain a 16K Basic program module in about four seconds. Standard Apple DOS 3.3 takes about five seconds from a hard disk, and with a standard floppy, it takes over sixteen seconds. Likewise, our data compaction, binary number storage, and lack of track sector lists let us get more data on one data disk than, we believe, any of our competitors. You can also have more than one disk of data per file, a feature that few, if any, of the other Apple database programs are designed with.

Of course, *DB Master*-generated data disks are copiable with any standard copy program. You can catalog them from normal DOS 3.3 to find out which file they belong to and how much data they contain. But even if the files were stored under regular DOS, as they were early in the program's development, most of the data would be unrecognizable without our "unpacking" routines. So it's a trade-off. In trying to squeeze as much performance as possible from what is really a fairly small computer, some compromises had to be made. Since our intended market was the business oriented nonprogrammer, we decided to sacrifice file compatibility in return for program performance.

Why not just make all of our source code available to our customers, and let them make whatever modifications they want? There are many very good reasons for not allowing that.

The folks at Stoneware, our publisher, do a great job of customer support, but there's no way they could begin to support users trying to modify code that Stoneware didn't write. We've turned down a number of offers in the $10,000-$20,000 range for licenses to use our ISAM system because we aren't set up to support a single, sophisticated user trying to work with a system that was never designed for use by others. If only 1 percent of the users of *DB Master* (which was designed for use by others) decided to modify the program or the operating system, we would be faced with hundreds of generally less-sophisticated users trying to deal with, among other things, an operating system that will let you save a program anywhere on a disk, including on top of other programs! Let's says you allow your users to modify your code. Now someone calls your hotline to report a problem in using the program. Is the problem in your code or in their modification? At what point does their customizing void your warranties? What is your responsibility and how much time can you afford to spend trying to trace whose code is doing what?

It took about five man-years of programming time to bring *DB Master* to market. Since then, another five or more man-years have been put into improving, refining (all right, debugging), and adding new features and utility programs. Standard *DB Master* includes about 16K of machine code and over 120K of Basic in eighteen individual modules. It barely fits on one diskette (the hard disk version doesn't), and the Basic code is about as crunched as can be. The operating system is just as bad. A similar problem applies to users who want to run our software on nonstandard disk systems. As for "simple" things like using hi-res graphics for a company logo (as was suggested by one writer), you gotta be kidding! You see, there's this little problem: no RAM at the IN#0. (Sorry about that.) We weren't being nasty or lazy when we decided not to support RAM-based printer drivers. It's just that we've already broken several crowbars trying to wedge a few more features, or a little more file capacity, into the Apple, and folks, there just isn't any more room. On the other hand, we believe our built-in printer support is second to none. What about using extra RAM? In converting *DB Master* to run on hard disk systems, we modified it to make use of a 16K RAM card. This gave us additional room, but now we're back to trade-offs again. What

should we give up (reducing the system for all users) to make room for those few who require RAM drivers to use some nonstandard piece of hardware?

In regard to trade secrets, we've got a heck of a lot of time invested in this system, and we're simply not about to publish commented source code for the world to plagiarize. There are those who feel that spending a couple of hundred dollars on a piece of software gives them (rather than the authors or publishers) the right to dictate how that software should be marketed and what rights they should have to it. Those who feel that way should reevaluate these feelings in light of their professed political and economic beliefs.

Articles have appeared decrying the use of nonstandard operating systems, file structures, etc. I submit that too great an emphasis on standardization can only stifle the creativity, exploration, and willingness to take risks which has brought our industry so far in such a short period of time. Nonstandard systems can cause problems, but they can also solve them. How can a software developer know if they've made the right trade-offs?

In a free enterprise economy, the market will tell.
Barney Stone (*DB Master* coauthor),
San Rafael, CA

The Threatening Approach

In the May Open Discussion, you said most companies require six to eight weeks for delivery. They don't. They can't. It's against the law. Specifically, it's a violation of federal regulations under Section 205 of the Federal Trade Commission Improvement Act for a mail-order business to fail to deliver within thirty days (if no other time period was specified), unless the business notifies the customer that it cannot deliver and offers to refund the money.

A friend and I each ordered a disk drive by mail. When it hadn't arrived after well over a month, I sent a letter asking what had happened and they ignored it. Then I sent a letter following the format recommended by the book and that got their attention; they sent the drive the day they got my letter. Seeing my success, my friend sent them a similar letter, and got his drive equally promptly. Soon after, I started seeing notes in newsletters about slow delivery from that company. Then they stopped advertising. I assume they went out of business.

On the subject of copy protection, I have a TRS-80 at home and an Apple at work. (It should probably be the other way around.) Copy protection is more difficult to do on the TRS-80 than on the Apple. Perhaps that's why few programs for the TRS-80 are protected, and most of those that are can be easily broken. I have rarely seen a serious program that I didn't want to (or have to) modify.

We have *DB Master* at work (yes, it's a legitimate, purchased original). Several people have told me it's a very good program. I wouldn't know; we don't use it. The application I had in mind for it requires that many people be able to use it to look up information, most of them unfamiliar with computers. I can't risk leaving an original of *DB Master* out for them to use. And without modification, the information retrieval would be too slow. To top it all off, examination of the Basic portions of the code turned up a routine, poked in each time the menu program is run, that checks if you are running a copy. If it decides you are, it zaps your memory and your data disk too. I would never entrust valuable data to such a program; what if it thought the original was a fake? So *DB Master* sits unused, while we use a public domain database program I got from the local Apple club and modified to fit our application. Breaking *DB Master*'s copy protection presents the sort of challenge that I'd probably enjoy at home, but really don't have time for at work.
Everett B. Ogden, Delmar, NY

The company in question in May, Omega Microware, supplied to us copies of all documentation showing that their company had shipped the ordered merchandise in excellent time in the instance in question.

The disk drive problem merely emphasizes the value of shopping at a local retailer when possible.

Trusting No Longer

I completely concur with C. Gordon Davison's letter (May, Open Discussion) on Howard's *Tax Preparer*. After not being able to complete our tax return on the revised version, and after reporting in detail the errors in computation of form 6251 and form 4625 by long distance, at our expense, on four separate occasions, we finally had to finish our tax return by hand. We double checked all the other computations since we could no longer trust the program. We never got a reply from Howardsoft. It would certainly be in the best interest of all concerned if Howardsoft would withdraw the program from the market until these errors are worked out. If the program worked properly we would certainly classify it as the best tax program on the market today, but not the way it exists currently.
Mario A. Riojas, Eagle Pass, TX

Counting on Your Experience

I would greatly appreciate any information regarding the *Insoft Accountant* program. This program is only available to me via mail order and has a very attractive price for what seems to be a very complete business package.
John Esquenazi, Eagle Pass, TX



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Just Skewing Around

Since my article, "The Speed Sector," appeared in the April 1982 issue of *Softalk*, it has come to my attention that there is a slight flaw in the 9 descending skew recommended by *Bag of Tricks* and the article. To give credit where credit is due, in an article in *Nibble* (Vol. 3, No. 2), "Faster DOS 3.3," which coincidentally also advocates the 9 descending skew, Craig Peterson pointed out that a *bsave* or *save* to an existing file takes significantly longer with 9 descending than with the standard DOS skew. This is due, for the most part, to the fact that DOS prereads each sector before writing to it. This practice allows random access in text-type files. Unfortunately, the preread fouls up the rotational delay which otherwise would have been minimized with the 9 descending skew. If the file does not already exist, there are no existing sectors to preread, and the rotational delay is minimal. I had noticed this phenomenon while doing timing tests for my article but had mistakenly chalked it up to variations in arm movement due to disk fragmentation.

To avoid this problem, I have developed a relatively simple patch to DOS 3.3 which will automatically delete an already existing file (if one exists) each time a *save* or *bsave* command is given. Adding this patch brings the time required to do a *save* or *bsave* back into line with that of normal DOS with a standard skew, making the 9 descending skew, overall, a clear winner! Given below are my timings for each case:

```
BSAVE NEWFILE,L$7FFF
```

(2 descend = 44.3; 9 descend = 40.5; 9 descend/patch = 41.9)

```
BSAVE OLDFILE,L$7FFF
```

(2 descend = 39.5; 9 descend = 58.8; 9 descend/patch = 42.3)

One word of warning about the patch. First, with the patch applied, DOS will no longer give you a file type mismatch error if you try to *save* over a binary file or *bsave* over an Applesoft file, etc. Personally, I find this a small price to pay. Also, the patch makes use of a (normally) unused portion of RWTS ($BCDF through $BC71 in a 48K DOS) which an enterprising Apple owner might have used for some other sort of DOS customization. To be sure that this is not the case, use the monitor to verify that there is a $88 at $BCDF—if so, it is safe to make the patch. The patch is applied via the *Master Create* program, allowing one to use it to create a DOS 3.3 master diskette. After updating the diskette with the procedure outlined below, it may be reskewed for 9 descending using the *init* program in *Bag of Tricks*, or by other means (if this has not already been done).

Patch to predelete on *bsave* or *save* (press return after each input line):
Insert and boot a DOS 3.3 *System Master*

```
BLOAD MASTER CREATE
```

(Load the *Master Create* program)

```
CALL -151
```

(Get into the monitor)

```
BCDF
```

(Verify that an 88 is in this location)

```
80D:4C
```

(Patch *Master Create* to exit after loading the DOS image)

```
800G
```

(Run *Master Create* to load DOS; wait while DOS image is loaded)

```
ID68:F2
```

(Begin patching DOS image)

```
227B:EA 3C
2440:DF 3C
24A6:DF 3C
24BF:DF 3C
18DF:48 EE 13 29 20 63 22 68 4C D5 23
:A9 20 8D 13 29 4C 80 21
```

(Finish patches to DOS image)

```
82DG
```

(Complete execution of *Master Create*)

Each disk that is inserted and updated during this execution of *Master Create* will contain a copy of DOS 3.3 (master) with the predelete patches applied. To ensure that they were applied correctly, boot the patched disk, try creating a binary file (using *bsave*), and then try to save a Basic program over it. If you do not get the file type mismatch error, the patches are in and working.
Don D. Worth, Valencia, CA

Hello Kitty

Here's a question to Mr. Kersey about the results I've had with his recent hints (May *Softalk*). I've incorporated his (Beagle Bros) *Key-Cat* from *Utility City* into the *Hello* program on several disks. It works beautifully. But when I incorporate changes to the *Hello* program, for example, from Disk Volume 254 to Disk 15-Vol 254 (with the pokes as outlined on page 133), the display comes up as usual for *Key-Cat*, but I can no longer make a selection other than "A" (where the Disk 15-Vol 254 is displayed), and with that selection, I get a syntax error. I would appreciate any suggestions.
Phillip Pocock, San Antonio, TX

Exclusive Software

To Peter Olivieri: Please point out that not all Apple II software runs on the Apple III in the emulation mode. For example, *The Home Accountant*, which you mention in a recent article, does not work fully on the Apple III. The only correct printouts one can get are from the print module (main menu item three). The *P*(rint) on several other modules does not produce meaningful copy on the Apple III. In talking with Continental, a software company that *does* respond to in-

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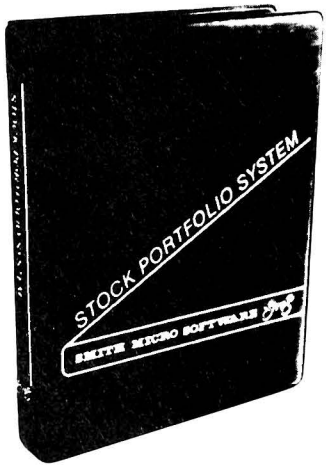
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quiries, I was told that for some technical reasons the print function will not work except through the print module. This is a severe limitation. Of course, Continental has not said that *The Home Accountant* is suitable for the Apple III. It pays to check on each item before buying it; in general the local sales people do not know, I find.
John Stalnaker, Sarasota, FL

Speedy Complements
A brief comment on Assembly Lines for April: The two's complement of a number is derived by performing a one's complement and adding one. This does not imply or require that the original number be positive. Since the two's complement of a negative number is generated in the same manner as a positive number, the same subroutines can be used in the listed program. There is no need to test for positive or negative and then use inverse programs to get the two's complement. This will save memory space and even increase speed of operation by a few microseconds.
Terry Nimmer, Madison, WI

A Couple of Mods
In answer to Tim Klein (June, Open Discussion), I know what *mod* (not a command, but an operator) and the symbol "#" in Integer Basic mean, but why would you want to rewrite a program in the second fastest Basic, when it is now written in the fastest, Integer Basic? Transportability is no excuse now that RAM Integer interpreters and compilers exist. You must have Integer to list the program, so why not use Integer?

Anyway, *mod* is short for modulo, a mathematical term meaning the remainder after integer division. It is most often used to poke the low-order byte of a two-byte number (x *mod* 256) with division for the high order byte ($x/256$). The symbol "#" means "is not equal to," just like the symbol "<>" in Applesoft. The Integer Basic manual explains these things on pages 25 and 57, respectively.
Steve Schonberger, Lincoln, NE

One way to change *mod* to Applesoft is:

```
MOD A(X)=INT((X/A-INT((X/A))*A+.05)
*SGN(X/A)
```

This returns x modulo a, that is, the remainder after division of x by a, if a is not equal to zero.
David Stempnakowski,
Universal City, TX

A Prescription to Fill
I would appreciate any information concerning Apples, user groups, newsletters, etc. I will be attempting to start a user group within our organization and publish a newsletter, and any help would be welcomed. Please contact me at Ortho Pharmaceutical, Route 202, Raritan, NJ 08869.
Robert Ywaski, Raritan, NJ

Mediating Immediate Conflicts
The apparent bug found by Bruce Zweig (April, Open Discussion) is not a bug in the *get* command or the *gosub* command and it is not related to the line number. The error is caused by using the *get* command from immediate mode.

Normally, trying to use *get* or *input* from immediate mode causes an illegal direct error. The reason these commands are not allowed is the fact that immediate commands are tokenized and stored in the keyboard buffer ($200) for execution. Since *get* and *input* also use the keyboard buffer, a conflict over memory allocation arises. Characters entered would overwrite the immediate commands. This is what causes the strange syntax errors. The false line numbers are the result of residue left in the keyboard buffer.

When a *gosub* is executed from immediate mode, the return point will be the rest of the immediate commands contained in the keyboard buffer. Even though deferred mode is in operation when the *get* command is being executed, the *return* command will return back to immediate mode. But by now the keyboard buffer has been changed by the *get* command, which results in a syntax error when the immediate mode tries to resume executing. What has happened is that the interpreter has been tricked into doing an illegal operation: using *get* in immediate mode.

The result of changing the keyboard buffer in the middle of an immediate command sequence is somewhat unpredictable. The fact that no syntax error resulted from using a line number of 50 was purely a coincidence. The immediate command sequence still does not execute properly as shown in listing number one. There appears to be no error

```
]REM LISTING #1
]LIST
50 GET A$
60 RETURN
]GOSUB 50
]GOSUB 50 : ?"TEST"
?SYNTAX ERROR IN 8890
]
]GOSUB 60 : ?"TEST"
TEST
```

when *gosub 50* is executed, but adding a second command to the immediate sequence will cause a syntax error. The *gosub 60 : ? "test"* command shows that returning to immediate mode doesn't cause a problem if the keyboard buffer is left intact.

In fact, any manipulaton of the keyboard buffer can result in syntax errors or strange results as shown in listing number two. The program pokes a *list* token into the sixth byte of the keyboard buffer. Using the immediate command *gosub : :* causes the program to list. Removing the colons from the immediate command will cause either a syntax

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```
]REM LISTING #2
]LIST
100 POKE 517 , 188
110 RETURN
]GOSUB 100 : :
100 POKE 517 , 188
110 RETURN
]GOSUB 100 :
?SYNTAX ERROR IN 0
]
]GOSUB 100
```

error or normal operation.

So the question is whether or not a real bug exists. Listing number three is a perfectly legal program. If you run it and then list it, you will discover that it has erased itself. There is no bug at work here. It is an error on the part of the programmer that he chose to use the same area of memory that the program resides in. Errors caused by illegal operations are not bugs. *Gosub* and *get* cannot both be used in immediate mode and

```
]REM LISTING #3
]LIST
10 FOR I = 2048 TO 2100
20 POKE I , 0
30 NEXT
]RUN
]LIST
```

I think the trade-off is obvious. The Applesoft manual is full of cautions and warnings concerning the use of Basic commands. Using *gosub* to circumvent the normal error checking apparently was not anticipated. Therefore, I conclude that the problem is a result of inadequate documentation.
Paul Stadfeld, Palatine, IL

Further reference to this may be found in the July issue of Call-A.P.P.L.E.

Boss Program
In response to Ms. Naida Dickson's plea for an Apple program that would circle the answers to her word search problems, I would like to suggest that she contact Mr. Ed Herndon, c/o The Mitre Corporation (1812 Space Park Drive, Houston, TX 77058). Ed is the site manager for Mitre in Houston (my boss!), and he has such a program for the Apple.
Bob Jackson, Webster, TX

At Your Service
I am interested in joining the Gamemaster. Could you please print an address for this service?
Michael Knickman, Hampstead, MD

Gamemaster's address is 1723 Howard Street, No. 219, Evanston, IL 60202. The voice line phone number is (312) 328-9009; the dataline number is (312) 475-4884.

Collector's Plea
I am trying to complete my collection of *Softalk* magazines. I have every issue except February and March 1981. I would like to hear from anyone who would be willing to sell these issues or possibly trade for some extra ones that I have. I would also like to get my hands on the first issue of *Softline*. Write me at the address below.

Also, can anyone help me to interface a ham radio receiver to my Apple to decipher Morse code?
James Owens, Box 160,
Kechi, KS 67067

On Track with the Intrepid Programmer
Most of us can identify with Charles M. Larson (Case of the Heavy Manual Cover, Open Discussion, January 1982). Programmers are a talented breed, and we Apple programmers have the best traits. As scientist, mathematician, logician, linguist, artist, and laborer we learn to create life with our computer. But, during development, we sometimes become tangled with our brainchild, feeling helplessly disoriented, and we may want to abort in fear of defects—for example, the can't-continue frustration of the word "never," inferring the absolute knowledge and power of eternity, as it appeared in the editorial statement, "You can never have two programs with precisely the same name on the same disk."

If we discover the truth of two related maxims—"Never say never," and "If all else fails, read the manual"—we will study *The DOS Manual* for enlightenment, insight, and inspiration about the disk operating system. After meditating on it day and night, we might experience a revelation that revives the for-next loop of our creativity.

For this example, we turn to page 25 and learn how to save programs by converting them to disk files. On page 152, we're warned about being reprimanded with file type mismatch if we use a name that belongs to an existing file of a different language on the same disk, and DOS will issue no further warning if we purge, by saving the program in memory, all our existing files of the same identity (name) and language. On page 35, we find we will be flogged with a file locked message if we try to delete or rename a locked file, or save a file with the identity and language of a locked file. If the locked file has the same identity, but is of a different language, saving still incurs a file type mismatch. We're instructed to try again under a separate identity even if we have a twin on the opposite side of the tracks. On page 17, we receive verification that a program is a file convert with a file name. And, as on page 153, we are warned about using the DOS rename in vain, because DOS won't even look for our new name in the directory of existing files. It repeatedly allows us to give every file on earth the same name; though they're not clones, they bear the same birth certificate.

And DOS might look down from memory in just indignation and declare a universal redim'd array error.
James A. Capers, Des Moines, WA

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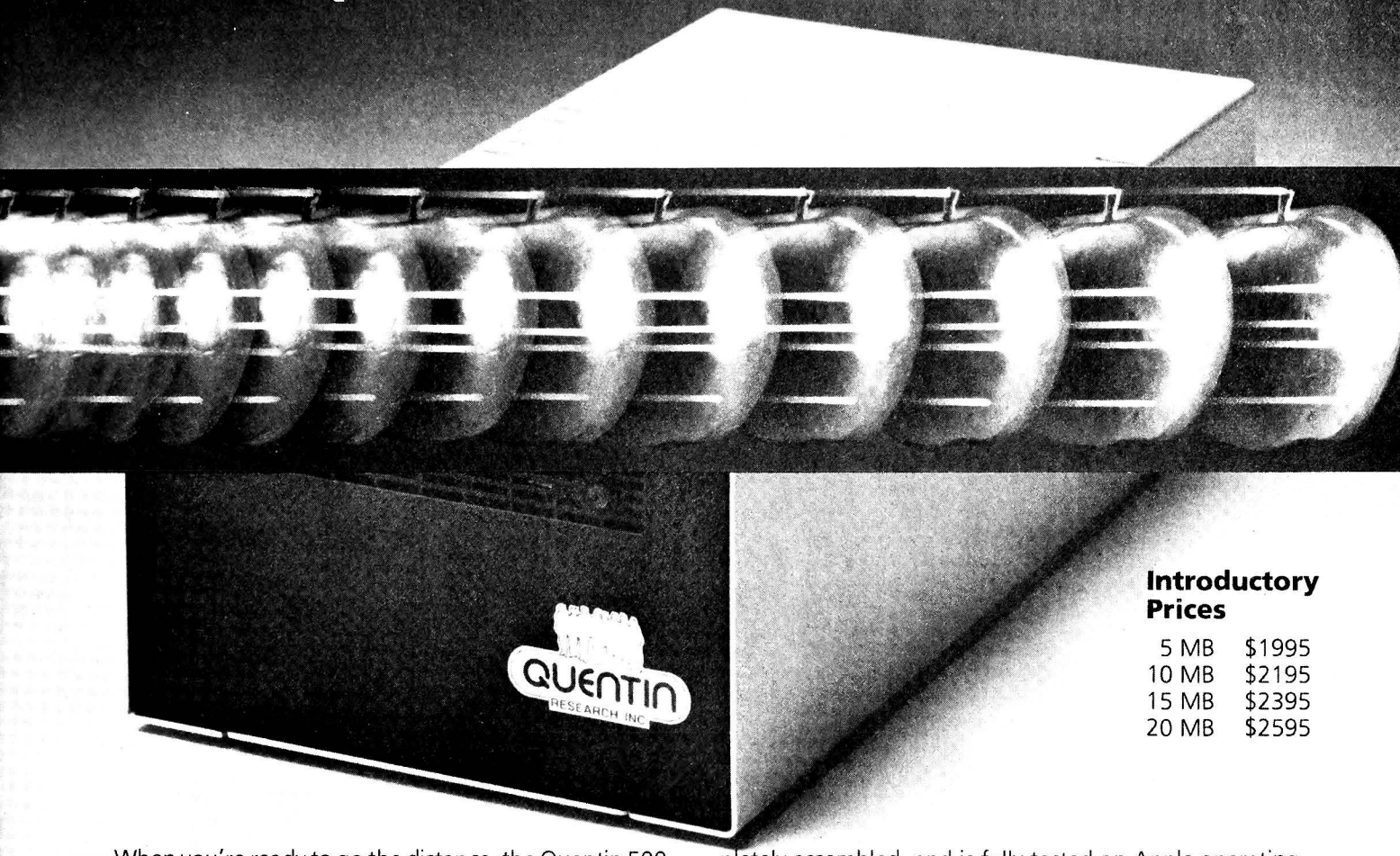
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THE BASIC Solution

By Wm. V. R. Smith

David Durkee subs for Wm. V.R. Smith this month.

This month, we're going to look at a simple disk utility program designed to make life a little easier for programmers who are more prolific than organized. Do you have disks that require three full screens to catalog? Do your disks contain a plethora of files named "TEST," "TESTER," and "TESTER2," which you might have used twice last year to test out routines you were writing? Have you been putting off deleting these unnecessary files from your disks because it seems like so much busy work? Delay no longer: the Excess File Deleter Program is here!

Despite the wordy sales pitch, this program is free, so have a seat in front of your favorite Apple and get set to type.

```
100 ONERR GOTO 220
110 D$ = CHR$ (13) + CHR$ (4)
120 REM MAIN LOOP
130 PRINT "DELETE: ";
```

We will discuss the error handling routine when we get to it. The variable D$ in line 110 is for printing prior to DOS commands. The CHR$ (4) is, of course, control-D. CHR$ (13) is a return, which is necessary for the DOS command to work following a GET statement, which is coming up. Line 130 gives the prompt for the following input routine.

```
140 GET A$
150 IF A$ = CHR$ (27) THEN PRINT D$;"CATALOG": GOTO 130
160 IF A$ = CHR$(3) THEN 370
170 PRINT A$;: INPUT "";B$
180 A$ = A$ + B$
```

This is a neat little input routine that allows you to enter single-character strings with *get* or multicharacter strings with *input* without first having to tell the computer which you are going to do. It works like this. The only single-character commands that this particular program will accept at this point are escape (for catalog) or control-C (to quit). Lines 150 and 160 handle these situations. If the character typed was neither of these, we assume that you are entering the name of a file you wish to delete. The character is printed to the screen and the computer executes an input (line 170). Then line 180 adds the first character to the string that was just input and the result should be the name of a file on the disk. Be sure to put the empty quotes in line 170. They suppress the "?" input prompt.

```
190 PRINT D$; "DELETE";A$
200 GOTO 130
```

Line 190 does the actual deleting, and line 200 unconditionally loops back to the input routine. Remember, if you want to leave the program type control-C when you are given the delete prompt.

The rest of the program is the error handler. Way back in line 100 a flag was set telling the Apple to go to this routine if it encountered an error. As you'll see, error routines can be useful in cases where you know what errors can be expected and you want to do something about them without exiting the program. A disadvantage to using these routines in programs that are printed in magazines and typed in by the readers is that they override the normal error messages. This makes errors that result from typing mistakes hard to debug.

To minimize this problem, you should stop right here and test what you've typed so far. To do this, delete line 100 (just for now) and enter the line *370 end*. Save the program (just to be safe), insert one of those overcrowded disks in the drive, and type *run*. To get a catalog, hit escape. To delete any file that is not locked, type in its name. When you're finished, input a control-C to get out. If it worked as advertised, replace line 100 and go on to the error handler. If not, it's up to you to find out what went wrong.

The error-handling routine was originally included for one reason: to allow you to delete locked files if you want to. However, because it defeats the normal error messages that the Apple is kind enough to give you, a few other contingencies had to be considered first.

```
210 REM ERROR HANDLER
220 ER = PEEK (222)
230 REM RECOVERABLE ERRORS
240 IF ER = 6 THEN PRINT "FILE NOT FOUND":GOTO 130
250 IF ER = 10 THEN 310
```

In line 220, *peek (222)* returns the code of the error detected. If you are curious, you can read more about this on page 136 of the Applesoft manual. All the error codes we use in this program are DOS errors, which are listed on pages 114 and 115 of the DOS manual. Line 240 is fairly self-explanatory. It protects you from getting an error if you misspell a file name or attempt to delete a file that doesn't exist. Line 250 checks to see if a locked file caused the error. We'll see what happens if that was the case later on.

```
260 REM FATAL ERRORS
270 IF ER = 4 THEN PRINT "THIS DISK IS WRITE
    PROTECTED": GOTO 370
280 IF ER = 8 THEN PRINT "I/O ERROR ENCOUNTERED": GOTO 370
290 PRINT "FATAL ERROR ENCOUNTERED—ERR CODE ";ER: GOTO 370
```

These lines are not too cryptic. Lines 270 and 280 cover the errors most likely to occur. Line 290 covers all other possible errors. Note that I/O error and a write protected disk need not be treated as fatal errors. To make them recoverable, simply change 370 to 130 in lines 270 and 280.

Now here's the sine qua non of the error handling routine:

```
300 REM FILE LOCKED HANDLER
310 PRINT "FILE IS LOCKED"
320 PRINT " HIT Y TO UNLOCK AND DELETE"
330 PRINT " HIT N TO ABORT";
340 GET C$: IF C$ <> "Y" AND
    C$ <> "N" THEN PRINT: PRINT: GOTO 310
350 IF C$ = "Y" THEN PRINT D$; "UNLOCK";A$: PRINT : GOTO 190
360 PRINT : GOTO 130
370 END
```

Lines 310 to 330 advise you of the situation and tell you your options. Line 340 asks for your decision in a single keypress and makes sure you gave a legal response. It's always a good idea to do this with get statements in case of an accidental keypress. If so ordered, line 350 unlocks the file and sends Apple back to line 190, where it will try to delete the file again. Otherwise, line 360 goes back to the input routine.

As we pointed out before, an error-handling routine is a useful thing, but can make debugging difficult. Double check your program for accuracy when you key it in. If line 290 aborts the run with an unexpected error code, the message corresponding to that code can be found on either page 136 of the Applesoft manual or pages 114 and 115 of the DOS manual. To get the number of the offending line, type *print peek (218) + peek (219) * 256*. Good luck! ■

It was a partnership that would ultimately lead to the formation of a new business and an exciting career for her son Robert as well as for Sirotek's sons Norman and Robert.

"It all started with Resin Sands," Fred Sirotek recalls. "The sand is coated with five different chemicals during the manufacturing process. About two or three years ago, not a week would go by without suppliers changing raw material prices. It invariably took Mrs. Woodhead about two weeks to recalculate our cost and pricing.

"Not knowing anything about computers at all, I said, 'We should have some kind of crummy computer that could do all this at the push of a button.' At that point I learned that Mrs. Woodhead's son was taking computer science at Cornell. So I said, 'Fine, next time he comes up for Christmas or whatever, let's talk to him.' The long and short of it is that about four days later, while Robert was still on his winter holiday, we had bought an Apple computer. And he proceeded to produce the programs for his mother at Resin Sands as well as for my spoon company."

"I'm still using my son's programs at Resin Sands," Janice notes with a bit of parental pride. "His programs solved our costing problems, so we thought others might find the programs useful. Fred began advising Robert on initial plans to market the programs."

The first plan for Robert Woodhead's infant business called for him to attend a computer show in Trenton, New Jersey, but Fred Sirotek was afraid to send the computer as airline baggage.

"So I asked Norman if he would drive Robert to the show," Sirotek explains. "I think Norman thought he would run over to Atlantic City for some fun while waiting to come home."

An Even Trade. The Boardwalk was to be bereft of Norman Sirotek's presence that year. "Little did I know what I was getting into," he remembers. He was fascinated by the computers at the show and promptly suggested to Woodhead that they work together on the business. Woodhead agreed, and the two returned to Ogdensburg as business partners.

Norman Sirotek, now Sir-tech's director of finance and administration, has an affinity for independent business activity. "At the time of the Trenton trip, I had been in Clarkson College for two years in a management program and had just decided to switch into engineering." But Clarkson lacked adequate drafting courses. Sirotek left Clarkson and went to work in construction with his father in Canada, taking drafting courses on the side. Then came the Trenton trip. "For a year after that, I worked construction and went to school while doing Sir-tech as a weekend hobby. It was something fun."

By the end of the year, the weekend hobby had become priority for Norman Sirotek. "I detested having someone tell me what to do and think. I quit school, stopped working construction, and put all my energies into the company, keeping Bob in touch with the business while he was finishing school."

Ivy League Computing. Woodhead's initial familiarity with the industry began with a part-time job at the Computerland of Ithaca while he was attending Cornell. He was able to work with most of the systems on the market, primarily programming business applications on North Star and Cromemco computers. That's when he set his sights on owning an Apple, "the best personal computer I could expect to afford."

"That was when they were 4K. I remember a customer who had 12K in his machine and we all thought he was nuts. He could actually run hi-res graphics. We looked at them and said, 'Enh, so what, good grief, lo-res is much better; more colors.' We couldn't see what you could do with hi-res. We weren't ready for the potential of the machine.

"Though I wanted an Apple, my first computer was a TRS-80 that I bought at a bargain basement price from the Ogdensburg Radio Shack. I got a really great price because nobody here knew what to do with a computer. I went back to school and was fired from Computerland because my boss found out I owned a TRS-80. He said it was like a Chevy dealer driving a Ford."

Computerland Ithaca's loss was the Cornell School of Hotel Administration's gain. Woodhead programmed a restaurant menu display graphics system still in use today. A year off from school followed, and Woodhead became involved in a variety of programming ventures, including a budding partnership with an acquaintance from school, Andrew Greenberg.

Going with Your Big Guns. Sir-tech's initial product line in the spring of 1981 consisted of a database program, *Info-Tree*, and an arcade-type space game, *Galactic Attack*. Mail order sales were generated through magazine advertising. Weaknesses in the database documentation and the gaming preference of magazine readers focused Sir-tech's early efforts on *Galactic Attack*.

"It was a good start for the boys, learning from the ground up," Fred Sirotek observes. "Neither Robert Woodhead nor Norman had too much business experience. I guess they both had some credits from the university on the subject, but in terms of hands-on experience they didn't have any. So Norman would come to me for help—you know, 'What do I do with this, Dad?' I'd either produce a suggestion or direct him to what he needed. Although I am technically the president of Sir-tech, the boys have always run the company on a day-to-day basis. I'm there when they need me."

"By not being involved in day-to-day activities, my father brings a clearer perspective to our broader planning efforts," elaborates Sir-tech marketing director Robert Sirotek. "We sometimes lose our objectivity down there in the trenches."

To the Barricades. Robert Sirotek volunteered for trench duty after being disillusioned with career opportunities in a large minicomputer company. "I had completed a business degree at Clarkson College and was working as a programmer. I got tired of the bureaucracy, saw what was going on here, and quit the job. I wanted to throw my full efforts in with Robert and my brother.

"Because *Galactic Attack* sales were picking up, Norm was steeped in administrative work. To market our products, I had to get to know them, including any under development."

What was under development was *Wizardry*.

"I had an idea for a *Dungeons and Dragons* type game," Woodhead explains, "and, just on an off chance, had an opportunity to talk to Andrew about it at school. It turned out he was thinking of doing a similar game. He had much better ideas than I had about the actual internal structure of how the game would work. I had some ideas about how I wanted the game to look and interact with the player. So we got together and collaborated on the development.

"I did the majority of the programming on the game. Andrew concerned himself with the data structures, the design of the scenario, the very tricky criteria in terms of how things work inside the game. It was a situation where we each did what we were best at."

Rob Sirotek played some early versions of it and thought it was fantastic. But Norman wasn't interested.

"I guess I was guilty of some conventional thinking," Norman chuckles. "I remember late one evening telling Bob Woodhead to forget the new game and put his efforts into something worthwhile, like a business package. I said nobody wants or needs the game. Bob looked straight at me and said I was wrong and went back to work."

Woodhead and Greenberg worked a total of two and one-half man-years over a sixteen-month period: about fifteen hundred lines of code a month, fifty lines a day, one line every nine minutes. They had the program actually running in November 1980, showed it at a computer show, and got an order.

"Two months after *Wizardry* came out, I was ready to eat my hat! I'm glad I wasn't more convincing with my argument," Norman says.

"The closer we got to release," adds Robert Sirotek, "the more excited we became. But my father wasn't yet convinced."

"The boys thought that it was a great game," Sir-tech's top




Two promising alumni of Cornell University, Andrew Greenberg (left) and Robert Woodhead.

advisor confirms. "But as far as I was concerned, computers were business machines. They weren't fun machines. You do things with them that you need. I certainly did not realize that there is such a relatively large segment of the population that has the computer only or mostly for pleasure. One of the questions on the registration cards was, 'How many games do you own?' I started seeing 'fifty games,' 'one hundred games,' 'too many to count' on the replies. . . . It's convincing. Somebody with that many games isn't doing too much business work on the computer."

"Though he didn't really understand computer gaming," Norman Sirotek says, "my father did make a valuable contribution to the product. He insisted that the program could not be released until the instruction manual was readable by people without computer backgrounds."

Manual Labor. "Although we had made substantial improvements on the manual," Robert Sirotek reflects, "we still weren't prepared for the volume of player questions. A few days after the release, the phone calls started coming in. Many were technical things that the manual addresses but some people don't understand until they hear it. But an equally large amount of calls had to do with solving the game. You know, 'I am on the ninth level with my eleventh level characters and can't for the life of me find the entrance to the tenth level! Where is it?' "

"At that time the company name was a pretty bad pun, Siro-tech," Robert Woodhead smiles. "After about the fourth phone call at the Sirotek home around four in the morning, we dropped the 'o' to become 'Sir-tech' and made sure the company phone number was in prominent places on the manual and packaging."

The volume of orders and the large number of phone calls caused significant changes in Sir-tech's operations, "making us work long hours every day of the week," Robert Sirotek adds.

Once the orders built up, they just kept coming. That's when the company added Peter Bresett and Lynn Dupree in production and expanded a single machine to a multiple machine disk copying system. The daily production went from less than one hundred disks a day to more than five hundred a day.

By the end of its second month of distribution, *Wizardry* was threatening *VisiCalc* for the number one bestseller spot.

Help from Above. They rarely lose production time due to machine failure. Bresett had lost his job as an air traffic controller during the strike; he brought with him a strong ability to attend to details and cope with the stresses of production. And Dupree "seems to have a sixth sense about which of the machines is getting ready to act up.

"Keeping the disk duplication system fine-tuned is critical to our production process," Woodhead says. "We have 128K RAM boards in each of the copy machines. This allows us to hold an entire disk side in memory for writing to the production disk. This full disk write must be done to both sides of the disk. Each disk is then encoded with a disk serial number in a separate operation. Then the disk must be fully booted to ensure that the copy is good. If one of the machines isn't working, it messes up the whole process."

"And the duplication system has to double for customer service uses too," Norman adds. "Industry experts warn software publishers about the overhead involved in supporting business applications compared to game programs. They should visit here for a day. People take *Wizardry* very seriously. Every day we get letters with disks enclosed requesting that we raise favorite dead characters, find lost parties, you name it. We even had to include waivers of liability in case we aren't able to recover a character."

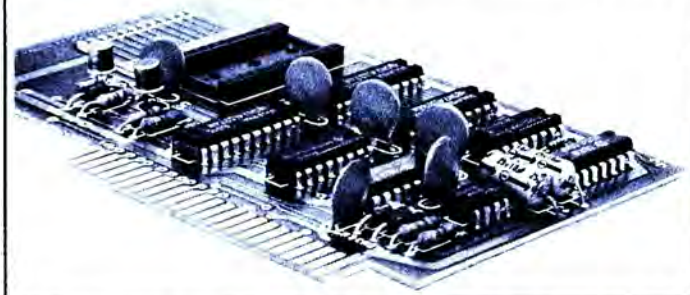
Covering All the Bases. Having addressed the production and customer service needs, it was Robert Sirotek's job to improve the company's marketing efforts. Since *Wizardry* was essentially selling itself, he turned his attention to the distribution channels. Up to the release of *Wizardry*, Sir-tech dealt primarily in direct mail order with a small list of retailers. But as the retail store sales caught on, a way had to be found to get the product out without having hundreds of small-volume orders.

Robert Sirotek quickly sought out the best software distributors. He had little trouble negotiating significant bulk purchases. "Selling such large volume orders is a difficult task for marketing people in other software houses who don't have the kind of buyer demand that *Wizardry* has," Sirotek says.

"We still sell to a few retailers directly," he admits. "Unless they specifically want to keep in contact with us directly, I explain that we rely heavily on distributors for ensuring rapid availability of the program. Most find that my referral gets them their order quickly. This improves my distributor's sales and everyone is happy. I believe Sir-tech has one of the strongest distribution networks in the industry. Certainly our advance distributor orders for *Knight of Diamonds*, the second *Wizardry* scenario, attest to that."

Sequel Success. In what is traditionally the slowest period of sales in the software industry, *Knight of Diamonds* entered the July *Softalk* Top Thirty in the number two position, the highest rating earned by any Apple software publication in its first month of release. Such staggering sales growth has forced

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Sir-tech to continue its keep-it-simple approach to management organization.

"With the first scenario under our belts," Norman Sirotek recalls, "we knew better what to expect when we learned that Andrew, Robert, and WARG were closing in on completion of the second scenario."

WARG is the Wizardry Advanced Research Group, a bunch of *D & D* enthusiasts at Cornell, where Greenberg is finishing a doctorate in computer science. "They work out the details of the scenario and Andrew and I make it work," says Woodhead. "With *Knight of Diamonds*, we had much of the control program complete from the first scenario. We simply had to change parts of the code that handle the way new things and situations work. Of course, those changes brought out thirty bugs; we'd fix those, and thirty new ones would show up. It was frustrating, but not as difficult as writing the first."

"Since my brother was able to estimate closely the flow of initial orders for *KOD*," says Norman, "my administrative responsibilities were clear-cut." Sir-tech hired Lisa Carpenter to help on the production end and bought a shrink-wrap machine that produces professional packaging totally in-house.

The Importance of Being Earnest. "We like to think that everyone here works with us, not just for us, so keeping interpersonal relations good is very important," Norman Sirotek says. "I enjoy the people aspect of administration, which is probably one of the few management skills I brought from construction that's helping me out here."

"Keeping everyone happy and working well together is becoming increasingly important," Robert Sirotek adds. "Just as production personnel has expanded, we've added office personnel to assist in the marketing and sales efforts. Jean Bromley handles secretarial and telephone reception duties. Our sister, Linda, is working with us this summer to help out in the office. Together, we are able to keep a healthy flow of orders into the production room."

"With the *Wizardry* scenarios paving the way, it is clear that Sir-tech is becoming a powerful software marketing company," Robert Woodhead remarks. "I am our chief connection with Andrew and the WARG group as far as developing new scenarios. We can sell them as fast as we can develop them, but there's a limit, so we have to look for other means of product development.

"In this respect, I see my job developing away from actual programming toward managing programmers," Bob continues. "For example, I'm working with a Canadian programmer, Gordon Eastman, who has written *Star Maze*, our next release. He's a fantastic programmer, but he needed a good idea. So I designed the game, and he programmed it. I like to work that way. I have loads of arcade game ideas but lack the patience to do the actual coding. I'm sort of a big-project person; I like the challenge of a program like *Wizardry*."

Business School—the Wizardry Way. All the staff has seen their jobs change since the release of *Wizardry*. The demands of the market required them to learn quickly.

"That's why I love working in our own business," Norman Sirotek reflects. "I've learned six times what I would have if I'd stayed in school. Of course, I've had to work ten times harder. But the rewards are there. Like when we hear that a child psychiatrist, Dr. Ron Levy in New York, is using *Wizardry* in the diagnosis of emotionally disturbed children. That our game is being used to help kids is amazing to me. I have a much deeper appreciation for what Andrew and Robert have accomplished."

"There is even a course at the University of Pennsylvania where *Wizardry* is used to teach decision making and systematizing information," Robert Sirotek says.

"My job is as big as I make it, not like at the minicomputer company where everything was spelled out. We have to keep learning and growing. It's what makes the 120 percent effort we put in here worthwhile."

Fred Sirotek rejoins the conversation. "The boys are so right; over the last year I have seen them go through substantial changes. It has been valuable experience because if any young man steps into an organization—to exaggerate, say General Motors—and gets a segment of the operation under his wing, then he learns that segment inside and out. But there are ninety-nine thousand other segments he will never get to see in that organization. The kid just doesn't have a chance to see the full spectrum, from dealing with banks to working with suppliers, to handling credit, and so on. You just can't step into an organization and find out very quickly for yourself what's important. If you start up the business, it sort of grows on you and you grow and learn in the process. I don't think the boys realize how much they have learned."

New Spells for Old Wizards. Packing a year of experience under their belts, Sir-tech management is looking toward the future.

"We have realistic growth plans based mostly on the near future," Robert Sirotek says. "Over the next few months, we have our work cut out for us simply keeping up with the demand for the first and second *Wizardry* scenarios. Between production and customer service, we'll be extremely busy."

Star Maze is Sir-tech's entry into strategy-oriented home-arcade gaming, the first of what is hoped will be more third-party programmed software for Sir-tech to market. They are also searching for good programmers to work directly with them in an internal development group.

"I believe we will investigate the business application side of the market in the not-too-distant future," Norman adds, "although I'll never again suggest that we drop *Wizardry* for it."

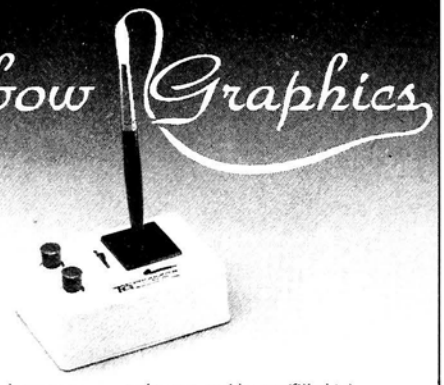
"And, of course, more *Wizardry* scenarios," Robert Sirotek emphasizes. "You stick with a winner."

"As long as the boys continue to build better mousetraps," concludes Fred, "they'll be able to sell them. What lies ahead? We shall see . . . we shall see."

Judging by initial performance, building better mousetraps is a native quality, inherent in the Sirotek-Woodhead alliance.

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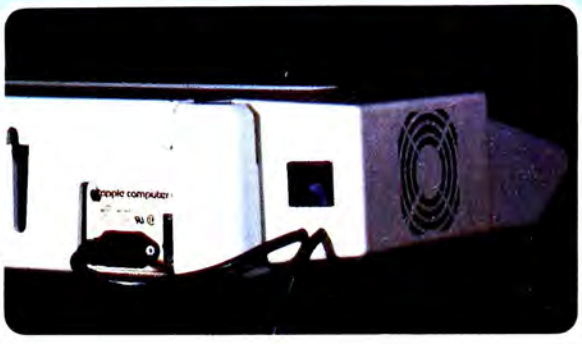
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Peeking and Poking The Apple III



BY JOHN JEPPSON

Picture the Apple II programmer perusing an *Apple III Basic Manual*. Much nodding and smiling. So powerful, so easy . . . so many new built-ins.

But wait. Something's missing. Where are they? Try the contents. Not there. The index? Not in there either. How about the list of reserved words? Here we go: *pdl, perform, pop, prefix$*. Good grief! They've left out *peek* and *poke*!

Doubtless you're in shock. The Apple III's creators left out *peek* and *poke*. They say you don't need them, that the Apple III's operating system takes care of all that. SOS they call it (pronounced "sauce"), the sophisticated operating system. Big Brother in binary.

The weird part is, they're right. You don't really need *peek* and *poke*. The Apple II has a lot of little peeks and pokes that in the Apple III are done directly with Basic statements or by writing control codes to the device drivers. And the big pokes—well, if you're going to insert an assembly language routine, there's a proper way to go about it. You're supposed to fire up Pascal, use the assembler to encode your machine language program, and call up the resulting code as an invokable module from Basic. Is this really possible? Certainly. In fact we're going to do it right here and now. And what assembly language routine shall we write? Why peek and poke, of course. Ha! We'll fix 'em.

What they say is: even if you had peek and poke, it wouldn't do you much good. SOS is constantly moving things around inside. You never know where SOS is going to put something, so how can you peek at it? To a certain extent this objection is valid. SOS loads program segments and places variables wherever it finds room at the moment; only SOS knows where. And while most variables remain at the same address once allocated, some don't even do that. If you make a series of assignments to a Basic string:

```
)Xstr$="abc": Xstr$="cdef": Xstr$="ghijk"
```

each Xstr$ is stored in a new place. So how do you know where to peek? the argument runs.

Peeking Toms. Of course, you may not want to peek just at your own programs. Perhaps what you really want to do is to look at the operating system. Sizable chunks of the operating system do have reasonably predictable addresses that might somehow be exploited. But that is just what those friendly folks at Apple want you not to do. They have provided a great variety of "legal" ways to use the operating system, such as powerful language packages, standard drivers that include very fast graphics, and assembly language modules that may include some thirty-six different SOS calls. But they don't want you messing around in the operating system directly. This policy is not merely to protect trade secrets. While it's true that *SOS.Kernel*, the central part of SOS, is considered proprietary information, Apple Computer has few worries about that. You won't soon unravel the complexity of SOS.Kernel unless you're so bright that you're wasting a national treasure by spending brain time on the task.

There's a more important reason for keeping peek and poke out of applications programs. The Apple III is not intended to be a static, finished product. Rather, it is an evolving computer system. Improvements are expected; indeed, they have already begun. And these improvements will be made to *your* existing machine by simply booting another disk that incorporates the changes. Apple wants your programs to run properly on the advanced Apple IIIs of the future. And they will, if you simply conform to the rules and stick to the tools provided. If your program uses "carnal knowledge" of the operating system and takes shortcuts by poking some magical spot, well, that spot probably won't be there after the next upgrade. And you'll be back to square one.

So why write peek and poke? It's not that we harbor an overwhelming compulsion to pollute the system with "illegal" programs. We'd just like to know what's going on in there.

Congratulations, It's a Chip. Like the Apple II, the Apple III uses the 6502 microprocessor chip. But the 6502 cpu has only a two-byte program counter. That is, it handles memory addresses that are only two bytes, or sixteen bits, long. Now it's an inescapable fact that there are just 64K (2^16 = 65,536) different combinations of sixteen binary bits, so it would appear that the 6502 limits a computer to 64K bytes of memory. How does the Apple III handle four times that much? It turns out there are two distinctly different ways to do this: *bank switching* and *extended addressing*. The Apple III uses both.

Think of the computer as a black box. Imagine that inside the box there is a smaller box. We'll call it a "switch box." Inside that switch box is the 6502. The function of the switch box is to shield the 6502 from the hard realities of life; to delude it into thinking that it lives in a nice, simple 64K machine. In other words, all the 6502 ever sees—all it knows about—is a 64K





stretch of memory. This keeps it very happy. What the 6502 doesn't know is that the 64K bytes of memory it's using are a bit slippery. They aren't the same bytes from one microsecond to the next. The switch box watches the 6502 and when the 6502 isn't looking swaps chunks of the real 128K (or 256K) memory in and out of the active 64K that the 6502 is using. The 6502 just goes on about its business, oblivious to the changing universe around it.

Fetch, 6502. Fetch! When the 6502 wants a bit of data, it performs a memory fetch. What happens is that the desired address, one of the 64K memory locations, appears on the sixteen address lines of the 6502 chip. That is, each of the sixteen address pins on the chip is given either high voltage or low voltage to represent 0 or 1 in the corresponding address bit. Because the chip has only sixteen such pins, the addressable memory is only 64K bytes. To address more memory you'd need extra pins. With seventeen address lines you could access 128K, with eighteen lines you'd get 256K, and so on. In the Apple III, the extra address lines are supplied by the switch box. The 6502 doesn't know it, but the memory chips actually get a twenty-bit address that's sixteen bits from the cpu and four bits from the switch box. The switch box (really some extra circuitry watching the 6502) gets those extra bits from one of the memory registers—hexadecimal location $FFEF, the *bank register.*

Not all 64K bytes that the 6502 uses are swapped. Locations $0000 to $1FFF and locations $A000 to $FFFF, a total of 32K bytes, comprise the *system bank* and are always on line. The other 32K, locations $2000 to $9FFF, constitute one of several different 32K user banks that can be switched in. The bank chosen is indicated by the value of register $FFEF. Thus, if $FFEF contains 2, the 6502 will be dealing with 64K locations made up of:

```
$0000..$1FFF + $2000..$9FFF + $A000..$FFFF = 64K
   Bank S         Bank 2         Bank S
```

The low nibble (bits 0,1,2,3) of $FFEF can contain sixteen different numbers, 0 through 15, or hexadecimal, $0 through $F. One of these numbers, $F, is reserved for a special purpose, but each of the remaining fifteen numbers ($0 through $E or 0 through 14) represents a bank of 32K memory bytes that might be switched in. So this scheme can handle 15 x 32K (480K) plus the 32K S-Bank, or 512K bytes of addressable memory. The present hardware maximum is 256K bytes, but the scheme has room for more in the future.

Don't Bank on It. Bank switching is great if you don't have to do it very often. You can run along in one bank for a while, then switch and run in another. But if you're running in one bank and want to fetch some data from a table in another bank, it's cumbersome. And slow. Several operations are required: you must store a new value in the bank register, fetch the data, and then switch back again by restoring the original contents of the bank register. All for one byte of data. Furthermore, the program code that actually does the switching must be located somewhere in the system bank (the part that's not switched). If the program were running in the switched-in bank at the moment it decided to change the bank register, it would instantly dematerialize itself, a form of suicide reminiscent of killing your own ancestor in a time warp. Suddenly, you never were. The 6502, of course, goes blithely on and fetches the next instruction from the corresponding spot of the newly switched-in bank. The results are generally strange.

Fortunately it is possible in the Apple III to access any byte of memory, in any bank, directly, and with a single operation. This technique is called *extended addressing* and works with any of the 6502 instruction codes that use the zero-page indirect indexed addressing mode. For example, the instruction *LDA ($2B),Y* tells the 6502 to load into the accumulator the contents of that memory byte whose address is found by adding the contents of the Y-register to the address stored in zero-page locations $002B and $002C. That "indirectly" obtained address is the one placed on the sixteen address lines of the 6502 chip.

Take Me to the $1600 Page, and Step on It! But, to access more than 64K memory locations, you need more than sixteen address lines. Once again, the switch box does the trick. Whenever the switch box sees that the 6502 is performing one of those indirect indexed instructions, it quickly adds in the extra address bits. In this case the extra bits are obtained from a memory register called the *Xbyte*. Each zero-page location ($0000 to $00FF) has "associated" with it another memory location at the corresponding spot in the $1600 page ($1600 to $16FF). Thus, if an address is stored as the contents of locations $002B and $002C (a total of sixteen bits), the Xbyte (the extra bits for the extended address) will be the contents of location $162C. So when your program performs a zero-page indirect indexed instruction, the address actually used is twenty

bits wide. And twenty bits is more than enough to get all the memory in the computer.

To the more technically minded reader, a question immediately arises. How is the value that is stored in the Xbyte memory location actually delivered to the circuitry of the switch box? Does the 6502 have to perform extra load and store operations, or what? It sounds like it might be very slow, but it isn't. The mechanism is peculiar, even bizarre. In fact, you should probably skip the next several paragraphs completely. No? Well, the story starts back with the Apple II.

The Apple II, like all respectable computers, transfers information to the video screen by direct memory access(DMA). The screen display must be refreshed and rewritten about sixty times every second, and the information used comes from a pattern of bytes stored in a specified stretch of memory. In the Apple II, the text currently on screen occupies memory locations $0400 to $07FF, a total of four pages, each consisting of 256 bytes (1,024 bytes of memory). So a lot of memory has to be accessed every second just so you can read the screen. Collectively this region of memory is known as Text Page 1. (We'll capitalize Text Page to distinguish it from a page of memory, which is a sequence of 256 bytes whose addresses all have the same high-byte.) The Apple II video Text Page is actually four pages of memory.

A Helpful Vulture. Information is not transferred to the screen by the 6502 cpu chip. That would be very slow and would tie up the cpu with a task unworthy of its time. Instead, there's additional circuitry in the video output section that watches the cpu. Periodically the cpu gets busy churning away inside itself and the address lines fall idle. The video DMA circuits then seize the address lines and make a quick data fetch of their own. Because DMA uses the address lines only when the cpu doesn't need them, the 6502 buzzes right along and doesn't even realize what's happened.

The Apple II also sets aside another 1,024 bytes of memory as an alternate source of video information. This is Text Page 2, which occupies the adjacent region of memory, locations $0800 to $0BFF. These two regions are identical, so any particular spot on the video screen is mapped from corresponding memory locations in each of the two regions. The corresponding spots will always be $0400 memory bytes apart. Thus, $04A3 and $08A3 represent the same screen location as stored in the two Text Pages, respectively. Now it just so happens that in the binary number system the Boolean statements *$4 X-OR $0C=$8* and *$8 X-OR $0C=$4* are both true. (X-OR is the Boolean operator *exclusive OR*.) This means that it's easy for the computer to move from a spot in one Text Page to the corresponding spot in the other. It's just the page number (the high-byte of address) *X-OR*'d with *$C*. And just why this is relevant to Apple III will emerge forthwith.

When it came time to design the Apple III, it was deemed desirable to incorporate an Apple II emulation mode. So, at least in emulation mode these two regions of memory continue to be used for video. Thus the Text Pages were kept around. It was also deemed necessary that the Apple III, in its native mode, have an eighty-column text screen instead of the forty columns of the Apple II.

Double Vision. The change to eighty columns presented a problem. Exactly twice as much data must be moved from memory to screen with every video refresh. DMA must access twice as many memory locations in the Apple III as it did in the Apple II—and it really can't take twice as long to do it. What to do? Well, there are those two separate text screens. Why not use them both simultaneously? So in the Apple III the memory access path was made sixteen bits wide.

Every time a "fetch" is sent out over the address lines, the fetch returns not one, but two bytes of memory: the byte requested and a corresponding byte from the memory location with page number *X-OR $C*. For DMA, this is great. It retrieves both text pages simultaneously and they are inter-

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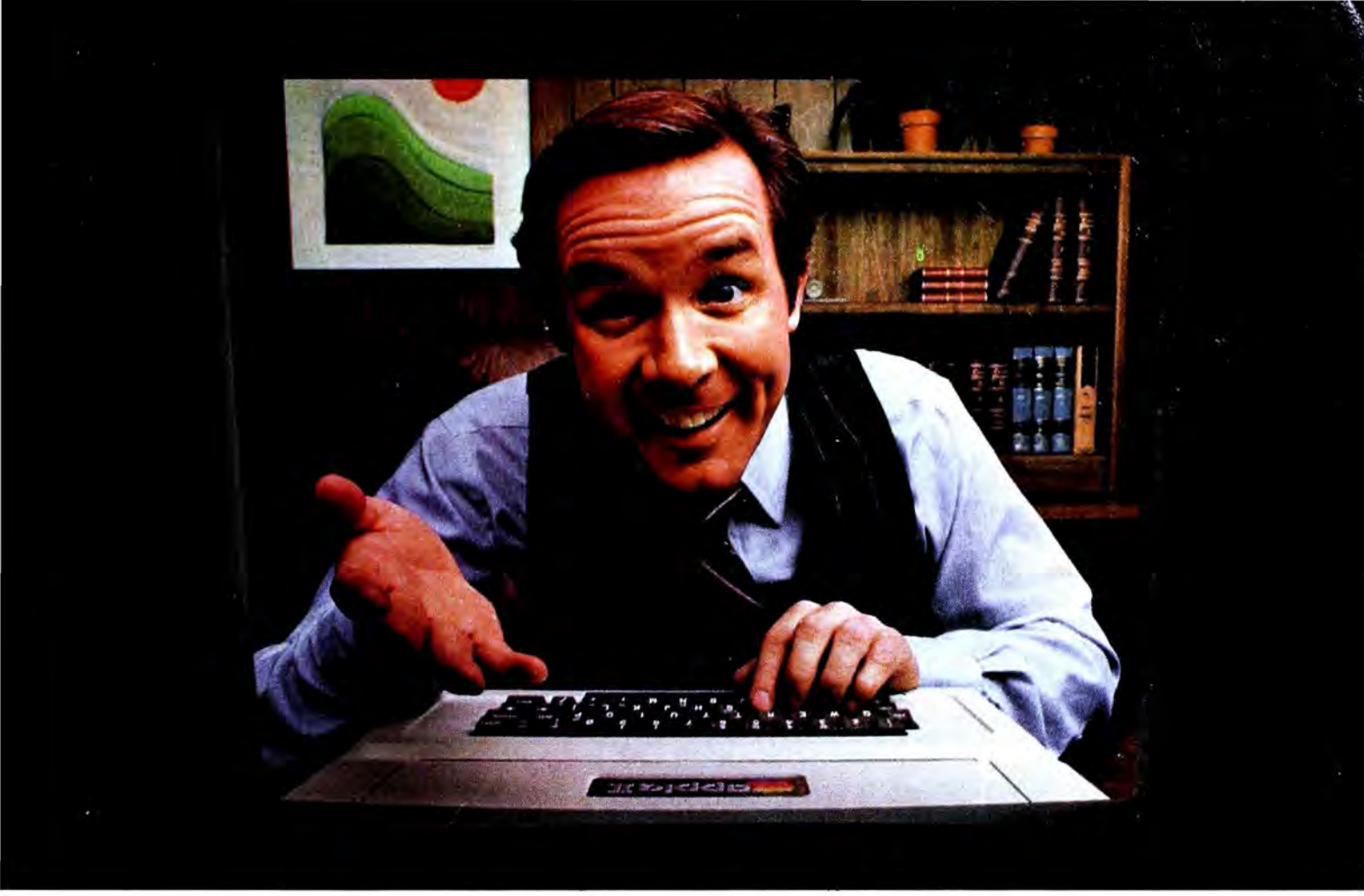
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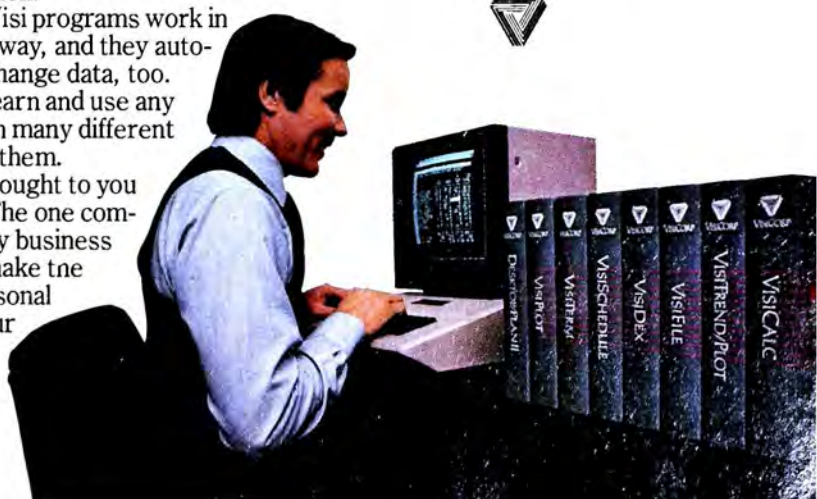
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woven on the screen; a byte from one, a byte from the other. You end up with forty-column screens superimposed, with the second display shifted one-half column sideways. And there's your eighty columns. Of course that extra byte is also returned in an ordinary memory fetch by the 6502. But in that case it is simply ignored.

At this point some absolute genius at Apple, whose name we don't know, figured out that the extra byte returned by an ordinary memory fetch could be exploited. This extra byte could provide the extra bits of information needed to extend the address space of the 6502 beyond the 64K (sixteen-bit) limitation. When the 6502 performs a zero-page indirect indexed operation, it must go out to memory to the designated spot on zero-page and get the address it will use for the data fetch. Since the address will be sixteen bits, or two, bytes long, it must go to zero-page twice. First it gets the low-byte of the address, then the high-byte. But the switch box has been watching the 6502 for signs of just this type of operation.

The Prodigal Byte Returns. When the high-byte of the address is returned, the switch box grabs the extra byte that is returned with the address but normally neglected. That is the Xbyte. The information from the Xbyte is quickly placed on the "extra" address lines, and there's the 6502 addressing a full 512K bytes of memory. So the Apple III gets extended addressing more or less for free, as a by-product of the DMA video apparatus. Furthermore, it's very quick, adding a maximum of one clock cycle to the five-clock-cycle memory operation. That Apple engineer, whoever he is, really earned his pay the day he thought that up.

"Aha," you say, "hold on just a minute. That extra memory byte from the DMA business is supposed to come from the location at page number X-OR $C. But when you go after the address you are accessing zero-page, and $0 X-OR $C is not $16. You said the Xbyte was located on page $16. What gives?" (Aren't you sorry you didn't skip all this? You were warned.)

Actually we have another little deception. Zero-page is not really zero-page. It is actually page $1A, and $1A X-OR $C is indeed $16. So the Xbyte is coming from the right place. What's happening is that the poor innocent 6502 thinks it's getting zero-page but it's really being fed something else. It's that switch box again. Every time (really, every time!) the 6502 tries to access any location on zero-page, the switch box yanks the zero-page reference off the address lines and substitutes another "zero-page." In this case it is the page whose number is stored in location $FFD0, the *zero-page register*. So in the Apple III there are a bunch of zero-pages. Languages and user programs are assigned zero-page $1A (locations $1A00 to $1AFF), SOS uses zero-page $18, and interrupt-handling routines use the true zero-page $0000 to $00FF. It's actually possible to designate any page as the zero-page, but the Xbyte extended addressing mechanism works only for zero-pages in the range $18 to $1F.

If you aren't already dazed, you will be overjoyed to learn that the 6502 *stack-page* is also switched when the zero-page is switched. Normally the 6502 considers the stack to reside permanently on page $01, that is, locations $0100 to $01FF. But page $01 can also be thought of as zero-page ($00) X-OR $1. In the Apple III, any instruction that uses the stack (PLA, PHA, and so on) actually uses the current zero-page X-OR $1. So if the zero-page is $1A, then the stack is on $1B. But in this case the reassignment process can be independently disabled by changing one of the bits in yet another special register, ($FFDF) the *environment register*. (Maybe next time.)

A Word from Mad Ave. To clear your mind, try contemplating one of the mysteries of the advertising world. The Apple III, as you may know, does not have the field completely to itself. There's a tiny company in New York, with a little-known three-letter name, that has recently moved into the "small" computer business. You've probably never heard of it. Anyway, the machine they make has a sixteen-bit cpu. A veritable revolution according to the ads. But its memory is only nine bits wide—eight data bits and a parity bit. So every time that machine performs a memory fetch it gets just eight bits of data. Nevertheless, because of its cpu it calls itself a sixteen-bit machine. The Apple III, on the other hand, returns sixteen bits of data with each memory fetch. Does that make it a sixteen-bit machine too? It's hard to say. Maybe it depends on who writes the advertising copy.

Extended addressing is really much easier to use than it is to explain. The key to success is to fix firmly in your mind that the 6502 must, at all times, have 64K bytes of memory to work with. No more, no less. All the complicated swapping around must conform to that principle. Most of the time the cpu sees the upper and lower sections of system bank with one of the user banks switched into the middle:

```
$0000..$1FFF + $2000..$9FFF + $A000..$FFFF = 64K
  S-bank         user bank       S-bank
```

We'll call this *ordinary addressing*. Each user bank is 32K bytes long, which is $8000 in hexadecimal. We can talk about a particular byte in a particular bank by using a number in the range $0000 to $7FFF (which is the size of the bank). Location bank 2/byte $43DE is a spot a little above the middle of bank 2. Now the switch box is going to take this whole bank and place it somewhere in the field of 64K bytes that the 6502 is looking at. In "ordinary addressing" as we have just defined it, that bank will start at what the 6502 is now calling $2000. So far as the 6502 is concerned, that location just discussed will be found at $63DE ($43DE + $2000).

In the lower section of the system bank ($0000 to $1FFF), one page will appear twice. If the 6502 looks at page $1A ($1A00 to $1AFF), it does indeed get page $1A. But if it looks at zero-page ($0000 to $00FF), it also gets page $1A, assuming, of course, that the value of the zero-page register ($FFD0) is $1A—as you will normally find it to be. And yes, the stack-page is also, usually, "duplicated," depending on that bit in the environment register ($FFDF).

Cpu, Meet a New Array. Extended addressing presents the cpu with an entirely different 64K byte array. This occurs only during the data fetch portion of a zero-page indirect indexed operation. The 6502 has already got the address and is now going after the actual data. The Xbyte determines just which chunks of memory are presented to the 6502. For extended addressing, the Xbyte must read $8n where *n* can be any hexadecimal digit. If the Xbyte reads $0n, you'll just get ordinary addressing as defined above.

In extended addressing the cpu sees a pair of user banks, banks n and n+1. For example, if the Xbyte is $80, then the 6502 is looking at:

```
$0000..$7FFF + $8000..$FFFF = 64K
  bank 0         bank 1
```

Alternatively, if the Xbyte is $81, then the 6502 sees:

```
$0000..$7FFF + $8000..$FFFF = 64K
  bank 1         bank 2
```

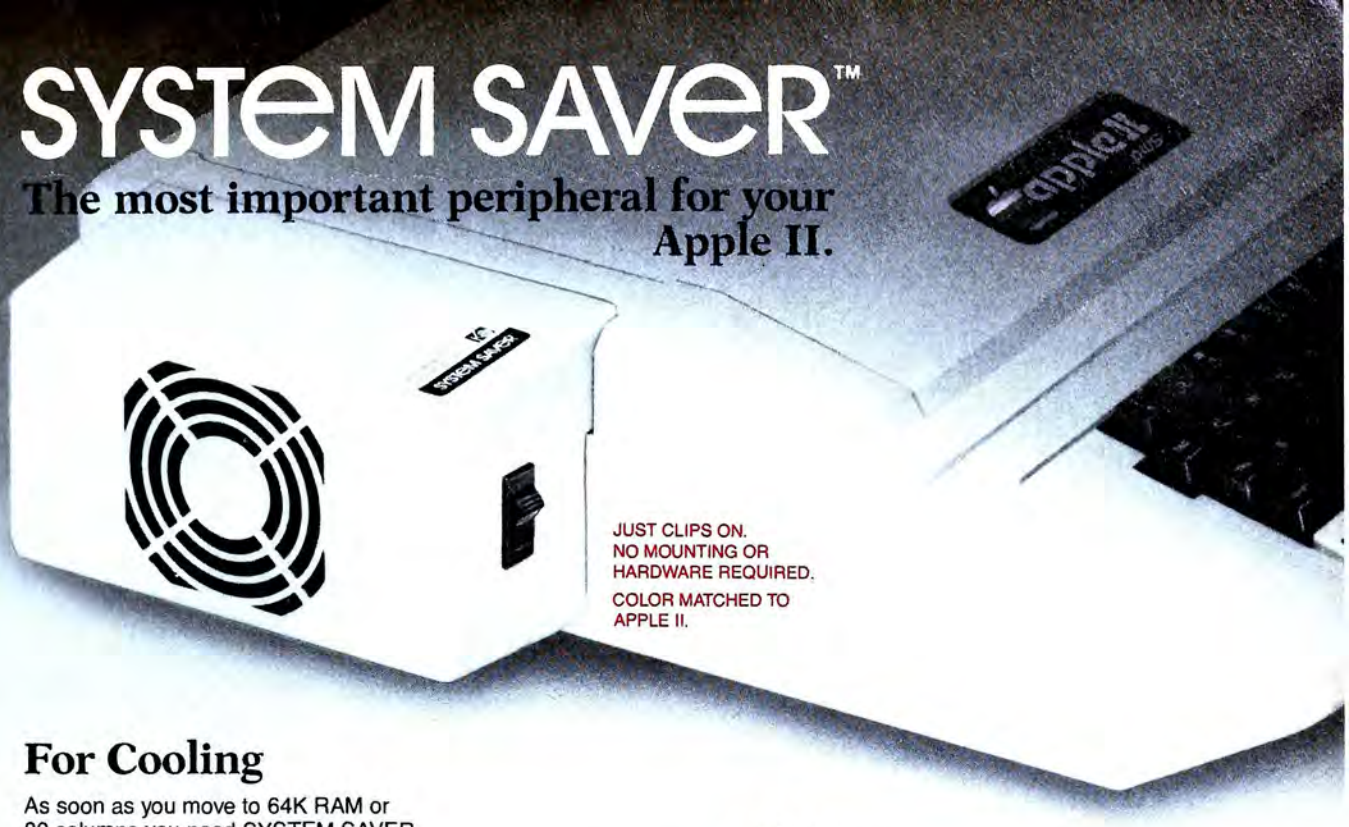
Notice that a location in bank 1, say $13AB, can be found either as $13AB of bank pair 1,2 (Xbyte = $81) or as $93AB of bank pair 0,1 (Xbyte = $80). It's the same memory byte, but it can have more than one address depending on where it is placed in the 6502's field of vision.

Pascal and Basic each leave a chunk of zero-page for you to use for extended addressing in your own assembly language routines. In Pascal you are given $00E0 through $00EF, and in Basic you get $00E8 through $00F7. These regions overlap, so if you are careful you can use the same assembly language routine with both languages. Suppose you want to load the accumulator with the contents of byte $341D of bank 1. We'll use Xbyte = $81, which looks at bank pair 1,2. The zero-page location where we will store the address (pointer) is $00E8 and $00E9. First, store the desired address pointer on zero-page:

```
LDA  #$1D  ;low byte at lower location
STA  $0E8
LDA  #$34  ;high byte at higher location
STA  $0E9
```

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The most important peripheral for your Apple II.

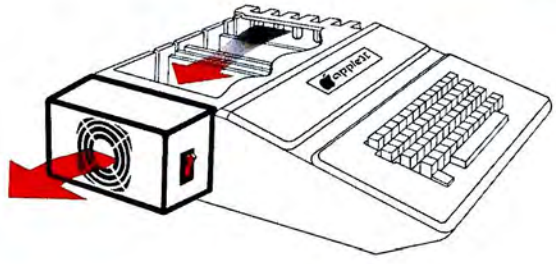


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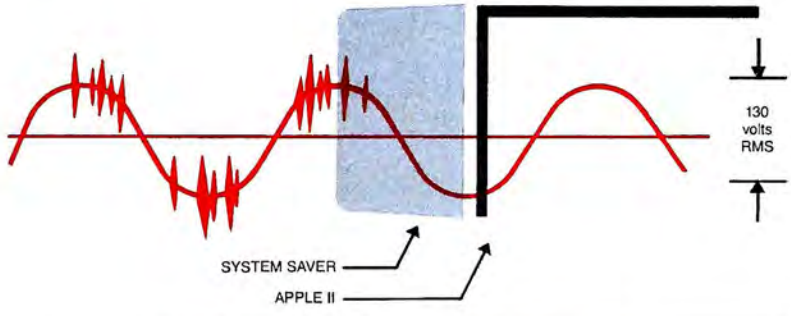
SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.



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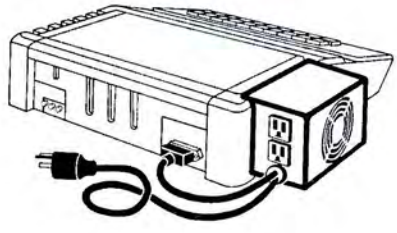
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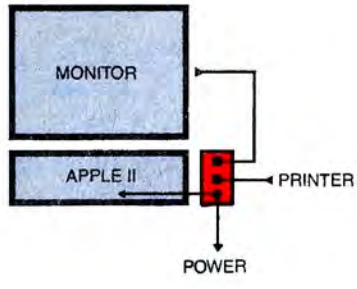
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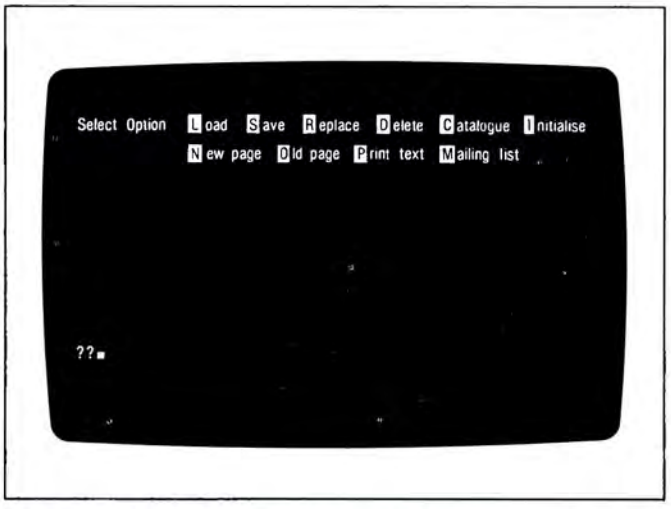
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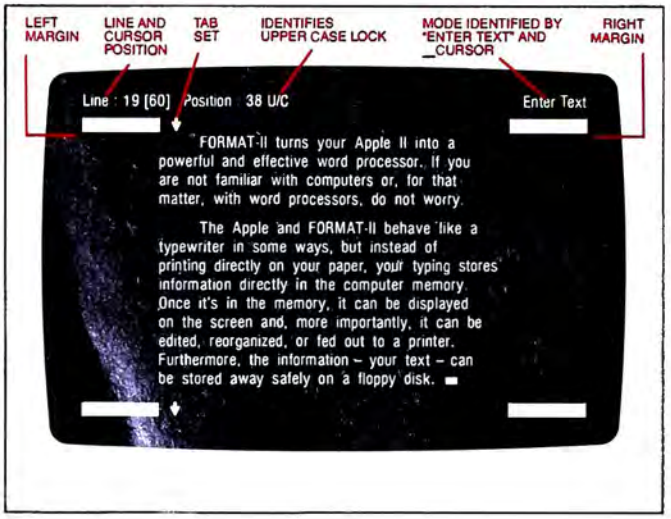
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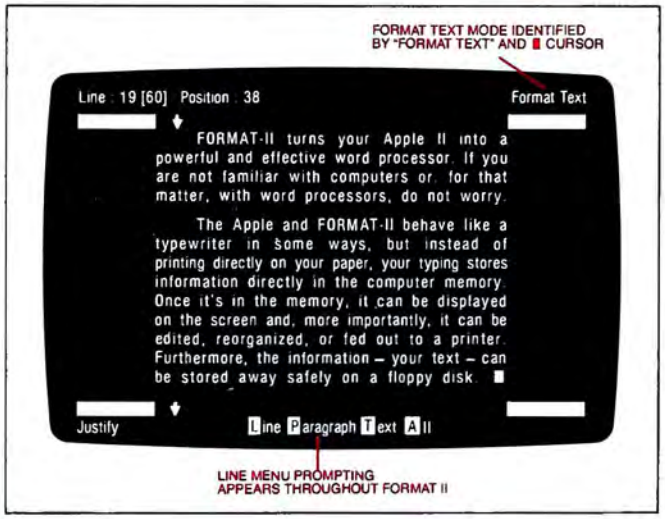
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[B]lank...out text.
[C]enter...text.
[D]elete...text.
[E]dit...text.
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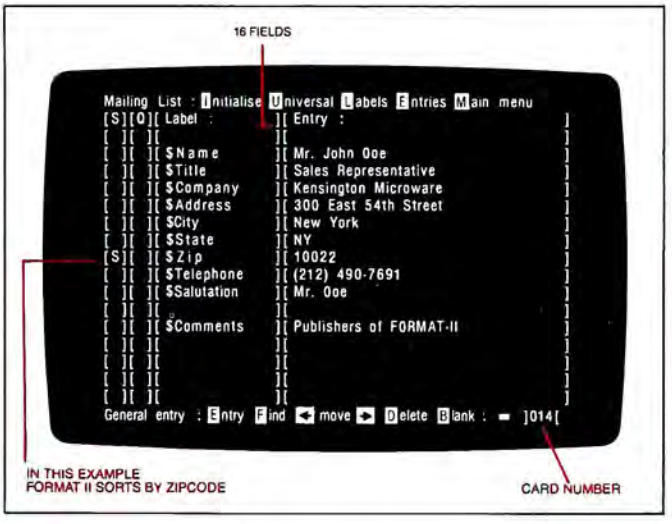
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Then store the Xbyte at the corresponding spot in the Xpage:

```
LDA  #$81
STA  $16E9
```

After setting the appropriate value in Y-register ($0 in this case), we fetch the data with:

```
LDA (@$0E8,Y ;same as "LDA ($0E8),Y"
```

Note the alternative Apple III indirect notation using @ and omitting all parentheses. The assembler will also accept standard 6502 notation. By simply incrementing the Y register you may step through a whole page of memory without changing the zero-page pointers at all.

There is one problem. Remember that a reference to zero-page *always* results in a swap for the current zero-page whose number is stored in $FFD0. If you want to look at the lowest page of bank 1, say, $0023/bank 1, you can't get there by asking for $0023 of bank pair 1,2 (Xbyte = $81). You will just be given $1A23 from the system bank because you've made a zero-page reference. Instead you must ask for location $8023 of bank pair 0,1 (Xbyte = $80). It's the same place, but you have avoided the zero-page reference problem.

Lower than Low. "Ah," you say, "but what do you do about the bottom page of bank 0? There is no bank number lower than 0, so you can't perform the same trick." That's a good question, especially since bank 0 is where the Apple III puts its graphics, and you may want to meddle with the graphics screen from assembly language. Several areas of the screen are in that lowest page of bank 0. In this case there is a special technique, *$8F addressing*. Use extended addressing with Xbyte = $8F. This produces a 64K block that looks like ordinary addressing with bank 0 switched in. The desired page will now be found as $2000 through $20FF.

$8F addressing has another handy feature. In all other forms of addressing, the area $FFD0 to $FFEF is very special. These locations are not actually in RAM at all. They are on the two VIAs (versatile interface adapters) that the Apple III uses for all sorts of goodies including part of the "switch box" mechanism responsible for the fancy footwork. All the special registers are in this area, and it is always on line. The corresponding locations in RAM are normally not available, but $8F addressing is all RAM, including the thirty-two bytes of RAM "under" the VIAs. And what is squirreled away there? Why, the system clock, of course. That's why the clock is protected when the Apple III is rebooted.

The environment register really deserves a separate article of its own. Table 1 lists the function of its bits without discussing them.

Down to Business. The accompanying assembly language program contains the function peek and the procedure poke. It depends primarily on extended addressing but, regrettably, uses less legal methods as well. After assembly, the resulting code can either be linked to a Pascal program or invoked from Basic as an invokable module. It works the same way in both languages.

Peek is a function and returns an integer value, the contents of the memory location at which you've peeked. The function requires two parameters. You must supply the address (as viewed by the 6502) and the Xbyte. Both are passed as integers. In Pascal you declare peek an external function:

```
functian peek (addr, xbyte : integer) : integer;
   external;
```

You may then make an assignment statement to an integer variable:

```
int := peek (addr, xbyte);
```

In Basic the process looks like this:

```
10 INVOKE "peek.pake.cade": REM the pathname af the cadefile.
100 int = EXFN%.peek(%addr,%xbyte)
```

Poke is similar, but since it doesn't return anything (except, occasionally, disaster), it is a procedure. It has a third parameter, the value to be poked. *Value* must also be an integer.
In Pascal:

```
pracedure pake (addr, xbyte, value : integer);
   external;
```

then one can use:

```
value := 128;
pake (addr, xbyte, value);
```

In Basic:

```
10  INVOKE "peek.pake.cade"
100 value = 128
110 PERFORM pake(%addr,%xbyte,%value)
```

Don't forget that the variables are all decimal integers. You may want to enter them and display them as hexadecimal strings, but you will have to convert. Basic has handy built-ins: HEX$(integer) and TEN(hexstring). In Pascal you will have to write your own.

The *address* can be any legal, ordinary integer. *Value* and *Xbyte* must be integers in the range 0 to 255. If they are greater, the integer *MOD 256* is used. Only certain Xbyte values have meaning; all the rest are treated as 0. Table 2 has some useful Xbytes and some comments. There are a couple of peculiarities that you should know about:

1. Nothing terrible happens if you give the Xbyte of a bank pair that doesn't exist (yet)—for example, ($8C = 140). Peek will either return $FF, signifying nothing, or some value from one of the existing banks—also of little use.

2. The artificial Xbyte $FF (decimal 255) isn't actually used as an Xbyte. It is merely a signal to the function to do all sorts of illegal things to the environment register, zero-page register, and interrupts in order to get at areas normally inaccessible. With this "Xbyte" you get a block that looks like ordinary (system) addressing but with "true" zero-page and "true" ($01) stack-page. Also, the area $C000 to $CFFF is "I/O space," and $F000 to $FFFF is the read-only memory used in the boot process.

Bit	Value	Functian
0	0	$F000..$FFFF = RAM
	1	= ROM
1	0	ROM = ROM #2 (but it daesn't exist)
	1	ROM = ROM #1 (if switched in with bit 0)
2	0	alternate stack (= zp x-ar $1)
	1	narmal stack (page $01)
3	0	$C000..$FFFF — read/write
	1	— read anly (write pratected)
4	0	RESET KEY — disabled at keybaard
	1	— enabled
5	0	Videa — disabled
	1	— enabled
6	0	$C000..$CFFF — RAM
	1	—I/O space
7	0	Clack speed — 2 mhz.
	1	— 1 mhz.

Table 1. The enviranment register, $FFDF.

Hex	Decimal	Result
$00	0	"ardinary" system bank. User bank at $2000..$9FFF
$80	128	bank pair 0,1
- -	- -	- -
$82	130	bank pair 2,3 — bank 3 nanexistent in 128K machine
- -	- -	- -
$86	134	bank pair 6,7 — bank 7 nanexistent in 256K machine
$8F	143	like system bank. Bank 0 ta $2000..$9FFF. ALL RAM!
$FF	255	"artificial" — gives a system type bank with 1. "true" zera-page and stack-page 2. $C000 ta $CFFF = I/O space 3. $F000 ta $FFFF = ROM

Table 2. Xbyte values.

Note: There are locations on $C100 page of I/O space that will cause the computer to "hang" just by reading them. It really isn't dangerous, but you'll have to reboot.

A Program by Any Other Name. Boot up Pascal, enter the editor, and type in the program. Capital letters are not required. Neither are the comments, but it would be a shame if you left out all of them. You can save a lot of typing by just typing in peek and duplicating it with the copy buffer. Then go through and make the necessary changes to convert one of them to poke. Save the program on disk. Use a path name of ten characters or less and permit the editor to add the suffix *.TEXT* to your path name (for example, *peek.poke.text)*.

Next, enter the assembler and assemble the program. The assembler will want to add the suffix *.code*. Let it. Otherwise the resulting file will not be type named code file and will not invoke properly. Later you can change the name (for example, *peek.poke.inv*) and the type name won't be affected.

The output of the assembler *is* the invokable module. Move it to your Basic disk and invoke it by its path name. You can then use either peek or poke at will in your program. Details of the required Basic program syntax may be found starting on page 160 of the *Apple III Basic Manual*.

Pascal is even simpler. You just declare peek and poke as *external* and use the linker to add them to your program.

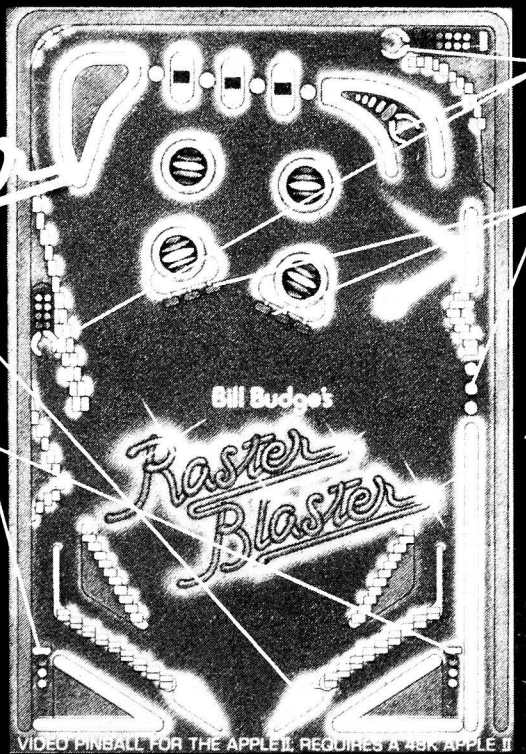
PEEK.POKE.TEXT — Source Code

```
.MACRO   POP
PLA
STA      %1
PLA
STA      %1+1
.ENDM
.MACRO   PUSH
LDA      %1+1
PHA
LDA      %1
PHA
.ENDM

ADDRESS  .EQU     0E8          ;zeropage "pseuda" register
BANKSW   .EQU     0FFEF
ZEROPG   .EQU     0FFD0
ENVRMT   .EQU     0FFDF
         .FUNC    PEEK,2
         JMP      BEGIN
RETURN   .WORD    0
XBYTE    .WORD    0
RESULT   .WORD    0
OLD_XBT  .BYTE    0
OLD_ZPG  .BYTE    0
ENV      .BYTE    0
BEGIN    POP      RETURN
         PLA                   ;"dummy" bytes far function
         PLA
         PLA
         PLA
         POP      XBYTE        ;parameters came off in reverse order
         POP      ADDRESS
         LDA      ADDRESS+1601 ;save original x-byte value
         STA      OLD_XBT
                               ;which bank is desired
         LDA      XBYTE
         CMP      #0FF         ;FF = ROM #1, C0-CF = I/O,
         BEQ      SPECIAL      ;    "true" 00 and 01 pages
         CMP      #80
         BMI      SYSTEM       ;80-8F=extended addressing
         CMP      #90          ;    else system bank (ordinary 6502)
         BMI      EXTEND
                               ;handle system bank
SYSTEM   LDY      #0
         STY      ADDRESS+1601 ;xbyte = 0 so get ordinary 6502
         LDA      @ADDRESS,Y   ;    indirect indexed addressing
         STA      RESULT
         JMP      DONE
                               ;handle extended addressing to a
                                  bankpair or $8F
EXTEND   STA      ADDRESS+1601 ;place extend byte
         LDY      #0
         LDA      @ADDRESS,Y   ;"extended" addressing to desired
         STA      RESULT       ;    bank pair
```


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```
        JMP     DONE
                                ;handle artificial bank 'FF'
SPECIAL LDA     ADDRESS+1
        BEQ     TRUEPGS         ;true $00, $01 desired?
        CMP     #1
        BEQ     TRUEPGS
                                ;ROM#1 —> F0000-FFFF,
                                   C000-CFFF—>I/O
        PHP                     ;save status, then disable interrupts
        SEI                     ;(an "illegal" mave)
        LDA     ENVRMT          ;save enviranment
        STA     ENV
        LDA     #73             ;#% 0111 0011 — new environment
                                   reg
        STA     ENVRMT          ;(an "illegal" mave)
        LDY     #0
        STY     ADDRESS+1601    ;system bank xbyte = 00
        LDA     @ADDRESS,Y
        STA     RESULT
        LDA     ENV             ;restare ENVRMT
        STA     ENVRMT
        PLP                     ;restare status (including interrupts)
        JMP     DONE
                                ;desired address an true 00 ar
                                   01 page
TRUEPGS PHP                     ;save status, then disable interrupts
        SEI                     ;(an "illegal" mave)
        LDX     ADDRESS         ;laad BEFORE leaving ald z-page
        LDY     ADDRESS+1
        LDA     ZEROPG          ;save ald zpg
        STA     OLD__ZPG
        LDA     #0              ;changes zera-page ta 0, stack ta 1
        STA     ZEROPG          ;(an "illegal" mave)
        TYA                     ;is high byte 00 ar 01
        BEQ     $1
        LDA     0100,X          ;indexed addressing (x = addr)
        JMP     $2
$1      LDA     0000,X
$2      STA     RESULT
        LDA     OLD__ZPG        ;restare ZEROPG (and stack page)
        STA     ZEROPG
        PLP                     ;restare interrupts (status)
DONE    LDA     OLD__XBT        ;restare Pascal's xbyte
        STA     ADDRESS+1601
        PUSH    RESULT
        PUSH    RETURN
        RTS
        .PROC   POKE,3
        JMP     BEGIN
RETURN  .WORD   0
XBYTE   .WORD   0
VALUE   .WORD   0
OLD__XBT .BYTE  0
OLD__ZPG .BYTE  0
OLD__ENV .BYTE  0
ENV     .BYTE   0
BEGIN   POP     RETURN          ;parameters came aff in reverse arder
        POP     VALUE
        POP     XBYTE
        POP     ADDRESS
        LDA     ADDRESS+1601    ;save ariginal x-byte value
        STA     OLD__XBT
        LDA     ENVRMT          ;save ENVRMT
        STA     OLD__ENV
        AND     #0F7            ;far POKE, enable write C000 ta FFFF
        STA     ENVRMT
                                ;which bank is desired
        LDA     XBYTE
        CMP     #80
        BMI     $1              ;80-8F=extended addressing
        CMP     #90             ;    else system bank (ardinary 6502)
        BMI     EXTEND
                                ;disallaw certain addresses
$1      LDA     ADDRESS+1       ;POKE disallawed at (system bank):
        CMP     #0FF            ;    BANKSW = FFEF
        BNE     $2               ;    ENVRMT = FFDF
                                ;    ZEROPG = FFD0
        LDA     ADDRESS
        CMP     #0D0            ; in this program — suicide certain
        BEQ     DONE            ; in yaur program — suicide prabable
        CMP     #0DF
        BEQ     DONE            ;if yau really want ta crash, just start
        CMP     #0EF               POKing inta SOS
                                      (RAM $8800 = FFFF)
        BEQ     DONE            ;    saan he will get very sick
                                ;detect artificial bank 'FF'
$2      LDA     XBYTE
        CMP     #0FF            ;FF = ROM #1, C0-CF = I/O
        BEQ     SPECIAL         ;    "true" 00 and 01 pages
                                ;handle system bank
SYSTEM  LDY     #0
        STY     ADDRESS+1601    ;xbyte = 0 sa get ardinary 6502
        LDA     VALUE           ;    indirect indexed addressing
        STA     @ADDRESS,Y
        JMP     DONE
                                ;handle extended addressing ta a
                                   bankpair ar $8F
EXTEND  STA     ADDRESS+1601    ;place extend byte
        LDY     #0
        LDA     VALUE
        STA     @ADDRESS,Y      ;"extended" addressing ta desired
                                ;    bank pair
        JMP     DONE
                                ;handle artificial bank 'FF'
SPECIAL LDA     ADDRESS+1
        BEQ     TRUEPGS         ;true zp ar $01 desired?
        CMP     #1
        BEQ     TRUEPGS
                                ;ROM#1 —> F000-FFFF,C000-CFFF
                                   —>I/O
        PHP                     ;save status, then disable interrupts
        SEI                     ;(an "illegal" mave)
        LDA     ENVRMT          ;save enviranment
        STA     ENV
        LDA     #73             ;#% 0111 0011 = new enviranment
                                   reg
        STA     ENVRMT          ;(an "illegal" mave)
        LDY     #0
        STY     ADDRESS+1601    ;system bank xbyte = 00
        LDA     VALUE
        STA     @ADDRESS,Y
        LDA     ENV             ;restare ENVRMT
        STA     ENVRMT
        PLP                     ;restare status (including interrupts)
        JMP     DONE
                                ;desired address an true 00 ar 01
                                   page
TRUEPGS PHP                     ;save status, then disable interrupts
        SEI                     ;(an "illegal" mave)
        LDX     ADDRESS         ;laad BEFORE leaving ald z-page
        LDY     ADDRESS+1
        LDA     ZEROPG          ;save ald zpg
        STA     OLD__ZPG
        LDA     #0              ;changes zera page ta 0, stack ta 1
        STA     ZEROPG          ;(an "illegal" mave)
        LDA     VALUE
        CPY     #0              ;is high byte 00 ar 01
        BEQ     $1
        STA     0100,X          ;indexed addressing (x = addr)
        JMP     $2
$1      STA     0000,X
$2      LDA     OLD__ZPG        ;restare ZEROPG (and stack page)
        STA     ZEROPG
        PLP                     ;restare interrupts (status)
DONE    LDA     OLD__XBT        ;restare Pascal's xbyte
        STA     ADDRESS+1601
        LDA     OLD__ENV        ;restare C0-CF read/write status
        STA     ENVRMT
        PUSH    RETURN
        RTS
        .END
```

John Jeppson is an anesthesiologist who lives in Bakersfield, California. A Harvard and Boston Med School graduate, he has done some aerobatic stunt piloting in his own Citaborea (spell it backward). In 1981, he traded up from a TI-59 programmable calculator to the Apple III, where he now performs loops, rolls, and hammerhead turns that baffle even the folks at Apple.

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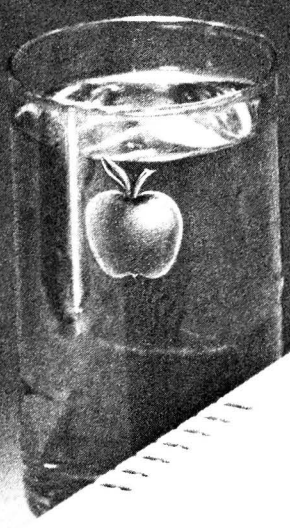
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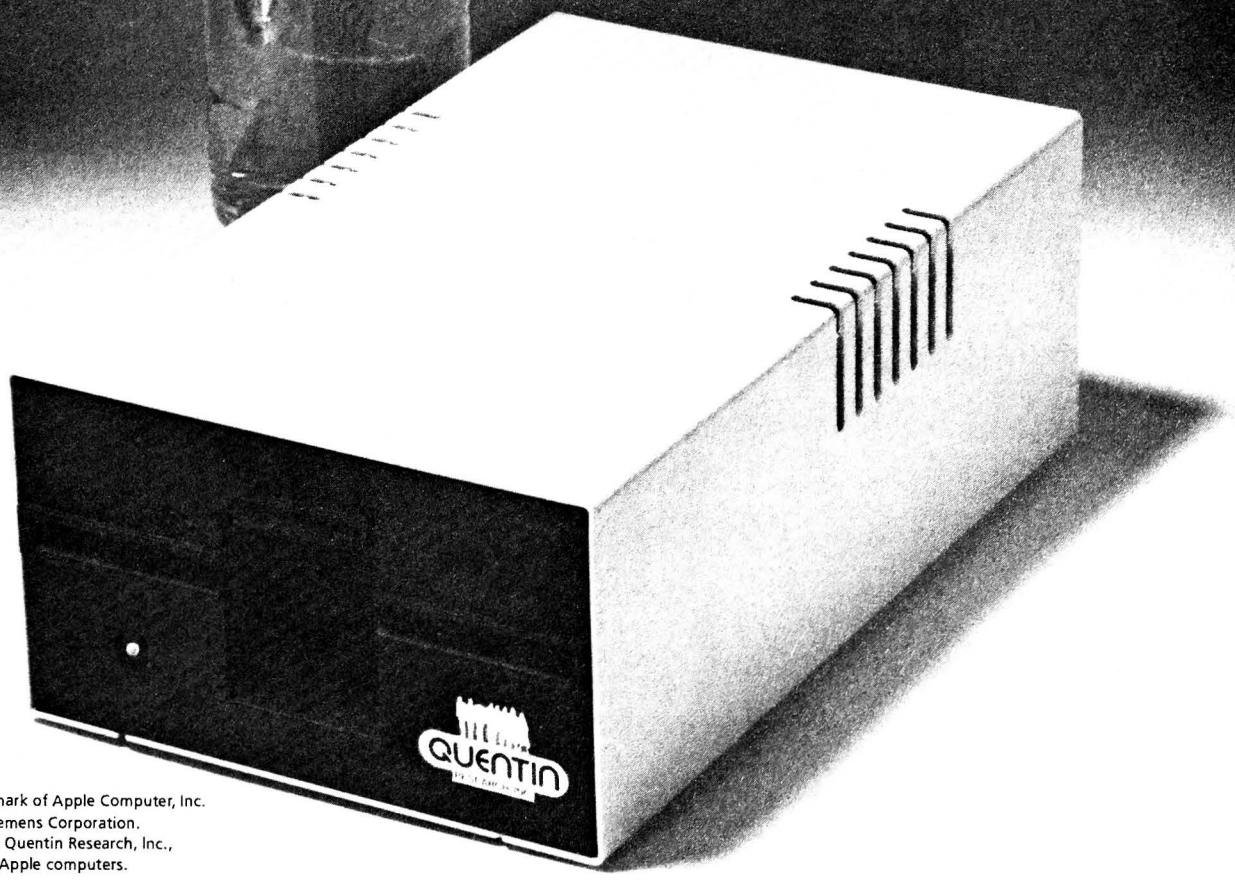
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VENTURES WITH VISICALC

BY JOE SHELTON

This month we'll take a look at *VisiCalc* templates and how to convert them from one version of *VisiCalc* to another. We'll see how the *Apple Writer* family of word processors can be effective in manipulating *VisiCalc* files. We'll also look at the darker side of the program and your computer. What if you've done everything right and your answer is wrong? How would you know? This is a side of *VisiCalc* and your Apple—or any other computer—that you should be aware of.

VisiCalc Templates. Applications templates are preformatted *VisiCalc* models. Many templates are commercially available and more are under development. What do you do if you see a template that was not developed for your version of *VisiCalc*? Convert it.

But conversion isn't all that simple. There are basically two versions of *VisiCalc* running on the Apple. The original thirteen-sector Apple II version and the original Apple III version have many of the same features and functions. The sixteen-sector Apple II version shares essentially the same functions as the new 1.1 version of *VisiCalc III*.

There is no problem converting templates designed for the simpler version of *VisiCalc* to the more advanced version, and, with the possible exception of memory requirements, having them run. But if the template you wish to convert uses functions that aren't in your version of *VisiCalc*, you will have to forego that model, or find a way to program the capability provided by the missing functions. In any event, the first thing is to determine the version of *VisiCalc* the template was written for.

Niffuming. If you desire to convert a template developed for the sixteen-sector Apple or for *VisiCalc III* to run in a thirteen-sector environment—in essence, muffining backward—you'll need an outside commercial program to convert sixteen-sector data to thirteen sectors. There are several conversion utilities available and some user groups have similar programs in their public-domain libraries.

Muffining. Any template developed for thirteen-sector *VisiCalc* can be converted to sixteen-sector format by using the *Muffin* program on the DOS 3.3 master disk. The converted file will run with sixteen-sector *VisiCalc*.

DOS to SOS. There are two methods of converting DOS files to SOS files. All Apple III dealers have been provided with a text file converter program that is simple to use and self-documenting. Screen prompts direct the user through the conversion process. It's best to rename all files to conform to SOS filename conventions before starting the conversion. SOS allows ten-character names with no spaces. Most users find it convenient to use a period in place of a space.

A second method of converting DOS files also allows the reversal of the process—a handy capability if you have an Apple III at work and an Apple II at home. The *Apple Writer III* package contains a utilities disk that converts *Apple Writer II* text files to *Apple Writer III* text files. It will perform the same task for your *VisiCalc* files. In addition, this utility will reverse the conversion.

SOS to DOS. Use the *Apple Writer III* utilities disk to convert to Apple II sixteen-sector format. If you're converting to thirteen sectors, you'll have to niffum as well.

After converting your templates, you may hear a series of beeps the first time you load your new *VisiCalc* template. After you have completely loaded the file, save it again and you shouldn't hear the beeps the next time you load the file.

VisiCalc and Apple Writer. *Apple Writer II* and *Apple Writer III* are easy-to-use word processors that can be used for writing reports or documents describing the information in your *VisiCalc* files.

Say you have completed a *VisiCalc* model and want to communicate the information to others. One way to accomplish this would be to include a copy of the printout of your *VisiCalc* model with the report. The reader could refer to it when necessary. A better way is to include the pertinent information in the body of the report itself.

It's a simple matter to include at least a part of a *VisiCalc* model in an *Apple Writer* file. One limitation is that the width of the *VisiCalc* model excerpt cannot exceed the width defined

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Instructions for inserting part of a *VisiCalc* model into an *Apple Writer* file are simple. After you complete your *VisiCalc* model, save it to disk. Then, use the print command to print the file to disk. The method of printing to disk is similar to printing on a printer. Place the cursor at the top left of the section you want to include in your document. Enter: */PF FILENAME<RETURN>* (lower right coordinates).

Use a different file name to print the file to disk than you used to save it. Printing to disk only prints the information visible on the worksheet and not the underlying formulas. A print-to-disk file can't be reloaded into *VisiCalc*, but it can be loaded into *Apple Writer*.

To insert the *VisiCalc* excerpt into your *Apple Writer* document, place the cursor in your document where you want your *VisiCalc* table and load the file. Your table is now included in the file and ready to print. If the table is too wide for your printed page, edit out some of the spaces between characters.

More Synergy. *Apple Writer* can also help you develop or change *VisiCalc* files. *Apple Writer* will load a *VisiCalc* file as if it were a normal text file. In the edit mode, the file looks like a list of the commands used to make the template, which, in fact, it is. When *VisiCalc* loads the file, the program reads these commands as if they were being entered manually.

If you edit this data, you are changing the commands that the program executes when loading. How can this help you? Suppose you have built a complex template with many individual cells referencing a single cell. Now you want to change the position of that master cell. Unless the model is designed to use the *replicate* function to recopy all the cells, you would have to go to each individual cell and change the cell reference.

A simpler way is to load the file in *Apple Writer* and then change the references. The procedure goes like this:

Enter control-B to move the cursor to the beginning of the file. Use the find and replace command to locate references to the old cell and change it to the new cell coordinate. For example, you would enter *control-F /B12/A12/A*. The file should now have every cell referencing B12 changed to reference A12. Even the value or formula in cell B12 will now be in A12.

All commands in the file are arranged alphanumerically in sequential order by the parent cell coordinates. In order to have everything look more appropriate—and possibly save problems later—you should move the command referencing A12 to the correct numerical position. Save the file to disk under a different file name, load it in *VisiCalc*, and see the results. You have just made your life easier and saved time.

There is another way to use *Apple Writer* that makes life easier. Three months ago we discussed how you might want to develop a model with an algorithm for solving a problem spread through a number of cells to ease development and trouble-shooting problems. After you have completed the model, you may want to consolidate these cells. You can go back and edit the final cell, but you will have had to write down each formula first and then make certain that you enter them correctly—you won't be able to look at the formulas in other cells once you have begun editing a cell.

A better way is first to note the cell coordinates of the affected cells and then load the file into *Apple Writer*. It is now easy to edit the formulas into a single formula, save the file under a different name, and load the file into *VisiCalc* to see the results.

Does VisiCalc Lie? As you build more complex models, you may find that your results are not always what you expect. Or worse, you may not realize that sometimes *VisiCalc* lies! This is the dark side of *VisiCalc* and the Apple. They don't really lie, they just aren't always accurate (sounds like a politician).

Every computer or calculator that does numerical calculations has areas where the answers are not completely accurate. This anomaly has to do with the method that the computer or calculator uses for rounding off fractions or decimals. A program like *VisiCalc* or a computer with its own numerics can only carry a decimal value to a specific number of characters or decimal places.

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VisiCalc, it's completely accurate. But, in order to ensure that you don't run into a problem, it helps to understand the types of things that can cause errors.

The most likely area of concern is in dealing with extremely small numbers—although in some programs or computers extremely large numbers can also be a problem. Boot *VisiCalc* and let's take a look at an example.

In cell A1 enter *1*.

In cell A2 enter *1+A1* and replicate that formula from cell A3 to cell A20 using relative reference. You should have 1 through 20 in column A.

In cell C1 enter *+A1/7* and replicate it from C2 through C20 using relative reference.

In column C we have a simple series of values showing how many times seven goes into the corresponding value in column A. Cell C1 shows that seven goes into one approximately .1428571 times. Cell C8 shows that seven goes into eight once and approximately .142857 times more. Remembering that *VisiCalc* can be accurate beyond what the cell displays, the value in cell C1 should equal the decimal part of the value in cell C8. That should be true for cells C2 and C9, C3 and C10, and so forth.

Leftovers. If that doesn't make sense, remember that once we have determined that seven goes into eight once, we are determining how many times seven goes into eight minus seven. In other words, we are again determining how many times seven goes into one.

Now, the big question is: Are they equal? *VisiCalc* can help us evaluate whether these decimal values are equal using the @INT function and logical operators.

If you have an Apple II, set the column width to 6 *(/GC6RETURN)* so you can see columns A through F. In column E we will enter an expression that will compare the value in cell C1 and the value in A1 divided by seven minus the integer portion of the value in A1 divided by seven. To put it another way, we are going to compare the value in cell C1 with the decimal value of A1 divided by seven.



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Logical operators permit comparisons for equality, greater or less than, or inequality. If the comparison is true—for example, 4 = 4—then the cell will display *true*. If the comparison is not true, the cell displays *false*.

In cell E1 enter: *+C1=((A1/7)−@INT(A1/7))*.

We have now compared the value in C1 (A1/7) to A1/7 minus the integer of A1/7. Because there is no integer value, we have compared one-seventh with one-seventh and found them to be equal. That shouldn't be a surprise.

Now let's try our original question: Is the value of A1/7 equal to the decimal value of A8/7? If the decimal value in C1 equals the decimal value in C8, we should see *true* displayed. Mathematically, that is what we expect. But you are probably miles ahead of us by now.

In cell F1 enter *+C1=(C8−@INT(C8))*.

The *false* indication tells us that *VisiCalc* has evaluated the values as unequal.

Let's take it a step further. Replicate the formula in cell E1 into E2 through E6, again using relative reference, and look at the results. You see that they are still all equal.

Now replicate E6 into E7 through E20, using relative reference. The values are unequal in cell E7 and every cell thereafter. As a point of interest, cell E7 is the first cell where we are comparing values that actually involve an integer value. Have we found the problem? Let's evaluate it some more.

Replicate F1 into F2 through F13 using relative reference again. There is no reason to replicate beyond F13 because the second cell referenced in each statement is beyond cell C20—the last cell in column C in which there is information.

All these cells indicate that the comparisons are unequal. And all of these are statements that include the actual subtraction of an integer value. It looks like the @INT function is the cause of our problems.

Where's the Problem? To begin with, the @INT function isn't the culprit. The culprit is the rounding algorithm in *VisiCalc*. The important thing to remember is that when you begin using very small values, your results are suspect. Move to cell D1 and enter *+C1!* and observe the value. In D8 enter *+C8!−1*. If you enter */GC12* (return), you can graphically see evidence of the difference in the values that *VisiCalc* compares.

There are different methods that computers use to understand numbers. The primary one is the binary system, which is the computer's native language. That is the series of ones and zeros that a computer uses to understand what it's supposed to do. For a computer designer, this is the easiest form of numerics to implement. It is also the least accurate for our use because we use decimal numerics. There lies the problem.

We understand decimal numerics and we are used to working with them, but the computer doesn't like them as well. It takes quite a bit of programming to make the computer completely accurate in decimal numerics. That is usually beyond the scope of an application like *VisiCalc*. So *VisiCalc* uses a decimal system that, as we have demonstrated, isn't always accurate.

What Can You Do? There are two criteria that pretty much guarantee accuracy if your calculated value meets them. The first is to ensure that your value is a terminating decimal. In people terms that means a value that realizes a finite number of decimal places. The value one-third is not a terminating decimal value because it is never resolved. The value is .333333 . . . to infinity. But one-fourth is a terminating decimal. It's .25, with no further decimal places.

The second criterion is that the value be shorter than the decimals carried by the program or computer. If a program is accurate to ten decimal places, the values should terminate in less than ten decimal places. If your value terminates at the eleventh decimal place, then the value will not be carried accurately by the program.

The Good News. The good news is that *VisiCalc* is as accurate for most computations as you will probably need. If you are working with values that are too small to ensure accuracy, there is a section in the *VisiCalc* manual that talks about making the *VisiCalc* program less precise. ◨

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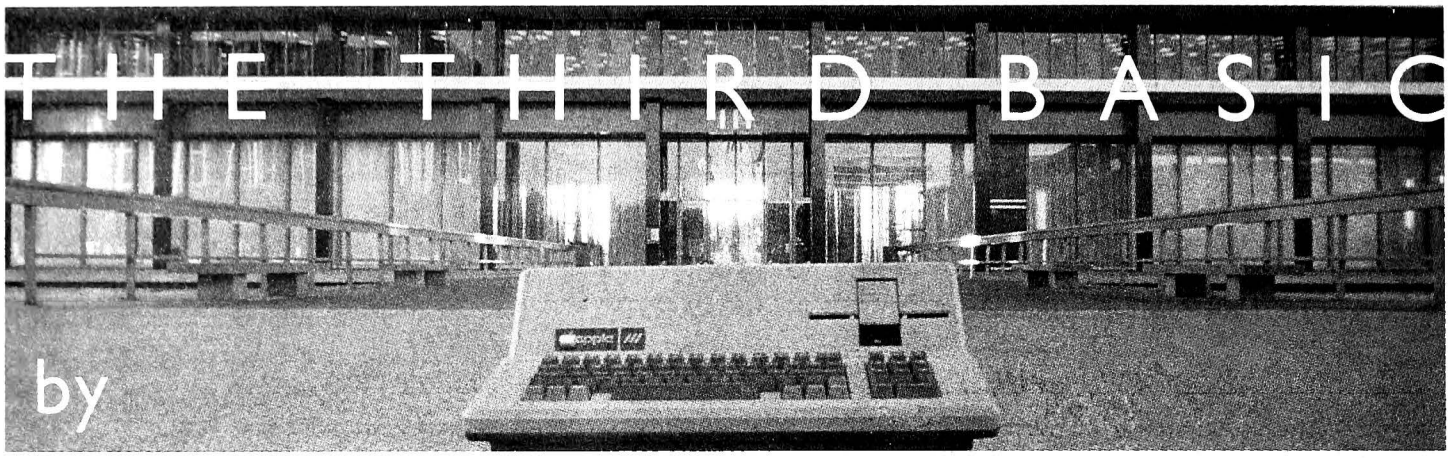
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THE THIRD BASIC



by

Taylor Pohlman

Exploring Business Basic, Part 11

We dug down deep in the "SOS mines" last month to find a number of useful things in the console driver that can make interesting applications a lot easier and more efficient to develop. At the end of that article, which you should read before this one if possible, we gave a parting challenge in the form of a program listing without documentation or explanation. This time we'll explore that program.

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Digging Out. The mysterious program at the end of last month's column was designed to allow you to perform four-way scrolling through text files by using a number of console features, especially windowing and horizontal scrolling. Rather than describe that previous program, however, here's a new version with even better features (and some simplification).

```
1  DIM a$(500),rightscroll$(1),
   leftscroll$(1)
5  INPUT"File name ta scroll thraugh:";a$
10 IF a$="" THEN 200
15 OPEN#1,a$
20 maxlength=0
22 INPUT"Haw many units ta fast scrall by? ";zip
```

The program starts with some initialization lines. The string array *a$* is used to hold the contents of the text file. Using the disk directly is possible, but presents some difficulties that would obscure the program's real intent. *Rightscroll$* and *leftscroll$* are string arrays that contain two versions of the scrolling commands for horizontal scrolling. One version will do a column at a time, and the other will do multiple columns, determined by the variable "zip."

```
25 ON EOF#1 GOTO 35
30 FOR i=0 TO 500:INPUT#1;a$(i):IF
   LEN(a$(i))>maxlength THEN
   maxlength=LEN(a$(i)):NEXT:ELSE:NEXT
35 lastrecord=i
```

The lines above read in the contents of the file into *a$* and set the values of *maxlength* (used to set the rightmost limit) and *lastrecord* (used to set the bottom limit).

```
37 sync$=CHR$(22)
40 leftscroll$(0)=SYNC$+CHR$(23)+
   CHR$(256-zip)+CHR$(26)+CHR$(80-zip)
   +CHR$(0)+CHR$(2)+CHR$(26)+
   CHR$(zip-1)+CHR$(24)+CHR$(3)+
   CHR$(21)+"5"+CHR$(12)
41 leftscroll$(1)=SYNC$+CHR$(23)+
   CHR$(255)+CHR$(26)+CHR$(79)+
   CHR$(0)+CHR$(2)+CHR$(26)+CHR$(0)+
   CHR$(23)+CHR$(3)+CHR$(21)+"5"
   +CHR$(12)
45 rightscroll$(0)=SYNC$+CHR$(23)+
   CHR$(zip)+CHR$(26)+CHR$(0)+CHR$(0)+
   CHR$(2)+CHR$(26)+CHR$(zip-1)+
   CHR$(23)+CHR$(3)+CHR$(21)+"5"
   +CHR$(12)
46 rightscroll$(1)=SYNC$+CHR$(23)+
   CHR$(1)+CHR$(26)+CHR$(0)+CHR$(0)+
   CHR$(2)+CHR$(26)+CHR$(0)+CHR$(23)+
   CHR$(3)+CHR$(21)+"5"+CHR$(12)
50 scrollup$=CHR$(16)+CHR$(3)+CHR$(26)+
   CHR$(0)+CHR$(23)+CHR$(10)+CHR$(21)+
   "5" +SYNC$
55 scralldawn$=CHR$(16)+CHR$(3)+
   CHR$(12)+CHR$(11)+SYNC$
```

The lines above set up the scrolling commands to be issued to the console driver. It would be useful to follow along in your Standard Device Drivers manual in the section on the console driver, but here is one example that will help you through it:

Line 41 defines the character codes necessary to set up scrolling horizontally to the left, one character position at a time. Here's how the character sequence works. First comes the sync character (decimal 22), which is used to start the action in step with the screen refresh. This helps to eliminate flicker. Next, character 23 is the command to horizontally shift the screen. The following character, 255, determines that the shift is one character position to the left. This action leaves the rightmost column on the screen blank; it will later be filled by information previously off the screen.

Opening the Window. To create a place to put this data, the next two sets of commands create a window one column wide and twenty-four lines high in which to write. Character sequence 26,79,0 addresses the cursor to column 79, line 0; and character 2 establishes this position as the upper right corner of the window. Since cursor addressing is done relative to the window, the next command sequence (characters 26,0,23) puts the cursor at the bottom of this one-column window. Printing a character 3 there estab-

lishes the position as the lower right corner of the window. From now on, this will be the only console area which can be written to.

The next two characters (decimal 21 and the literal "5") set up cursor movement options that will allow us to write data into this window very rapidly (the "5" option has the effect of turning off scrolling and new-line, while leaving "wrap" and cursor advance intact). This means that if a single string is written into this window, the characters will spill down the screen, one per line. One twenty-character string could fill the entire window, written with one print statement. This is much, much faster than individually positioning the cursor and then printing the characters one at a time.

The last character in the string in line 41 (the form-feed character, decimal 12) serves to home the cursor to the top left of the window (in this case column 79, line 0) preparing us to print the missing string which will fill the blank space created by the horizontal shift. Notice also that line 40 is nearly identical, except that the position of the top left and bottom right of the window are determined by the value of "zip."

Right scrolling is handled in the same way, by setting up characters in *rightscroll*. Check through those characters to make sure you understand what's happening.

```
60 HOME:PRINT CHR$(21);"5";
65 FOR i=0 TO 23:IF LEN(o$(i))>80 THEN
   PRINT MID$(o$(i),1,80);:
   NEXT:ELSE PRINT o$(i):NEXT
```

These two lines disable vertical scrolling and put the first twenty-four lines of the text file on the screen. Note that care is taken to put only the first eighty characters of each line on the screen—and that by disabling scroll it is possible to write the screen completely full.

(Make sure there are twenty-four spaces between quote marks in line 72.)

```
70 hi=1:vi=24:TEXT
72 blonk24$="                    "
73 bnk$=""
75 FOR i=1 TO zip:bnk$=bnk$+blank24$:NEXT
```

These lines do further initialization. The variables *hi* and *vi* stand for horizontal and vertical indexes, which tell the program where the lower lefthand corner of the screen is in the text file. *Blank24$* and *bnk$* are areas to store data that's to be written rapidly to the screen—for single column scroll and multiple column scroll, respectively.

```
80 GET a$:cursor=ASC(a$)
85 move=(cursor=8)+2*(cursor=21)+
   3*(cursor=10)+4*(cursor=11)+
   5*(cursor=136)+6*(cursor=149)
88 b$=blonk24$:t=1
90 ON move+1 GOSUB 130,100,105,110,120,
   135,140
95 TEXT:GOTO 80
```

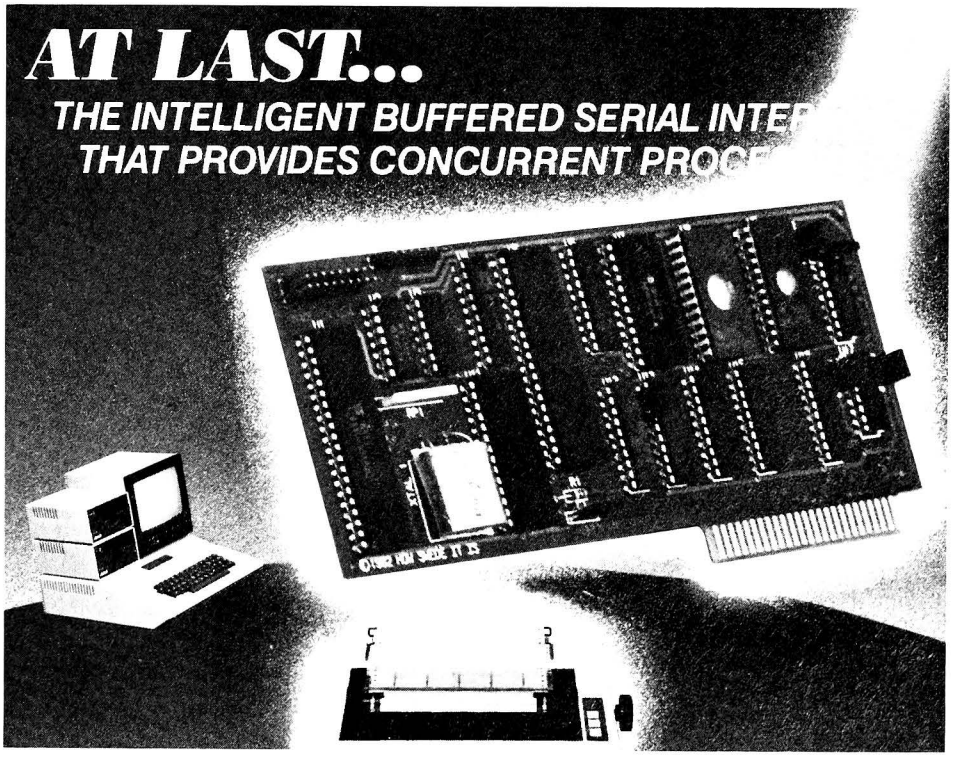
The section above represents the major loop of the program. Here the cursor commands are accepted in line 80, and decoded into a command number in line 85. Be sure you understand how line 85 creates values using the logical expressions. This is really handy (Pascal users have something similar in the *case* statement). Once the *move* variable is calculated, then an *on . . . gosub* statement is used to go to the appropriate subroutine. Note that values 1,2,3,4 of *move* correspond with left, right, down, and up on the cursor keys. Values 5 and 6 represent the left and right arrow keys with the open-Apple key pressed. Remember that open-Apple adds 128 to the ASCII value of the key. This trick is going to be used to implement the "zip" mode we defined above. Just watch!

```
100 IF hi>t THEN index=vi-25:hiindex
    =hi-t:FOR j=1 TO 24:SUB$(b$,t*j-t+
    1,t)=MID$(o$(index+j),hiindex,t):
    NEXT:hi=hi-t:PRINT rightscroll$((t=1))
    ;b$;
102 RETURN
105 IF hi+80<=maxlength THEN index=vi-25:
    hiindex=80+hi:FOR j=1 TO 24:SUB$
    (b$,t*j-t+1,t)=MID$(o$(index+j),
    hiindex,t):NEXT:hi=hi+t:PRINT
    leftscroll$((t=1));b$;
107 RETURN
```

Here's where things get a bit sticky. Remember that we said that the technique for scrolling was to use the console horizontal shift and then fill in the empty space with the appropriate characters from the file. Here then are the routines that perform the horizontal shift. Line 100 implements the left-arrow function by first checking to see if the horizontal index (hi) is greater than the left shift (t) required. If everything is okay, then *index* is set to the top of the twenty-four lines of text to be scrolled, and the new left edge is calculated and assigned to *hiindex*. Then a loop in this same line fills *b$* with the appropriate contents of *a$*, the array containing the file contents. The SUB$ function is used to increase the performance of this loop, by directly substituting characters in an existing string. With this completed, the horizontal index is adjusted by the width of the scroll; then a print statement directs the special characters required to do the horizontal shift.

Note that another logical expression (t=1) is used to pick the appropriate string from the two just defined. Immediately after the scroll string is printed, the *b$* string is printed, which spills down the vertical window the characters previously extracted from the text array. By using this technique, it is possible to scroll so fast that it looks like you're not even writing characters on the screen. The only slow part of this routine, in fact, is in the loop that creates the string *b$* to be written.

The scroll routine in line 105 is similar, except for the fact that it must first check to be sure that scrolling doesn't occur past the end of the longest line (previously calculated as *maxlength*).



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These routines may not become clear without pencil, paper, and some diagrams. Apologies are offered for the obscure way that many statements are crammed into one line; but breaking everything out neatly would considerably worsen performance. Besides, after all these articles you can probably make sense out of anything.

```
110 IF vi<lastrecord THEN PRINT
    scrollup$;MID$(a$(vi),hi,80);:vi=vi+1
115 RETURN
120 IF vi>24 THEN PRINT scrolldown$;
    MID$(a$(vi-25),hi,80);:vi=vi-1
125 RETURN
```

Lines 110 and 120 are vertical scrolling, and therefore considerably easier. After checking to be sure that scrolling is allowed, the scroll characters are printed and the appropriate substring is printed to the screen. Note that the MID$ function makes selecting eighty characters from the string very easy.

```
130 IF cursor=27 THEN POP:GOTO 200
132 RETURN
135 IF hi>zip THEN t=zip:b$=bnk$
137 GOSUB 100:RETURN
140 IF hi+79+zip<=maxlength
    THEN t=zip:b$=bnk$
142 GOSUB 105:RETURN
```

Line 130 handles the case of stray characters, and uses the escape key (Ascii 27) as the way out of the routine. Lines 135 and 140 handle the case of the open-apple cursor keys. Note that if the full "zip" increment on cursor movement is not possible, the routine reverts to the initial conditions: a horizontal shift of one, set in line 88. After setting the appropriate value, a gosub is executed to the main scroll subroutine.

```
200 TEXT:PRINT CHR$(26);CHR$(0);CHR$(23);
210 CLOSE
220 END
```

Last but not least is the wrap-up and conclusion, positioning the cursor to the bottom of the screen and terminating the program.

File Frolic. Well, here's hoping that you have lots of fun playing with this program and the various text files you have lying around. One note of caution, however. Because of the limit in Basic of 255 characters in a string, this program will not work with all text files. Among these are many *Apple Writer III* files because it is easy to create enormous amounts of text without benefit of intervening carriage return characters. If you want to test the program with *Apple Writer* or similar text files, you'll want to print them out to disk first (instead of simply saving them) and then load them into the scroll program. This works equally well with *VisiCalc* print files—as long as the width is not more than 255 characters.

If you really want a text file to fool with, check back to last month's issue where we described a gibberish-generating program that's guaranteed to produce interesting things to scroll through. Some people have claimed that it can be used to create this column as well, but lining up that infinite number of monkeys at an infinite number of Apple IIIs has some bugs still to be worked out. Oh, well . . .

Last Challenge. Last article we covered a lot of esoteric goodies in the console driver. One of the least understood, but most powerful capabilities is the "two byte read," where you can programmatically get a second byte that, among other things, can indicate whether enter or return has been pressed. Normally these two keys return the same ASCII code, but the data entry routines above cry out for that distinction, which we provided in this article by using tab and open-apple, return. It's not easy to figure this one out, and some substantial rewriting of the field routines may be required, but we'll offer a copy of *Quickfile III* to the earliest postmarked solution. Send a listing to *Softalk* marked "The Third Basic Solution," and the winning routine will be published as soon as possible in these pages.

Next month we'll go even further into the uses of the console features in constructing business oriented applications programs. Until then, keep koding with the kool konsole. ▮

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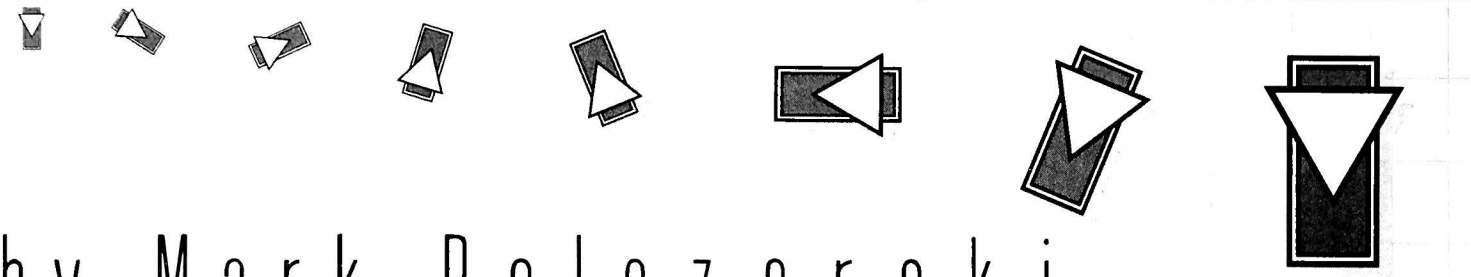
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GRAPHICALLY SPEAKING



by Mark Pelczarski

When last we left off, we had a program that would create Applesoft shapes and had clues to the real meaning of animation. By plotting a shape, updating the coordinates, erasing it, and then replotting, all in a loop, we could create the illusion (if not the actuality) of movement. "Now," the Chief Inspector asked, "can that illusion be created using a joystick, or keyboard, or some predetermined function or path?" Probably so. The evidence supports the possibility.

Exhibit A shows the beginning of a program that will load and initialize a shape made with last month's *Maker*. If you don't have last month's column, refer to Exhibit B, which has the beginning of a program that creates a shape in the form of a little tiny circle and does the same initialization. Either one of the two exhibits must be used in conjunction with the other exhibits in this investigation.

Exhibit C provides overwhelming evidence that a shape can indeed be controlled with a joystick. You may notice some similarities to the third example posed last month, but it has been proven in court at least once that if the figures are changed, a program is entirely different. Notice that line 50 simply sets the starting point for the animation. The animation loop runs from lines 60 through 100. Line 60 does the draw, line 70 saves the old coordinates, line 80 does the update, and line 90 erases. The key is line 80, where the update occurs.

The variable S in lines 55 and 80 controls the sensitivity of the joystick, and its value can range from 1 to 127. The lower the value, the less sensitive the joystick will be to your movements. The function in line 80 takes the joystick values, which range from 0 to 255, and maps them to a range of −1 to 1 (when the sensitivity is increased, the range of values will eventually increase also). This way, based on the setting of the joystick, X and Y will either increase or decrease by 1.

Testing the Waters. Also in line 80 is a gosub (go to subroutine) to line 200, which is the beginning of a sequence of *if-then* statements that test the values of X and Y. If either is out of the proper range (0-279 for X; 0-191 for Y), the subroutine assigns the value for the edge of the screen. Each of the programs—er, exhibits—contains a similar subroutine that prevents an out of range error.

Exhibit D contains essentially the same program, with a few lines added that allow your animation to leave a trail (answering the trick question, "Can you draw with it?"). Lines 45, 85, 86, and 95 have been added and allow you to turn hplot on and off with the two button inputs. Line 95 does the hplot (when P=1, the routine does the hplot; when P=0, it skips the plot). Lines 85 and 86 read the buttons, and if either is pushed, change the value of P accordingly. You may want to try changing the value of S (sensitivity, remember?) in line 55 to a value of 100 or so, just to see the difference in the handling of the joystick.

```
1 REM EXHIBIT A
9 REM Initialize
10 INPUT "SHAPE NAME : ";A$: ONERR GOTO 10
20 PRINT CHR$ (4); "BLOAD";A$; ", A24576"
30 HGR : POKE − 16302,0: POKE 232,0: POKE 233,96
40 ROT= 0: SCALE= 1
```

Exhibit A.

```
1 REM EXHIBIT B
9 REM Initiolize
10 POKE 24576,1: POKE 24577,0: POKE 24578,4: POKE 24579,0: POKE 24580,18:
   POKE 24581,63: POKE 24582,32: POKE 24583,100: POKE 24584,45: POKE
   24585,21
20 POKE 24586,54: POKE 24587,30: POKE 24588,7: POKE 24589,0
30 HGR : POKE − 16302,0: POKE 232,0: POKE 233,96
40 ROT= 0: SCALE= 1
```

Exhibit B.

```
1 REM EXHIBIT C
50 X = 140:Y = 96
55 S = 50:D = 255 − 2 * S
59 REM Beginning of animotion loop
60 XDRAW 1 AT X,Y
70 XL = X:YL = Y
80 X = X + INT (( PDL (0) − S) / D):Y = Y + INT (( PDL (1) − S) / D): GOSUB 200
90 XDRAW 1 AT XL,YL
100 GOTO 60
199 REM Subroutine to check ronge of x ond y
200 IF X < 0 THEN X = 0
210 IF X > 279 THEN X = 279
220 IF Y < 0 THEN Y = 0
230 IF Y > 191 THEN Y = 191
240 RETURN
```

Exhibit C.

```
1 REM EXHIBIT D
45 HCOLOR= 7
50 X = 140:Y = 96
55 S = 50:D = 255 − 2 * S
59 REM Beginning of onimation loop
60 XDRAW 1 AT X,Y
70 XL = X:YL = Y
80 X = X + INT (( PDL (0) − S) / D):Y = Y + INT (( PDL (1) − S) / D): GOSUB 200
85 IF PEEK ( − 16287) > 127 THEN P = 1
86 IF PEEK ( − 16286) > 127 THEN P = 0
90 XDRAW 1 AT XL, YL
95 IF P THEN HPLOT XL,YL
100 GOTO 60
199 REM Subroutine to check ronge of x ond y
200 IF X < 0 THEN X = 0
210 IF X > 279 THEN X = 279
220 IF Y < 0 THEN Y = 0
230 IF Y > 191 THEN Y = 191
240 RETURN
```

Exhibit D.

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But suppose you don't have a joystick. Never fear, much the same can be done through the keyboard! Enter Exhibit E. The changes from the joystick example have all been made between lines 70 and 90. Instead of updating the position using joystick reads, line 72 checks to see if a key has been pressed. If one hasn't, the program skips down to line 84 and uses whatever increments were in effect before (XI and YI). If a key has been pressed, however, line 74 gets the value of the key, and a sequence of if statements determines what is to be done based on the key that's been pressed. If the letter I has been pressed, for example, the X increment is set to zero and the Y increment to negative one, causing the next movement to be upward. M causes a downward move, and J and K move left and right, respectively. A space sets both increments to zero, which stops movement, and, to keep your imagination going, W moves several units at a time down and right. Also, the Z and X keys are set up to turn plotting on and off, as the last example (piece of evidence?) reveals.

```
1 REM EXHIBIT E
45 HCOLOR= 7
50 X = 140:Y = 96
59 REM Beginning of animation loop
60 XDRAW 1 AT X,Y
70 XL = X:YL = Y
72 IF PEEK ( - 16384) < 128 THEN 84
74 GET A$: IF A$ = "I" THEN XI = 0:YI = - 1
75 IF A$ = "M" THEN XI = 0:YI = 1
76 IF A$ = "J" THEN XI = - 1:YI = 0
77 IF A$ = "K" THEN XI = 1:YI = 0
78 IF A$ = " " THEN XI = 0:YI = 0
79 IF A$ = "W" THEN XI = 5:YI = 3
80 IF A$ = "Z" THEN P = 1
81 IF A$ = "X" THEN P = 0
84 X = X + XI:Y = Y + YI: GOSUB 200
90 XDRAW 1 AT XL,YL
95 IF P THEN HPLOT XL,YL
100 GOTO 60
199 REM Subroutine to check range of x and y
200 IF X < 0 THEN X = 0
210 IF X > 279 THEN X = 279
220 IF Y < 0 THEN Y = 0
230 IF Y > 191 THEN Y = 191
240 RETURN
```

Exhibit E.

Suppose you want to get the computer to control your animated shape in some fashion. You have several ways to do this. One is by using some type of formula to determine the new coordinates. Another is by predefining a path for the shape. A third is to let the computer generate a random path.

The first method, using a formula, is probably the most difficult because it requires some use of (ugh) mathematics. Exhibit F shows how it's used, but this is not the place to get into heavy discussion of the sociological value of sines, cosines, and absolute values. This particular part will be short and sweet.

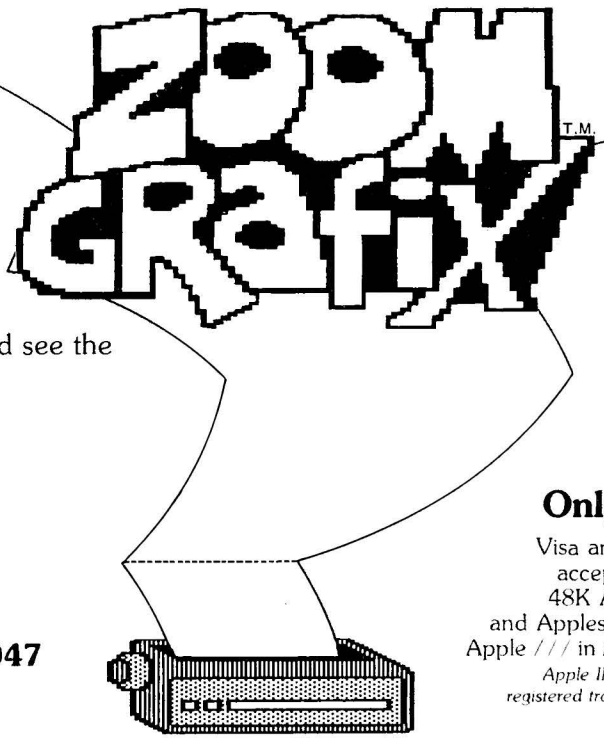
Aren't We Clever. Another subroutine has been added at line 150. It evaluates a function—being very creative, we tried using sin(X)—and returns an X,Y coordinate scaled to fit the screen. How? Okay, first, the initial values of X and Y are computed and plotted at line 50, using the subroutine, of course. XC and YC will be the actual coordinates used in the functions. X and Y will be the values that later fit the screen. The animation loop has a for-next counter that changes XC from .1 to 28 in increments of .1. Those were chosen because sin was used for a function (it cycles through four circles, using radian measure), and it was easy to adjust to the screen. Within the loop, the updating is done by calling the subroutine at line 150.

In the subroutine, YC is first calculated as a function of XC. The next two lines scale X and Y appropriately. Since XC goes from 0 to 28 and we want X to go from 0 to 279 (the screen coordinates), we can multiply whatever XC is by 10 so it fits the screen exactly. Y is a little more tricky; see line 170. Since we

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```
1 REM EXHIBIT F
45 HCOLOR= 7
50 XC = 0: GOSUB 150
55 P = 1
59 REM Beginning af animatian loop
60 FOR XC = .1 TO 28 STEP .1
65 XDRAW 1 AT X,Y
70 XL = X:YL = Y
80 GOSUB 150
90 XDRAW 1 AT XL,YL
95 IF P THEN HPLOT XL,YL
100 NEXT XC
110 END
150 YC = SIN (XC)
160 X = 10 * XC
170 Y = 191 - (YC * 20 + 95)
180 GOSUB 200: RETURN
199 REM Subrautine to check range af x and y
200 IF X < 0 THEN X = 0
210 IF X > 279 THEN X = X - INT (X / 279) * 279
220 IF Y < 0 THEN Y = 0
230 IF Y > 191 THEN Y = 191
240 RETURN
```

Exhibit F.

know that sin gives results from −1 to 1, we want to multiply that by something to get more than a two unit vertical movement. If we were graphing the exact function, 10 would be appropriate, since that's what we multiplied X by. To make it a little more dramatic, though, we used 20. That makes the low end −1*20 or −20, and the high end 1*20 or 20.

Since the actual screen values for Y are all positive (from 0 to 191), we then added 95 to center the results vertically on the screen (−20+95=75, 20+95=115). The last step, if we are worrying about an accurate result, is to subtract all of the above from 191. That's because on the hi-res screen the Y values all appear reversed from the way your experience with normal graphing would lead you to expect. Of course, if we are just using a function for effect and not for accurate plotting, this last step can be left out. Note in the program that line 55 sets P so that the trail will be plotted.

If none of that made sense, or if it wasn't very interesting, here's another approach that has some more immediate results. See Exhibit G. Similar in a way to what we did with keystrokes, this program sets a path in advance that determines

```
1 REM EXHIBIT G
45 HCOLOR= 7
50 X = 140:Y = 96
55 P = 1:N = 20
59 REM Beginning af animatian laap
60 FOR I = 1 TO N
65 XDRAW 1 AT X,Y
70 XL = X:YL = Y
72 READ M
74 ON M GOTO 75,76,77,78,79,80,81,82
75 XI = - 2:YI = - 2: GOTO 84
76 XI = 0:YI = - 2: GOTO 84
77 XI = 2:YI = - 2: GOTO 84
78 XI = 2:YI = 0: GOTO 84
79 XI = 2:YI = 2: GOTO 84
80 XI = 0:YI = 2: GOTO 84
81 XI = - 2:YI = 2: GOTO 84
82 XI = - 2:YI = 0
84 X = X + XI:Y = Y + YI: GOSUB 200
90 XDRAW 1 AT XL,YL
95 IF P THEN HPLOT XL,YL
100 NEXT I
110 RESTORE : GOTO 60
150 DATA 3,3,3,3,6,6,6,6,7,7,7,7,1,1,1,1,2,2,2,2
199 REM Subrautine ta check range af x and y
200 IF X < 0 THEN X = 279
210 IF X > 279 THEN X = 0
220 IF Y < 0 THEN Y = 191
230 IF Y > 191 THEN Y = 0
240 RETURN
```

Exhibit G.

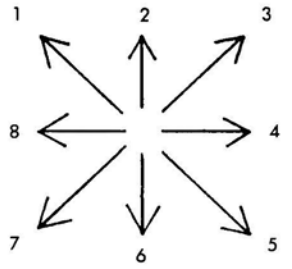


Figure 1.

how the shape will move. First, line 55 optionally sets P so that the trail will be plotted and sets N, the number of moves in the path, to 20; but you can choose whatever you want. Lines 60-100 compose the animation loop again. This time a for-next loop counts from 1 to N, and each time through the next move, M is read from a data statement (line 150). Line 74 is called a "computed *goto*" statement. Program control goes to the line number in the list that corresponds to the value of M. If M=3, for example, it will use the third line number, 77. Each of the eight lines sets the X and Y increments so that moves corresponding to 1 through 8 give the directions shown in figure 1.

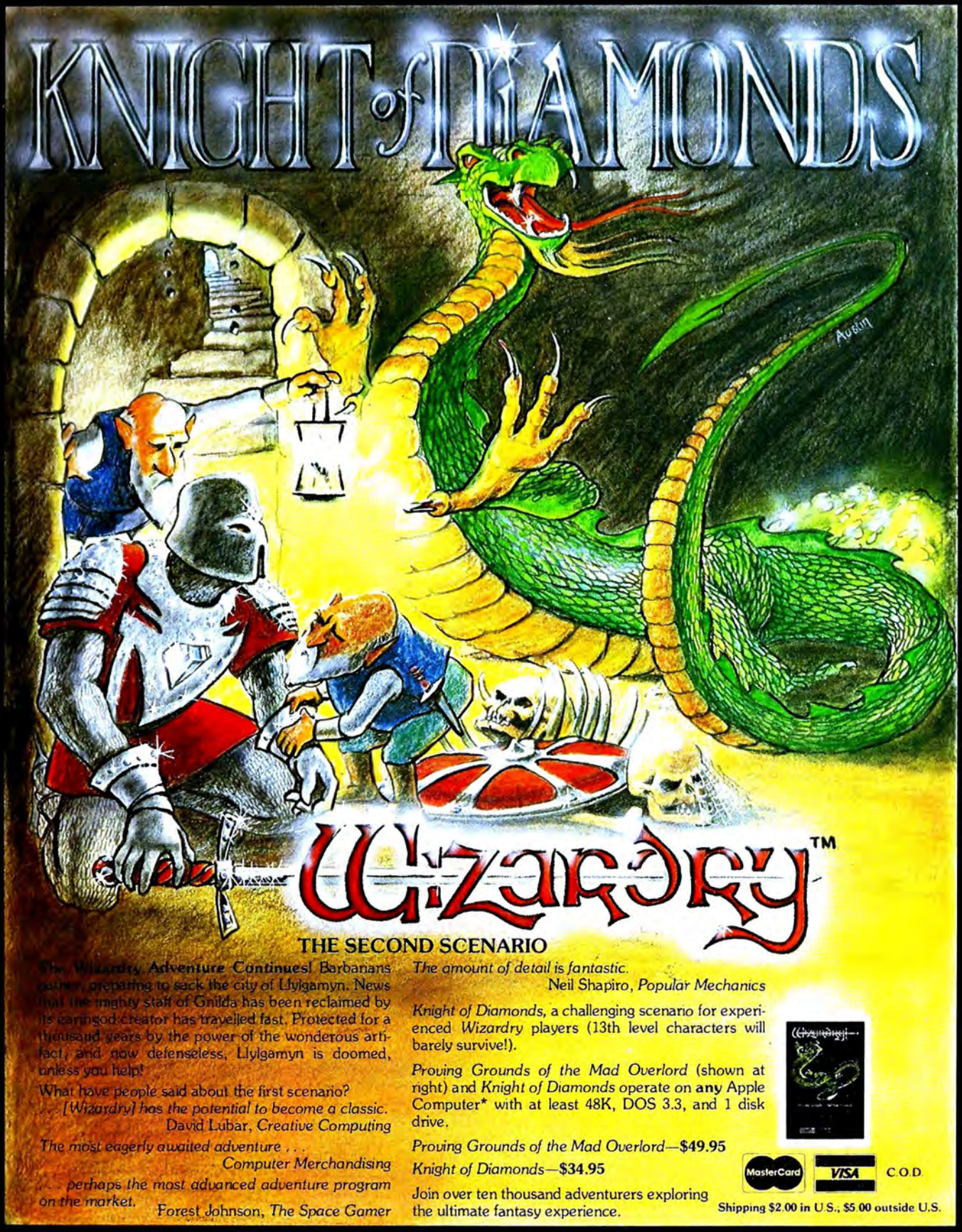
Looping the Loop. Note that the data statement at line 150 contains numbers that, when read by the program, will correspond to these directions. After the animation loop completes N moves (finishing the list of numbers in the data statement), the restore in line 110 starts the data at the beginning of the list again and causes the path to be repeated.

Note also that in the subroutine that begins at line 200, the values have been changed slightly. Now, if a shape gets to the edge of the screen, instead of stopping it there, the program puts it at the opposite edge so it can continue. Something similar was done in line 210 of Exhibit F, where we put a formula that, instead of using X, uses the remainder after dividing by 279. In that example, try changing the number 28 in line 60 to something like 56.

The last exhibit in this case for animation is Exhibit H, in which we let the computer do whatever it wants. It's very similar to Exhibit G, except instead of putting the moves in a data statement, we use the computer's random number generator to pick random moves. For that we don't need N, or the for-next loop, or the read, data, and restore statements. Just replace the read with an instruction that chooses a random number from 1 to 8. Call it random scribbling, if you wish, but could there be a clue there? Maybe not. . . .

```
1 REM EXHIBIT H
45 HCOLOR= 7
50 X = 140:Y = 96
55 P = 1
59 REM Beginning af animatian laap
60 XDRAW 1 AT X,Y
70 XL = X:YL = Y
72 M = INT ( RND (1) * 8) + 1
74 ON M GOTO 75,76,77,78,79,80,81,82
75 XI = - 2:YI = - 2: GOTO 84
76 XI = 0:YI = - 2: GOTO 84
77 XI = 2:YI = - 2: GOTO 84
78 XI = 2:YI = 0: GOTO 84
79 XI = 2:YI = 2: GOTO 84
80 XI = 0:YI = 2: GOTO 84
81 XI = - 2:YI = 2: GOTO 84
82 XI = - 2:YI = 0
84 X = X + XI:Y = Y + YI: GOSUB 200
90 XDRAW 1 AT XL,YL
95 IF P THEN HPLOT XL,YL
100 GOTO 60
199 REM Subrautine ta check range af x and y
200 IF X < 0 THEN X = 279
210 IF X > 279 THEN X = 0
220 IF Y < 0 THEN Y = 191
230 IF Y > 191 THEN Y = 0
240 RETURN
```

Exhibit H.



THE SECOND SCENARIO

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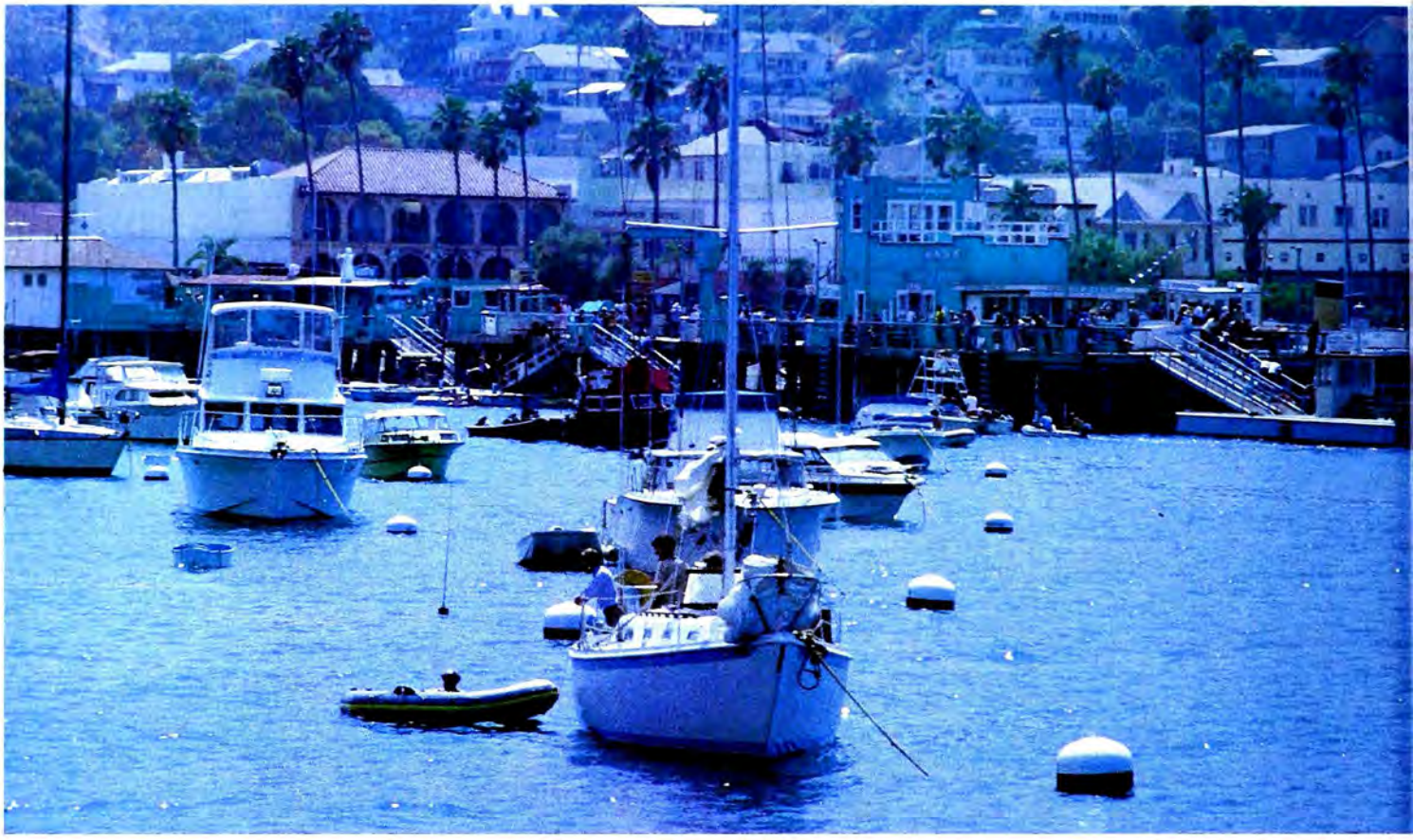
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Twenty-Six Miles Across the Sea



BY MICHAEL FERRIS

Zane Grey, the great western novelist, did some of his writing twenty-six miles off the coast of California. A hotel there bears his name.

In the early days of Hollywood, a motion picture company went to the same eight-by-twenty-one-mile dot of paradise to shoot a western. They left a few buffalo behind; now hundreds roam the island.

Cool in the summer, warm in winter, the fabled isle of Santa Catalina was once owned by chewing gum king William Wrigley. In 1929, Wrigley built a casino on the tip of Avalon Bay. A round, Arabian fantasy with fluted sides, the casino is the island's most famous landmark.

Today, a new kind of landmark—an Apple that invites visitors to leave fingerprints all over its monitor's face—sits on the edge of the Pleasure Pier. In the window of the Avalon Chamber of Commerce, right over the water, a video screen welcomes people to the island with an invitation: "Please touch." When you press a purple dot next to an item on the menu, you get a visual sampling of some of the shops and services of Catalina, a scrolling screen of sponsors who claim to have the best places in town to eat, sleep, and play.

This innovative, interactive advertising is the brainchild of Island Services and the handiwork of Mark Wauben, who programmed the graphics on the forty-eight-item display. Wauben and his partner, Kent Haggerty, distribute the Touch Screen device that fits over a standard CRT screen and runs on an Apple.

Heart of Glass. The Touch Screen is a special touch-sensitive plate of glass that carries a light charge. When you touch the surface, it breaks the current at a given set of coordinates. The computer then goes into the program and lifts the correct information from the disk.

According to Wauben, the touch-style information service is far more fun than conventional information services. "It has the same appeal as a video game. People like to participate in it."

And sure enough, when Wauben and Haggerty demonstrate the Touch Screen, people approach it eagerly and grin as they make it work—an effect most advertisers can't lay claim to.

"All our lives we are told not to touch things, then we come along with a television screen you have to touch to make work. People are a little reluctant at first, so we employ a little humor to encourage them to use it," Wauben explains.

Surveys conducted by Touch Technology, the Touch Screen manufacturers in Annapolis, Maryland, show that the video screen captures the attention of 60 percent of an audience—20 percent of them repeat users.

"I think the information reaches more people more effectively because it is information they have sought out them-



selves," Wauben says.

The general state of public telephones prompted Island Services to create their scrolling Yellow Pages for Catalina. "Kent and I were walking down a pier past a bank of phone booths with their phone books hanging down and pages ripped out," Wauben explains. "It seemed that anyone who wanted local information just went to the phone book and tore it out."

Fantasy Island. "We also had a theory about Catalina. Avalon is a tiny town with a lot of mom and pop shops and businesses. It's a lot like Disneyland; you can walk anywhere. It's the only town on the island, surrounded by farmland and conservancy. We thought it would be an ideal testing place; and we had a system that could really promote the island."

Island's first program was placed on the boat that ferries passengers from Newport to Catalina every day. The reliability of the Apple II was clearly demonstrated.

"The system was running twenty-four hours a day from April to November—six months," Wauben says. "During that whole time we only had one technical problem." The system was down for three hours in the third month for a disk change. A glitch had developed.

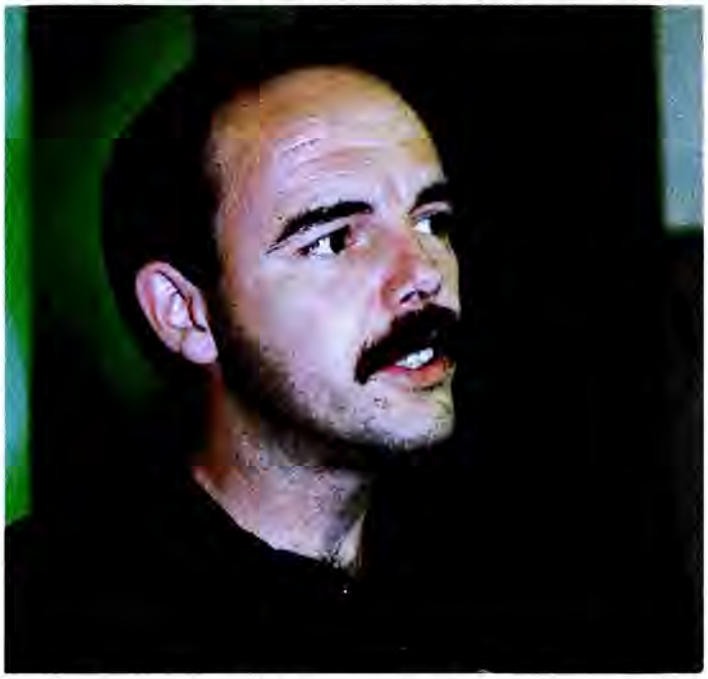
"The boat was anchored off the harbor. I had to go out in a

dinghy to change the disk, having missed the scheduled docking.

"You know, some disks are only guaranteed for forty hours. We had two in continuous use for three months each. And the run to Catalina is not the smoothest . . . the salt air, the motion of the boat, all the banging around when it's docking. That's quite a testimonial."

The program on the ferry was a primitive version with the same advertising that it has now, but the screen just scrolled continuously and didn't give the viewer a chance to interact. "It was so boring, I don't know why the people just didn't throw it overboard," Wauben jokes.

The Touch Screen was added when the system found a home on the Chamber's green pier. The program has been updated since, with public service information interspersed with the ads. When Wauben created the program, he had flexibility for his advertisers in mind: rate, price, and date changes can be incorporated easily.



Mark Wauben, Island Services partner, raised his brainchild on a ferry.

As soon as more than the present forty-eight advertisers subscribe to the service, Wauben says he is going to start hunting for a good two-megabyte hard disk to hold the program.

Silent Partner. Although Island Services has its main office in Avalon, Wauben does his programming in a little stucco house in Long Beach, California. Once a clamoring, oil-rich boomtown, Long Beach today is a contrast of futuristic refineries and palmy neighborhoods spotted with oil pumps, like lonely carnival rides, soundlessly churning up the last crude legacy of the dinosaurs.

Island shares a corner lot with a pump named Berry Number Five.

In the silent seesawing shadow of the metal rig, Wauben adapts the computer-generated images of Island's program author, Spencer Pettit. He uses an Apple II, a graphics tablet, and *E-Z Draw*. On a deadline, he is chasing glitches through a Touch Screen presentation for a museum trade show. In this imaginary tour guide for the Philadelphia Museum, one touch gives you several screenfuls of information about a nonexistent can opener exhibit; another touch brings you to a portrait of Ben Franklin telling you where to dine in Philadelphia.

"Museums are getting more involved with hands-on technology these days," Wauben explains while he wrestles with a submenu, a new feature of the Touch Screen presentations. What is now a scroll of eateries will be a choice between, say, restaurants and nightclubs.

"Museums and theme parks are an area we're heading into; less advertising and more pure information. It's information on demand; a lot more interactive, not just passively scrolling across the screen at a prechosen speed."

As a computer graphics artist, Wauben keeps up on the latest developments in his field. PresTel, a system operating throughout France, England, and in some cities in Germany, impresses him. "Lots of color and nice graphics for computer banking, electronic mail, and databases with news, weather, and sports.

"In Los Angeles, the Times Mirror company is testing a Canadian-based news broadcast system called Telidon." This is basically a text service similar to the Source, and Wauben says Apple software is being used extensively for the graphics.

Cousinly Kudos. "People's minds work in pictures," Wauben points out. "That's the challenge here, to make the picture tell the story and not get too involved with the words. Touch Screen displays are like international road signs. No matter what language is used, the graphics do most of the talking.

"We had a visit recently from a cousin of mine who has an Apple dealership in Dusseldorf, Germany. He speaks just enough English and reads even less, but he had no trouble working and understanding the Catalina menu. 'Wunderbar! Wunderbar!' was all he could say.

"I saw a Bell and Howell system at a trade show a while back. It had an Apple hooked up to a carousel slide projector; a real Rube Goldberg device. It was like having a mule pulling a tractor. Touch Screen displays eliminate this sort of hardware overkill."

Island Services is actually one of a network of three companies working on touch television applications. An advertising agency in Cleveland, Ohio, is working on industrial versions that can replace traditional slide show demonstrations.

High-Priced Lookers. "Some companies still pay up to $200 each for super high-resolution slides. You can create about ten charts and graphs per hour on the Apple, and you have the ability to go back in and make quick changes on them," Wauben says.

A programmer and an artist in Orlando, Florida, create touch television displays for hotels and malls.

All three companies share the same origin.

Wauben started working with computers in 1980 when he was a staff artist on the Orlando *Sentinel*. The *Sentinel* was creating some programming on a $30,000 computer; the newspaper also had a couple of Apples.

"We were working on an at-home television newspaper using Apple graphics software. I noticed the resolution was identical on both computer systems; then I compared the prices: $30,000 versus $3,100. It was clear how a small entrepreneurship could grow out of all this.

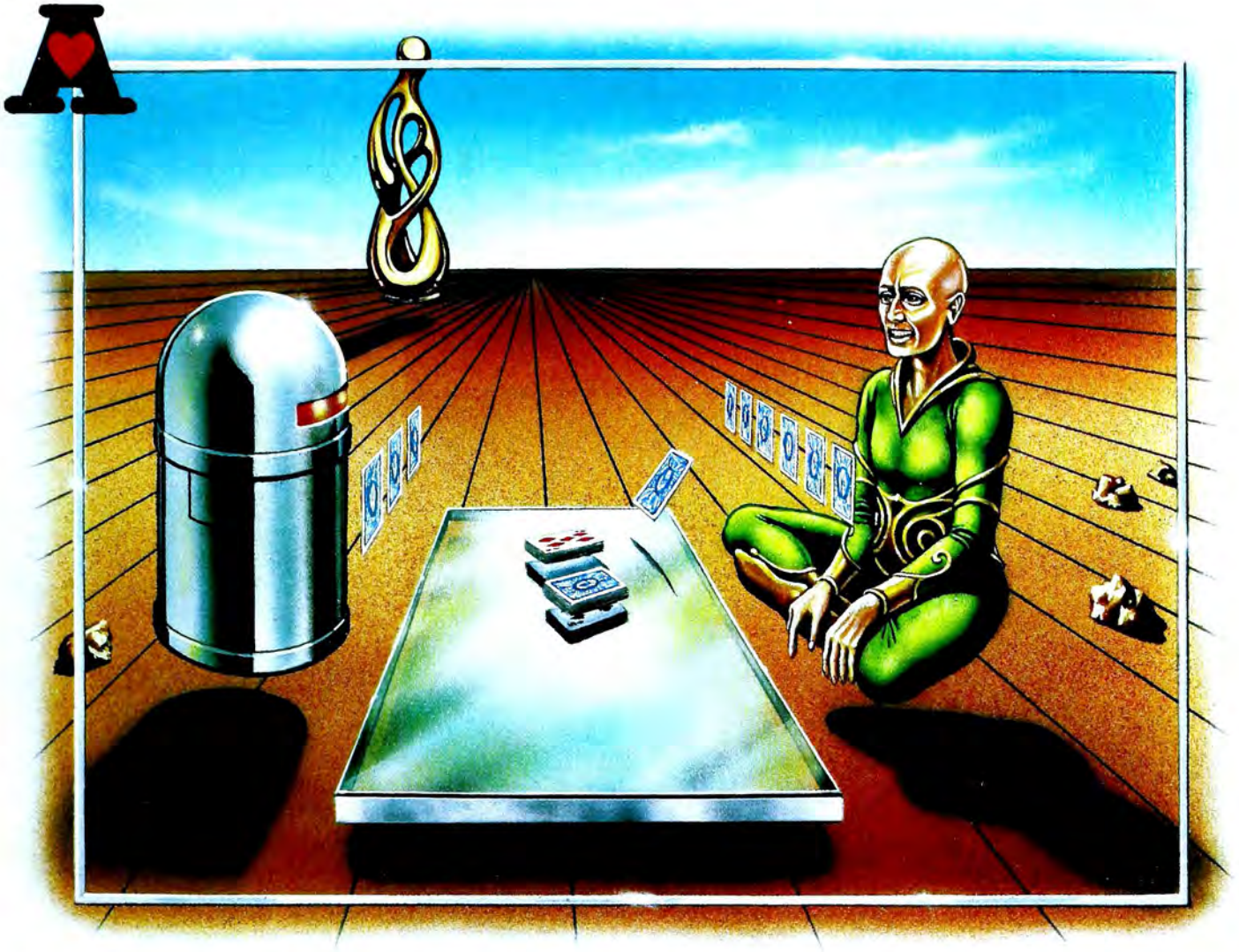
"Then I moved to California to develop a graphics branch for Island Services—then an accounting firm." Around the same time, some of Wauben's co-workers from the *Sentinel* began setting up shop in Cleveland and Orlando.

The Apple-touch television connection was being made. The future of interactive computering was in capable, creative hands.

Spending his days punching out Liberty Bells, seagulls, boats, and can openers has fueled a dream of Wauben's: to open a computer graphics clip art service. "A lot of people are going to have a need for this kind of graphics," he says, as the Philadelphia program gets a final run through, screen by screen. "This kind, and a lot of other art just like it."

To do what you do best and earn a living doing it—the commercial artist's dream. For Wauben and company, interactive computering is turning out to be everything it promised to be. ◨■

For more information on the Touch Screen or classes and seminars on computer graphics, call Mark Wauben at (213) 595-0258, or write Island Services, Microcomputer Graphics Division, Box 1522, Avalon, CA 90704.



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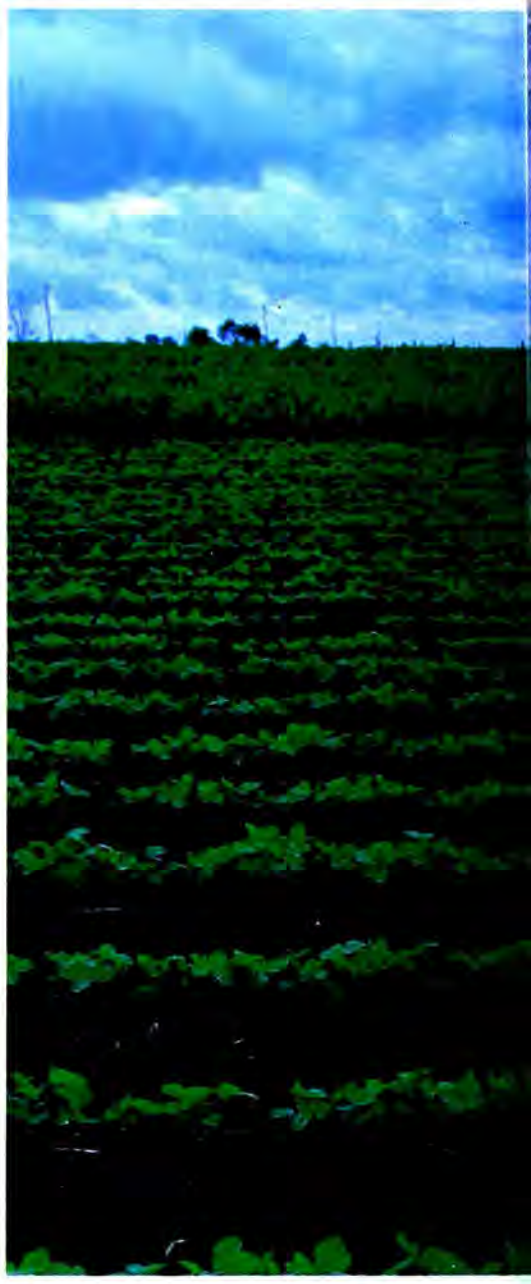
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Down on the Farm With Apples

BY DAVID HUNTER



And the Lord smelled a sweet savour; and the Lord said in his heart, I will not again curse the ground any more for man's sake; for the imagination of man's heart is evil from his youth; neither will I again smite any more every thing living, as I have done.

While the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night shall not cease.

—Genesis 8:21-22

About ten thousand years ago, our Neolithic ancestors discovered agriculture. Before, for untold millenia, our species survived by hunting and gathering wild foodstuffs. How and when the shift occurred, from a hunter-gatherer society to an agricultural society, remains shrouded in the mists of ancient prehistory.

A more significant shift in human destiny has never occurred. Agriculture made it possible to support a much larger population than a hunter-gatherer society could. The world's population wouldn't have exceeded thirty million people had humans never progressed beyond the hunting and food-gathering stage; the earth's natural resources, unaided, can't sustain more. Civilization with all its goods and evils emerged only when humanity had time to think and create.

Despite floods, the ill wind of plagues, the destructive force of wars, and the words of prophets and poets, agriculture remains the most important force in every human's life. We all must eat, and the infrastructure that makes this possible permeates all societies and binds all the peoples of the world into one big hungry family.

After the Seventh Day. Computer technology has contributed greatly to the science of modern agriculture—in genetic engineering, in weather forecasting, in mechanical engineering, in analyzing production techniques, and in numerous other tasks lumped together under the title "farm management." Only a small fraction of the two million-plus farmers in the United States actually own computers, although many more are used to benefiting from this technology through universities, co-ops, and government agencies.

Farmers tend to be victimized by an outdated image of rural vacuousness, of superstition, of conservatism, yet they consistently disprove it. Arlene Martin is one of the modern breed, adapting to computer technology, displaying the innovative mettle farmers are rightfully famous for: if there's a better way to do a job, then you learn that new way.

Arlene and Marion Martin own and operate a 380-acre farm in Webster City, Iowa. Despite fourteen inches of rain in the month of May, high interest rates, and the rising cost of feed, business is going smoothly as usual.

Marion Martin and one part-time hired hand physically manage more than four hundred head of beef cattle and thirty-two sows. They grow corn and soybeans. Arlene Martin keeps the books, does the accounting, and files taxes for the farm. Their thirteen-year-old son helps on the farm part-time when he's not in school.

A little more than a year ago, the Martins visited Beacon's Electronics in Ames, Iowa, in search of an Apple computer. Arlene Martin decided to become the "computer person" on the farm.

"The reason we chose an Apple is because Iowa State University in Ames highly recommended the brand," she explains.

Updating farm operations in the past has meant buying the newest tractor or combine harvester, adapting the latest milking techniques or seeding plans, and employing scientifically formulated space-age fertilizer. The Apple may be the newest implement that farmers cannot do without. The potential is there, but several problems portend a slower adaptation than that to more familiar kinds of tools. Computers will arrive like the seasonal forces of nature, at a speed farmers are familiar with.

The first problem is time. Farmers work hard all year, seven days a week, from before dawn to after sunset. The time required for learning to use an Apple with packaged software may prove too costly. Many farmers would just as soon leave computers to the experts—universities and agricultural agencies.

Cow's Eye Apple. Ken and Myrna Hertneky manage a herd of seventy dairy cows on a nineteen-hundred acre farm in Ramah, Colorado, about fifty miles east of Colorado Springs. In



Photo by Laura Rudkins.

the past they sent their individual cow and herd reports to the Dairy Herd Improvement association.

"The reports would take two to three weeks to come back," explains Myrna Hertneky. "Farmers need that information right away."

The Hertnekys bought their Apple almost a year ago, and in December they picked up Farmplan's dairy herd software package. With an Apple II and that one package, which includes several programs, they can generate information almost immediately. If a cow has fallen off in milk production, they don't have to wait two weeks to identify the culprit.

Harvesting Software. This brings us to the second problem—a scarcity of agricultural software. Until recently there was very little software available for the Apple to help the farmer, beyond accounting and database programs. Now that is changing; more than a dozen outlets, from universities to private companies, are marketing agricultural packages.

Roy Hatt has been investigating feed supplement techniques for the National Research Foundation. Operating out of Taft, California, a hundred miles north of Los Angeles, in the guise of RLH Consulting, Hatt has found that some farmers—those who have had the time—are doing their own programming.

"The TI programmable calculators were a good first generation, but I think many fourth-generation programs on micros are out there," Hatt says.

Wisconsin Microware, AG-COM, Farmplan, Sigma Microcomputer Systems, McIntosh Software, Harvester Computer Systems, and Oklahoma State University are just some of the current sources of agricultural software for the Apple.

Mike Hoybook studied math and computer science at West Texas State before joining his father on the family farm in Sulphur Springs, Texas. Hoybook worked with his father for two years managing a herd of one hundred dairy cows, then acquired his own farm where he now milks about forty out of a herd of sixty. He has authored a dairy management system and is currently marketing it through his company, Sigma Microcomputer Systems.

"I don't agree that time is going to keep farmers from learning to use computers. Sure they are awful busy. It's the same with anybody who has their own business. If you're independent, you find time," he explains.

"When farmers find out what it is and what it can do, the computer will take hold."

Above the Fruited Plain. Another problem, beyond the time factor and the perceived lack of software, is the current state

of the national economy. The dairy industry, in particular, is in rough times. There is much talk of eliminating or greatly reducing government price supports.

"The dairy industry is in trouble," Hoybook says. "Prices are going down. Most farmers are afraid to spend money right now. They would rather wait, let the other guy try a personal computer, and see if it catches on."

Hoybook believes that soon we may see a nationwide production base for the dairy industry. Farmers may suffer penalties for overproduction. There also may be more exporting of dairy products, and the world price for milk is much less than the price in the United States.

"I believe milk has seen its highest price for a long time. Now more than ever, dairymen are going to have to cut corners," Hoybook explains. "Microcomputers help identify nonproducing cows faster. We see problems developing before they get too bad."

forged ahead at a remarkable speed. The fantastical bovine creatures treated like gods in old Irish epics have almost come into being. Geneticists and breeders striving for years to create the perfect milking cow have made considerable headway.

But along with the fabulous scientific progress has come the end of an era. The family farm may never completely disappear, but it's rapidly becoming an endangered species.

Micro Milking in the Midwest. Dr. Art Stiennon learned computing and farming at the same time. His was not the way of son taking over from father, who had taken over from *his* father. Stiennon bought his first farm in southwestern Wisconsin in 1966. He bought his first computer in 1968.

Today Stiennon operates a network of twenty-three farms totaling forty-five hundred acres in Dane County, Wisconsin. Stiennon has acquired several of the farms from retiring farmers.

"The son would say: 'Dad, I've found a job in town.' With no one to take over, the farmer sells out and retires," Stiennon explains.





Photos by Laura Rudkins.

Left: Troy Martin, thirteen, and Marion and Arlene Martin of Webster City, Iowa. Arlene works with the Apple III analyzing production and finances while her husband and son do the farm work. Right: Some of the Martins' four hundred head of beef cattle. The Apple helps in herd management and marketing decisions.

A white head and white feet
had the Bull Finnbennach
and a red body the colour of blood
as if bathed in blood
or dyed in the red bog
or pounded in purple
with his blank paps
under breast and back
and his heavy mane and great hoofs
the beloved of the cows of Ai
with ponderous tail
and a stallion's breast
and a cow's eye apple
and a salmon's snout
and hinder haunch
he romps in rut
born to bear victory
bellowing in greatness
idol of the ox herd
the prime demon Finnbennach.

—From the Irish epic *Tain Bo Cuailnge*

There is no bigger business than agriculture. Its assets number in the hundreds of billions of dollars and gross receipts dwarf even those of the oil industry. In this country alone, there are more than two million farms. Our founding fathers were farmers and considered agriculture a preeminent concern of the young United States. Since then, there has been no bigger force influencing agricultural development in this country than the government.

In the last century and a half, agricultural sciences have

"In the old days you could make a living off thirty cows; now it takes at least seventy cows. Most of the farms I've acquired are small, from one hundred to three hundred acres."

Stiennon, with a strong mathematical background, taught himself to program on a PDP-8/L and eventually produced dozens of farm management programs. By 1980 he had more than two hundred fifty programs and realized he had something worth marketing. Stiennon hired a programmer to convert his programs to the Apple and formed Wisconsin Microware. The initial product from Stiennon's company is *The Agricultural Software Package,* or *Ag-Pac.*

The going price for *Ag-Pac* is rather steep. Nonetheless, the package, which is broken into four main sections, is quite complete for the diversified farmer. The financial management section includes programs for determining amortization costs, internal rate of returns, refinancing mortgages, and mortgage balances. The crop enterprises portion of the package focuses on cash grain production, profit matrix, pricing grain, crop sharing, blending wet and dry grain, trucking grain, hedging, and soybean spreads.

Ag-Pac's livestock enterprises section features programs for feeder pig production, pasturing stockers, cow-calf operations, breeding-herd taxes, dairy replacement heifer production, balanced least cost rations for dairy cows, and balanced least cost rations for beef cattle. The final fourth of the package is called land investment, including Lee's land formula (a capital budgeting model for evaluating farm land acquisitions), population pressure, and population map.

"Even a small dairy farm is big business. If you have sixty

cows at $1,500 each, more than $75,000 in milking and farming equipment, and $150,000 in land, that's already more than $300,000 needed in working capital," Stiennon says. "In such a substantial enterprise the cost for a computer and software is not great. Four large tractor wheels cost about $7,500."

The Early Bird. In any farming community there are leaders. These brave individuals are the first to try a new technique or technology, while the rest of the community watches to see what happens. Stiennon believes that computers are the focus of this phenomenon now.

"One of the nice things about human beings is our natural tendency to be constantly optimizing," he says.

The Hertnekys are community leaders. In the past when a new hay baler or swather came on the market, they were always the first to try it. Lately, the Hertnekys' neighbors are wondering about Ken and Myrna's Apple II.

"Yes, it can help, if farmers learn how to utilize the computer properly," Myrna Hertneky suggests. "Farmplan's program has been very easy to use. We've increased our milk production per cow from fifty pounds a day to between fifty-seven and fifty-eight pounds a day."

Unlike the Martins of Webster City, Iowa, Myrna is not the only computer person on the farm. "Ken has really taken an interest. He knows more about business than ever before," she says.

The Hertnekys have worked their farm now for about twenty-eight years. Their daughter works part-time on the farm, along with Ken's parents. Their son is in college.

"The price of milk is dropping. Hay has gone up. The price of grain is steady, if not down a little. Freight rates have stayed the same," Myrna explains. "The interest rate is what's really holding people down."

The Land of Plenty. Across a mountain range, a few deserts, and some of the richest farm land in the world, is a new company with a product and a message.

"Agriculture has traditionally been pampered, maybe too much, but, of course, that's been helpful to farmers." The speaker is Milo Tenney, president of Farmplan in Sunnyvale, California. "Price supports and subsidies will continue to be cut. Agriculture has to stand more on its own feet."

Tenney grew up on a dairy farm in Chandler, Arizona. He graduated from Utah State with a major in agricultural economics and a minor in computer science. Last June he filled the top spot at Farmplan, by virtue of his dual background.

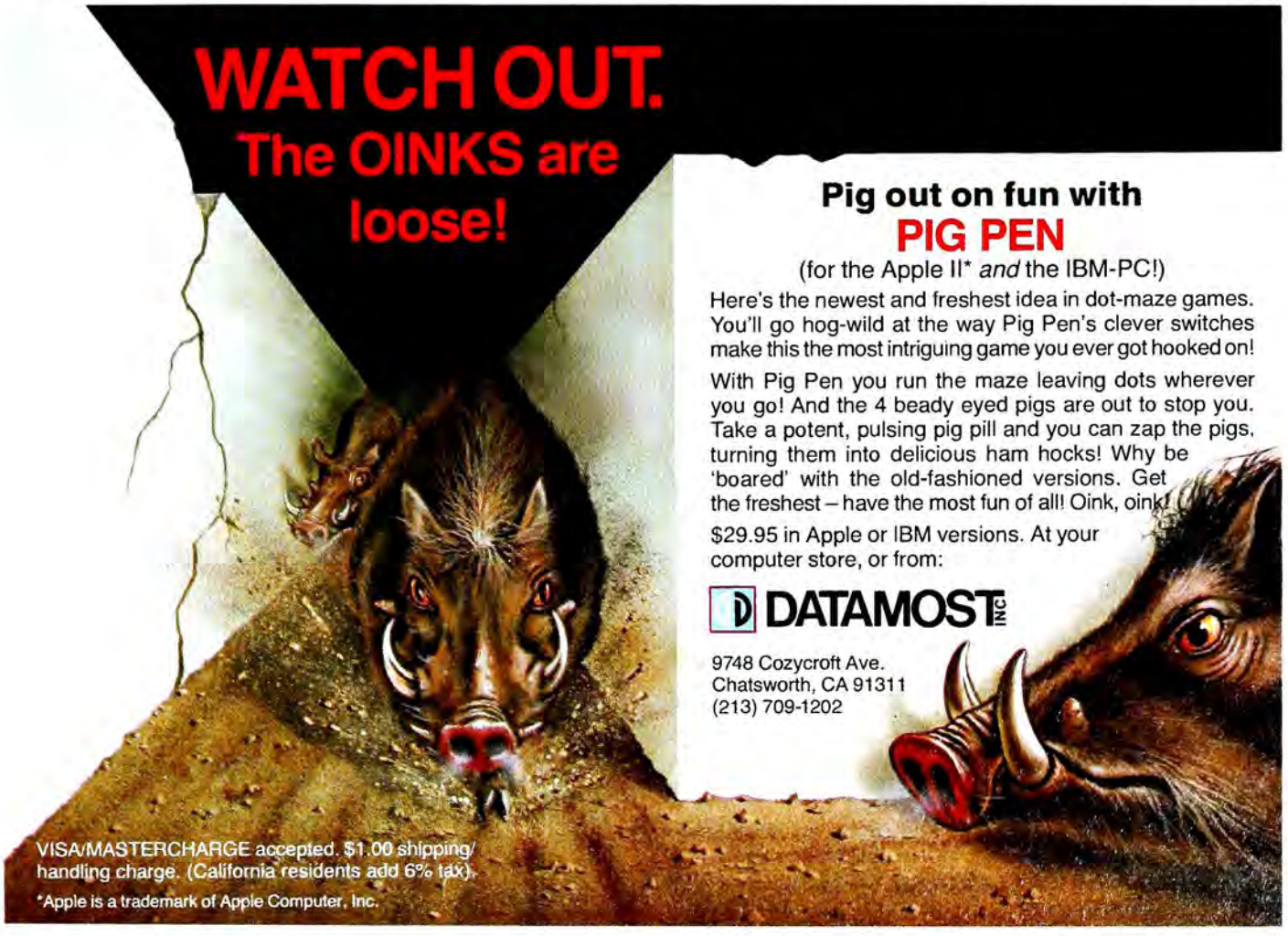
Working with a couple of programmers, Tenney developed a series of farm management products to market nationwide. In what is called the *Farmplan Agent Program*, district agents handle sales for areas of two or three states and local centers provide after-sale service. Tenney believes that personal computers are very definitely destined for a place on most American farms.

"In the relatively near future everybody is going to have one, like every serious farmer has a tractor. Farm computers will go the same route," Tenney predicts. "Better and better software is going to give farmers information in terms they can understand, even if they don't have any real computer expertise."

Farmplan's *Dairy Herd Management* package basically keeps records and manipulates information. It is a decision aid, but not a decision maker. Tenney believes eventually there will be software programs that come close to reproducing the sixth sense farmers spend generations acquiring.

In the here and now, Tenney believes that some farmers are expecting too much from the computer. "No. This is not a farm manager, but it could help a farmer make a little more profit.

"Marketing decisions are very important. Market analysis and one good decision could pay for the computer overnight."



The advent of farming for profit instead of survival, destined as it was in the long run to lift many families out of lifetimes of drudgery and to cause many more yet to leave farming altogether, also ended neighborly interdependence, and set farmer against farmer in competition for each other's choice land. It also changed attitudes. For the first time, an entire class of farmers went to their barns each morning asking themselves, "How can I make more money out of this operation?"

—Mark Kramer, from *Three Farms*

Iowa Cornfed Microcomputing. The fine line dividing profit and survival gets thinner every day. Both motives are behind the efforts of Arlene Martin to learn programming. With her Apple III, Apple II, Paper Tiger 560, and several existing programs acquired from *Successful Farming Magazine*, this fifty-two-year-old woman finds the world of microcomputing fascinating.

She has attended Iowa Central Community College for courses in programming and plans to get a degree. While her husband is busy running the farm and improvements are being made on the farmhouse, Arlene is busy learning *VisiCalc III.*



Photo by Laura Rudkins.



Photo by Jim Solmons.

Left: These are just a few of the Martins' thirty-two sows. Several software packages are available for hog management. Right: Although this Maryland farm hasn't succumbed, family farms are becoming an endangered species.

Traditional Yankee farmers in New England are characterized by a competitive yet neighborly demeanor. Next door neighbors fight the same weather, toil on the same ground, and compete in the same market. Iowa is no different from New England. Neighbors help each other when more than two people are needed for a task, like raising a barn, but when push comes to shove, it's every farm for itself.

Just about everybody who received one of the early Apple IIIs had problems, and Arlene was no exception. "Last summer I wouldn't have given you a nickel for it. I got frustrated and nervous. Left it alone for a while."

Fortunately, Arlene did not get too discouraged. When Apple replaced the old III with the new one that runs properly, things got better in a hurry.

Benny Lane is a programmer with the Oklahoma State University Division of Agriculture, which has released several programs for the Apple originally produced for the TRS-80 and IBM 370. Lane grew up in a farm community, enjoying the experiences of any farm kid.

"Mess up once with computers and that sets you back a long way," he explains. "You'll get laughed out of the market. Someday micros may actually drive a tractor, but that technology is two or three years away and about ten years away from being fully accepted. For the moment computers will only do tasks on the farm that farmers trust them to do."

Least Cost Computer Rations. A farm management specialist at Oklahoma State University, Ted R. Nelson wonders how many farmers will actually buy computers and use them. "It's more efficient to hire somebody else to do that kind of work.

"All the expertise needed can't be in software. Farmers can't duplicate on their own the expertise practiced by local fertilizer dealers, for instance."

Ralph Butterfield is an instructor for adult agriculture courses at Madison Public School, a small rural high school in central Minnesota. He's been teaching agriculture for twenty-five years and knows a lot about farmers.

"I find that farmers are not really interested in learning data processing. They're vitally interested in that information but their time is worth more," Butterfield explains. "Farmers would rather turn it over to someone who knows that business."

Still, Butterfield finds the implications of data processing coming to the farm staggering. The younger generation, he finds, is more appreciative of computer technology and is in a good position to acquire the proper training and skills.

"Farmers will always depend indirectly on the skills of others, like accountants and lawyers," Butterfield explains. "But now sons are coming back from college with knowledge of computers and who knows what will happen next. Apples are a major catalyst that will help data processing on farms come about. In the long run, farmers will go wherever they can get help."

Sowing the Seeds of the Future. The majority of living Americans know little about where their food comes from and have no part in its production. We take it for granted that there will always be eggs, bread, fresh vegetables, and mashed potatoes when we get hungry. In other parts of the world it's a different story.

Ten thousand years ago humans first planted seeds and harvested crops. They made sacrifices to gods and deities at seedtime and harvest time. We, in the most technically advanced country in the world, still celebrate the rising of Jesus Christ from the dead around the time of spring planting.

Ten thousand years from now, our descendants may look back and praise us for bringing computers to the farm. We will have helped forge their society, for better or worse. ◨

AG-COM, Box 706, Muscatine, IA 52761; 319-263-8475, 319-264-8781. Farmplan, 1055 Sunnyvale Saratoga Road, Sunnyvale, CA 94087; 408-746-0636. Harvest Computer Systems, 203 West Eleventh Street, Alexandria, IN 46001; 317-724-9527. McIntosh Software, 2428 First Avenue N.E., Cedar Rapids, IA 52402; 319-366-6327. Oklahoma State University, Extension Farm Management, Department of Agricultural Economics, 513 Ag Hall, Stillwater, OK 74074. Sigma Microcomputer Systems, 310 Helm Lane #C-10, Box 861, Sulphur Springs, TX 75482; 214-885-2892, 214-488-3579. Wisconsin Microware, One South Park Street, Suite 220, Madison, WI 53715; 608-255-9020.

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INTRODUCTION

This edition the THE BOOK OF APPLE COMPUTER SOFTWARE 1982 combines previous editions (some re-written) and new articles, reviews and evaluations. Judging from the response accorded the first edition, which immediately sold out, there is a great need for a guide to the hundreds of programs that compete for the Apple owner's dollars. With the introduction of the Z80 card, choices get even harder concerning what to purchase; therefore, we dedicate this book to you, the consumer. We hope you will use it for a guide and as a reference to assist you in making intelligent and informed decisions when purchasing software.

Currently, the Apple Computer owner is presented with a bewildering selection of software from which to choose. On the one hand, this should please you in that, as the owner of probably the most popular micro-computer in the world, you have a wide and rapidly growing selection of software from which to choose. On the other hand, this wide and growing selection presents some problems. The vast majority of retail computer store staff people simply just do not have the time to adequately review each new piece of software that comes in their store. The problem is compounded if the new program is an extensive or complicated one, such as an accounting package or a word processing system, or a comprehensive data base management program. This does not mean that store personnel do not want to give you the best service possible; it's just that it is an almost impossible task. If you purchase software through the mail, the risks that you assume, without a reliable guide to assist you should be apparent.

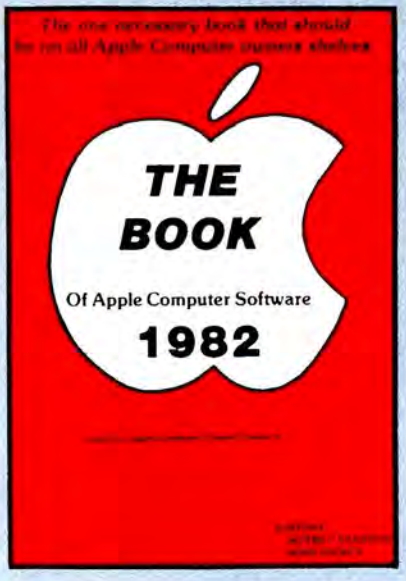
Other pitfalls await the uninformed buyer. For instance, in too many cases you cannot by the appearance of the package whether the program requires Integer Basic or Applesoft Basic or whether it needs 16, 32 or 48K of RAM. It is also often difficult to tell when you purchase a program on tape whether it can be transferred to disk or, if a disk program is purchased, whether it can be copied or not.

Another area that can present problems to the buyer is the similarity of software. A well-stocked computer store may possibly offer five different word processing packages, four assemblers, ten different adventure type games and/or several mail list programs, (the choices seem endless); all of which have obvious advantages and disadvantages as well as different prices.

The goal of "The Book" is to eliminate as many of these potential problem areas for the software buyer as possible.

We welcome any comments or criticisms from readers that will help us in reaching this goal.

*Obviously, Apple and Apple Computer Co. is mentioned many times throughout "The Book." Apple II is a registered trademark of Apple Computer Inc.



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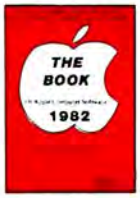
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The Schoolhouse Apple

by Jean Varven

On the opening day of Applefest in Boston this past May, the sign on the booth read simply: The Phoenix School. While the booth did generate some interest, the school's founders couldn't help feeling disappointed. Not nearly as many parents and kids as the organizers of the Phoenix School were expecting stopped by that first day to get acquainted with what the school had to offer.

Some Apple-owning residents of the Boston/Cambridge area did take the time to visit the booth to express regret that the school was so far away. Situated midway between Harvard and MIT, the school is not named for its location. Rather, explains director and cofounder Larry Davidson, "The name is meant to suggest the idea of something new springing from the old."

By the time the second day rolled around, says Davidson, a second line—an all-important clarifier—had been added to the sign. The addition read: Cambridge, Massachusetts.

The Phoenix School is an independent coeducational school for students ages five to eighteen. One of the things that sets the school apart is its emphasis on integrating the computer into the education and lives of its students.

The idea for this innovative school was born in December of 1980 out of dissatisfaction and frustration. At that time, Davidson and two colleagues, Alison Birch and Brian Harvey, were teaching at Lincoln Sudbury regional high school. All three felt unhappy about limitations the public school system imposes on learning and teaching and wished they could do something to create the kind of environment they felt would benefit students most.

The learning environment Davidson, Birch, and Harvey envisioned more than a year and a half ago had four primary attributes: small classes, attention to the individual needs of students, quality instruction, and the opportunity for students to be involved in the community. Computers, mostly Apple IIs, came later, a natural outgrowth of the collective experiences the new faculty members brought with them, and a powerful means of establishing learning and teaching situations that were responsive to students' needs and interests.

Double Screening. Before a student is accepted to attend the Phoenix School, parents and child take part in an interview with two members of the staff. Applicants are chosen based on an assessment of their academic and social readiness for the Phoenix School environment. The interview provides the opportunity for the school's representatives to answer any questions the family may have about the school and to review the applicant's educational history. Parents and child get a picture of what the school offers, what a typical day might be like, and so on.

Midway through the meeting, one teacher stays with the parents while the other accompanies the child to the computer center. While the parents learn more about the school through further conversation with a teacher, the child learns more by doing—by exploring the environment and the computer. Davidson remarks that, once students get started, it's usually hard to tear them away from the Apple when it's time to go home.

But kids aren't the only ones who become intrigued by the computer. Parents are also eager to expand their world by learning to make the computer do their bidding. This past spring and summer, Phoenix School staff members conducted a variety of workshops especially intended to give individual attention to adults and children in the community who wanted to learn more about computers.

Newcomers to computing were invited to experience a "gentle introduction to what computers are all about" in the form of a one-day workshop entitled "Demystifying Computers." Through a combination of discussion, demonstration, and hands-on experience, participants discovered that they could indeed control the computer. Other offerings included intensive two-week workshops on Logo, Pascal, Lisp, and word processing on the Apple.

Davidson reports that several parent/child teams attended the summer workshops. And although the school will not hold as many open workshops during the regular school year, the schedule does call for several workshops that will help parents keep up with what their kids are learning.

Tight and Together. When school opens for the fall term on September 16, Davidson anticipates having about forty-five students enrolled. As planned, class size will be small—from eight to ten kids per class—making it possible for teachers to work closely with each student. And if things go as Davidson hopes they will, the ratio of students to computers will be 2:1. Since 50 percent of students' work won't involve the use of computers, this ratio means that a computer should be available whenever a student wishes to use one.

Students in the lower grades will attend class from nine in the morning until two in the afternoon. They will be in differ-

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ent groups for different subjects, depending on what is being taught. They will have regularly scheduled individual computer time in addition to using the computer in conjunction with their math work. In addition, the classroom experiences of these students will be supplemented by field trips that help bring the subjects they've learned about in school to life.

A typical day for a high school student at the Phoenix School will be somewhat the reverse of the schedule for younger students. High schoolers will spend their mornings outside the classroom, gathering experience and information they wouldn't be able to get within the school setting. Library work, field trips, and community internships are some of the ways these students will spend the first part of the day. According to Davidson, not all the internship opportunities have been explored as yet, but possibilities include work in a hospital, at a local computer company, and at the children's museum; interning at WMBR (MIT's radio station), with a political group, or with a member of the state legislature; and helping to teach younger students at the Phoenix School.

Formal classes for high school students will take place from 12:30 to 5:15. Rather than taking five or six classes at a time over a quarter or semester, high school students will study fewer subjects over shorter periods of time. This arrangement is meant to give them the chance to become really involved, to concentrate intently rather than having to spread their energies and attentiveness too thin.

The large room that serves as the computer center will house twelve machines. The remaining computers will be scattered among the other classrooms. But, Davidson hastens to mention, no room will have just one computer. The standard is two or more in some classrooms, none at all in others.

The reasoning that underlies this particular arrangement is simple but significant. Davidson and other educators see real value in the interaction that happens between students who are working side by side on computers. Whether they are learning about the same subject or not, kids working next to each other tend to show each other what they're doing, even to show off a little. And in the process of sharing their excitement and their frustrations, their knowledge and their questions, kids become more confident in themselves and their abilities to solve problems using the computer.

Little Big Job. Setting out to establish a small school, especially one that will challenge and meet the needs of a broad range of students, is an ambitious undertaking. Davidson, Birch, and Harvey knew that one of their first and most important tasks would be finding the right faculty members. They needed people whose experience and interests qualified them to teach more than one subject very well and to take on a variety of roles. The five full-time faculty members who will greet students this fall certainly seem to fill the bill.

Alison Birch majored in math in college. Her experience includes teaching math, computers, physics, and astronomy to high school students. Ellen Davidson, Larry's sister, is a former education major; she has taught in elementary schools for two years in Appalachia and for nine years in New York. Davidson studied social science and has experience in helping people learn to work together cooperatively.

In a departure from strict academics, the two women also plan to teach weaving, folk dancing, and the art of making stained glass. These opportunities to learn and enjoy the arts and pleasures of earlier times will help provide the students a balance to the computer-intensive curriculum.

Anne Kramer's field of study was social science. Her primary responsibility will be teaching elementary school students, and she is qualified to teach art and music to students in the upper grades. Rowland Russell studied math in college and has taught social studies and science, including biology and oceanography. In addition, Russell writes poetry and plays the dulcimer and will teach interested students to do both.

Davidson's credentials include a bachelor's degree and the master's degree in linguistics, both from Harvard. He was chairman of the math department at Lincoln-Sudbury regional high school and has taught English and math to high school

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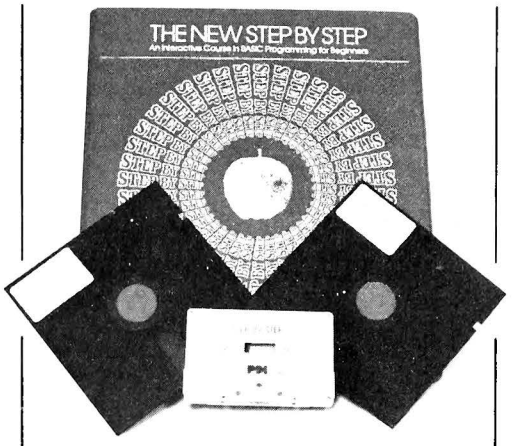
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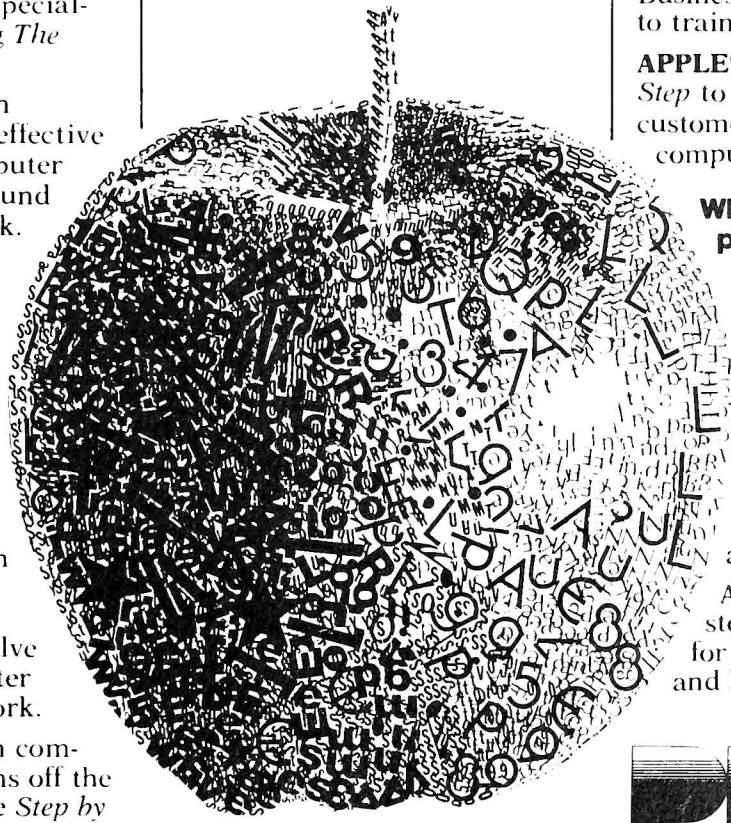
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students. Since September of 1980, he has worked at Logo-Computer Systems; he wrote the manual for the company's version of Logo. Come fall, Davidson will devote full time to the school.

Writing Right. Students at all grade levels will be doing a lot of writing in all subjects, using the Apple and a word processing program. In keeping with the experiences other teachers have reported, Davidson finds that word processing makes a real difference—children, and people in general, develop significantly better writing skills when they're not bogged down by the mechanics of doing their assignments in longhand.

The computer as a tool interests Davidson, as does the study of computer languages as languages. He has drawn on his linguistics background to work with students, computers, Logo, and Lisp in the study of English grammar.

Studying grammar and linguistics on the computer involves formalizing one's knowledge of grammar. When you're attempting to generate sentences and translations on the computer, you must make things explicit in order to get the results you want. Davidson has found that using the computer in the study of grammar is one way of involving students whose primary areas of interest have been math, science, and computers rather than English. Approaching grammar from a different perspective—putting it in a different context—seems to make all the difference.

A small private school offers special benefits to staff and students, along with new challenges. Students who have been accustomed to other kinds of school settings may have some adjustments to make. For this reason, the primary focus during the first two weeks at the Phoenix School will not be academics. Instead, these days will be used for an intensive orientation period, a time when students get to know the school, the surrounding area, and one another.

In a situation where students and staff work closely with one another every day, it's especially important that there be effective ways of working out whatever problems may arise. During the orientation period and throughout the year, students and staff will learn how to interrelate. Each student will have a faculty advisor who will remain the same throughout the student's tenure at the school, unless the student insists on a change. Advisors will be available to help students plan their coursework and to encourage their growth, academically and otherwise.

Thrust and Query. In the process of teaching young people and adults about computers, Davidson has noticed some rather telling differences between the two groups of learners. While adults learning about computers tend to have more knowledge of the subject, they also tend to ask many more questions ahead of time than do their younger counterparts. Kids are generally much less hesitant, more willing to plunge ahead without worrying overmuch about breaking something or making a mistake.

It would seem that the Phoenix School, with its emphasis on the computer as a problem solving tool and its attentiveness to individual needs, is one place where learners of all ages will be free to explore and to flourish.

With Reference to Educational Computing. If you're trying to sort out who does what in education and where you should be when during the coming year, you may want to obtain a copy of the *Classroom Computer News 1983 Directory of Educational Computing Resources*. This new book, published by Intentional Educations, becomes available in August. The directory includes information about educational computing resources, periodicals, and professional associations, and a calendar of national and regional educational computing events. For information about how to order, contact Classroom Computer News, 51 Spring Street, Watertown, MA 02172; (617) 923-8595. Contact: Laura Koller. ◻■

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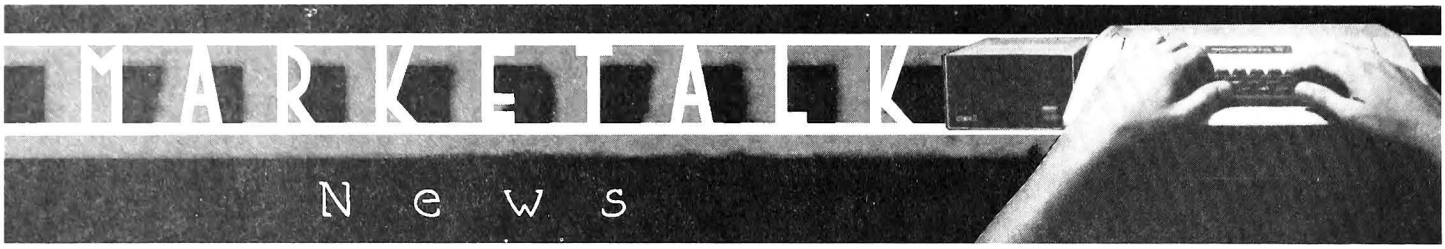
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☐ **Starsoft** (4984 El Camino Real, Suite 125, Los Altos, CA 94022; 415-965-8000) announces the release of *CPA Partner*, a client write-up package. Menu driven; features client reporting, budgets, balance sheets, profit and loss, and fund analysis. Maintains up to 300 clients with 99 departments, and 1,900 monthly journal entries. Prints client invoices and provides revenues analysis by client, billing code, or by staff code. $2,000.

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☐ The Agricultural Economics Department at Oklahoma State University has completed translating thirteen of its fifteen programs to run on the Apple. The programs provide farmers and ranchers with help in record keeping, livestock feeding, and least-cost feed formulation. Additional information is available from **Extension Farm Management** (Department of Agricultural Economics, 513 Ag Hall, Oklahoma State University, Stillwater, OK 74074; 405-624-6157). Prices: $10-$100.

☐ **VisiCorp** (2895 Zanker Road, San Jose, CA 95134; 408-946-9000) has announced *VisiCalc Advanced Version*, the second-generation "electronic spreadsheet" program for the Apple III. The new version of the bestselling business program brings to an organization what the original *VisiCalc* brought to the individual—the power to save time and effort. $400.

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☐ **Lloyd's of London Press** (817 Broadway, New York, NY 10003; 212-673-4700) has launched a new service on *Prestel*, the world videotex service that can track 22,000 merchant vessels in 800 ports worldwide. United States users have access to the service via telephone to *Prestel* in Boston. *Prestel* connects a database of over 230,000 pages to home and office computer terminals. Access to the service is available to Apple II owners by disk. $85.

☐ From **Beaman Porter** (Pleasant Ridge Road, Harrison, NY 10528; 914-967-3504) comes *PowerText*, the word processing system that automatically shapes your text into memos, letters, reports, and more. Includes underlining, justification, pagination, and spacing. Tracks footnote or bibliography numbers, supports eighty columns. Requires two disk drives. Pascal version: $199; 64K version: $299.

☐ **Perfect Software** (1400 Shattuck Avenue, Berkeley, CA 94709; 415-644-3001) announces the release of its new word processor, *Perfect Writer*. Capabilities like those in *Wangwriter* and other sophisticated systems; edits documents larger than the computer's memory, allows up to seven files on-line and two files on screen at one time. Seven edit modes and user definable commands. $389.

☐ *Sports Management Software* is a series of seven programs from **Market Computing** (201 15th Avenue S.W., Puyallup, WA 98371; 800-426-1200, 206-848-9276). *Athletics Package* keeps records of league standings, league scheduling, and reservations. $250. ☐ *League Standings* registers game results and computes team and league standings; records win-loss, ties, games behind; displays statistics; prints mailing labels. $100. ☐ *League Scheduling* creates round robin schedule for several leagues. Prepares schedules, noting time of day, number of teams, holidays, and rain outs; prints master schedules, mailing labels. $100. ☐ *Reservations* makes reservations for facilities such as handball courts and practice fields. Short term and long term available. $100 each. ☐ *Warm Fuzzy Sampler 1* introduces managers to the use of computers in recreation management. $25. ☐ *League Registration* is a computerized filing system that organizes league records, provides easy access to league and player information. Holds data on as many as 600 players on data disk. $150. ☐ *Tennis Draw* registers players and teams in tournament events, creates single-elimination random draw, allows seeding of players and teams. Handles eight to sixty-four players in twenty-one events simultaneously. $60. ☐ *Swim Meet* helps manage competitive swim events. Registers swimmers in events, tracks qualifying times, assigns six or eight-lane pools, generates heat sheets, and prints final standings. Stores information on 160 swim-

mers per event, for as many as 100 events, with up to 20 heats per event. $125.

☐ The *Using VisiCalc* tutorial developed by **McMullen and McMullen** (Jefferson Valley, NY 10535; 914-245-2734) contains over three hours of audio cassettes, printed examples, and a disk of *VisiCalc* templates. $59.95. ☐ Also available is volume 5 of the Powersharing videotape series, *Taking a Trip through VisiCalc: A Tutorial*. Thirty-eight minutes. $250.

☐ The personal computer keeps information personal with *Classified*, a software utility from **Passage Research** (945 Turquoise Street, Suite G, San Diego, CA 92109; 714-488-5358). The program encrypts and decrypts information stored on any file, including confidential phone numbers, financial program data files, and files containing trade secrets. $39.50.

☐ A new quarterly, *Journal of Computers Reading & Language Arts* (CRLA), is ready to receive papers. The journal will cover the rapidly growing interest in computers and their relationship to reading, language arts, and related studies. It will be directed toward reading and language arts teachers, educational specialists, classroom teachers, education of instructors, and education researchers. Published by **ALP** (Box 13039, 6472 Moraga Avenue, Oakland, CA 94611; 415-531-2500).

☐ A technical report describing the advantages of the new Modula-2 programming language over Pascal is available from **Volition Systems** (Box 1236, Del Mar, CA 92014; 714-457-3865). *Modula-2—A Solution to Pascal's Problems* discusses eight commonly acknowledged drawbacks of Pascal and how Modula-2, a high-level language said to possess most of Pascal's attributes, addresses these problems. Free.

☐ Turnkey computer learning centers are being offered to schools and private investors by **Queue** (5 Chapel Hill Drive, Fairfield, CT 06432; 203-335-0908). *The Queue Computer Learning Center* will combine popular microcomputers and software into an organized curriculum for computer programming and literacy, academic areas, and specialized test preparation. Also includes course outlines and brochures, literature and training to run a complete profit or nonprofit learning center. $15,000. Lease plans from $500 per month.

☐ For educators, researchers, and students, **MicroStat Software** (Box 681, Fairfield, IA 52556; 515-472-5979) introduces *Introstat 2.1*, a statistics package that includes all the common statistics normally encountered in first-year college statistics courses. Easy data entering and manipulation; high resolution scatterplot. $85.

☐ Find what you need in computer graphics with *The S. Klein Directory of Computer Graphics Suppliers* (730 Boston Post Road, Suite 27, Sudbury, MA 01776). The directory gives the who, what, and where of the computer graphics industry and pinpoints suppliers. $47.

☐ *Information Systems in the 80s: Markets, Products, and Vendors* gives an overview of the key variables that will affect the information processing industry in this decade. Examines factors influencing the industry, including personal computing and home information. Available from **Prentice-Hall** (Englewood Cliffs, NJ 07632; 201-592-2348). 363 pages. $29.95.

☐ **Flexible Software** (Box 47, Prairie View, IL 60069) announces *PharmaSources '82*, the 1982 edition of its international guide to software and databases. The 170-page directory concentrates on pharmaceutical, biological, and medical device industries. Supports micro, mini, and mainframe computers. $85.

☐ The second edition of *The Blue Book* for the Apple is now available from **WIDL Video** (5245 West Diversey, Chicago, IL 60639; 312-622-9606). Includes over 2,350 software and hardware listings and more than 450 software and hardware producers. 464 pages. $24.95.

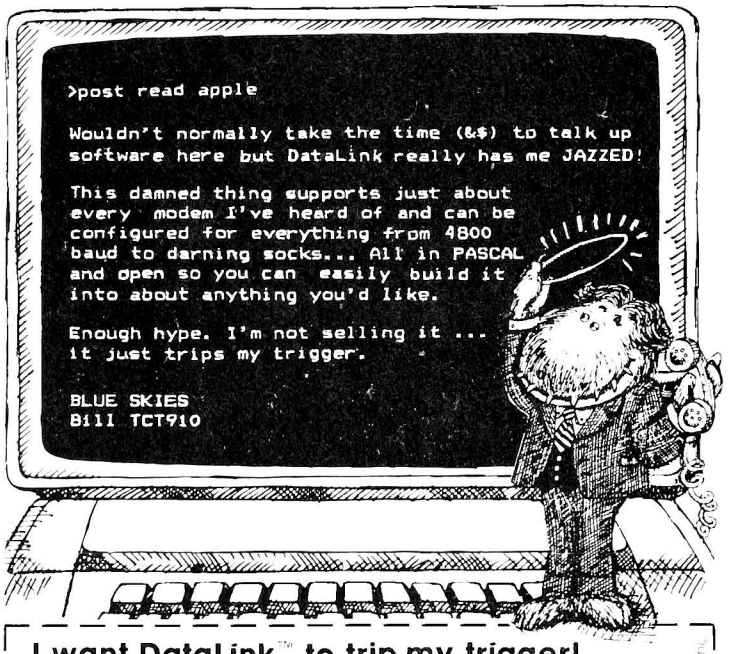
☐ Administrative software for special education departments of public and private schools is now available from **Creative Educational Services** (36 River Avenue, Monmouth Beach, NJ 07750; 201-870-6543) with the *Individual Education Program* (IEP). It collects and evaluates data and handles paperwork concerning each handicapped student. Compiles goals, objectives, criteria, methods, and materials for students, and

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produces customized IEP planning document. $475. ☐ *Special Education Tracking System*, which gives student status, deadlines, notices, and reminders, is set for release late this summer. $295.

☐ A sixteen-track digital synthesizer recording system described as more advanced than conventional recording methods is now available from **Syntauri Corporation** (3506 Waverley Street, Palo Alto, CA 94306; 415-494-1017). *Metatrak* gives musicians, composers, and users the power, flexibility, and control of an all-digital synthesizer-recorder. Available only for the Studio Pro five-octave alphaSyntauri synthesizer, it features multitrack recording, ability to sequence sixteen tracks together, independent per-track control of volume, instrument, and vibrato, and a built-in click track, *Metatrak*'s metronome. $1,995. Owners of the alphaSyntauri synthesizer with SuperPlus sound-on-sound recording may convert to *Metatrak* for $100.

☐ **Legend Industries** (Box 112, 2220 Scott Lake Road, Pontiac, MI 48056; 313-674-0953) has introduced *Slot 8*, an expansion card that plugs into slot 7 and provides its user with two slots for peripheral use. $64.95.

☐ **Panasonic** (One Panasonic Way, Secaucus, NJ 07094; 201-348-7183) offers black and white and color in one monitor. The *CT-160* is a dual-mode ten-inch color display for graphics or games that also switches to black and white for business use. Built-in audio system for games or speech synthesizers. $400.

☐ The *TR-120M1P* features a direct-etched faceplate to minimize glare and a high-resolution display. The TR-120M1P reproduces eighty-by-twenty-five-character displays or computer graphics through green phosphors. Also features video looping connector and an integral audio system. $220. ☐ Panasonic also introduces two dot matrix printers. The *KX-P1160* is a bidirectional printer designed to print up to 165 characters per second. Nine-by-thirteen matrix produces ninety-six ASCII characters with descenders; adjustable sprocket pin feed handles paper from four to fifteen inches wide with an optional front inserter to print single sheets. Optional RS-232C interface and a line spacing feature allow selectable spacing.

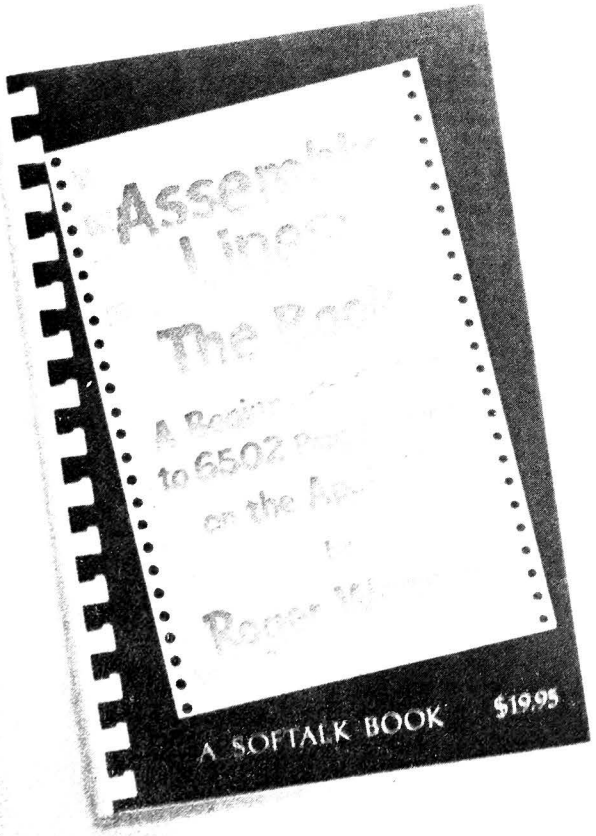
☐ The *KX-P1090* is also bidirectional and handles paper four to ten inches wide. Eighty characters per second, up to eighty characters per line. Pin and friction feed. ☐ Panasonic's three-inch compact floppy disk has the same recording capacity as most conventional five-inch disks. Dimensions are 80 mm wide, 100 mm long, and 5 mm thick. A plastic case with automatic head window shutter protects against dust and fingerprints; automatically opens and closes when the case is inserted or pulled from the drive. Features reversible write-protect mechanism. Prices to be announced.

☐ Create your own firmware. **Word-Power** (Box 736, El Toro, CA 92630; 714-859-7145) has developed *PROM Programmer*, a new hardware board for programming EPROMs. Combines ease of use with hobby and construction projects. Allows user to program two EPROMs simultaneously. $99.95.

☐ Mr. Rubik have you up a tree? *The Cube Solution* by **Muse Software** (347 Charles Street, Baltimore, MD 20201; 301-659-7212) makes dealing with your cube puzzle easier with colorful graphics and simple commands. The program matches its cube to yours, then walks you through the solution. It also lists the solution on your printer if you prefer to solve it later. $24.95.

☐ **Space-Time Associates** (20-39 Country Club Drive, Manchester, NH 03102; 603-625-1094) puts gamers in the air with *Air Navigation Trainer*, a real-time simulation of air navigation. Features sound effects, four different simulations, ground-based navigation aids, constant or variable wind selection, automatic direction finder, and resetable elapsed-time indicator. $40.

☐ More business! That's what **Data Research Associates** (10 West Forest Avenue, Englewood, NJ 07631; 201-569-2620) is hoping to create for computer stores, dealers, and related businesses, with the implementation of a program to create more walk-in traffic. *Computerack* is a display module that has 150 positions in which to stock computer supplies. Different models are available, starting at $2,000. ☐ *Soft-Rack* is a display module for software. Marketed by Data Research as an investment rather than a product, the *Soft-Rack* package includes $18,000 worth of trial-version software using *Softlok* en-



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$19.95 gets you more than 270 pages of graphs, listings, and exercises. Written in a style Wagner had fifteen months to polish in the pages of *Softalk*, *Assembly Lines: The Book* is a must for anyone serious about trekking through the universe of machine language programming on the Apple II.

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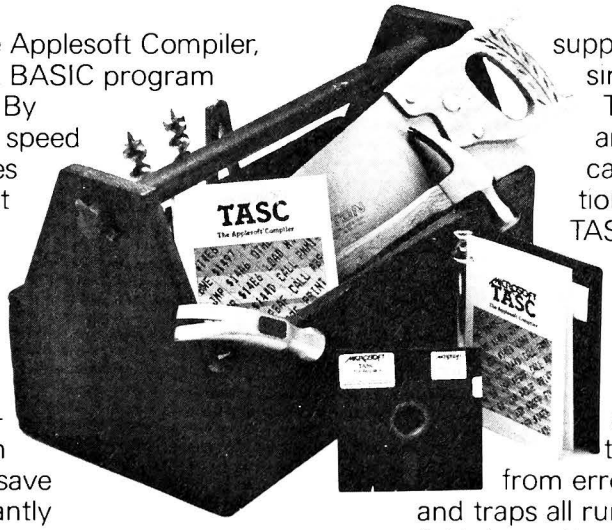
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cryption. When the software purchaser calls to have the program unlocked, the dealer is billed for the remainder of the program price. $1,600.

☐ *The Software Fitness Program* is an interactive, multiuser accounting system for CP/M and MP/M users now available from **Open Systems** (430 Oak Grove, Minneapolis, MN 55403; 612-870-3515). Features include self-instructional, on-line computer lessons and self-running demos. Previously provided to major computer manufacturers and small business users, this accounting system is now available directly to dealers and distributors. Requires Z-80 card. Dealers: $525; 200 or more, $275.

☐ *The Slide Show* by **C & H Video** (Box 201, Hummelstown, PA 17036; 717-533-8480) has been updated to include several new features. Hi-res pictures now load in approximately six seconds; a separate binary file incorporates transitional effects. The user can also create a run-time package that runs separately from *The Slide Show* disk. $49.95.

☐ **Pericomp Corporation** (7 Erie Drive, Natick, MA 01760; 617-655-2460) announces a CP/M inventory software package, the first of a new series of their *Five Star Software* package. Features unlimited, multiple-volume master files and entry-edit, stock status, and stock movement capabilities. Requires Z-80 card and two disk drives. $595; demo, $95.

☐ Financial analysis and planning are some of the features of *ProfitPlan*, a simple worksheet application program for CP/M version 2.2 microcomputers. Put out by **Chang Laboratories** (10228 North Stelling Road, Cupertino, CA 95014; 408-725-8088), *ProfitPlan* contains many of the features of *MicroPlan*, the electronic worksheet for the IBM Personal Computer. Requires Z-80 card. $195.

☐ **Harvest Computer Systems** (203 West Eleventh Street, Alexandria, IN 46001; 317-724-9527) has released a new version of its *Farm Ledger* program. In addition to handling income, expenses, and open accounts, *Farm Ledger* features check writing, checkbook balancing, comparison of performance against projections, and more. It will not, however, keep track of how many "oink-oinks" you have here and there. $250.

☐ Joining the ranks of databases is version 2.0 of *dataKEYper* from **ESP Computer Resources** (9 Ash Street, Hollis, NH 03049; 603-465-7264). Handles up to 800 files; each record holds up to 2,000 fields and alphanumeric fields hold up to 255 characters. Already running on a Corvus hard disk drive, *dataKEYper* is now being introduced in 5¼-inch and 8-inch floppy versions; all files created by the floppy versions can be used on a Corvus hard disk if the user wishes to upgrade. Also featured are automatic column alignment, automatic page numbering and date printing, and totaling capabilities. Corvus version, $249.95; 5¼-inch floppy version, $99.95; 8-inch floppy version, $149.95.

☐ Speaking of databases, **Stoneware** (50 Belvedere Street, San Rafael, CA 94901; 415-454-6500) presents *DB Master Utility Pak #1*, an accessory to version 3.0 of *DB Master*. With it, the user can translate the *DB Master* file format and Apple text files, add, delete or modify fields in a current file without having to re-enter data, create copies of files, and merge data from those copies into one file. Also included is a utility that will build a new set of disks should data disks become damaged. *Utility Pak #1* is compatible only with version 3.0. $99. ☐ Professional graphics quickly at low cost is the billing Stoneware gives *GPS—Graphics Processing System*. Two versions are available: *Professional Version*, for architects, contractors, sales reps, designers, and others whose work involves graphics; and *Standard Version*. Features grid for scaling and altering in proportion, two zoom features, 2-D rotation to 360 degrees, text and overlay abilities. Speaks to Apple Silentype and accommodates graphic dump programs. Game paddles or joystick. *Professional Version* also compatible with the Apple Graphics Tablet, Symtec Light Pen, and Houston Instruments HiPlot Models DMP 3,4,6, and 7. *Professional*, $99.95; *Standard*, 59.95.

☐ New from **Digital Research** (Box 579, Pacific Grove, CA 93950; 408-649-3896) are two products to aid 16-bit programmers. *Pascal/1MT+86* is the 16-bit version of Digital Re-

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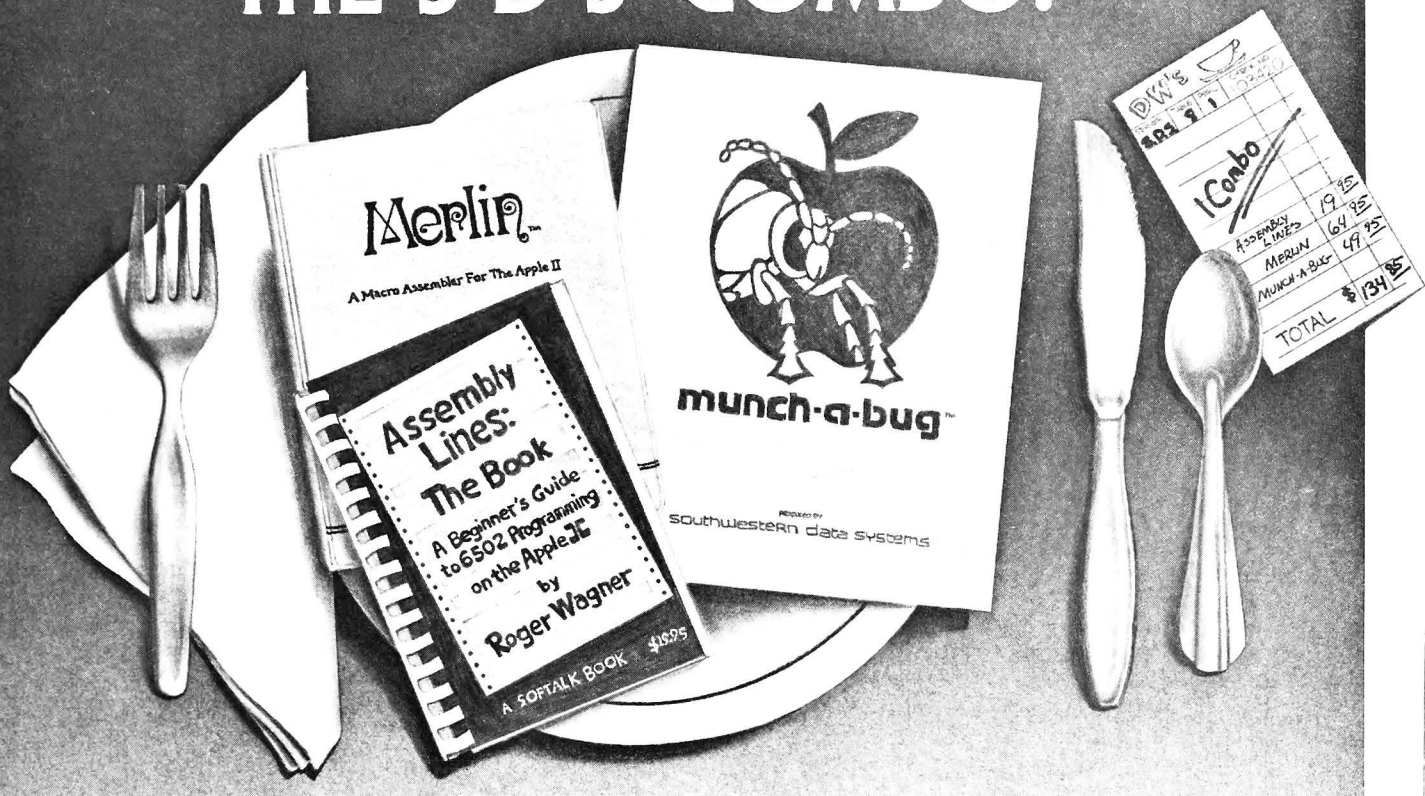
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search's native code compiler programming language, Pascal/MT+. It supports floating point real numbers for scientific applications, decimal arithmetic for business, and "ROM-able" code for industrial applications. Compiler, $600; with Speed Programming, $800. ☐ *SID-86* is a 16-bit symbolic debugger that enables the programmer to refer items by name, rather than by address; this is to save time if addresses change when the program changes. $150.

☐ Now that you've mastered *A2-3D1* graphics, **SubLogic** (713 Edgebrook Drive, Champaign, IL 61820; 217-359-8482) announces availability of *A2-3D2* and *A2-GE1*. The *A2-3D2 Enhancement* features everything found in its predecessor plus color lines and hi-res line generation, manipulation of individual objects in other objects' frames of reference, faster 2-D line drawing and erasing, and aid-routines in simulation speed. *A2-GE1* interfaces between the *3D1/3D2* utility and the non-technical user with single-key entries, text positioning in three sizes, animation of up to five objects at a time, and replaying of prerecorded motion files. *A2-3D1* with *3D2 Enhancement*, $84.90; upgrade to *3D2* for *3D1* owners, $24.95; *A2-3GE1* graphics editor, $34.95.

☐ You ought to be in pictures. Well, maybe not you, but your data at least. Latest in the *PFS* series from **Software Publishing Corporation** (1901 Landings Drive, Mountain View, CA 94043; 415-962-8910) is *Graph*, a utility that creates bar, line, or pie charts with ease. Data entry is from *PFS* files, *VisiCalc* files, keyboard, or a combination of the three. *PFS: Graph* supports Silentype, Epson, and others. It also supports the Hewlett-Packard 7470A plotter for color charts. $125.

☐ Falling asleep while waiting for long programs to load should no longer be a problem with *Hyper-Load*, an Apple DOS 3.3 enhancement from **BURT Microsystems** (14221 Matisse, Irvine, CA 92714; 714-559-5097). Disk II will read data eight times faster than DOS 3.3. Currently available by mail only. $35.

☐ *The Global Program Line Editor* by **Synergistic Software** (830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216) is an improved version of *The Program Line Editor*, Synergistic's 1980 utility release. New features in *GPLE* include global editing with search and replace, search and display, and search and edit. Escape functions are edited without a separate program, and programmers can list by line or page. Uses language card if one is present. Compatible with most eighty-column boards. Has system enhancement with typeahead buffer and DOS mover. $64.95.

☐ Who will be the next Budge, Nasir or Suzuki? *Apple Graphics and Arcade Game Design*, by Jeffrey Stanton, published by **The Book Company** (11223 South Hindry Avenue, Los Angeles, CA 90045; 213-417-8033), examines and teaches techniques of games and graphics. Begins with Applesoft graphics, and covers raster graphics, screen access, routines in designing games from shoot-'em-ups to scrolling games. Also discusses game theory. Softcover. $19.95.

☐ For both Apple and Atari owners, **Program Design** (11 Idar Court, Greenwich, CT 06830; 203-661-8799) presents their line of "Challenger" programs. For adults, *Minicrossword, Kross 'n Quotes, Code Breaker, Word Search* (various subjects), and *Concentration* are mind-stretching games. Preschool I.Q. builders, spelling and mathematical programs are available for tots and children. The *Step by Step* series teaches programming in Basic; the third in the series dealing with DOS, I/O, and shape tables is due for release in November. Other programs include *Preparing for the SAT* and *Machine Language Step by Step*. Prices vary.

☐ **Universal Systems for Education** (2120-E Academy Circle, Colorado Springs, CO 80909; 303-574-4575) introduces *The Placement Test* to accompany their PAL reading education program. Evaluates a child's reading ability and recommends the PAL grade level most appropriate for the child. Includes $10 coupon good toward the purchase of any PAL master disk or reading package. $29.95.

☐ In an effort to bring computers into the classroom, **University Extension of the University of California, Davis** (Davis, CA 95616; 916-752-0880) is offering a course on *Teachers, Computers, and Kids* in Tracy, California, August 16-20, and in Garden Valley August 23-27. The aim of the course is to familiarize teachers of kindergarten through high school with the fundamentals of computers and computer-aided instruction. Write or phone for more information.

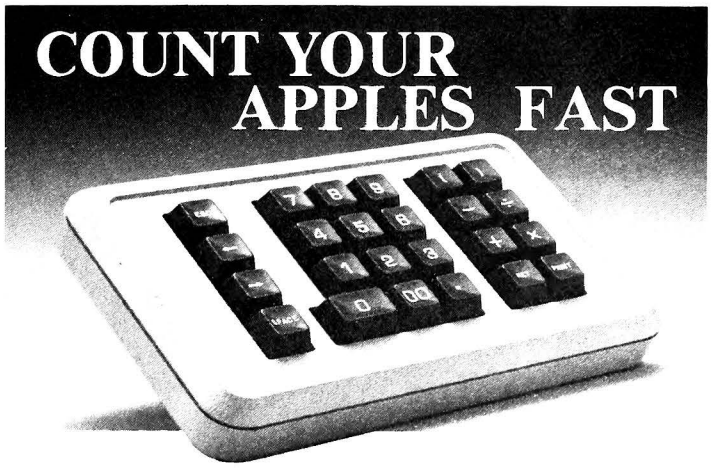
☐ Looking for word processing for your business? *Word Processors and Information Processing* by **Para Publishing** (Box 4232-88, Santa Barbara, CA 93103; 805-968-7277) will aid the shopper in purchasing word processing equipment, supplies, and services. For the noncomputer expert. 172 pages. $11.95.

☐ A user-friendly guide to *WordStar* is now available from **Sybex** (2344 Sixth Street, Berkeley, CA 94710; 415-848-8233). *Introduction to WordStar*, by Arthur Naiman, promises to quickly teach the beginner to use this powerful word processing program effectively. Also contains a complete dictionary of commands used in *WordStar*, *Spellstar*, and *MailMerge*. Softcover, 220 pages. $8.95.

☐ Become multilingual—in Basic, that is. *The Basic Conversions Handbook*, for Apple, TRS-80, and PET users, simplifies the method used to convert Basic programs for one of these machines to Basic used by another of the three. Published by **Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 800-631-0856 or 201-843-0550); includes sample programs and an appendix of subroutines. 80 pages. $7.95.

☐ Attention, writers: **Micro Moonlighter Newsletter** (2115 Bernard Avenue, Nashville, TN 37212; 615-297-5106) announces a *Summer Writer's Contest* that will award a personal computer to the winner. The newsletter is looking for articles that describe the best use of a personal computer in a home-based "cottage industry." The winner will receive a choice of a personal computer and/or software valued at $500. Entrants should submit a stamped, self-addressed postcard with entry for acknowledgement of receipt.

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ice from CCS (Box 5276, San Antonio, TX 78201; 512-340-8735). Offers toll-free "telesearch" phone-in service. ☐ Sofsearch *Special Reports* and *Sofselect Reports* are now available to nonsubscribers on a single-search basis. Subscription, $145. *Special Reports* and *Sofselect Reports,* $25 and $75, respectively; $45 and $95 for nonsubscribers.

☐ The new year is not far away, and *The Great Computer Calendar for 1983* might make a good start. Thirteen-month, full-color, spiral-bound calendar features photographs of computers, components, and people and places in the industry. Includes January 1984 for advance planning and historical dates in the history of computers. Available from **Reston Publishing Company** (11480 Sunset Hills Road, Reston, VA 22090; 800-336-0338 or 703-437-8900). $7.95; $39.75 for ten-pack.

☐ **Sirius Software** (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195) announces the release of a new home game. *Free Fall* takes you on a journey through a dimension not unlike Mr. Serling's. Girders, bombs, needles, and black holes all get in the way as you guide an apparition from one nightmare to the next. Keyboard, paddles, or joystick. $29.95.

☐ *Market Analyst* for the stock market professional or novice is from **Anidata** (613 Jaeger Court, Sicklerville, NJ 08081). Features analysis, management, news, views, and quotes with database access. Supports printer and D.C. Hayes micromodem or communications card with external coupler. Requires 16K card. $295.

☐ The gold rush is on! Only this one's on Mars. In *Klondike 2000* from **Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 201-843-0550) it's every man for himself as you and your landing party try to collect and hold onto the gold. Robots guard the gold, but their loyalty can be bought. This space adventure game features single or multi-player modes, sound effects, and three skill levels of play. $24.95.

☐ **CE Software** (801 73rd Street, Des Moines, IA 50312; 515-224-1992) announces the arrival of *SwordThrust* adventures six and seven, *The Eternal Curse,* and *The Hall of Alchemie.* CE warns that *SwordThrust* seven is written by an outside author whose mercy on dungeon travelers is almost nonexistent, presenting a challenge to even experienced adventurers. $29.95 each. ☐ CE Software also reports that four-color packaging has raised the prices of all adventures in the *SwordThrust* series to $29.95; the master diskette, however, remains at $29.95.

☐ *Millionaire* is an educational stock market simulation game that both teaches and entertains. Includes margin accounts, call and put options, stock and industry graphs, news reports, volume indicators, company histories, buy-sell transaction reports, and more. From **Micro-Z Applications** (22704 Ventura Boulevard, Suite 141, Woodland Hills, CA 91364; 800-853-2246, ext. 101). $49.95.

☐ **Synergistic Software** (830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216) announces the release of *U-Boat Command,* a new strategic action war game in which players defend their submarine against enemy destroyers and aircraft. With periscope vision of the surface, they fire torpedos while watching their fuel, air, and energy supplies. $29.95.

☐ **Chuck Atkinson Programs** (Route 5, Box 277-C, Benbrook, TX 76126; 817-654-2011) offers help for businesses that spend a lot of time buying, selling, or manipulating inventory stock. *Inventory Management for Small Computers* is the book that will keep such information at your fingertips. 120 pages. $16.95.

☐ *Information Management Software* prepares purchase orders, does physical inventory quicker, and controls inventory while printing sales tickets. Available on eight-inch disk for CP/M-CBASIC systems. $250.

☐ **Peachtree Software** (3445 Peachtree Road N.E., Eighth Floor, Atlanta, GA 30326; 404-262-2376) has acquired the rights to market three computerized dictionaries and a thesaurus in their *Office Production* series. *Spelling Proofreader* (formerly *Magic Spell)* includes the Random House Dictionary; Stedman's Medical Dictionary and Black's Law Dictionary are available at extra cost. The package allows users of the *PeachText* word processor (formerly *Magic Wand*) or other CP/M-based word processors to check their documents for misspelled words and typographical errors. As an extra-cost adjunct to *PeachText,* Peachtree has licensed the Random House Thesaurus, yet to be released. Dictionary, $300.

☐ In response to the dropping price of memory chips, **SSM Microcomputer Products** (2190 Paragon Drive, San Jose, CA 95131; 408-946-7400) has reduced the price of its 64K memory board, the *MB64.* Formerly $749; now priced at $599. ☐ SSM also announces the availability of the *MB32,* a 32K version of the MB64. Except for the difference in RAM, both boards are identical. Can be upgraded to 64K. $425. ☐ By purchasing any of the three *Transend* data communications software packages between June 1 and October 1, modem users also get free membership to the Source worth $100. The first hour of use is free as well. *Transend* is a series of upgradable packages designed to meet the needs of virtually any data communications application. *Transend 1,* $89; *Transend 2,* $149; *Transend 3,* $275.

☐ Clearing this up once and for all: *Grafpak II,* the hi-res printing utility that works with over seventy different printers and over twenty different I/O cards, and *Graphic Composer* (both in Marketalk News, May 1982) are *not* sold separately, but as a package from **SmartWare** (2281 Cobble Stone Court, Dayton, OH 45431; 513-426-3579). $34.95.

☐ **CompuServe** (5000 Arlington Centre Boulevard, Columbus, OH 43222; 614-457-8600) reports that *Popular Electronics* has become a new source of on-line information, offering a computer club directory that CompuServe subscribers can scan to find computer clubs throughout the United States and Canada. Also available from *Popular Electronics* are the latest lines of microcomputer hardware, software, and activity reports from the clubs in its directory. CompuServe is available in over 260 U.S. cities.

☐ Attention, dealers: **Shugart Associates** (475 Oakmead Parkway, Sunnyvale, CA 94086; 408-733-0100) has slashed its prices on *SA400* and *SA450* single/double-sided 5¼-inch minifloppy disk drives. In quantities of 250, the SA400 is now $175, and the SA450 is $225. Shugart cites lower manufacturing costs through



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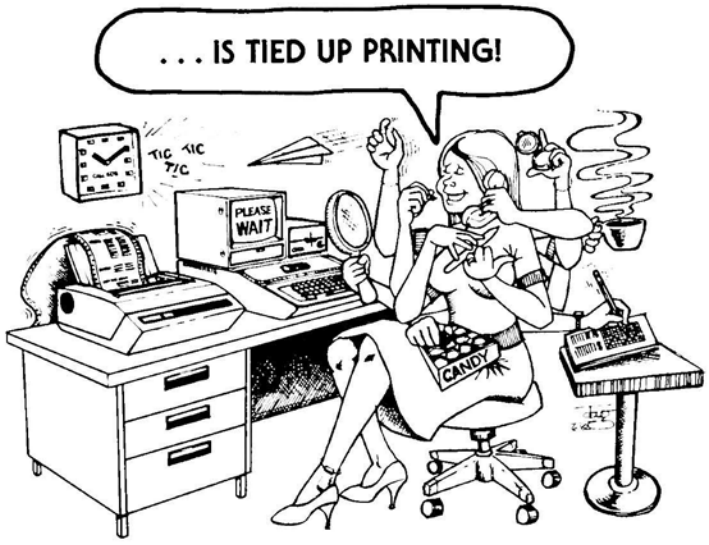
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improved production processes as the main reason for the reduction.

☐ It was just a matter of time, but **the Source** (Source Telecomputing, 1616 Anderson Road, McLean, VA 22102; 703-734-7500) has finally installed a WATS system, enabling its subscribers to dial direct with greater reliability and at a lower cost. The new system means a more dependable, error-free channel to the Source for business subscribers, and simpler access and a significant savings on long-distance rates for personal subscribers. For a surcharge of 25 cents per minute, subscribers can dial an 800 number and be linked directly to the Source. The new service will protect businesses from accidental disconnection from Telenet or Tymnet (the services most businesses use).

☐ Modem users with CP/M systems now have access to *CPUnet.* This software development by **CPU Computer Corporation** (420 Rutherford Avenue, Charlestown, MA 02129; 617-242-3350) permits up to sixty-three users to simultaneously share peripheral devices and access computer programs and data stored on centralized hard disks.

☐ In a cooperative marketing campaign with **Mountain Computer, Passport Designs** (785 Main Street, Half Moon Bay, CA 94019; 415-726-0280) introduces its synthesizer, *Soundchaser Digital,* dubbed the "home organ of the future." The basic system consists of a four-octave AGO-standard keyboard with interface card, and music system digital synthesizer cards by Mountain Computer. Features of the music system include an eight-voice polyphonic synthesizer, fifty preset sounds, unlimited user sounds, and four-track sound-on-sound recording. $995.

☐ Just when you were satisfied with your present disk drive, **Fourth Dimension Systems** (3100 West Warner Avenue, Suite 7, Santa Ana, CA 92704; 714-850-1228) has introduced *Super Drive,* an Apple-compatible drive with enhanced read-write electronics and a track-zero microswitch. Reads data faster and more accurately; storage capacity of 143,360 bytes when using DOS 3.3. Also compatible with DOS 3.2.1, Pascal, and CP/M. $419.

☐ *Appli-Card,* from **Personal Computer Products** (16776 Bernardo Center Drive, San Diego, CA 92128; 714-485-8411), is called the one-card solution for executing CP/M programs. Appli-Card features 64K memory, 40-255 column scroll, 2K PROM, real-time clock, single-card *WordStar* execution, upper and lower case, and more. Comes standard with CP/M or SB/80. Available now for Apple II; Appli-Card for the Apple III will be introduced this fall. $595.

☐ *Compucart* is the mobile computer workstation that offers system security by closing the computer with a roll-down door secured by a single lock. Occupies about four square feet; designed to relieve physical stress on the user from extended use. Complemented by several printer and power options. **Compucart** (201 North Rome Avenue, Box 2095, Tampa, FL 33601; 813-251-2431). $595.

☐ New from **Microcom** (1400A Providence Highway, Norwood, MA 02062; 617-762-9310) is *MICRO/Terminal,* software that will let Apples II and III interactively exchange information with other micro, mini, and mainframe computers, information, timesharing, and bulletin board services. Features built-in editor and mapping capabilities. $84.95 for Apple II; $99.95 for Apple III.

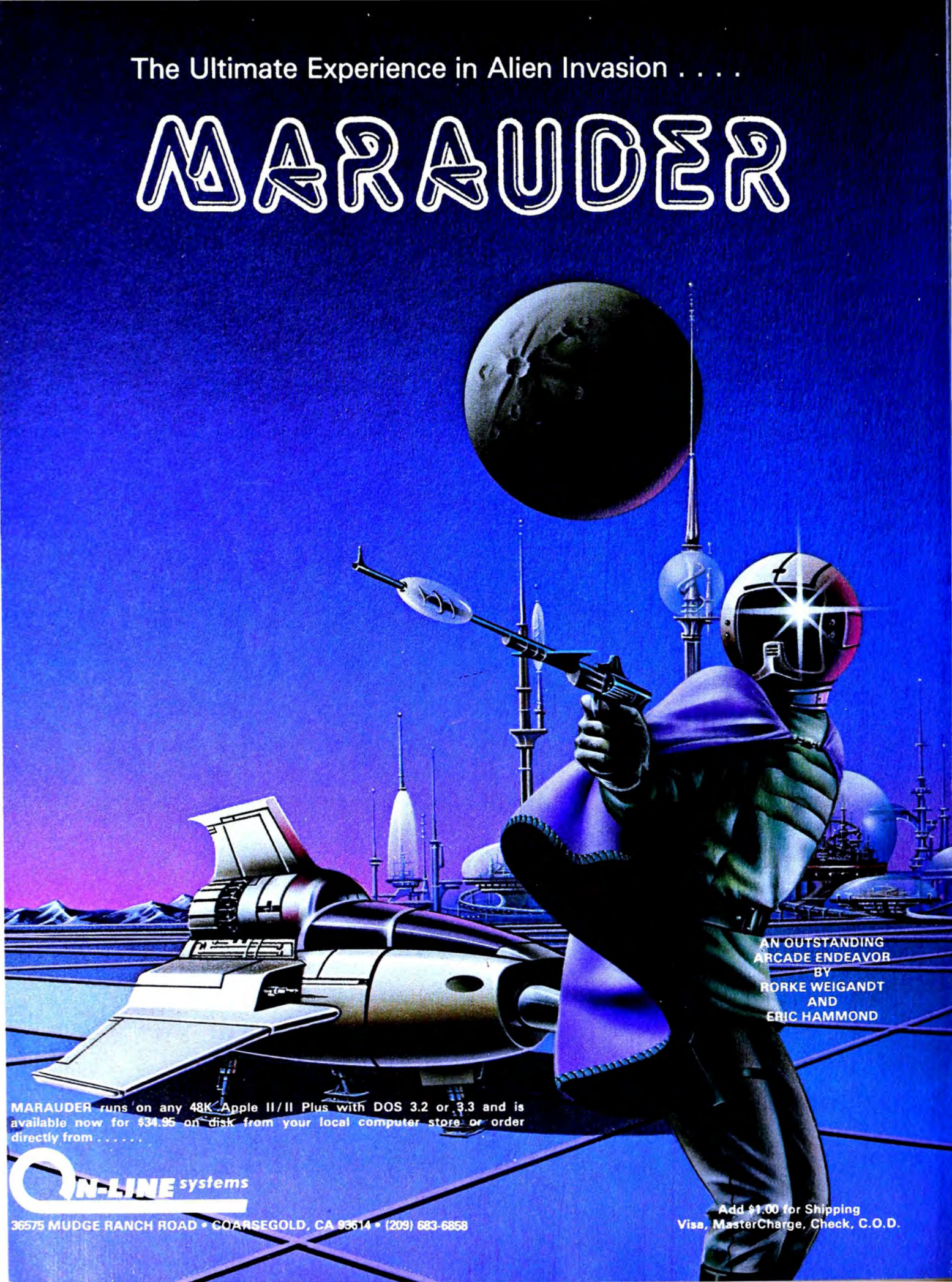
☐ Your Apple III keyboard is protected from dust and other hazards with *Plexi-Lok III,* an acrylic snap-on device from **Last Electronics** (Box 1300, San Andreas, CA 95249; 209-754-1800) that snaps over the keyboard. No longer will data be lost because of visiting tinkerers. $24.95.

☐ **Starcom** (Box 592, Westminster, CA 92683; 714-898-6541) is a separate information service not connected with Compuserve or the Source as we originally reported (Marketalk News, July 1982). Starcom offers programming in Basic, an electronic consumer's buying guide, electronic travel reservations, inter-user mail, nationwide local access phone numbers, interactive chat between users, games, news. Modem: 714-891-8334, 714-895-1166; twenty-four hour service. $3.60 per hour. ■


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choices, choices

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extras, extras

For ease of use, for efficiency and true proofreading effectiveness the DIC-TIO-NARY provides you with many other useful goodies. You may add or delete individual words from the wordbook...or do the same with an entire list of words. You may have any portion of the wordbook listed, and may search it even while processing documents. When you add it up, you'll find you can't get our total combination of features in any other spelling program at any price.

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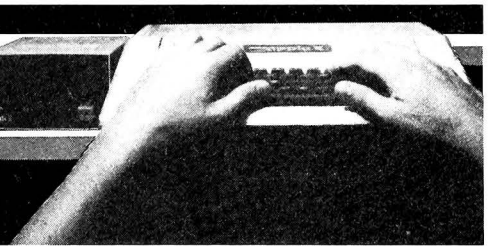
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MARKETALK Reviews



Summertime Apples: one more time. This month's software festival continues in the glorious tradition of last month, with more programs than you could possibly use in a single season, all presented for your consideration and evaluated for your computing pleasure—before you have to go back to school and back to work, and we go back to normal.

DataFax. By Curt A. Bianchi and Rudi Diezmann. *DataFax* is a very interesting and powerful concept in database programming. The program is written in Pascal and designed to be a freeform, relational filing system that can keep track of unstructured information. The program requires two disk drives and a language or RAM card to function, but you need not have the Pascal system itself, as all the files needed are on the *DataFax* program disk.

The program can use any printer interface and eighty-column card normally compatible with Pascal. Because of its design, the program can be up and running as fast as you can get the disk into the drive. There is no setup required before you can begin. With most databases, the time involved in designing the storage format is itself a deterrent to using the program. It may also be necessary to redesign the format and input scheme for each new project you undertake, making an educated guess as to how many spaces should be allowed to handle each item of information and then designing a screen format to accommodate it. The titles and the information that your file contains are then set and not easily changed.

Problems also arise if you forget something in your original layout or find you need to define larger spaces to hold your information. This usually means starting over and in many cases transferring information from the old configuration to the new—a job that could mean putting the whole thing off to another day.

Now if you're wondering how they automated all of this, they didn't! They threw out the formatting altogether so that you only type in the information itself. When a disk fills you go to the next one; the system can expand onto a hard disk at any time and can do anything an office filing system can do except lose things. The method of finding things is a system of keys that you define. While entering the data you can choose any word or group of words to be the keys. There may be as many keys to a file as you want. You might choose a person's name, an address, a city or anything that has meaning to you. It is not necessary for the key to be part of the record. You can also set auto keys which are added to each folder you begin or edit while they are in force.

The editing-data entry mode has a comprehensive set of cursor move commands utilizing the control key that give you a very complete screen-based text editor. If any of the commands conflict with your system commands, it is a simple matter to assign the command to another key.

When it comes time to print your information, there are nine print options that control the format of the folders you print. You can also choose to print a folder or group of folders to a disk file, and in that way move a sorted selection of information into another database.

The retrieval of information is as straightforward as the input. You tell the program the keys you want to find, and it shows you a list of all the folders that were saved using that key. There is also the ability to do a search using more than one key at a time. When using multiple keys you simply insert the words *and* or *or* between them, and the program makes the appropriate search. The *and* command brings forth folders containing both keys, and the *or* command will bring you the folders containing any one of the keys.

If you are a form junkie and just have to have one, the means exist—but after using the program for a while your craving should abate.

You can also extract information from your database and place it onto a text disk. From there it can be merged into another database or edited with a word processor. It is also possible to transfer files to another system by using *DataLink*, a Pascal-based terminal program. In short, your information is not locked into this program but can be moved about and used as you like.

Invariably, the most appreciated feature of this program is its ability to make a new idea become a functioning database in a very few minutes.

Error handling is very straightforward. If you attempt to give it a command that is not applicable, it beeps and prints out a definitive error message at the screen bottom. A nice touch is that the message stays there until you hit the space bar so that you have time to read the message and decide what steps need be taken. The manual has a complete glossary of all the error messages and instructions on how to deal with each one.

The manual included in the current package is a temporary version; the final manual and an updated program disk will be sent at no charge to all registered owners.

Link Systems's support of their products is a model for the industry. A call to their Santa Monica, California, headquarters brings a clear, accurate response and helpful advice. RIR

DataFax, by Curt A. Bianchi and Rudi Diezmann, Link Systems (1640 19th Street, Santa Monica, CA 90404; 213-453-1851). $199.95.

GraForth. By Paul Lutus. This is a strange and wonderful mixture of contradictions—an instrument of awesome power and irritating quirks. It's a "graphics language"—a language that makes your Apple think in pictures instead of words.

Any computer language is a set of rules and rituals for manipulating data for some particular purpose: the purpose of Basic is to be like human language, the purpose of Pascal is to be fast and orderly, and so on. The purpose of *GraForth* is, literally, to think in pictures; that is, to organize data in ways that correspond to the mechanics of human visual perception, manipulating the dots on the display screen to represent a variety of images rather than a standard set of characters in the form of letters and numbers. This makes it possible to do image manipulations of a speed and complexity that you wouldn't normally expect from an eight-bit, one megahertz microprocessor.

You still have letters and numbers, of course, even though the system "thinks" of them as visual images. What's the difference? The characters are sent to the text screen memory area in the usual way, but that area is not displayed. Instead, using that area as a template, *GraForth* re-creates the information on one of the hi-res screens, using character images from its own library. Then the hi-res screen is displayed.

From the user's viewpoint, there may be no difference at all (except for an odd rippling effect when the display scrolls) if all the default values are in effect. But you can, if you wish, have a display in mixed upper and lower case or in a different typeface (four special fonts come with the system, including Slant and Gothic; you can also design your own). Headlines are in double-sized characters (or larger)—and all of this is on one screen, in several colors.

And you haven't even come to the pictures yet.

GraForth offers four different drawing modes: simple line graphics, turtle graphics, character animation (not Donald and Mickey; characters like A, B, C and 1, 2, 3), and the big one—three-dimensional image manipulation.

Simple line drawing is done with a set of commands that operate the familiar Apple hi-res drawing routines. But the *GraForth* commands are image-oriented, a noticeable improvement over the machine-oriented Apple routines. In *GraForth*, you can plot or unplot (erase) any point on the screen; draw or erase a line between any two points; or create or erase a solid rectangle by specifying two opposite corners. All of this can be done in any of the four hi-res colors, called orange, blue, green, and violet.

In turtle graphics you draw by directing an imaginary turtle who draws a line as it moves. Thus you can specify starting point, direction, length, and color of the line. Directions can be specified relative to the screen's X and Y axes or relative to the turtle's current orientation. To draw a square fifty pixels on a side, you simply say *50 move 90 turn* in a four-time loop.

Character animation makes use of the system's ability to create special character sets. You can design an image and then have the system break it down into character-sized chunks and store them as elements of a special character set. Then whenever you want to display that image you switch to the special character set and display that block of characters. Because the system can juggle characters very fast, you can get animation effects by switching rapidiy between blocks of characters. This ought to be useful to game designers.

And so we come to the main attraction: animated 3-D graphics. You can control up to sixteen different three-dimensional images at one time, each moving in a different pattern at different speeds. An image can move about on the screen, rotate on one or more of its axes, expand or contract (or both simultaneously, getting taller and thinner or shorter and wider), shift its apparent perspective, and more.

The essence of the idea is that the system maintains a table of parameters for each image. It alternates between the hi-res screens, displaying one while it redraws the images on the other, using parameters from the tables. Then it updates the table for each object according to the movement pattern you specify, and finally it switches screens and repeats the process—all in a fraction of a second.

The results have to be seen to be believed.

And one more thing: the system also makes music. You select one of nine voices (actually duty cycles of the audio signal, from 0 to 50 percent) and then specify pitch and duration for each note. The speaker in your Apple is not very "musical"; but if you connect the output through your stereo system (see the *Apple II Reference Manual*), you will have a primitive music synthesizer.

GraForth includes the word *note*, but not the word *rest*, so there's a one-tenth second delay you can use. It's called *dsec* (for decisecond), defined as: DSEC 0 DO 1026 0 DO LOOP LOOP; and used in the form N dsec where N is in tenths of seconds.

So, *GraForth* can draw pictures in several different ways and even make music. For fast, complex graphics work on an Apple, it is quite possibly the best instrument available.

It is not intended to be a general-purpose programming language. *GraForth* is a hybrid of Standard Forth and Applesoft. It uses Apple DOS (slightly modified) and many Applesoft commands (such as *peek, vtab, left$*), but usually with Forth logic and syntax. It also has a few quirks of its very own. This makes it difficult to learn, since the new stuff keeps getting confused with what you already know—some of which applies and some of which doesn't.

GraForth has other shortcomings, too: string handling is awkward, and arrays are not even mentioned in the manual, though you can get around most of that. This language, like Standard Forth, is extensible: you can modify it by adding your own commands.

In short, *GraForth* is not the language for a program to decode cryptograms or balance your checkbook. But if you want to write programs that mix upper and lower case without special hardware, simulate the view from an observation ship out near Saturn, or create an anatomy text that lets the user change viewpoint around inside a model of a living body, or if you want to write a game—this is the language of choice. JR

GraForth, by Paul Lutus, Insoft (10175 S.W. Barbur Boulevard, Suite 202-B, Portland, OR 97219; 503-244-4181). $75.

Galactic Gladiators. By Tom Reamy.

Ed: Amazing! Just amazing! Why, I bet that this game combines the good parts of absolutely *every other* computer war game, all the simulations, and all the role-playing games available on the Apple market!

Johnny: Not so, silicon breath! In *Galactic Gladiators* there are no hi-res cows.

That, in all fairness to our poor eternal straightman, is about all that *Galactic Gladiators* lacks. One of SSI's Rapid Fire series, it borrows from the fantasy role-playing genre, the adventure genre, and the strategic war game genre and combines them with a surprising speed of execution. This quality apparently inspired a comparison to arcade games in the minds of their ad agency, but don't let that fool you. This is not a fast reflex game in any way. The most common failing of most complex strategic games is the waiting involved, especially when you are playing against the computer. This is where the speed comes in; though it may be more challenging to play against another human (and possibly more fun, if you like to exchange martial epithets such as "Die, you mutant pig"), even the computer player is capable of making quick and reasonably intelligent moves.

So many scenarios and game options are available that it is hard to know where to begin. The prospective player, however, should begin with the manual. It is well-written and often amusing. Read the first five pages once and you should have a good grasp of how to play the game. Then set it aside to use as a reference and play the "Brawl at Cosmic Mike's Place" sce-



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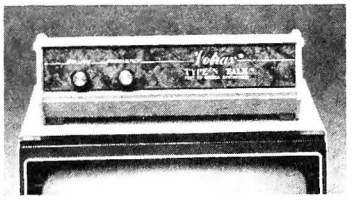
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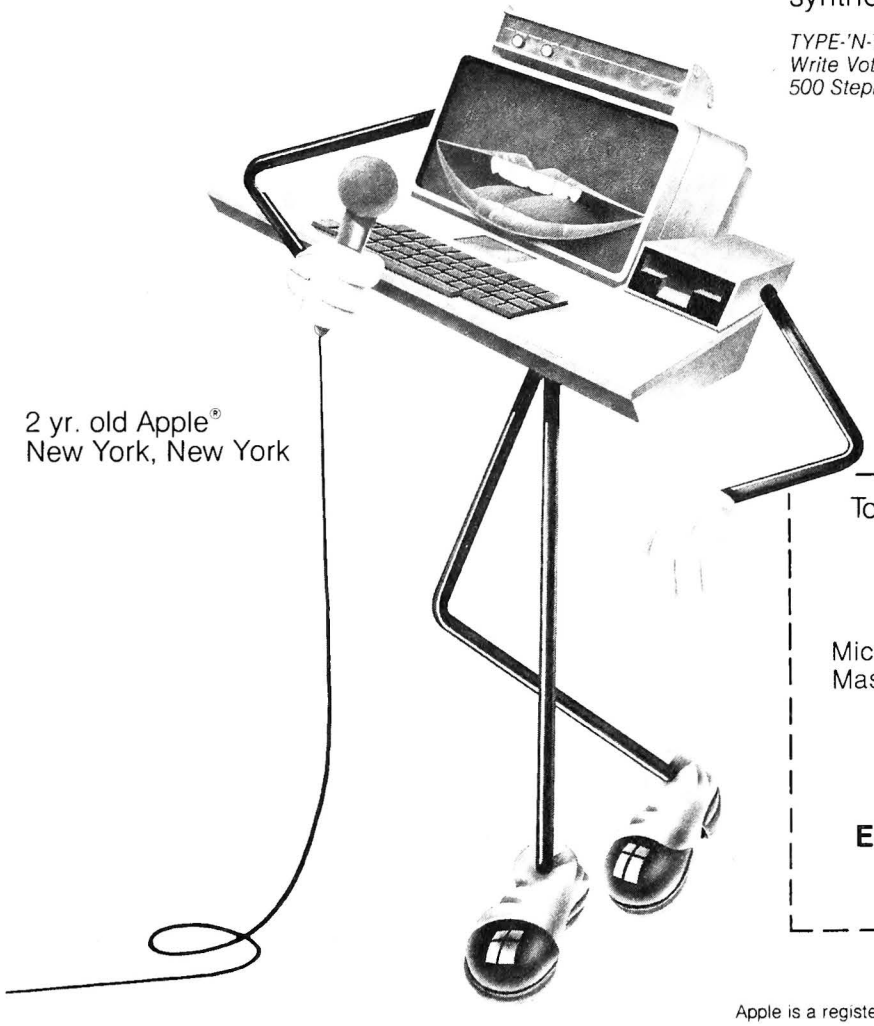
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nario. This is a good one for beginners because it is played on a close range field with only three warriors on a side.

Each warrior has four characteristics that determine his order of movement and attack and his chances of hitting and being hit: strength, dexterity, endurance, and speed. In addition, there are experience and weapon skills, which change with time and determine surprise and hit probability. It is useful to take advantage of the game's team saving feature, which allows these last characteristics to be maintained and built up from game to game.

In any game there are two teams. One is played by a human and the other by the computer or another human. A really beautiful feature is that a person can leave or join a game in the middle, because you can change between two-player and player-computer mode at any time. Anyway, these teams can be set up evenly or with an advantage for one player, depending on the players' experience.

A variety of weapons are available. Each warrior carries two to start with. Some of these, like the gemstone, a guided missile weapon, can only be used once. Some have to be reloaded each time they are used, such as the phasors. The hand weapons can be used every turn, but cannot cover distances. If you change weapons or reload, you can't do anything else in that turn, so don't get caught with your pants down.

You can choose an elimination game, or a game with one player defending against the other, or one with certain definite goals, depending on the scenario. Battlefields can be randomly created or totally self-designed, wide open or filled with obstacles, indoors with rooms, outdoors with rocks and trees, or mazelike—and in any of three sizes. Don't underestimate the effect of battlefield variables on the game strategy; a smaller field or one heavily packed with obstacles can give advantage to warriors with hand weapons; a more open one can throw the battle in favor of those with phasors.

In addition to eleven imaginative and varied scenarios that come with the game, the manual suggests setting up quests, which are defined as a series of battles on different battlefields pitting one team against different enemy teams. The series is held together by a quest description and a set of battle descriptions which give a raison d'etre to the carnage and extend *Galactic Gladiators* deeper into the realm of the fantasy role-playing game. Three sample quests are supplied in the documentation, but they encourage you to develop your own. If you come up with a really good one, you can send it to SSI and they may publish it on a *Galactic Gladiators* data disk planned for release later this year.

Galactic Gladiators is, simply, a masterpiece. With all its complexity, it isn't at all overwhelming (except in the good sense), and it will continue to be interesting when your other game disks are gathering dust on the shelf. DD

Galactic Gladiators, by Tom Reamy, Strategic Simulations (465 Fairchild Drive, Suite 108, Mountain View, CA 94043; 415-964-1353). $39.95.

VisiTran. By Bruce Wallace. If you are writing, or are considering writing, a program that will generate values or numbers that you would like to analyze in a *VisiCalc* file, your current options are to enter these values manually into *VisiCalc* or to write your own conversation program to change your values to *VisiCalc* format. *VisiTran* might be an answer to your problem.

It is important to note that this is really a program to be used by Applesoft Basic programmers. The operation is fairly easy. You load your file into *VisiCalc* and enter special *VisiTran* variable indicators (labels preceded by ©) in the cells in which you want your information entered, and save the file. You then run the *VisiTran* program, specifying *VisiCalc* file name, XFER (transfer) file name, Basic exec file name, and beginning subroutine line number.

VisiTran then creates a Basic exec file that contains the subroutine that you will use in your Applesoft program to transfer data from your program to *VisiCalc*. When your program executes this subroutine, it opens the XFER file you specified and enters the variables to be transferred. To complete the transfer, you boot *VisiCalc*, load your original file, and then load the XFER file. The information from your program is now included in the *VisiCalc* file.

This program allows transfer of integer, string, real variables, and one and two-dimensional arrays. If you aren't an Applesoft programmer, this program may not be for you. But if you are learning or already programming in Applesoft, *VisiTran* could save you hours of time and trouble.

The program disk comes with an eight-page manual that explains the operation of *VisiTran*. JS

VisiTran, by Bruce Wallace, ADC Associates (960 San Antonio Road, Palo Alto, CA 94303; 415-493-5500). $99.

Forth-79. By Anita Anderson, Martin Tracy, and Philip Wasson. Forth is fascinating! It's difficult to get into at first because you have to learn some strange thinking habits; but once you get over that threshold, you're hooked! It gives you such power, and such elegance of logic, that you will have trouble turning off the Apple and descending into reality again.

Forth is a computer language—in the broadest sense; a set of rules and rituals for operating a computer. But it can also be a "logic language," a means of expressing logical thought in symbolic form. That is what makes it so powerful: you can write your program as a series of logical structures and the computer will execute that logic directly.

You can do that with Basic, you say? Not quite. With Basic you have to take the logical structure of your program, break it down into Basic instructions, and then enter those instructions. This is often the most tiresome part of programming in Basic.

Forth avoids this problem in two ways. First, the logic language in which you define your program is the same as the computer language with which you input it to the Apple—no translation is needed. Second, that language includes rules for extending itself by adding new definitions; so if you need a logical operator that isn't already included, you can add it yourself. It will immediately become a part of the language and will be available for your use from then on.

In Forth, a program (they call it an application) is imple-



mented in a hierarchy of subroutines. The simplest subroutines—they're called words—are things like, "Take the top word off the stack and print it." Then you write more complex words, building their definitions out of the simple words, and finally you have all the words you need to define a sort of ultimate word that is the complete application. When you execute that word, it calls its definitions, they call their definitions, and the program is running!

Charles Moore, the inventor of Forth, designed clever ways to link these subroutines together. Without going into details here, the end result is faster run-time speed and better memory economy than anything north of assembly language!

Forth-79 is based on International Standard Forth (1980), but not limited to it. Using the natural extensibility of the language, MicroMotion has added several extras: a complete string-handling package, a set of thirteen/sixteen-sector routines (either way), and a bunch of other handy utilities. They also provide a screen-oriented editing program of great power—it supports twenty-seven different commands, none of them trivial; and in case you're used to a different system, they give you a Forth word that will relabel all the editor commands to your taste.

A second disk, available at extra cost, contains a complete add-on package of floating-point arithmetic (thirty-two-bit). It also includes trig functions (including hyperbolic), exponential notation, natural logarithms, and more. And as if that weren't enough, the disk also has a high-speed turtle graphics package. These routines operate on the hi-res image in memory, at speeds comparable to an assembly language memory move—faster, in many cases, than the human eye can follow.

Best of all, you can include any or all or none of this stuff in your own programs. If your application requires any of these features, just load the proper screens from the disk and those features will become part of the dictionary for your particular application. When you save the dictionary, those features will be saved as part of it.

There is one small problem amidst all this power and elegance: the documentation is less than perfect. The system comes with a 200-page tutorial and reference manual, which is packed with useful information, but it's not as well organized as one could wish, and it lacks an index. All the necessary information is there, but you sometimes have to hunt for it.

Some of the features described in the book are part of the boot-up dictionary, and so are always available. But others, like the string handling routines, have to be loaded separately after booting, and the book doesn't always make clear which is which.

MicroMotion is working on a revised edition of the manual, which should solve most of the problems.

Warning: Forth is not for beginners. You need to have some of the thinking habits of a programmer before you start or Forth will drive you up the wall. But if you can work nested loops in Basic without getting your tongue tangled and find your way around in a two-dimensional array—and if you enjoy solving puzzles—you shouldn't have any real trouble with it.

So if you're bored with Basic, and if assembly language seems like more trouble than it's worth—go Forth! JR

Forth-79 by Anita Anderson, Martin Tracy, and Philip Wasson, MicroMotion (12077 Wilshire Boulevard, Suite 506, Los Angeles, CA 90025; 213-821-4340). $99.95. *Forth-79 Floating Point Arithmetic and Hi-res Turtle Graphics*, by Anderson, Tracy, Wasson, and Steve Tabor, $49.95; both packages, $139.95.

The Swordthrust Series. By Donald Brown. You enter a cave at the end of a dark passage. A bone-thin wolf pulls himself to attention in the corner and growls his threat. You're alone, you're lost, you mean him no harm, you have plenty of enemies already; you don't need another. So, tentatively, you smile. The wolf looks hard at you; then, slowly, he smiles back. When you leave to continue your adventure, he goes along.

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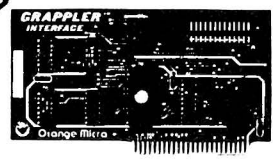
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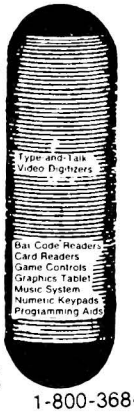
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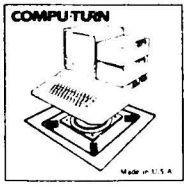
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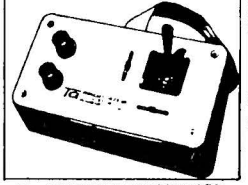
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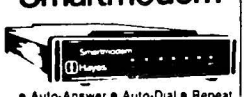
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The *Swordthrust*s are adventures. The *Swordthrust*s are role-playing fantasies. No mistake, they're both. At the start, it's as if you're entering a great castle courtyard; you sign a register, and, if you've not been there before, you must create your character.

After you identify your character by name and sex (yes, women are welcomed and possess a unique configuration of qualities), you're given a set of characteristics that you may accept or reject; if you accept them, you still have the option to modify them, trading some for others.

Then your character proceeds to the Main Hall where there's a weapons and armor store, a bank, a bar, an examination room for evaluating your character's attributes in detail, an instructor for fighting skills, and a greedy old wizard waiting to fleece you when you buy his spells. Many of these things affect your character's make-up. All this is typical of a role-playing fantasy.

When you enter the adventure, you communicate with the computer in two or three word phrases. Verbs, or commands, are no problem; you can call up a comprehensive list of those available at any time. You must come up with the objects of the commands and determine when to say and do what. This is definitely the adventure genre.

The flavor and settings of the scenarios vary greatly, and the inhabitants of each do too. In at least one scenario, you'll meet humans you may recognize; don't assume they're friendly. And don't assume you're what you think you are either—characters may react to changes in you that you are unaware of.

Settings range from mountain caves and dungeons to Arabian harems, from Bavarian castles to deserted Victorian mansions. The puzzles are clever and logical; you can safely map and finish an adventure without solving it, however. Well seasoned adventurers will find the series fairly easy going but still hard enough to be fun. The novice will find them difficult but solvable.

In the end of each chapter, if you have been successful, you return to the Main Hall with gold and treasure with which you can buy new skills and learn new spells. This is also where you rearm and reoutfit, look in the mirror, and have a drink—perhaps eliciting a hint—at the local tavern.

All subsequent adventures in the *Swordthrust* series require your having created a character on the master disk; if you're wise, you'll take that character through *The King's Testing Ground,* the first adventure, contained on the master disk. Here you'll meet, and probably befriend, Richard, a great knight of old. Together, you traverse land and underwater caves seeking treasures such as Excalibur, King Arthur's famous sword. Subsequent adventures depend only on this first one and are totally independent of each other.

Second in the series is *The Vampyre Caves,* the name of which is the scenario's description. *The Kidnapper's Cove* comes next, followed by *The Case of the Sultan's Pearl,* a mystery, easy to get through but difficult to solve.

In *The Green Plague,* you must work against the clock; a look in a mirror at your green face tells you you've got the creeping crud. You must find the antidote before it's too late. *The Eternal Curse* may cause you great consternation until you grasp its message. A little familiarity with Oscar Wilde doesn't hurt.

Literary references are not uncommon in the *Swordthrust* saga; they're fun and speed insight, but knowledge of their source or even recognition of them isn't necessary to play.

Episode number 7, *The Hall of Alchemie,* is the first one not written by CE founder and owner Donald Brown; its author is Peter Wityk. The difference is evident, but none of the saga's hallmarks have been besmirched.

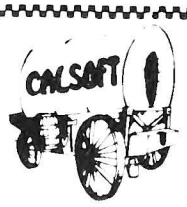
The *Swordthrust*s are not as grand or as emotionally involving as *Wizardry* can be; they are not as complex and diffi-

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cult, nor as comprehensive, as the *Zorks*. But they are unique and thoroughly enjoyable. If you like adventuring and fantasy, you shouldn't miss a single one. MCT

Swordthrust, concept and adventures 1 through 6 by Donald Brown; adventure 7 by Peter Wityk; CE Software (801 73rd Street, Des Moines, IA 50312; 515-224-1995). *Swordthrust 1* required for succeeding adventures. Each, $29.95.

DataLink. This is a new Pascal telecommunications program designed to bring mainframe capabilities to the microcomputer. It has the ability to modify itself for any system through the use of menu driven configuration routines. Once you determine the word format and file protocol of any system that you wish to "talk" to, you can store this information in a file that can then be called by name and executed when needed. This means that once you adjust to a particular system you need never do it again. You may also place the routine log-on procedures in a macro file that can be executed at sign-on time so that you need not go through the "Hello, this is me, is that you?" nonsense each time you call.

For those less adventurous souls who dislike being involved in such details, there are six preset configurations that will sign you on to the Source, CompuServe's MicroNet, and several other popular systems without your having to do any more than place your dialup system's phone number and your personal user I.D. into the file. You can define most of a session from dialing to hang up beforehand and then sit back and watch the whole affair proceed on its own.

The program's most prominent feature is its dual compatibility with the Hayes Micromodem and the Novation Apple-Cat. In the past it was near impossible to transmit files from a system using one of these modems to a system using the other. This feature alone makes *DataLink* a welcome addition to the Apple peripheral community.

The program can carry on phone transmissions at up to 1,200 baud and direct computer-to-computer transmissions at up to 4,800 baud. Another welcome feature is the ability to take over local control during a phone session, do some local processing, and go back to the phone session without having to hang up and recall the other system again. This is very handy when, while in the middle of a phone session, you realize that you are missing a critical file that you want to transmit. You've only to push a key to drop out of the conversation, load the file you need, and then push another key to rejoin the call in progress.

Accuracy is perhaps the most important consideration in data communications, and in this department *DataLink* continues to illustrate the strength of its redundancy. Its main method of checking is the STX-ETX-LRCC mainframe protocol, thought by many knowledgeable users to be the most dependable and efficient. Among the other protocols available to the system are the X-ON/X-OFF, ACK-NACK, and STX/ETX.

Because *DataLink* is written in Pascal, it will automatically recognize and configure itself to operate properly with any eighty-column board, terminal, or printer that is Pascal compatible.

The documentation is complete and includes clear explanations of the system's many commands. Also included are an extensive trouble-shooting section that will lead you out of almost any error situation that you encounter, and a walk through a case study to show you how to utilize the system's many features. In addition to the manual there is a very thorough reference card that covers all of the commands and many of the varied modes of its operation. The only fault in the documentation is the choice of type style and the small size of the printing, both of which will be corrected in a future edition.

Support for this product is excellent. A phone call brings a courteous and understandable answer to any question. The company also has an enlightened policy with regard to providing updates to all registered owners.

System requirements for *DataLink* include 64K, Apple Pascal version 1.1, and either an internal modem or an interface card with external modem. The program is compatible with the Hayes Micromodem II, the Novation Apple-Cat II at 300 or 1,200 baud, the Apple Comm Card with 300 baud external

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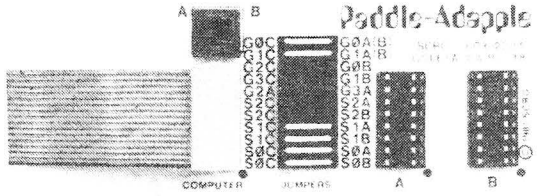
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modem, the CCS 7710A communications card with external modem, the SSM AIO card, and most other interface cards that use an ACIA 6850 chip and a 300 baud modem. RJR

DataLink, Link Systems (1640 19th Street, Santa Monica, CA 90404; 213-453-1851). $99.95.

Rearguard. By John Anderson. A bang-bang shoot-'em-up arcade game with some unique differences. You chase the aliens; they don't chase you. The screen scrolls horizontally; the terrain zips by beneath your ship. The aliens flee ahead of you across the screen. If ten escape, the game is over.

You can stop the aliens in two ways: with your twin-mounted dart gun—you have an endless supply of darts—or with your ship. Careful, you can only renew your force field nine times. Full joystick control lets you ride their tail pipes for a seemingly sure shot. Watch out, the aliens come in pairs. At the last instant, they break for the top and the bottom of the screen, leaving you bamboozled in the middle.

There are ten attack pairs in each wave of invaders and three waves in a fleet. The more you destroy, the more force shields you'll receive to help you face succeeding armadas.

If you find yourself bored by the seemingly endless procession of kamikaze aliens, a second playing level forces you to avoid the fireball debris of each shattered alien or be destroyed yourself. A third level cuts the size of your darts in half. On a fourth level, aliens who have successfully escaped off the right edge of the screen will shoot back! On the fifth level, all the aliens shoot back, even at the moment of their destruction. All effects are cumulative from level to level so caution in advance is advisable.

All high scores are saved to disk after each play, with the result that the initials or nicknames of the top ten players will be saved for all time. Or you can wipe the slate clean and start over. PC

Rearguard, by John Anderson, Adventure International (Box 3425, Longwood, FL 32750; 800-327-7172; 305-862-6917). $29.95.

The Turbocharger. By Roland Gustafsson. Tired of waiting for those l-o-n-g program loads? Need to copy disks quickly? Would you like your files dated when you catalog? Want to personalize your DOS commands? This could be the program for you.

Disk access on the Apple is fast, but apparently there is room left for improvement; this program makes it even faster. For example, anyone who has ever saved an entire hi-res screen onto disk knows that it is a fair-to-middling sized file: thirty-four sectors on the disk. Loading it back onto the computer takes about ten seconds. With *Turbocharger*, it takes about half that. With a much shorter file you wouldn't really notice the difference. If you have long programs, lots of data, or if you make frequent trips to the disk, you will greatly appreciate the time savings.

A display of the dates on which files were saved to disk can really make your catalogs look professional. *Turbocharger* is compatible with the Mountain Computer time clock, and with that accessory the date is automatically entered when you boot up the disk. Without the extra hardware, you can change the date manually. Because the current date is saved to disk, you only have to enter the date once, when you first boot the disk at the beginning of the day.

Quick-copy, a separate program on the same disk, does exactly that: copies quickly. Very quickly. It copies an entire disk onto another initialized disk in under a minute. (Sorry, Blackbeard, protected disks won't copy.) Again, if you have a lot of material to back up, this program will save you a lot of time.

Command Changer is for those of you who hate to type out *catalog*. It runs through the list of DOS commands and asks for your new command names. Hitting return defaults to the standard names. This may seem like a neat option at first, but after using it once you may not think so. Consider all those programs you have that use DOS commands. Your *Hello* program probably does a *catalog*. If you shortened *catalog* to *cat* every time *catalog* appears in a program, your computer says, "Who, me? I don't know any command named *catalog*." Conclusion: it just isn't worth the trouble.

Turbocharger's documentation calls it "the utility that no Apple user should be without," a common claim in software advertising. If the speed of disk accessing and copying means a lot to you, get it. If not, there are probably other utilities you shouldn't be without. DD

The Turbocharger, by Roland Gustafsson, Silicon Valley Systems (1625 El Camino Real, Suite 4, Belmont, CA 94002; 415-593-4344). $29.95.

The Keys of Acheron. By Paul Reiche III. Four jewels, magical keys of legend, each hidden in a different dimension, must be recovered from the domain of Kronus the Demon. The first jewel is guarded by the dragon who lives beneath the magician's castle. To find the castle and conquer the dragon, you first must obtain the enchanted necklace of fire opals from the unicorn who lives within the mandrake grove. Every twist and turn in the grove seems to lead back upon itself. Press on, for the unicorn can guide you to the dragon's lair.

The second jewel is hidden in a trackless jungle. The primeval swamp is filled with beasts from a far distant time—sabertooths, allosaurs, and the ferocious *Tyrannosaurus rex*. Through the jungle, across a river aswarm with beasts, lies the temple of the reptile men. Deep within the bowels of the temple, you must face the Sserpa shaman. Take the amethyst key from him if you can.

The third dimension, the crystal caves, is hidden in the heart of a dead volcano. Piranhas swim in its hidden pools. Earthquakes bring the volcano to life with paralyzing jets of steam, cave-ins, and crushing jaws of rock.

In the shadowland of Kronus, you can wander endlessly. Constant clues and messages from Kronus seem to guide you on your way. Yet still you wander. For the eighteenth time, you return baffled to the central chamber. You have vanquished an endless procession of fiends, wraiths, shadow bats, and slime beasts. Once you encountered the deadly automaton (and lost). You have given up again and again only to return, fascinated, the next day.

This time you find the secret passage. You follow it down to the stormy sea. Black rain, waves, and whirlpools attack you on the crossing. You stand at last on the far shore. An image of Kronus forms and politely says, "Yonder is the onyx pathway which will lead you to my citadel. The path is old and in poor repair. The guard rail is broken in many places. Please be extremely careful."

You walk with care, but in an encounter with a wraith, you forget the instructions, and fall to your death.

The Keys of Acheron is a sequel to *Hellfire Warrior*, Automated Simulations's sophisticated dungeon-and-dragon-type game. You must have *Hellfire Warrior* to play the *Keys*. You will use the *Warrior*'s innkeeper program to keep track of your character, purchase armor and magic potions, and to give you new life after each defeat. Note: The monsters and magicians that inhabit the *Keys* are rather dangerous. The *Keys* should be explored only by experienced characters with sword and armor that have been enchanted to at least the seventh level.

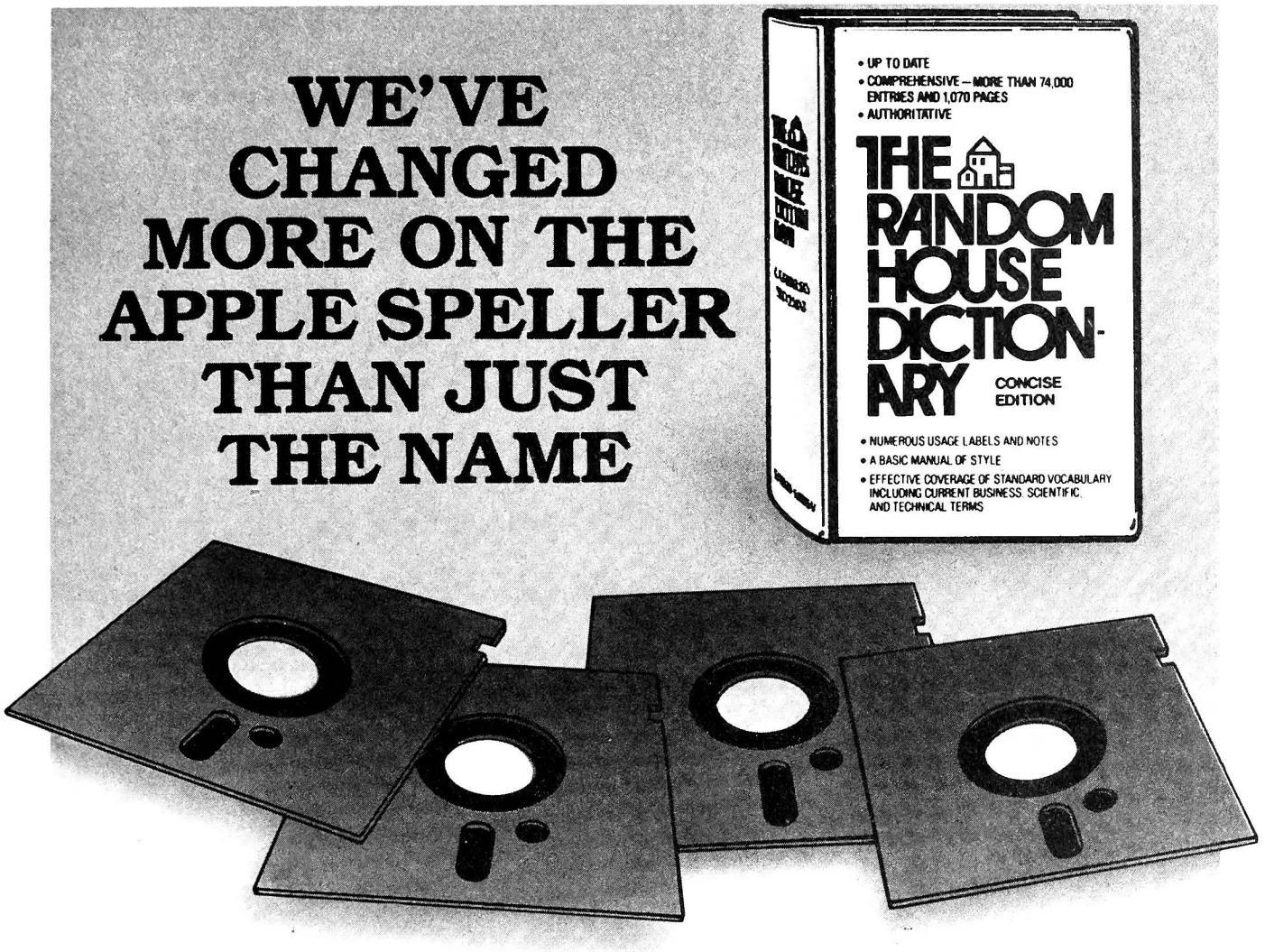
The earlier *Hellfire Warrior* was created by Jon Freeman, author of the *The Playboy Guide to Games*. Freeman served as a play tester for the *Keys*, but the *Keys*'s dimensions are the product of a younger, more diabolical mind. There are more mazes and traps and false clues in *Keys* than in *Hellfire*, and a greater emphasis on puzzle solving. In the end it is your mind against the author's. PC

The Keys of Acheron, by Paul Reiche III, Automated Simulations (1043 Kiel Court, Sunnyvale, CA 94086; 408-745-0700). $19.95.

Zenith. By Nasir. Aptly titled, this home-arcade game from an established master may be the high point in a spectacular career—the culminating effort of a superior programming talent. Everything we've come to expect from Nasir is present in *Zenith*. Yet it's still a step away from true greatness—from immortality in gaming.

It didn't take the calculating mind of Sam Spade to predict that Nasir would make a better version of *Horizon V*. That game's scrolling 3-D graphics are truly amazing to look at, but the game itself lacks challenge and purpose. What was miss-

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ing in the first game—feistier opposition and a worthwhile task to perform—are not problems with *Zenith*.

The game gets its title from the uncompleted space city Zenith, which is being attacked by devil-may-care aliens. The game is playable with joystick or keyboard; you're advised to go with a joystick. Controlling the movement of your fighter via the keyboard is really tough.

On the joystick, button zero fires your lasers and button one engages a device that has two functions—repairing buildings and capturing aliens. Points are earned for patching the flashing or burning portions of buildings damaged by the aliens, probably the toughest job in the game because of the speed with which the damaged portions fly by your sights.

It's much easier to slaughter the aliens, which come in two basic forms. Most of the aliens appear as lazily rotating television aerials that are easily done away with. The other kind are not so innocuous. Little green men is what they are, but fiery balls of destruction is what they turn into. Get hit three times and your ship crashes spectacularly.

Destroying all the aliens and rebuilding as much of the city as possible is the object of the game. You have a finite amount of fuel, but Nasir fans won't despair. There is the proverbial refueling episode precipitated by capturing three or more aliens, ones that haven't turned into fiery balls of destruction. Exchanging the underdeveloped gumbies with the alien mothership garners more fuel or repairs for your ship.

The trip through hyperspace rivals a similar excursion found in *Horizon V*, but in *Zenith* you're just a spectator. There are no elaborate docking skills required. The trick is capturing the aliens, which are never far from one of their fiery comrades, and exchanging them before they die in captivity.

Zenith's animation and graphics are superb. You can swoop and soar like Luke Skywalker in a rebel fighter over the Deathstar. The fiery alien balls seek out your ship more persistently than the antiaircraft fire in Nasir's *Phantoms Five*.

The problem with *Zenith* is a lack of sophistication. The scenario is capable of keeping your interest through several games, and then it gets predictable. *Labyrinth* and *Minotaur* are two recent games that are impossible to predict, and the longer you play the harder they become. Eventually there is an end in those games too, but it takes a lot of time and accumulated skill to reach it.

Zenith needs two or three more species of aliens and more than one docking sequence. It needs oceans and mountains and clouds. It needs wayward workers, caught by the aliens, who have to be rescued. The game is not disappointing like *Horizon V*, but it just hasn't gone far enough.

Nasir has yet to reach his zenith. DH

Zenith, by Nasir, Gebelli Software (1771 Tribute Road, Suite A, Sacramento, CA 95815; 916-925-1432). $26.25.

Firebug. By Silas Warner. In the midst of the latest wave of arcade games that stress high-speed action and contorted complexity of design, it is most refreshing to find a company daring enough to produce a lo-res, just-for-fun game. *Firebug* is a nifty snake-style game; the head of the snake is a detonator and the tail is the fuse. The object of the game is to burn down the five rooms on each level. Randomly placed gasoline cans aid in this pyromaniac's delight. As you pass over each of these cans, you can pick them up. Running around the room, you can then drop them off and prime them. As the fuse passes over them, they ignite, burning everything in the surrounding area, creating a sparkling display. When a wall or room divider is ignited, the fire spreads to engulf the entire wall. Other neighboring sections may be swept into the blaze. One well-placed detonation can sometimes produce an incredible chain reaction.

When you begin the game, you can determine the difficulty factor by choosing the length of the snake's fuse tail. As time goes by, the tail gets shorter and shorter. If the fuse catches up to the detonator, it destroys you. Also, if you try to run through a conflagration, you will ignite. There are thirty levels with added higher "challenge" levels for those skillful arsonists who make it that far.

Children enjoy the game because, in its slower modes, they can follow what is happening on the screen and can control the game. For those who crave a faster pace, shortening the fuse length requires the same superhuman reflexes found in other arcade games. A most welcome summertime diversion. RRA

Firebug, by Silas Warner, Muse (347 North Charles Street, Baltimore, MD 21201; 301-659-7212). $29.95.

Apple Flasher. By Paul Mosher. *Apple Flasher* turns your Apple II into a souped-up projector. It is simple to use, very quick, and powerful. Author Paul Mosher has spent a fair amount of time polishing this unpretentious utility, and the result is a program that shines.

What *Apple Flasher* does is simple. It helps you look at hi-res screen images stored on disk. More important, *Apple Flasher* is simple. Once booted, you simply insert a disk containing some pictures, press a key, and a menu of all the thirty-three or thirty-four sector binary files on that disk is displayed. These are almost always hi-res screen images.

Beside each file name is displayed a letter from A to O, and pressing that letter will cause the picture to be loaded and displayed. (The loading is much faster than a normal DOS bload.) At this point you can press another letter to see another picture, or press escape to return to the menu. Pressing the spacebar while viewing a picture causes the bottom part of the picture to be replaced by a display telling you what picture you are looking at and reminding you of your options.

The menu page allows you to use several more powerful features. The scan mode lets you quickly review all the pictures on the disk. The slide projector mode imitates a circular slide projector, which can be controlled by either the arrow keys or a paddle and button. A possible added attraction would be the implementations of both paddle buttons in this mode, the extra one for moving backward. *Apple Flasher* also has an autodisplay mode in which pictures on one or two disks can be cycled through. Special time codes can be imbedded in the pictures to control the rate at which the image changes. The autodisplay mode is especially handy for advertising displays.

Apple Flasher is loaded with nice touches. For example, it keeps the next and previous pictures in memory during slide projector mode, so, in most cases, access to the next slide is instantaneous. And, just about anywhere, you can load a fresh disk from either disk drive by pressing 1 or 2, without going back.

Apple Flasher comes with a well-written manual that explains each option clearly and in detail, and the program is well error trapped; it does not respond to bad key presses and is impervious to anything but a reset.

Apple Flasher comes on a copy protected disk, and Crow Ridge will supply a backup for $7.50 plus postage. They will fix a damaged disk for the same price. RW

Apple Flasher, by Paul Mosher, Crow Ridge Associates (Box 1, New Scotland, NY 12127; 518-765-3620). $34.50.

The Slide Show. By Bruce A. Cash and Robert W. Hench. This program (not to be confused with the software development package of the same name) was created for the ordering and display of up to seventy-five hi-res pictures in sequence, using a variety of special effects transitions. It takes input from *Appleplot, VersaWriter, The Complete Graphics System,* and others, making it a nice organizational tool for educators, business people, and anyone who has hi-res graphics files scattered among several disks. Sequences—name of slide, position in sequence, and type of transition—can be printed out for reference.

The keypress option for advancing the slides is a little awkward for group presentations, for which the game paddle button option offers the best simulation of an actual slide projector. A timed mode will leave each picture on screen for up to seventeen minutes.

Error trapping is extensive and painstaking, with flashing arrows reminding you to check every menu selection. Thirty dashes on the cursor line make sure you won't go over the thirty-character maximum slide name. The creation of a slide sequence requires that the accompanying documentation be

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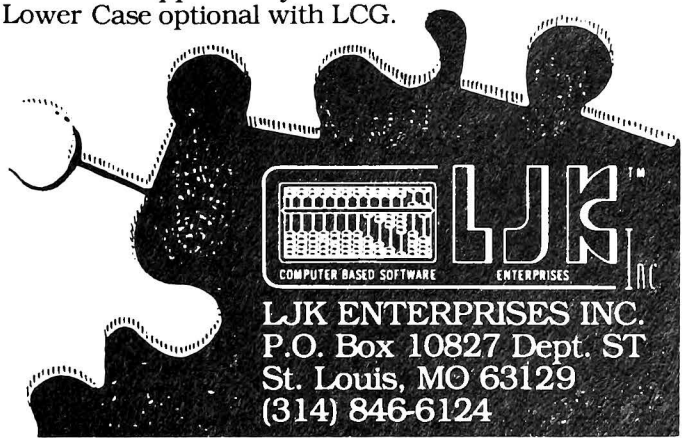
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followed closely the first time through; fortunately, the tutorial is as meticulous as the prompting, and the procedure is quickly learned. Two disk drives are recommended.

The transitions themselves are handsome and effective, ranging from vertical and horizontal wipes to ripple effects, slow dissolves, and overlays; twenty in all. Text editing features come in very handy for modification of sequence, changing slide names, backing over mistakes, and escaping back to the menu if you change your mind in mid-creation.

The program's most viable applications are in business conferences, exhibits, and store displays. For the latter, the free-run transition mode option, providing automatic advance every nine seconds, is invaluable. AC

The Slide Show, by Bruce A. Cash and Robert W. Hench, C&H Video (110 West Caracas Avenue, Hershey, PA 17033; 717-533-8480). $49.95.

Swashbuckler. By Paul Stephenson. The blood chills and the hackles rise on the neck every time one of your characters is run through. It's not the graphics, although they're good—with the little man grasping his chest and dropping to the deck. It's the sound. The sound is very short and high-pitched. It resembles an indrawn breath saying "eek!" Its effect is that of fingernails across a blackboard, and there isn't any way you can turn it off, unless you take a pair of wire cutters to the speaker leads.

The computer graphics and animation become ever more realistic and astonishing. In *Swashbuckler*, you are trying to eradicate the vicious crew of a pirate vessel along with their pet vermin. Your enemies include men with clubs, hatchets, swords, and spears. Their rats and scorpions crawl across the deck toward you: one bite from either reduces your reach from a lunge to a thrust. The fangs of a snake or the stinger of a scorpion will bring that fatal "eek!"

Behind the battling figures on the screen are well-done stationary graphics to help establish the mood. There are wooden beams, cobwebs, a great cannon, and others, depending upon the level.

You stand in the middle of the screen, foil in the guard position, slightly raised. Three left-hand keys control your movement. Five keys on the right-hand side of the board control swordsmanship. You can parry high, parry low, thrust, lunge, or stay on guard.

On come the baddies. You are always between your attackers. The higher the level you're on, the nearer the pirates and their helpers will appear. All's fair in love, war, and computer games. In other words, as you battle one enemy, the other will attack you from behind.

You begin with three swordsmen and can earn another when you've done in twenty-five attackers. It's a gory game. When your sword goes through an enemy, he drops his weapon and his jaw in surprise. Then he collapses to the deck in a heap. Finish off the second of each pair and more take their place. When your score is high enough, you move up another deck to meet even tougher adversaries.

The animation isn't perfect. The scorpion, for example, is about the size of a large dog and moves jerkily. If you finish off a pirate while one of the vermin is moving toward you, it seems to return to its beginning position before it attacks.

Then, too, it's difficult to understand what makes an effective attack. The swords clash against each other, men grunt when they're stabbed, and there's the infernal "eek!" Placement and timing appear to be the keys, but they're the game's requirements, not necessarily lifelike. DA

Swashbuckler, by Paul Stephenson, DataMost (9748 Cozycroft Avenue, Chatsworth, CA 91311; 213-709-1202). $34.95.

Deadline. By David Lebling and Marc Blank. A millionaire philanthropist has been found dead of an apparent drug overdose in his library. You, the chief of detectives, have received a letter from the attorney of the deceased requesting that you be present at the reading of the will and have a look around while you're there. There is also the matter of the possible existence of a new will, made by the dear departed immediately prior to his departure, but subsequently, shall we say . . . misplaced.

You are armed with an inspector's casebook, excerpts of suspect interrogations, the report of the medical examiner, and a packet of "tablets found near the body" (physical evidence).

If the Mystery Writers of America gave an award for Best Fiction in Software, *Deadline* would win in a walk. Of course, it has little competition, but besides being a well-written program (with a vocabulary of more than six hundred words, full-sentence commands), it is well *written*. This is an elegant mystery, with its roots in Agatha Christie rather than Mickey Spillane. Virtually all the suspects have you, the detective, outclassed by a mile in poise, class, and resourcefulness, and they love to let you know it in a number of subtle ways. You are bound to feel more like Lieutenant Columbo than Nick or Nora Charles as you muddle about these haunts of the very rich.

The parameters of your investigation are the entire house and grounds, and the authors have loaded the whole estate into their program, down to the last garden hoe, toothbrush, and ancestral portrait. It's a real place, and every object in it is really there. It is a big program, though its speed (machine language) belies its bulk. Its sentence-comprehension ability can require painstaking prompts on the placement of the verb in relation to the subject, and results in an occasional non sequitur response, but once you get the hang of it, things can become rather chatty. If the program can't answer, it always tells you why, and it demonstrates a laconic wit in anticipating a lot of the sillier commands that may float into your head during the frustrating passages of the game.

Those passages are many. It's easy to feel lost and helpless in *Deadline*. There is no treasure; you have no weapons, no adversaries, and no quest—save for the truth and evidence to back it up. Your surroundings are of the familiar, mundane world and are largely inert; it's totally up to you to make sense of the world in which you find yourself.

The disciplines required in *Deadline* are like those of no other adventure. You don't get to see a point score mount encouragingly, and you can't even know if you're on the right track. You need to have a real grasp of deductive reasoning and a feel for minutiae. Linear thinking and direct action will get you zip. Your success is dependent on how strong a case you can make based on your accumulated evidence.

The variables for subsequent plays of the game are somewhat restricted—the facts of the murder, the method, and the culprit don't change—but even though it's always the same mystery, you are not likely to get a conviction your first time through, and you'll have to go back and reconstruct events again, searching for the evidence that will clinch your case. Therein lies the variety of *Deadline*. For anyone who ever loved a mystery—and who has a couple days free—it's indispensible. AC

Deadline, by David Lebling and Marc Blank, Infocom (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031). $49.95.

Printer's Assistant. By Ed Magnin. This program is a joy. It rates near the top in almost every way, including having a valid reason for existing. Very simply, it creates short (two-sector) exec files that will set up formatted printouts and/or program listings on your printer or screen. Its best feature is the ability to set the left and right margins, other than the default settings of zero left and eighty right. This takes care of the major annoyances of the Epson involving the setting of margins and the lack of a linefeed in lines of more than eighty characters, which causes overprinting.

In use, the program requires no attention from the operator. It places a short routine in memory that intercepts the PR# calls to your printer and adds the format that you have defined. PR# calls to peripherals other than the printer are not affected. If you want to go back to normal operation you just type *exec PR#0* and everything will be as it was. That's all there is to know about it.

The documentation is in the program itself and you may print a hard copy if you so desire. There is even a little exec file to see if the program with which you are using the *Printer's Assistant* employs page 3 for any of its routines, the reason being that this little gem is tucked away in a corner of page 3 and

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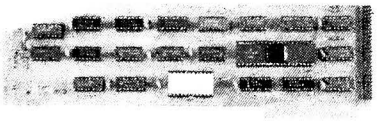
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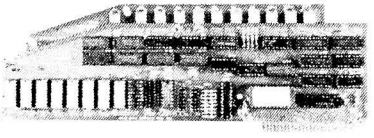
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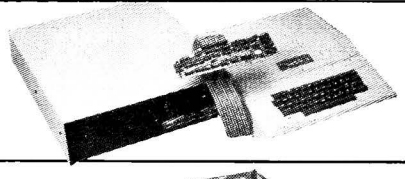
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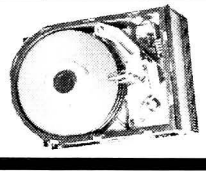
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would be overwritten by the program. If the program does indeed have a conflict on page 3, you won't be able to use it. (You can use the program with at least thirty programs without running into a page 3 problem.)

As you might guess from the company's name, help is but a phone call away. Most often it will be Mr. Magnin himself on the line with a clear answer to your question. If he tries to sell you something else—listen; he may be doing you a favor. RJR

Printer's Assistant, by Ed Magnin, Telephone Software Connection (Box 6548, Torrance, CA 90504; 213-516-9430). $25.

Star Blaster. By Mark Kriegsman and Geoffrey Engelstein. Your mission is to protect Earth from a barrage of attackers from the planet Dragon. As you patrol above a mountain range, the enemy's worst darts across the screen—and you must ward them off.

There are eight levels of difficulty to live through, each one characterized by different attackers, the more difficult levels comprised of faster and more able enemies. Coming at you are fleeting spaceships, skeletonlike squares able to shoot darts, flying fish to devour you, and a moving wall which you must chisel through to escape. The final level is a challenge from the head of the Dragonian expedition, the Dragonian Annihilator. When you destroy it, the entire screen goes wild.

Star Blaster offers a unique feature: two ways to see the game in action, either in the play mode or the demo mode. If you choose the demo mode, useful for practice, you can attack free from harm, although you score no points. One touch of the escape button brings you to the play/demo menu where you can choose to play for real.

In the play mode, you score points whenever you destroy an attacker, but you are also vulnerable to their bullets. When you are destroyed, an explosion sounds. If all three of your ships are destroyed, the screen clears and you must start again at the beginning level. Hitting the escape key in the play mode will freeze the action.

Star Blaster can be played with joystick or paddles. Sound is optional; the instructions are clear, simple, and easy to follow. KK

Star Blaster, by Mark Kriegsman and Geoffrey Engelstein, Piccadilly Software (89 Summit Avenue, Summit, NJ 07901; 201-277-1020). $29.95.

Apple-Link. By G. Jaffe and S. Pierce. This is not a communication package in the sense of *Data Capture* or *Z-Term*, as it cannot communicate with systems such as the Source or Dow-Jones. What it will do is transfer any number of any type of DOS file to or from a Hayes Micromodem-equipped Apple.

While a Micromodem is required on both the originating or base computer and the remote computer, only the base computer need have the *Apple-Link* program software. Actually, only the base computer need even be attended, given that the remote computer has been left turned on with the Micromodem in a ready state and the proper disk in its active drive.

The program is menu driven and very easy to use. It also has sophisticated error trapping, so its operation is nearly foolproof. By way of explanation, let's run through a typical session.

First the remote system must be booted and an initialized disk placed in the active disk drive to receive the files you will be sending. Next, the command *in#(slot)* places the remote modem in the auto-answer mode. That's it. The remote system is all set. Everything else will be controlled by the *Apple-Link* program in your Apple.

On your end you boot the *Apple-Link* disk, a menu appears on your screen, and you select *Auto Dialer* and type in the number you want to call. The program now takes over and makes the connection and returns you to the menu. You now select *File Transfer* and your Apple formats the other computer's screen and transfers all the necessary software to its memory.

Now the serious stuff starts. Your screen asks if you want to transmit or receive files. You type T and your system catalogs

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the first twelve files on your disk, with a letter in front of each. You type the letter of each file you wish to send and the screen displays another batch and so on until you've seen the whole disk catalog. Now the screen tells you how many files you have chosen and prompts you for a start command. You oblige with an S and the program takes over.

While a file is being transmitted, a clock appears on the screen that shows how much more time will be required to complete sending the current file; a nice touch.

You can abort the sending of a file at any time by hitting the escape key. Also, the screen tells you the sequence number of the file being sent so that you can tell how far along you are in your list of files. The end of the session can be made automatic so that you can start sending a long list of files and leave the room, knowing that the program will do the job and hang up the phone when it has finished.

The error handling and error report functions, are like the rest of the program, well thought out; each sector is verified by check-sum byte to ensure the integrity of the data.

If you have frequent need to transfer files or programs to other users, this program is one you would want for your system.

A backup is provided free when you return your registration card. RJR

Apple-Link, by G. Jaffe and S. Pierce, Computer:Applications (1330 S.W. 108 Street Circle, Miami, FL 33186; 305-385-4277). $59.95.

Escape from Rungistan. By Bob Blauschild. The recent advent of Sirius Software into the adventure game market with *Kabul Spy* is confirmed by *Escape from Rungistan*, a foray into innovation and experimentation. In *Rungistan*, the innovation is animation.

Creature Venture from Highlands perhaps began true animation in adventureland with animated occurrences you could watch. In *Rungistan*, you must take part in or act during the animated scenes. In many cases, how you react is a life or death issue.

You'll give a command that begins an animated sequence; the command request reappears with a fast-blinking cursor while the animation continues. You must react by giving the appropriate command in the circumstance, hitting return before the animated event ends. Quick thinking—and accurate typing—are necessities.

For example, a mouse runs through your jail cell. You must catch the mouse, or at least stop it, before it gets away. As it runs across the floor, you must figure out that food might tempt it and offer it cheese. Sure enough, it takes the cheese into a corner; then you can catch the mouse easily—with the right words.

The experiment works. Just as hi-res adventures replaced all but the best text adventures, so animated hi-res adventures promise to replace static ones. They are the next step toward the computer adventurer playing his role in a computerized video movie.

The breakthrough doesn't replace the need for a good plot, good puzzles, and good graphics. For the most part, *Rungistan* has all three.

The graphics are the colorful, comic book style popularized by On-Line and adopted by several others, including Sirius for *Kabul Spy*. Directions are easier to follow than in the latter game, although north is not always up or ahead on your screen.

The plot is not deep or complicated; it will never compete for literary honors with the likes of Sentient's *Cyborg*. You must merely escape from jail and from the country; but enough side events occur along the way to make the story interesting.

The puzzles are generally good. A few are mere traps, and the fact that the last one depends on finding the one of several synonyms that the game will accept to do the obvious is inexcusable, but the majority are clever and satisfyingly perverse. The help function is essential and very helpful.

A great improvement over *Kabul Spy* is in the method of handling portions of the game in and out of memory. While *Spy*

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required turning over the disk and waiting through a rather long load, then returning the disk to continue (and heaven help you if you accidentally moved back where you just came from—you'd have to go through the process twice again to recover), *Rungistan* simply loads in a new section when you enter it. Should you get yourself killed, you're given the option of starting over from the point immediately after any of the loading sections that you've already passed, with precisely what you had at that point.

Escape from Rungistan has good enough puzzles to please the average-to-good adventurer, and, with the excellent hints, it's easy enough for the beginner. Incidentally, don't scare the snake. MCT

Escape from Rungistan, by Bob Blauschild, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $29.95.

Soft-Step. By Lee Stevens. This is an interactive debugging utility for Applesoft Basic programs with many features that can be used by even the novice programmer. They include the ability to *step* through a basic program one line at a time and pause and examine or define variables or memory. You can also place a *break* at any point of the program which causes it to stop and await your command. This is useful in trying to locate a bug or to run only a portion of the program.

The nicest features are the *trace* and *list* commands. Used together these improvements on their Applesoft counterparts allow you to trace all lines or a range of lines while listing each line just before its execution. This is especially useful because it does not require you to print a listing of the program in order to follow along with the trace.

Other features include: *print*, which allows you to print the value of an expression; *do*, which predefines a command to be executed whenever the debugger pauses; and *let*, which allows you to change a variable's value. There is also an *auto* mode in which you can set a sequence of functions for the program to perform at a break without waiting for you to enter the instructions to do so.

The program comes on a protected disk without a backup copy. There's no mention in the manual of how to obtain one, though you can return a damaged disk with ten dollars and receive a new copy. With this oversight corrected, this program could be given highest marks.

The program is less than 3K in length, which is amazing when one considers the number of features included. Its small size allows a large amount of memory to remain free for the use of the program being worked on. The program resides in memory above the program being edited, at the high memory boundary.

All in all, with its brief but good documentation, this package is an excellent tool for any Applesoft programmer. RIR

Soft-Step, by Lee Stevens, Accent Software (3750 Wright Place, Palo Alto, CA 94306; 415-856-6505). $49.95.

Master Diagnostics and **Master Diagnostics Plus.** By Dr. Nicholas Romano. You may only use this program once or twice a month, if that often, but if it helps save you a trip to the shop, it will soon pay for itself.

There are a number of options available in DOS 3.3. These include motherboard ROM test, Applesoft or Integer card test, parallel card test, RAM test, disk drive analysis, Micromodem II self-test, Monitor routines, and a help screen. For the disk drive alone, the program will test the read/write head, disk speed, the write/protect switch, and provide a head cleaning routine. (There's a head, screen, and housing cleaning kit optional with the *Plus* program.)

The manual is complete enough but demands very careful reading. It could use an indexed list of the problems that can occur. The section on internal maintenance describes how to clean the contacts on a card with a pencil eraser. DA

Master Diagnostics and *Master Diagnostics Plus*, by Dr. Nicholas Romano, Nikrom Technical Products (25 Prospect Street, Leominster, MA 01453; 800-835-2246). $49.95; *Plus*, $69.95.

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. ■

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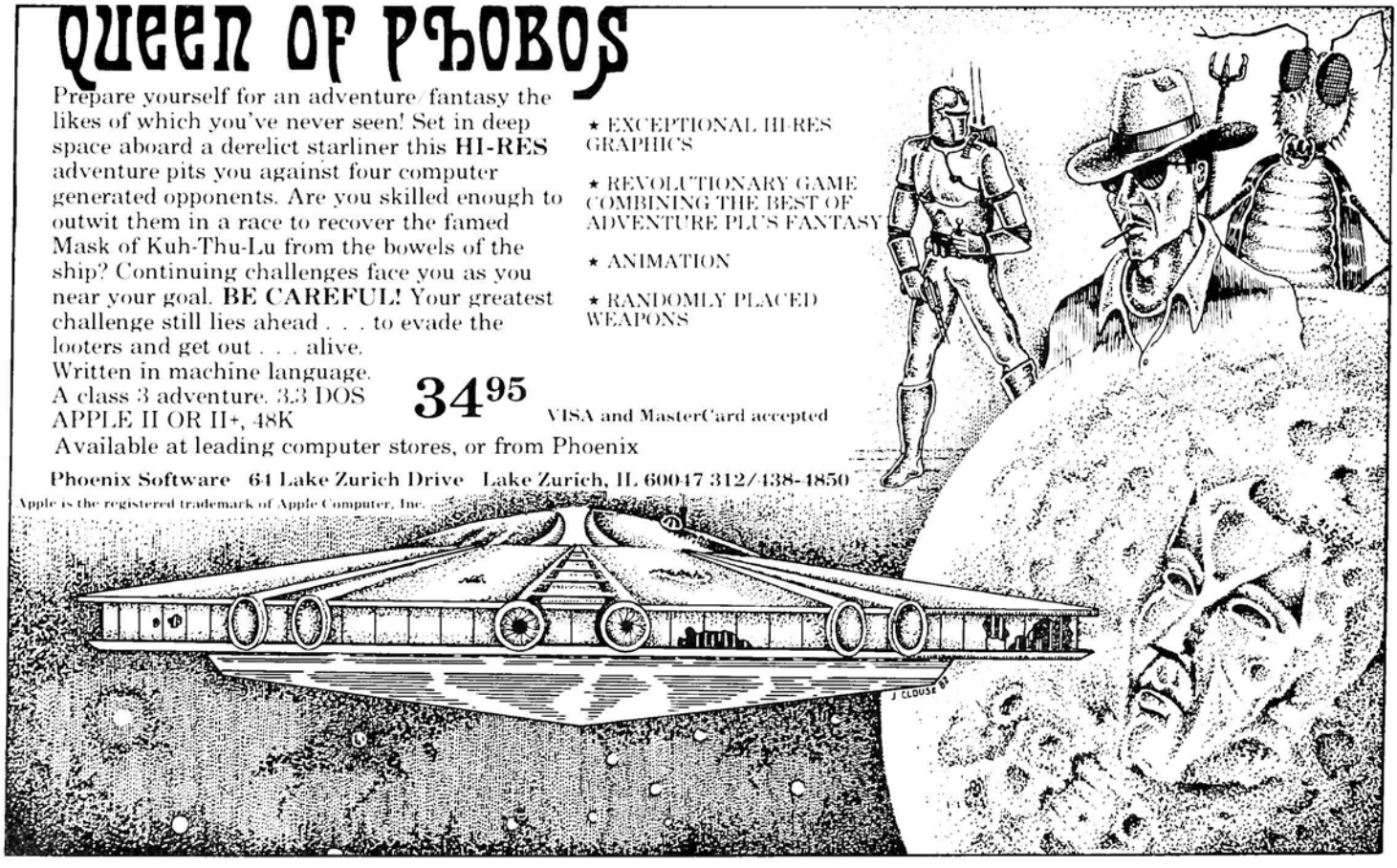
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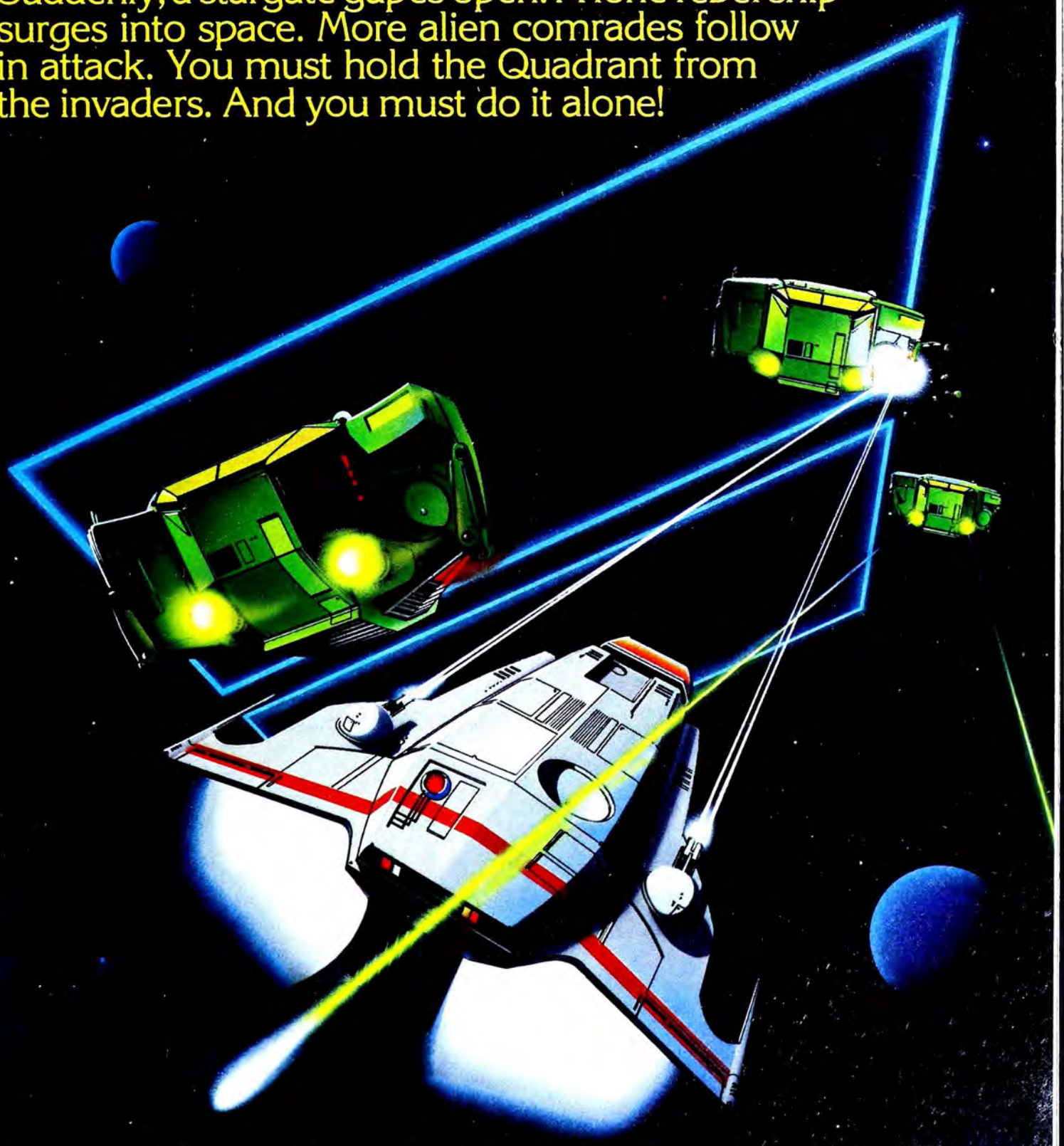
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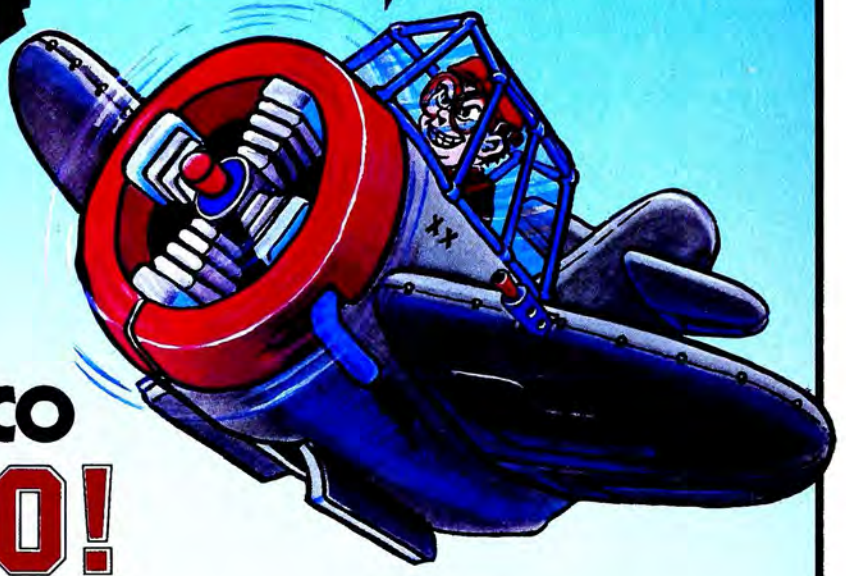
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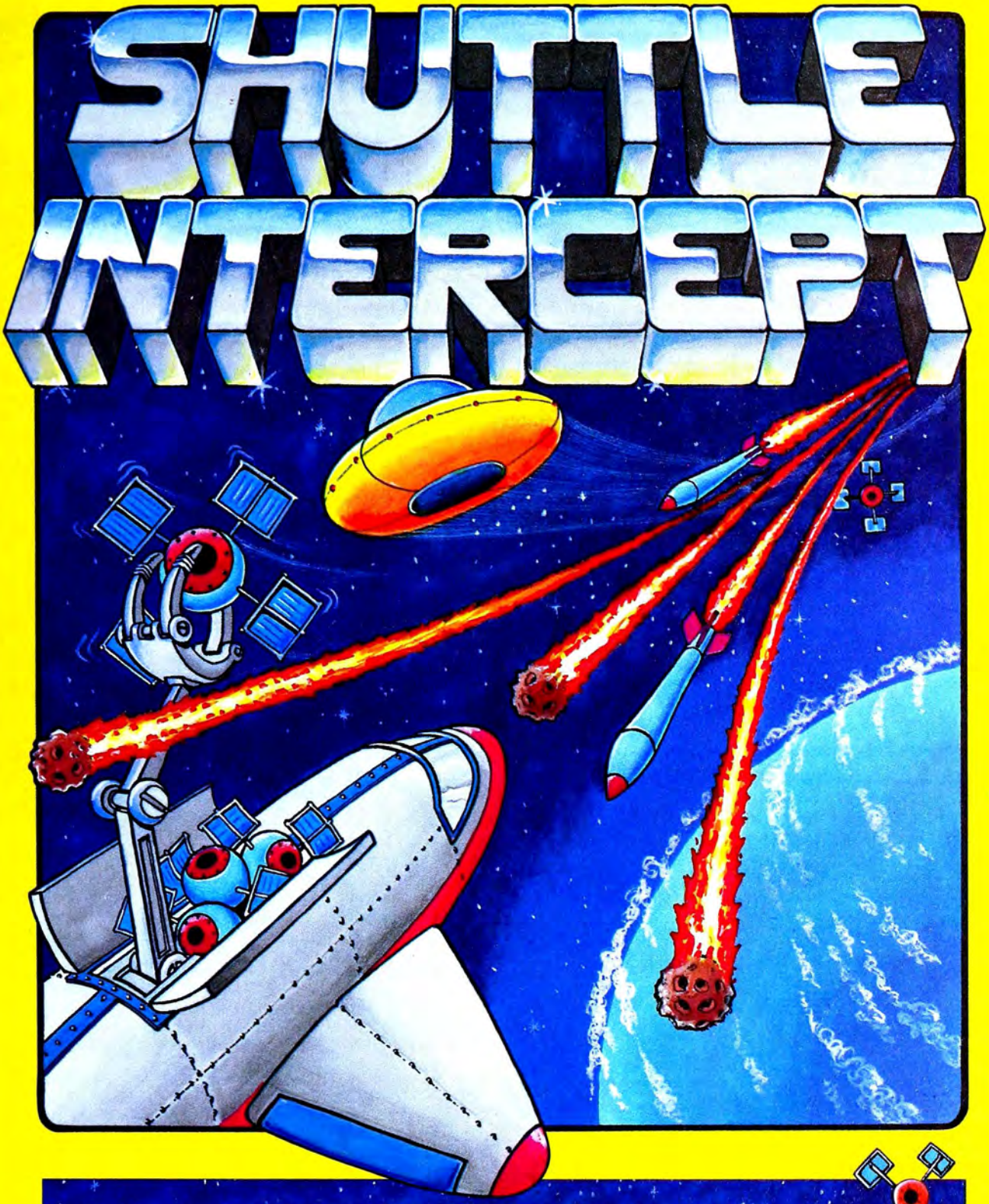
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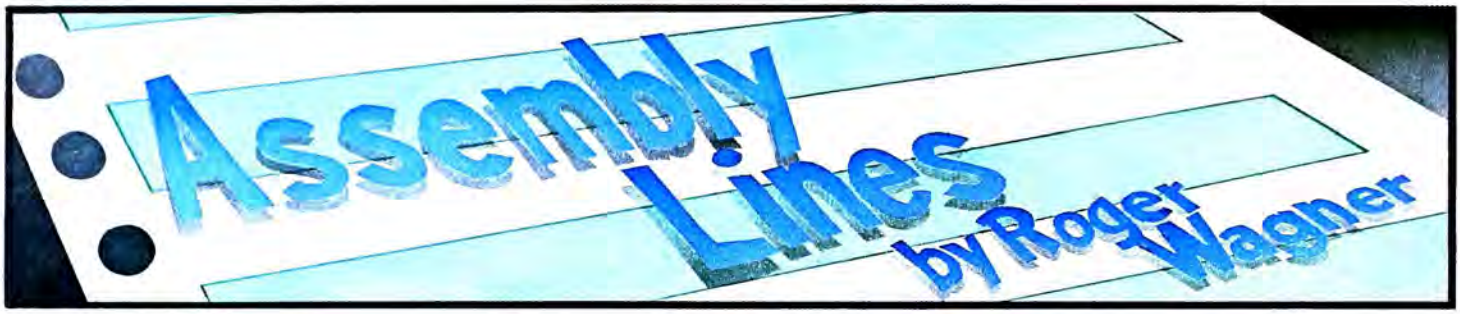
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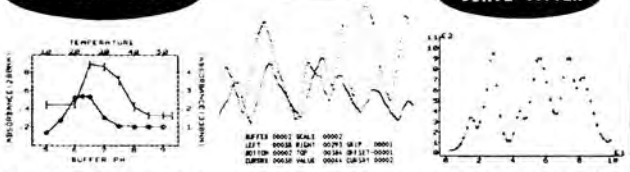
In lo-res graphics, the SCRN(X,Y) function returns the value of the color of the screen at the X,Y coordinate specified. Unfortunately, no such equivalent function exists for use with hi-res graphics in Applesoft Basic.

In the last few issues we've seen how to plot points in a variety of ways. Now, here is a routine for doing a hi-res equivalent of the SCRN(X,Y) function. One conceivable use for this routine might be in a game program in which knowing when one object is touching another is important. Using the SCRN routine given here, you can test to see if any points have already been plotted at the coordinates a presumably moving object is about to use.

```
1  ************************************************
2  *              HI-RES SCRN FNCTN               *
3  *                   6/22/82                    *
4  ************************************************
5  *
6  *
7           OBJ  $300
8           ORG $300
9  *
10 CHKCOM  EQU  $DEBE
11 FRMNUM  EQU  $DD67
12 GETADR  EQU  $E752
13 LINNUM  EQU  $50
14 COMBYTE EQU  $E74C
15 PTRGET  EQU  $DFE3
16 CHKNUM  EQU  $DD6A
17 GIVAYF  EQU  $E2F2
18 MOVMF   EQU  $EB2B
19 *
20 X       EQU  $E0
21 Y       EQU  $E2
22 *
23 HPOSN   EQU  $F411
24 HNDX    EQU  $E5
25 HBIT    EQU  $30
26 GBAS    EQU  $26
27 *
0300: 20 BE DE 28 ENTRY   JSR  CHKCOM
0303: 20 67 DD 29         JSR  FRMNUM
0306: 20 52 E7 30         JSR  GETADR
               31 *
0309: A5 50    32 SET     LDA  LINNUM
030B: 85 E0    33         STA  X
030D: A5 51    34         LDA  LINNUM+1
030F: 85 E1    35         STA  X+1
               36 *
0311: 20 4C E7 37 GETY    JSR  COMBYTE
0314: 86 E2    38         STX  Y
               39 *
0316: A5 50    40 CHKX    LDA  LINNUM
0318: 4A       41         LSR             ; PUT BIT 0 IN CARRY
0319: A9 01    42         LDA  #$01       ; SET BIT 0
031B: 85 50    43         STA  LINNUM     ; %0000 0001
031D: B0 02    44         BCS  CHKHI      ; X='ODD'
031F: 06 50    45         ASL  LINNUM     ; SHIFT LEFT ONE POSN
               46                         ; %0000 0010
               47 *
0321: A6 E0    48 CHKHI   LDX  X
0323: A4 E1    49         LDY  X+1
0325: A5 E2    50         LDA  Y
0327: 20 11 F4 51         JSR  HPOSN
               52 *
032A: A4 E5    53         LDY  HNDX
032C: B1 26    54         LDA  (GBAS),Y
032E: 48       55         PHA             ; SAVE DATA
032F: 10 08    56         BPL  HICLR      ; BIT 7 CLR
0331: A5 50    57 HISET   LDA  LINNUM
0333: 09 04    58         ORA  #$04       ; SET BIT 2
0335: 85 50    59         STA  LINNUM     ; BIT 'ON'
0337: D0 06    60         BNE  CHKBIT     ; ALWAYS
0339: A5 50    61 HICLR   LDA  LINNUM
033B: 29 8B    62         AND  #$8B       ; CLR BIT 2
033D: 85 50    63         STA  LINNUM
               64 *
033F: 68       65 CHKBIT  PLA             ; RETRIEVE SCREEN BYTE
0340: 25 30    66         AND  HBIT       ; SELECT BITS OF INTEREST
0342: 29 7F    67         AND  #$7F       ; CLR BIT 7
0344: D0 06    68         BNE  SEND       ; BIT IS "ON"
               69 *
0346: A5 50    70 OFF     LDA  LINNUM
0348: 29 8C    71         AND  #$8C       ; CLR BITS 0,1
034A: 85 50    72         STA  LINNUM
               73 *
```


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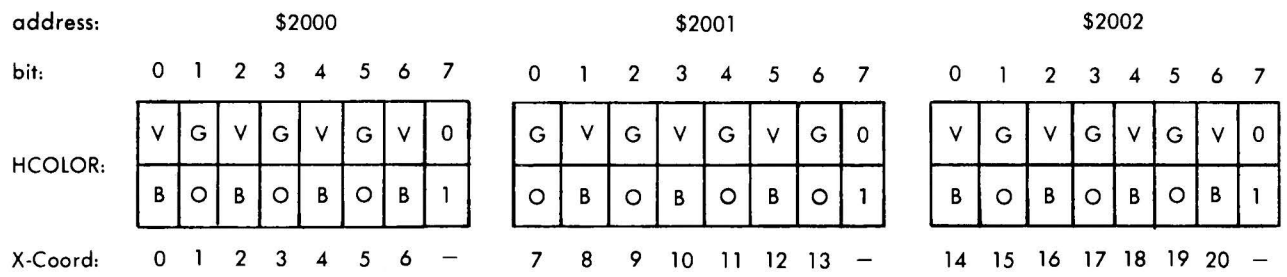


Figure 1.

```
                        74 *
034C: 20 BE DE  75 SEND     JSR  CHKCOM
034F: A4 50     76          LDY  LINNUM
0351: A9 00     77          LDA  #$00
0353: 20 F2 E2  78          JSR  GIVAYF
0356: 20 E3 DF  79          JSR  PTRGET
0359: 20 6A DD  80          JSR  CHKNUM
035C: AA        81          TAX
035D: 20 2B EB  82          JSR  MOVMF
                83 *
0360: 60        84 DONE     RTS
```

An Overview. You'll remember that last month we used the Applesoft hplot routines to plot a point. The X and Y coordinates for the point were passed to the routine via normal Applesoft variables.

The final plot was accomplished by setting a particular bit within a byte of memory. The bit to be set is determined by creating a "mask" for the bit position within the byte.

Figure 1 (by now an old friend) was used as a guide to which bits are set for any given color and X coordinate.

For our SCRN function we need to identify whether the bit corresponding to a given X,Y coordinate has been set, to take into account the high order bit (bit 7) where necessary, and then return a value between 0 and 7 corresponding to the color of the dot. Before going any further, take a look at figure 2, which shows the bit patterns for the color values that might be returned.

What the SCRN routine does is establish a temporary register in which the bit pattern for the color value to be returned to the user will be constructed. Notice that for any of the possible color values we need only concern ourselves with the last three bit positions. This greatly simplifies our task.

Note also that when a dot is "off" (either black), the routine returns a number with bits 0 and 1 cleared. Bit 2 will still have to be specifically conditioned, however, since black2 sets the high order bit of a byte even though no dot is illuminated.

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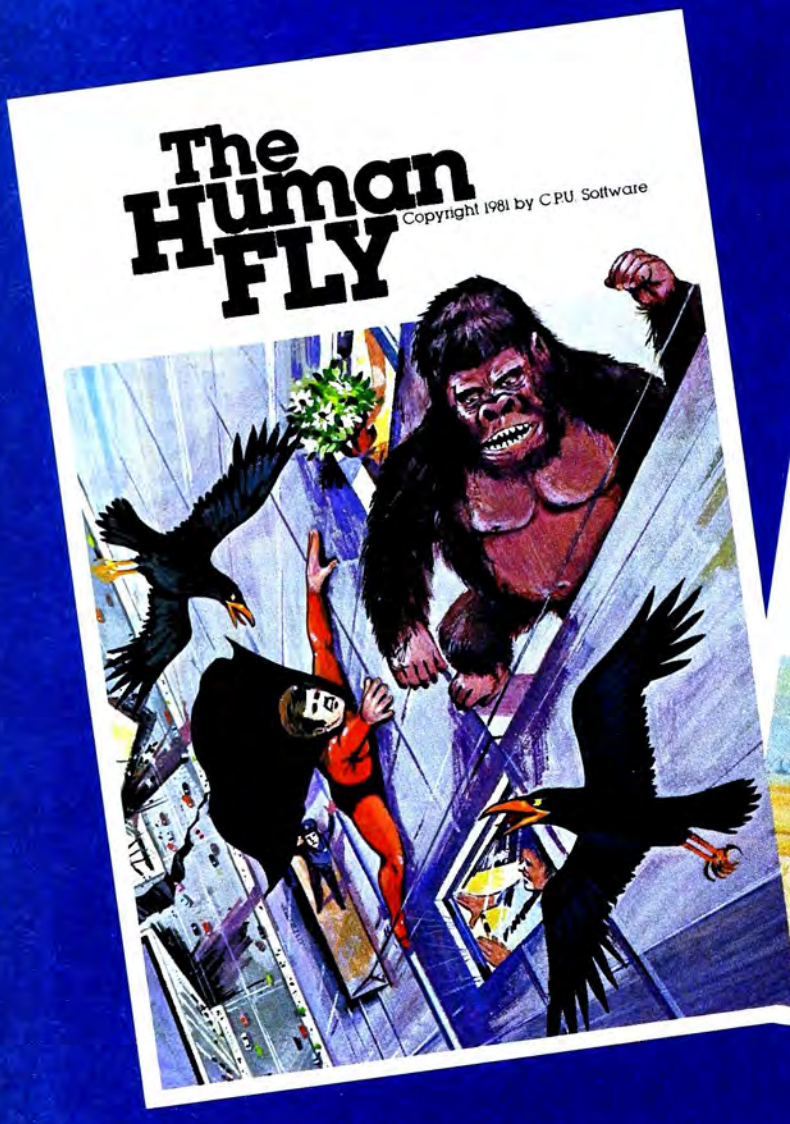
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HCOLOR	VALUE	BINARY EQUIVALENT
BLACK1	0	0000 0000
GREEN	1	0000 0001
VIOLET	2	0000 0010
WHITE1	3	0000 0011
BLACK2	4	0000 0100
ORANGE	5	0000 0101
BLUE	6	0000 0110
WHITE2	7	0000 0111

(Note: the binory digits ore broken up into groups of four for eosier viewing.)

Figure 2.

Because neither white is directly plotted, the routine will never return a value of 3 or 7. Remember that when white is specified, Applesoft normally plots only one color. Thus our SCRN routine has no way of determining whether a given dot is a pure color or part of a larger dot pattern creating a white line or area.

To determine a dot's color from among the four remaining colors, we look at the X position of the dot. Since you can only plot even color values at even coordinates, and odd color values at odd coordinates, the two final bit positions of the color register value will be 01 or 10 depending on whether X is odd or even. The status of the third bit depends on whether the dot's high order bit is set or not. When all these checks are collected into a routine, we have the following procedure:

1. Lines 28-38 retrieve the values of the X and Y coordinates from the Applesoft call command. These are transferred to the hi-res routine registers ($E0-E2).

2. The value for the X coordinate is returned in LINNUM ($50,51) and, as such, can be checked for whether it is odd or even. To do this we need only check the low order byte to see whether the last bit (bit 0) is set or not. The easiest way to do this is to use the LSR (logical shift right) command on lines 40,41 to shift the last bit into the carry flag, which will be tested almost immediately.

A bit (pardon the pun) of programming style here. We could test for all six possible color conditions individually, but it turns out that it is easier to set up the final color value more subtly. Let's start by assuming that some color will be present. Line 42 puts a possible value (#$01) into LINNUM as a starting point. (Since we're done with LINNUM from lines 28-38 we can now use it as our working register for the color value. Also note that we no longer need to worry about LINNUM+1 since the color value will never exceed 255.)

Now we can do the carry test, BCS (branch on carry set), to see whether the coordinate was odd or even. If the carry bit is set, X was odd, and LINNUM already contains the bit pattern for all colors that could be plotted at an odd coordinate. If the carry is clear, line 45 will be executed which shifts the pattern to the left one position to correspond to the "even" colors.

3. Lines 48-51 do the JSR HPOSN which will calculate the address of the byte in memory that corresponds to the coordinates given. See the plot routines from previous issues if you need refreshing on this. Lines 53-55 load the byte into the accumulator and push it onto the stack to be retrieved later.

The test on line 56 checks for whether the high order bit was set. A BPL (branch plus) is done if the bit was clear. If the bit was set, we need to set bit 2 of LINNUM (our color register). Note that bit 2 is clear for HCOLORS 0-3 and set for HCOLORS 4-7. Bit 2 is set using the ORA (logical OR of accumulator). If the high order bit was clear, the logical AND command is used to clear bit 2.

4. Final check. Now we need to see whether the dot was actually turned on or not. The memory byte is retrieved from the stack using the PLA (pull accumulator) and masked with HBIT ($30). HBIT is a mask created by the HPOSN routine to show which bit corresponds to the given X coordinate. By masking HBIT with the memory byte we can isolate the bit we're interested in. As a further step, the AND #$7F clears the high order bit (which we've already tested for anyway). As an

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example, suppose that the memory location had held the value $9B and the value for X was 4:

```
MEMORY:    $9B    1001  1011
HBIT       $90    1001  0000
                  ----------
RESULT     (AND)  1001  0000
           #$7F   0111  1111
                  ----------
RESULT     (AND)  0001  0000
```

Note the final result will only be nonzero if the dot is on.

5. If the dot is on, everything is already set up, and we can proceed to the final exit phase. If the dot is off, the AND #$8C on line 71 will clear only bits 0 and 1. This allows us to determine the status of the high order bit, even if a dot is not actually plotted at the position given.

6. SEND (lines 75-84) is identical to the REAL VARIABLE SEND routine given in an earlier issue and is used to send our resulting value back to Applesoft. The only thing different in this case is that the routine loads a zero into the accumulator instead of the high order byte of LINNUM (LINNUM+1), since as mentioned earlier, the value for color will never exceed 255.

Sample Program. To test this routine, *bload* the file at $300 and call it using the syntax:

```
CALL 768, X, Y, C
```

where X and Y are the screen coordinates to examine, and C is the variable into which the routine will return the resulting color value from LINNUM.

As an example of using the SCRN routine from Basic, this program will return all the possible values for C and illustrate the dependence of those values on hcolor and X position:

```
 0 HOME:VTAB 22:X=0:Y=0
10 FOR I=0 TO 7
20 HGR:HCOLOR = I
30 HPLOT X,Y
40 CALL 768,X,Y,C
50 PRINT"X = ";X,"COLOR = ";C
60 NEXT I
70 X = X + 1: IF X = 1 THEN 10
80 TEXT:END
```

The program goes through two passes, the first plotting all eight colors at X = 0, and the second with all eight colors at X = 1. After doing the plot, the program calls the SCRN routine to verify that it reads the color we think we plotted. It will do so except in the following cases:

1. White will always read as either 2,3,5, or 6. This is because when white is specified, a single plot only illuminates one color dot.

2. An attempt to plot an "odd" hcolor on an even X coordinate or an "even" color on an odd X coordinate returns 0 or 4 as the result because of the plotting restrictions described in several of the previous articles.

Conclusion. The SCRN routine can be applied in a variety of ways. In general, whenever you want to examine the screen to determine what color has been drawn, you can use this routine. Possible applications might include graphics printing routines and games in which it is necessary to determine the existence of lines that represent walls or obstacles.

If you wish to use the routine directly from machine language without calling it from Applesoft, simply delete the entry routines and load LINNUM with the X coordinate and $E2 with the Y coordinate.

If you have any comments on current articles or suggestions for future ones, please don't hesitate to mail them in to the *Softalk* editorial offices. Your input is especially appreciated and can have an important effect on the direction this column takes. Until next month, happy Appling! ◨

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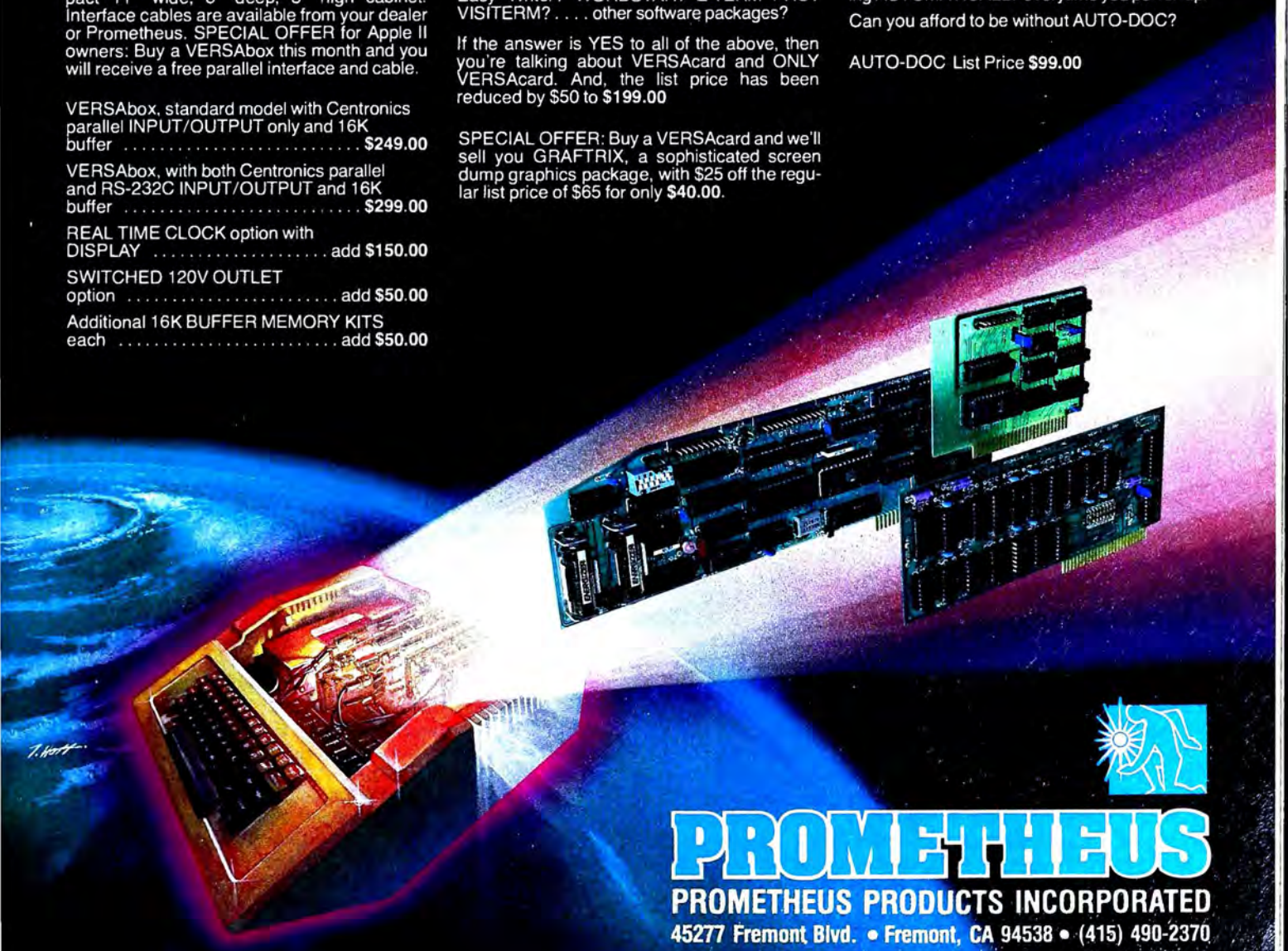
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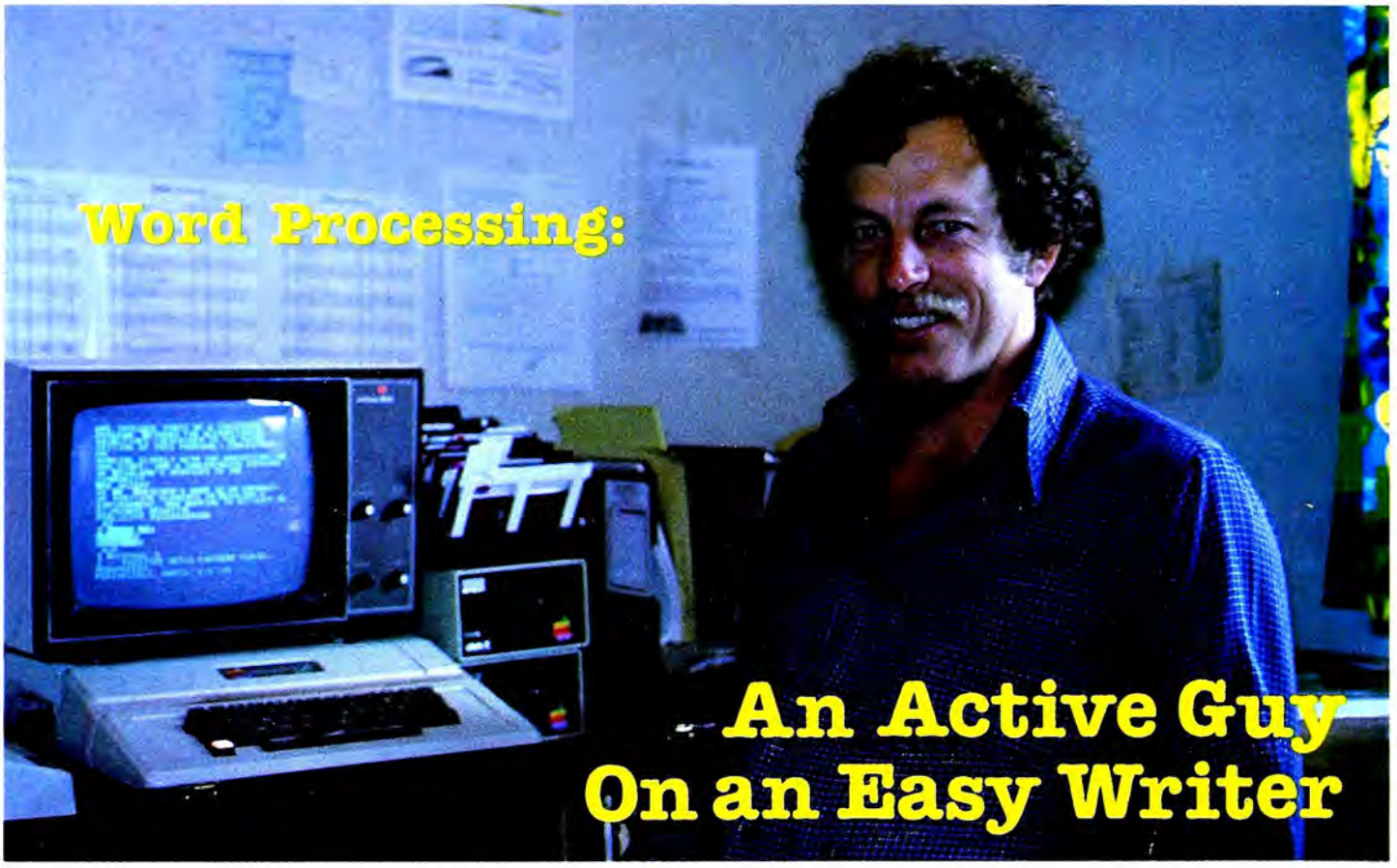
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Word Processing: An Active Guy On an Easy Writer

BY JONATHAN MILLER

It's been said that freelance writing is much like acting—many are called but few are chosen. While 25,000 people may call themselves freelance writers, fewer than three hundred, by one estimate, actually make a living at it. And most of those are married to millionaires.

Many so-called freelancers don't deserve to make a living slinging prose, anyway. They know not what they do. But others, a dedicated minority to be sure, undeservedly suffer the slings and arrows of an outrageous profession. They're humiliated by lunatic publishers, abused by sadistic editors, and hounded by merciless creditors in a contemporary version of a Gothic horror story. Their query letters are ignored, their ideas stolen, their prose butchered, and, to add injury to insult, they're led time and again to the postal altar to wait for checks that are never in the mail. What awaits instead are the creditors' final notices, a daily reminder that freelancers are not only out of step with decent, hard-working Americans, they're out of their minds.

Down to Cases. Which brings us to John Boeschen, a freelance writer and an *Easy Writer* user.

The year is 1975 and this former Peace Corpsman is "getting it together." Seven years ago after he graduated from Stanford, Boeschen had no definitive goal or direction. But he decided to put away childish things—like a wild notion to bike around the world—in favor of marriage and a high school teaching career. True, $400 a month isn't much, but it's a beginning, the voices of conventional wisdom said.

But John Boeschen rejected the conventional wisdom. After two years of teaching parochial high school kids the relativity of Einstein's theories, he decided to become a freelancer and parlay an emerging talent for writing simply about technical and scientific subjects into a career. He concluded that he'd rather spare the rod and write his own life's script.

"Teaching was creative and exciting," Boeschen recalls, "but it also was frustrating and tiring. Besides, I discovered that I wasn't satisfied working for somebody else." Boeschen had already spent two summers writing science studies for the U.S. Department of Agriculture and, in the process, had tapped a hitherto unknown talent. He had been bitten by the bug. His association with the USDA led to his first freelance sale, to *Flue Cured Tobacco Farmer* no less, on a scandalous subject close to the hearts of growers everywhere: *Sex and the Tobacco Bud Worm.*

Major life decisions take time, but Boeschen decided early that teaching was the wrong job for him. His eclectic nature required greater stimulus, a curriculum as large as all outdoors. It was time to put up, shut up, and become a freelancer—a linear descendant of those freelance knights of old. The chances of succeeding weren't good, but what does it profit a man who takes no risks? Certainly, teaching high school kids was no risk-free bargain. Lots of hassles for lousy pay and a future promising more of the same. Whatever else freelancing was, it was at least a promising unknown.

The Daring Young Man. As writers go, John Boeschen is a rather jolly, daring sort, which may say a lot about his success. Soon after graduating from Stanford, for example, he and a buddy pedalled across the United States on their ten-speeds, sleeping under bridges and in cow fields and foraging from roadside groceries. And when the Peace Corps sent him to Turkey to teach English without a working knowledge of the native language, Boeschen quickly improvised. He boned up on local idoms by passing himself off as a Bulgarian refugee, thereby discovering for himself the first law of foreign languages: the only way to learn is to sink or swim.

"And you always swim," says survivor Boeschen, our Turkish drop-in. "Even the most cantankerous American patriot will learn Turkish if"—forgive us—"he is dropped cold turkey into the system."

This, of course, was precisely what Boeschen intended to do as a fledgling freelancer—jump in. He had an idea for a book

on hydroponics and proposed it to Harcourt Brace Jovanovich, the New York textbook publisher. The editors weren't taken with his idea, but they were taken with him. He was victorious in defeat: they invited him to become a textbook writer and rewriter for them, a relationship that has lasted seven years.

Branching Out. It was an auspicious beginning, but the novice freelancer soon learned that one client doesn't make a career. Freelancing is a business, not a hobby, and survival requires diversity. One must have creative fingers in a number of market pies, from books to trade publications to consumer magazines to business newsletters.

In Boeschen's case, that meant manipulating his typewriter for *Family Circle, Beverage World, Potato Grower,* and countless trade publications. In those early years, he'd often churn out over a dozen stories a month for $100 here and $200 there. The writing was easy, but the work load impossible; Boeschen decided it was time to make his next great leap forward and buy an Apple.

The trouble is, when you've been earning $400 a month, have an old car—Boeschen still tools around in a red, 1971 Maverick—and do something as crazy as freelance writing, banks look askance at lending you $5,000 for a computer and printer. Writers are strange enough, says Boeschen, but writers who play with computers—Boeschen's voice drops to a mock conspiratorial whisper—are even stranger. This was 1978, remember—ancient history in the computer era. Benighted people of that time still thought Apples only grew on trees.

So when his friendly banker behaved predictably and said no, Boeschen fell back and punted. He joined a much more cooperative co-op up in his suburban bailiwick of El Sobrante—that's across the bay from San Francisco—to get his loan and launch an enterprise that's doing very nicely today, thank you. He's doing nicely because he's got his Apple, his two *Easy Writer* word processing programs (the baby and the professional), and the makings of a diversified business that includes cottage publishing. He's writing books like *Freelancing for Fun and Profit* and *The Build the Bed Book* (St. Martin's Press) and virtually producing them right there in his little northern California den.

"There's a whole new era opening up for writers," Boeschen says with wide-eyed wonder. "It's a great life, it really is. It used to take me many, many revisions to put a story together, but now with the Apple and the *Easy Writer,* here it is the first time. It's original and clean and it reads well. It's been a revolution in my life."

Through the Looking Glass. If all this sounds vaguely like a religious conversion, well, perhaps it is. When Boeschen speaks of revolution, he's not just talking about the joys of painless editing. He's saying that the bloody machine has seduced him with its synergy and profoundly affected the way he writes.

"You know what it is?" he asks, brightening with a sudden insight. "You know what that screen is? It's Alice's mirror. It's the looking glass she fell through. It is, it really is. It pulls you in, because the whole process is so dynamic. It's like 3-D.

"Before, writing on a typewriter was kind of two-dimensional and flat, but here you have all these acrobatics on the screen, the way the letters cartwheel across, do tumbles and flips or disappear if you want them to, or reappear somewhere else. It's like going to a fair or carnival. I can sit in here all day and love it. My wife says, 'How can you do it?' I say, 'It's easy, fun, exciting.' I'm just getting feedback from the machine all the time."

Writers are not generally too keen on machines. Computers in particular are viewed by some members of the profession like agents of a foreign power.

Back in the late seventies when Boeschen was stepping out into a brave new literary world, word processing wasn't even a dirty word. There was precious little software for an Apple writer to buy, let alone abuse—but Boeschen has never regretted his choice. He went with one of the earliest word processing programs—*Easy Writer,* the brainchild of John



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Draper, the legendary Cap'n Crunch. "It's never botched up a file, never lost anything, never crashed a disk," says Boeschen. "It's extremely fast, extremely simple to use, just a beautiful little program."

Just His Type. What makes *Easy Writer* particularly attractive to Boeschen is the program's incremental spacing feature in the print mode. It gives his completed work a professional appearance by adjusting spaces as much as 1/120th of an inch between characters.

"When you're dealing with editors and professional groups, you're working on image," he says. "Incremental spacing gives you that justified professional look and I'm sure it played a part in my getting the contract to do a newsletter. My printing costs were much, much less than those of the larger firms bidding on the project."

Boeschen usually knocks out his stories on *Easy Writer* and runs them on a Qume printer. When he's working on more complicated projects like his two books, he formats pages on his companion *Easy Writer Professional* program. It displays in eighty-columns and goes incremental one better, marrying his professional program to an IBM Electronic 50 (via an Escon converter) to get proportional, type-house-quality spacing. "I think this is going to be the wave of the future as far as New York publishers are concerned," says cottage publisher Boeschen. "They're sort of in a budget crunch—to pay me to do a whole book including production saves them money because I can get them mechanicals (layouts) and do it quickly. With the *Easy Writer Professional*, once you've figured out the picas or inches, you can wrap text around a picture right there on the screen. And it fits."

The budding book writer still has to come up with ideas that sell, says Boeschen, but marginal proposals may make it over the rejection hump if camera-ready packaging can be offered as part of the deal.

Under such arrangements, authors end up doing a lot more work, but they also gain potentially greater control over the final design by supplanting the middlemen—typesetters and paste-up artists. When printing, the cottage publisher still retains control because the *Professional* allows him to stop the printer at any point on any line. "I use this system every day," says Boeschen. "It has paid itself back a hundred times, what with the mail merge (with *Easy Mailer*) for the editors' names, the query letters, the typesetting, and the original writing. I don't think you can get a better system than these two combined."





Left, Boeschen and son Trent John; right, Carol Bold, Boeschen's superhelp transcriber.

The Bouncing Ball. The words are those of a satisfied customer, but what's most important to Boeschen is the process, not the product. Word processing has had a deep influence on both his writing and his perceptions. Writing has suddenly acquired a new dynamic—a visual right-brain stimulus that triggers a chain of free associations. At the flick of a switch, words and paragraphs dance to the writer's tune.

When Boeschen says that word processing has made "a 100 percent difference in his writing," he's not just talking about instantaneous editing. Word processing has also changed the



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way he composes. All those acrobatic characters cartwheeling across the screen have liberated the visually oriented right-side of his brain. And that, in turn, has inspired a new approach to composition, a process he calls "mind mapping."

Boeschen mind maps by drawing a verbal sketch of, say, an interview he's writing up. In the middle of a large sheet of paper he writes down the main theme of his article and circles it. Then, without consulting his notes, he tries to go with the free associative flow. In the spaces around the circled theme, he jots down words and phrases that simply pop into his head as he eyes his scratch canvas.

"I never write whole sentences," says Boeschen, "just words and short phrases. They're like prompts on the Apple computer." Within a few minutes he has mapped out the entire article and is ready to stitch his crazy quilt of random ideas into free-flowing prose.

"Now that I have a word processor, writing has a lot more texture, a lot more ripples and bulges and soft and touchy things," says Boeschen. "You see something that catches your eye and gets you going a whole new, different way. It's sort of like *Star Trek*'s transporter. One moment you're hung up on some block of type in front of you and the next, you hit a control key and you're off that little starship paragraph and on a whole new world."

Sometimes one of these flashes occurs when Boeschen is scrolling something out of sight and out of mind. Sometimes one occurs after he has let his concentration and his eye wander from the monitor. He'll be gazing out the window of his den, concentrating on a tree or a plane passing overhead, when suddenly there'll be a picture of what he's writing about.

"It's not words, it's a picture," he says, almost awestruck. "It's in your head, of course, but I think the screen is facilitating that. That's the mind blower for me. It's not just the grammar and being able to make corrections and revisions quickly. It's putting you more in control with what you really feel. I think what you write on a computer is more personal. It is a machine, but it traps your personality."

Into the Vortex. It was probably inevitable that word processing and hours of speculation on its meaning would lure Boeschen into programming. Boeschen says he's not technically oriented, but he is a tinkerer, a cerebral tinkerer whose machine is a prose poem with now-moving parts called words and graphs. He's dropped through his looking glass, just as he once dropped into Turkey, though the language he has had to learn is computertalk—and very Basic. "Basic is a weaver's language and I'm a weaver," says Boeschen. "I like to go back and forth and bring things together.

"Here's this computer and here I am tinkering. It tells you when you make a mistake and gives you a lead on how to correct it and you find out there's a whole new way in which answers to the question exist, that there are different approaches to solving problems."

Not only that, but there are different approaches to making a buck. If you can master English and Turkish (Boeschen got the master's degree from Berkeley in the latter), why not computerese?

We're Off To See the Wizard. Freelancing with a computer, after all, is serendipitous. It leads you into cottage publishing and then down countless branching yellow brick roads. It has led Boeschen to craft two programs—a freelancer ledger that keeps tabs on his multifarious business activities, and a health-hazard appraisal which he administers for local hospitals and community groups. Boeschen's wife Sandy, a hospital planner, encouraged him to develop the latter with a little bit of assembly-language help from programming friends.

"Talk about captivating an audience," says Boeschen, who travels to hospitals with his Apple II Plus and a Silentype printer. "You get them with the blipping lights and then you get them with the silent printing and they're ready to buy, but it's free."

Well, not exactly free. Boeschen charges his client groups for the service, but he says they're happy to pay because the

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Boeschen has yet to alter his business card to read, a la Paladin, "Have program, will travel," but he's obviously thinking along those lines. He's started to write software manuals for different groups and he is eager to delve into machine language, if ever he can steal the time.

But there's the rub. Sometimes it gets pretty hard to keep all these eclectic balls in the air. It's not easy writing books, stories, manuals, grant proposals, computer programs, newsletters, and brochures—and then playing at-home daddy.

Reveille. Boeschen's day begins dark and early—at 5:00 a.m., to be exact. He usually gets in two hours of writing before the family rises. Boeschen turns off his Apple so that his two kids, Coulter James, six, and Trent John, two, can watch television cartoons without signal interference. He makes breakfast if his wife's in a hurry, prepares and packs the kids' lunches, and is back at his console by 8:30. He usually calls it quits for the day at 3:30 when his older boy returns from school and Boeschen must drive the housekeeper to the bus stop.

When he first started freelancing, Boeschen used to put in longer days, but, as he says, "your whole life changes when you've got kids. The kids can see you more, but they also see you more grumpy." Then, with a touch of anguish in his voice, he adds, "There are times, sometimes at 3:30, when I know I could finish something if only I had an hour—and I can't do it."

Freudian Rejection Slips. Writing is often an agonizing process, even with a word processor, even for a pro. For a freelancer, though, the actual writing is often the least of his problems. Before a freelancer can suffer the sweet agonies of creation, he has to sell publishers and magazine editors on his ideas. That usually means dealing with a large order of rejection, which often takes its toll in what is commonly described as burn-out.

That's where Boeschen found himself about a year ago. "I was just finding it hard to sit down and do the work," he recalls. "Rejection is part of the game, but I found myself muttering curses and I knew I needed a vacation. I needed to stop working and change my attitude, because I was starting to worry about money, which really wasn't the problem and indicated to me that there was something deeper."

What Boeschen did, in effect, was take a busman's holiday. He spent three months delving into programming and studies linking creativity and visual stimulation of the right brain. These explorations, in turn, helped ease a middle-class psyche that was having difficulty dealing with the unpredictability of freelance income.

"Our lives are regulated around middle and end of the month clocks," Boeschen says. "That's one of the reasons I developed that ledger program, so I'd know precisely where I stood. It's funny, but in spite of wanting to break away from that attitude all these years, I have never been able to. I'll still get despondent. I'll be down for weeks. There's no money coming in, it's all going out. Then, three or four months later, a big check will come in and I'm elated."

Safe and Sound. Boeschen still has his momentary bouts with doubt, but he's back on an even keel. He knows that to succeed at freelancing you have to treat it as a business; to keep from going bats you also have to approach it as a game. You psych out your different markets, then hit the appropriate verbal buzzers and bells to keep those editors and publishers salivating. And if, as inevitably happens, some blockhead rejects your brilliant idea, you shrug it off and move on.

"The way I look at it, there are 64,000 to 70,000 magazines in the United States and Canada," he says. "I don't depend on any one thing for income. No one magazine can keep me from paying my bills. What else can they do to me? They can't slur my name, because no one knows me.

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By Jim Merritt

Tools of the Craft, Part 14

If you took the time to tackle and subdue last month's closing exercise, you should now have a reasonably interesting command processor running on your Apple. For the benefit of those of you who are just now catching up after having detoured to take advantage of the lovely summer weather, you were asked to write a FUNCTION, NewCommand, that accepts a single-character command from the console keyboard, but echoes a complete command name. For example, 'A' would be echoed as 'Add,' 'S' as 'Subtract,' and so on. Blanks were to be echoed as typed, but otherwise ignored. Illegal command characters were to be rejected, with an appropriate error message. NewCommand was to return a function value of type ComType.

Here, embedded within a program to test it, is one version of NewCommand that meets the requirements outlined; how does it stack up against your own?

```
PROGRAM
  TestCam;
(* Test driver program far FUNCTION
   NewCammond *)
TYPE
  ComType= (Add, Subtract, Multiply, Divide, Quit);
FUNCTION
  Capitol(Ch
            :Char)
   :Chor;
(* Return Ch, converted to upper case
   (capital) if Ch is lawer case. *)
BEGIN (* Copital *)
  Copitol := Ch; (* Na change unless lower cose *)
  IF ((Ch >= 'o') AND (Ch <= 'z'))
    THEN (* It's o lawer-case letter — transform it! *)
      Copitol := Chr(Ord(Ch) - Ord('o') + Ord('A'));
    (* Otherwise, it's not o lower-cose letter, so leave it
    alone. *)
END (* Capitol *);
FUNCTION
  NewCommand
    :CamType;
DESCRIPTION: Prompts far, and occepts user input
  chorocters until one corresponds to o CamType
  commond, then returns the motching volue. A, S, M,
  D, ond Q mop onto Add, Subtroct, Multiply, Divide,
  ond Quit. Treots copitols and lawer cose os
  identicol. Echoes blonk for blonk, cammond name
  far cammond chorocters, and 'ILLEGAL
  COMMAND' far oll other choracters. Pressing the
  return key is equivolent ta pressing spoce bor. *)
CONST
  Blonk=     ' ';
  Prompt=    'Command: ';
VAR
  CamCh
    :Chor;
  Volid
     :Booleon;
BEGIN (* NewCommond *)
  Write(Prampt);
  Volid := Folse;
  REPEAT
    Reod(KeyBoard, CamCh);
    CASE Capitol(CamCh) OF
      'A':
        BEGIN
          Valid := True;
          Write('Add');
          NewCommand := Add;
        END;
      'S':
        BEGIN
          Volid := True;
          Write('Subtroct');
          NewCammond := Subtract;
        END;
      'M':
        BEGIN
          Volid := True;
          Write('Multiply');
          NewCammond := Multiply;
        END;
      'D':
        BEGIN
          Volid := True;
          Write('Divide');
          NewCommand := Divide;
        END;
      'Q':
        BEGIN
          Volid := True;
          Write('Quit');
          NewCommand := Quit;
        END;
      Blonk:
        BEGIN
          Write(ComCh);
          (* Note that Valid is NOT set here *)
        END;
      'B', 'C', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'N', 'O', 'P', 'R',
      'T', 'U', 'V', 'W', 'X', 'Y', 'Z':
        BEGIN
          WriteLn('ILLEGAL COMMAND');
          Write(Prompt);
          (* Note thot Volid is NOT set here *)
        END;
    END (* CASE Copitol(ComCh) *);
  UNTIL Volid;
  WriteLn;
```


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```
END (* NewCommand *);
BEGIN (* TestCom *)
  WHILE (NewCommand <> Quit) DO
    (* nothing much *);
END (* TestCom *).
```

Note that this version of NewCommand uses our old friend Capital so as to be able to treat upper and lower case characters identically. Also, notice that all input characters are read from the Keyboard file, not from Input. This dispenses with the otherwise automatic echo that the operating system supplies for every character typed and permits NewCommand to provide its own customized feedback to the user.

Armed with what you've already learned about Pascal's input and output facilities, you are nearly qualified to solve the majority of problems that involve I/O. All you need now is a little practice, and you'll certainly get practice if you follow this column! This is not to say that we've exhausted the topic; there's still a "wild I/O frontier" to explore at the far edges of the Pascal system, where programmers live or die by their own rules. On the other hand, there's no compelling reason to proceed down that winding trail when there are still a few milestones left along the main road. Let's head back in that direction, reexamining certain I/O concepts more closely before moving on to other topics.

By Any Other Name. We've been using *physical file names* for some time now without knowing exactly what they are, how they are formed, or why they are needed in Apple Pascal. A brief discussion here should fill in the gaps and will prepare us to investigate the subtler nuances of Apple Pascal's file-naming conventions whenever necessary as we travel down the Path.

As you've seen already, a physical file name is a string of characters that may contain letters, digits, punctuation symbols, or a combination of all three. You may want to think of physical file names, such as 'PRINTER:' or 'MYPROG.CODE' or 'MYDISK:MYFILE.TEXT' as addresses, since they enable the operating system to find the files they name as surely as the address '11021 Magnolia Boulevard, North Hollywood CA' enables you to locate the offices of *Softalk*.

The exact syntax of physical file names in Apple Pascal reflects the way I/O is organized in the system, so an overview of that scheme should give us some useful insights. At the lowest level of the operating system lie the *device drivers*, which we introduced (but did not examine) in earlier discussions. Written in the Apple's 6502 microprocessor machine code, the drivers actually control and communicate with the hardware I/O devices that are connected to your Apple.

It is the job of the machine code drivers and the P-code operating system, working together, to make each device appear to your programs as one or more *volumes*. (Usually, a single volume corresponds to a single hardware device, but sometimes, especially in the case of high-capacity hard-disk units, the drivers will be written in a way that makes the device appear to be several different volumes. This scheme provides, among other benefits, better means for organizing programs and data, as you'll see after you've gained a reasonable amount of practical experience with the system.)

When Volumes Vary. Certain volumes—for example, those corresponding to the system console and printer—may reasonably be treated as individual files by your programs. That is, these volumes are naturally the sources or destinations for individual (and indivisible) sequences of input or output data. Such volumes are said to be *unblocked*. Other volumes, such as those corresponding to disks and tapes, may be treated as storage, on which many different files may coexist. Volumes that may be subdivided into files are said to be *blocked*. In general, if a volume may function as a single file, it is probably unblocked; if it can hold more than one file, it is definitely blocked.

If you want to associate a given file variable with an entire volume—if, for instance, you want to send some output data to the printer—you need to open the file using a physical file name that designates only the volume that interests you.

Every volume in the system is identified by a specific, unique *volume number*. Appendix D of the *Apple Pascal Operating System Reference Manual* contains a table entitled "Pascal I/O Device Volumes" which gives the volume numbers of the twelve standard Apple Pascal input/output devices. In the table, the volumes described as "disk drives" are blocked, while those not so described are unblocked. For instance, volume #6: corresponds to the standard printer (an unblocked volume), volume #1: to the console (also unblocked), and volume #4: to the bootstrap (first) disk drive (a blocked volume).

The Real Thing. The character strings '#6:', '#1:', and '#4:' are legitimate volume names. These character strings may be used as complete file names if you wish to access the associated volumes as single files. This is appropriate for the unblocked volumes named by '#6:', and '#1:', but not usually for the blocked volume represented by '#4:'. Furthermore, although entire blocked volumes may be treated as single files, they may only be safely accessed as such using facilities of Apple Pascal that we won't cover until we revisit the topic of I/O later on down the Path. For purposes of discussion, then, we'll assume that the names of unblocked volumes are also legitimate physical file names, while the names of blocked volumes are not.

Unblocked volumes have permanent *symbolic volume names* which are synonymous with their numeric ones. For example, taken as a volume name, the character string 'CONSOLE:' is equivalent to '#1:', while the string 'PRINTER:' names the same volume as '#6:'. The table in the Apple Pascal manual lists both the number and the symbolic name for every volume.

When you refer to a volume "by number," you tell Pascal that you want to deal with the specific, corresponding physical device. For an unblocked volume, such as the CONSOLE: or the PRINTER:, the Pascal system draws no distinction between the volume number and the corresponding symbolic name, so you're free to use whichever you wish.

In contrast, the typical blocked volume (a floppy disk drive, for example) does not have a permanent symbolic name, even though it may always be referred to by number. Instead, it bears the name of the "removable volume" (such as a floppy disk) that it happens to contain at any given moment. To illustrate, suppose you used your system on Monday, putting the Apple1: disk in the first disk drive and the Apple 2: disk in the second one. Then, volume #4: would assume the name 'APPLE1:', while volume #5: would acquire 'APPLE2:'. In other words, '#4:' would be equivalent to 'APPLE1:' and '#5:' to 'APPLE2:'. Now, suppose that on Friday you mounted APPLE1: in the first drive, as before, but, for a change of pace, mounted APPLE3: in the second one. In this case, '#4:' would remain the same as 'APPLE1:', but '#5:' would now be equivalent to 'APPLE3:'!

See the Light. All of this implies that the only way to be sure of accessing a particular physical disk drive is to use its volume number. When a Pascal program opens a file, specifying '#4:' as a volume name, you will always see the first disk drive's light flash briefly, indicating that Pascal is seeking the file using that drive. When the program specifies '#5:', it will always be the light on the second disk drive that flashes, and so on.

Of course, we've already agreed that when opening a file on a blocked volume, the volume name alone is insufficient as a physical file name. We must add to the volume name something that enables the Pascal system to distinguish between one file and another on the same blocked volume. It turns out that each file on a blocked volume possesses its own *local file name*, and that is what we must add to the volume name in order to complete the physical file name. For instance, the file SYSTEM.PASCAL exists on the APPLE1: disk; its complete physical file name is 'APPLE1:SYSTEM.PASCAL'.

Note that a local file name is unique for any given volume, but may not be unique across volumes. In other words,

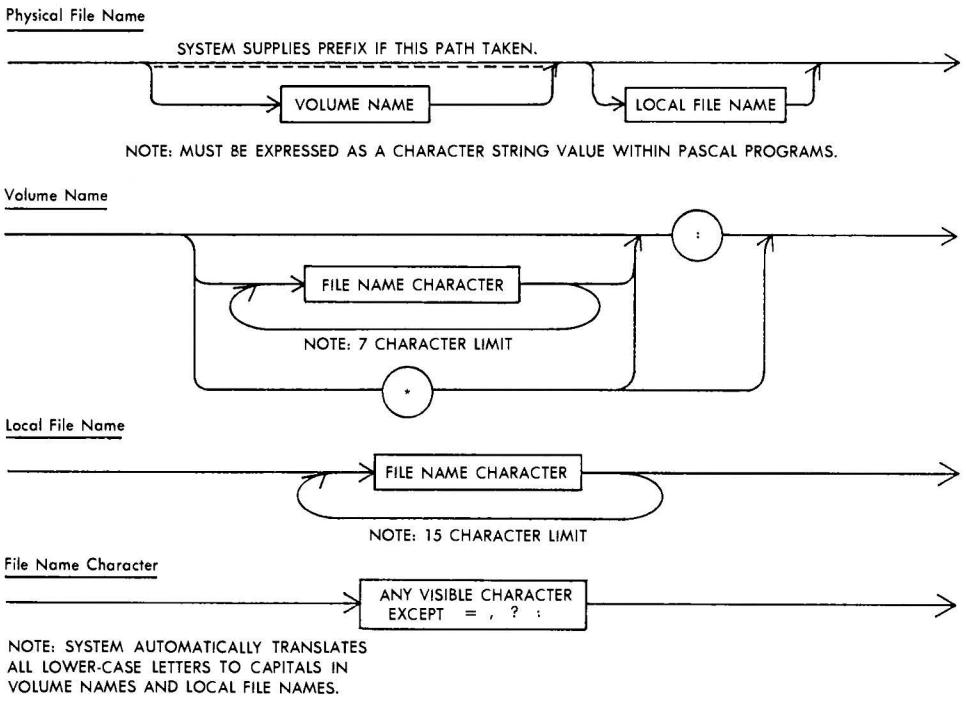


Figure 1. Physical file name syntax.

two different volumes with different volume names and numbers may contain files bearing identical local names. APPLE0: and APPLE1: both contain files named SYSTEM.PASCAL, for example. On the other hand, no single disk may contain two different SYSTEM.PASCAL files. Since physical file names must always specify a volume, the Pascal system can always tell the difference between a file and its namesakes on other volumes.

"Hold it!" you say. "We haven't been specifying volumes in any of our physical file names before this month!" Well, that's true to an extent. You certainly haven't been using physical file names such as 'APPLE1:LISTER1.TEXT' or 'APPLE2:GUESS.CODE' in your programs or in your dealings with the Editor, Compiler, or Operating System. Names like 'LISTER1.TEXT' (or probably just 'LISTER1') and 'GUESS' have always been sufficient. This is because, in order to resolve possible ambiguities, the system itself adds a volume name to your physical file names if you neglect to do so. It adds the name of the *system prefix volume.*

It's Automatic. Whenever you boot Apple Pascal, the system assumes that the prefix volume is the one that is mounted in the booted disk drive. Since for most people, this volume will be APPLE1:, Pascal translates a name like 'LISTER1.TEXT' into 'APPLE1:LISTER1.TEXT'. Remember also that certain utility programs add special suffixes to the file names you supply. The Editor appends '.TEXT', and the execute command appends '.CODE', for instance. Thus, if you decided to write some edited text into "MYFILE", the Editor would first translate that name into 'MYFILE.TEXT'. The operating system would then complete the physical file name by producing 'APPLE1:MYFILE.TEXT'. Be warned, however, that the operating system applies no suffix to any file names that *your* programs give to Reset or ReWrite; at this level, the system is only responsible for appending the prefix volume name, if necessary.

So you see, your Apple Pascal system has been using complete physical file names since the first time you turned it on, even though you may not have been conscious of the fact until now. The railroad syntax diagrams for a physical file name are given as figure 1. Note that a volume name may not contain more than seven characters, a local file name may not have more than fifteen (including suffix, if any), and a colon is, obviously, exactly one character. The sum of all these parts implies that a physical file name will never (and must never) exceed twenty-three characters in length.

The syntax diagrams also imply that ':LOCALNAME', '*LOCALNAME', and ':LOCALNAME' are all valid physical file names. It turns out that, due to a quirk in the operating system, ':LOCALNAME' is considered to be the same as 'LOCALNAME'. '*:LOCALNAME' and '*LOCALNAME' are also synonymous (but only with each other!). The curious asterisk in this second set of file names is just a shorthand way of signifying the name of the bootstrap volume. Note that the *bootstrap volume name* (also known

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as the "system volume name") is not necessarily the same as the prefix volume name. They start out the same whenever Apple Pascal is booted and will remain so unless and until the prefix is forcibly changed, either by a human being using the Filer utility (which we'll study soon) or by a program employing certain advanced and esoteric methods (which we won't study for some time).

Name or Number? When supplying a physical file name to the Pascal system, should you refer to a volume by its number or by its symbolic name? Let's look at your options by way of analogy. Disk drives are similar to houses, each with a particular "street address," while floppy disks, having symbolic names, are like the people (or, more properly, the families) who live in those houses.

If Eileen lives at 1 Crawford Street, there are two ways to send a message to her. You can tell the neighborhood mailman to deliver a note to "Eileen," or you can address the note to "Occupant, 1 Crawford Street." So long as Eileen lives there, she'll get your note, no matter which way you address it (though she might be insulted to get a note for "Occupant"). If you have reason to believe Eileen may have moved, however, the safer choice is to address the note to "Eileen." This way, if she has indeed moved, the mailman will be able to forward the message to her new address. On the other hand, if you address the note to "Occupant," the mailman is duty-bound to deliver the note to the specified street address, and Eileen will never read what you have to say (but someone else—the new occupant—might!).

Suppose that you have a file named HELLO.TEXT on the disk EILEEN: in the second disk drive. Either of the following calls to Reset will associate that physical file with the text file variable TFile (which we assume to have been declared prior to the Reset call):

```
Reset(TFile, '#5:HELLO.TEXT');
Reset(TFile, 'EILEEN:HELLO.TEXT');
```

In the first case, including the volume number '#5:' in the file name causes the Pascal system to look for HELLO.TEXT on any disk that happens to be in the second disk drive at the time of the call to Reset. This is much like addressing a letter to "Occupant" and is a technique to use when your program cannot be sure (or doesn't care) which disk is in a given drive. So long as a file HELLO.TEXT exists on that disk, Reset will associate it with TFile. The disk's volume name—whether it be EILEEN:, APPLE2:, GARBAGE:, or any other—is irrelevant. This can lead to problems. Perhaps, for example, two different disks, EILEEN: and HERRING:, both contain files named HELLO.TEXT, but only the file on EILEEN: contains data that is suitable for a particular program. If that program used the former example of Reset to open TFile and HERRING:, not EILEEN:, was seated in the second disk drive, the program would acquire nonsense data through TFile. In general, the program has no way of knowing that TFile has been associated with the wrong HELLO.TEXT.

Anywhere Is Home. To solve this problem, the symbolic volume name 'EILEEN:' is used in the second example call to Reset, thus ensuring that the file opened will be on the EILEEN: disk. The use of a symbolic volume name instead of a volume number implies that the specified disk may reside in *any* disk drive. For instance, you might put EILEEN: in the second disk drive one day, and another day, you might place EILEEN: in the third or fourth drive. This makes no difference to the program using HELLO.TEXT since, whenever it opens a file, the system automatically scans the disk drives to find the EILEEN: disk. The second example call to Reset will fail only if EILEEN: is not mounted in *any* disk drive, or if EILEEN:, although mounted, does not contain a file named HELLO.TEXT.

The preceding scenario does not actually tell you how to choose between the two methods of specifying volume names, nor was it intended to. The choice between numeric or symbolic volume names is not always easy or obvious, and the criteria for the choice changes with each new program. The ability to choose wisely is another of those skills that is probably best learned through experience—by designing, building, and observing programs. It does seem that the use of symbolic volume names leads to more flexible and "friendly" program behavior (although this is not always the case, as we'll see in coming months). You may be interested to learn that both the bootstrap volume name and the prefix volume name are remembered by the operating system in symbolic form whenever possible.

Into the Heart of Read and ReadLn. Earlier in our travels down the Path, we drew a sharp distinction between ASCII characters that look like digits and the numbers those characters resemble. For example, the character '2' is not the same as the Integer number 2. The character '7' is not the same as the number 7. You can add the numbers 2 and 7 to get the number 9, but there is no operation (at least not in Pascal) that permits the "addition" of the characters '2' and '7' to get the character '9.'

As an analogy, let's use groups of rocks to stand for numbers and painted tiles to stand for the digits in the Char data type. The number 2 would be represented by two rocks, the number 7 by seven rocks. The character '2' would be represented by a tile with a '2' painted on it, while '7' would be painted on the tile that stands for the character '7.'

Harkening back to first grade math, if you put two rocks and seven rocks together, you get nine rocks, the proper representation for the number 9. If you put the '2' and '7' tiles together, however, you don't get nine tiles, and you don't get a tile with '9' painted on it, either. (What do you get? That's a question for another column.) Evidently, conventional arithmetic applies to rocks and Integers, but not to painted tiles or elements of the Char type.

Pascal can acquire only Char values from your keyboard. Suppose one of your programs calls Read to get two Integer numbers from the console, and you supply 123 and 456 at the keyboard. Although what you type may look like numbers to you, Pascal actually receives two three-character sequences: '1', '2', and '3', followed by '4', '5', and '6'. It is the job of Read and ReadLn to "look" at these character sequences and decide which numbers they represent. This is known as a *data conversion,* from Char to Integer.

Here is a function, IntegerInput, that accomplishes this conversion. In performance and architecture, IntegerInput is very similar to the code Pascal itself uses to do the same job.

```
PROGRAM
  TestIntIn;
(* Test driver for custom Integer Input routine thot warks
   similarly ta the ane used in Pascal Read. *)
VAR
  Number
    :Integer;
FUNCTION
  IntegerInput(VAR
                 InFile
                  :Interactive;
                VAR
                  Dest
                   :Integer)
    :Baalean;
(* DESCRIPTION: Acquires on Integer from InFile, one
     character at a time, and converts that
     representotion ta praper Integer format, plocing
     the datum value inta Dest. Function returns True on
     successful input, False (with Dest unchanged) if
     input character sequence does not correspand ta
     Poscol Integer syntax. *)
  CONST
    Blonk=      ' ';
    (* Assume input of numbers in base 10 *)
    Rodix=      10;
  VAR
    (* Halds the input value during its constructian. *)
    Value
      :Integer;
    (* True if input motches Pascal Integer Syntox, Folse
       atherwise. *)
    SyntoxOK
      :Boolean;
    (* True if sign of input number is negotive, Folse if
       pasitive. *)
    Sign
      :Baalean;
BEGIN (* IntegerInput *)
  (* First, skip any leading blanks *)
  REPEAT
    Get(InFile);
  UNTIL ((InFile^ <> Blank) OR EOF(InFile));
  (* Naw, remember if this is a signed number *)
```

```
  Sign := (InFile^ = '-');
  IF (Sign OR (InFile^ = '+'))
    THEN (* Thraw the sign away *)
      Get(InFile);
 (* Naw, callect the absalute value af the number,
    character by character *)
  Value := 0;
  SyntaxOK := False; (* Guilty until praven innacent *)
  WHILE ((InFile^ >= '0') AND (InFile^ <= '9')) DO
   BEGIN (* WHILE *)
    SyntaxOK := True;
    Value := (Value * Radix)
           + (Ord(InFile^)-Ord('0'));
    Get(InFile);
   END (* WHILE *);
 (* Assign final functian value *)
   IntegerInput := SyntaxOK;
 (* If all is well, pass back praper Dest *)
   IF SyntaxOK
     THEN
       BEGIN
         IF Sign (* we remembered!! *)
           THEN
             Value := - Value;
         DEST := Value;
       END;
END (* IntegerInput *);
BEGIN (* TestIntIn *)
  REPEAT
    IF IntegerInput(Input, Number)
      THEN
        WriteLn(' = ', Number)
      ELSE
        WriteLn(' : ILLEGAL NUMBER');
  UNTIL EOF;
END (* TestIntIn *).
```

The type of the input parameter InFile is given as Interactive because, as we've discussed, logic designed to deal with Interactive files will also work with regular Text files. On the other hand, logic designed for Text files does not always apply to Interactive devices, since it often assumes the "initial Get." If you use IntegerInput in one of your own programs, be sure that any actual parameters corresponding to the formal parameter InFile are of type Interactive, not Text. (Of course, if you forget, the compiler will always be there to remind you.)

About Real Number Input. The conversion procedures for Integers are permanent parts of the Apple Pascal Operating System and occupy RAM memory (though not much of it) at all times. The conversion of Real numbers from character representation to internal format, while similar in approach to that for Integers, is much more complicated, as you can imagine after comparing the syntax diagrams for Integer and Real literals. As a result, the amount of P-code that is necessary in order to convert between Real numbers and their character representations is too large for this code to be included as a permanent part of the Apple Pascal Operating System. Instead, it is stored in a file named SYSTEM.LIBRARY on your bootstrap disk.

When you execute a program that accepts input or produces output of Real numbers using Read, ReadLn, Write, or WriteLn, the Pascal system looks for SYSTEM.LIBRARY. If it finds that file,

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the system extracts the Real-number conversion code from it and loads it into memory with your program automatically. The bootstrap disk should be mounted at this time so that the system's search for SYSTEM.LIBRARY will succeed. If the search fails, you will receive an error message. Once your program begins to execute, you may remove the disk containing SYSTEM.LIBRARY (unless your program needs that file or disk for some other purpose); the conversion code will remain in memory until your program quits executing.

A Quiz and a Bug. Here is a tiny program. Cover up the paragraphs that follow it; then try to determine exactly what it does and how it works by studying the listing only.

```
PROGRAM
 Mystery;
(* What does it do? *)
BEGIN (* Mystery *)
 REPEAT
  Read(Keyboard, Output^);
  IF EOLn(Keyboard)
   THEN
    WriteLn
   ELSE
    Write(Output, Keyboard^);
 UNTIL EOF(Keyboard);
END (* Mystery *).
```

The *Mystery* program does nothing more than echo keyboard input to the screen. We've seen echo programs before, so what makes this one so special? Well, it manages to use Read and Write (not Get and Put) without declaring any auxiliary storage variables (such as "Ch," which seems almost obligatory in programs of this sort). This program is an example of "tricky coding"—that is, it exploits subtle features of the language in an attempt to achieve a certain result using minimal storage space or execution time. In this case, we exploit the fact that Input^ and Output^, being windows to Interactive files and hence to FILEs OF Char, are thus full-fledged Char variables in their own right and can be the objects of Read and Write calls. By using this technique, we save the space that would be occupied by a single Char variable—hardly any saving at all.

Of course, *Mystery*'s particular trickiness is unnecessary and baffling to anyone who knows how to use Get and Put and should not be used in writing real programs. As a rule of thumb, you should endeavor to write clear, understandable programs, even at the expense of execution speed or memory storage (unless the waste is simply too severe). All this aside, you can still learn a great deal by contorting the language as we've done here. For example, in every spot within *Mystery* where the identifier "Keyboard" is used, substitute "Input," and then recompile. How does the new version of *Mystery* behave?

Next, recall that Read(Ch) is the same as Read(Input, Ch). So, shouldn't Read(Input, Output^) be the same as Read(Output^)? Of course! But does the compiler agree with you? Try collapsing the Read, Write, EOF, and EOLn calls to their "default" forms (where the source or destination file is merely implied), and then change the program's name so that *Mystery* finally looks like this:

```
PROGRAM
 Mystery2;
(* What does it do? *)
BEGIN (* Mystery2 *)
 REPEAT
  Read(Output^);
  IF EOLn
   THEN
    WriteLn
   ELSE
    Write(Keyboard^);
 UNTIL EOF;
END (* Mystery2 *).
```

Now, recompile and see what the compiler thinks of your new program. You should receive a couple of identical error messages for your trouble ("Error 20 — '.' expected").

What Happened? Before you pull out your hair trying to decide where you misunderstood the Pascal language, you should know that the compiler is faulty; it simply contains a bug. For various reasons, it fools itself into thinking that Input< and Output< stand not for Char variables, but for something else. What that "something else" is cannot be explained right now, but may become apparent to you once you understand the concepts of *record* and *pointer*, which we'll cover soon.

Finally, *Mystery*, like any program that gets its input from the Keyboard file, demonstrates a certain characteristic of that file: Pressing the return key sets EOLn(Keyboard) True, but pressing control-C does not affect EOF(Key-

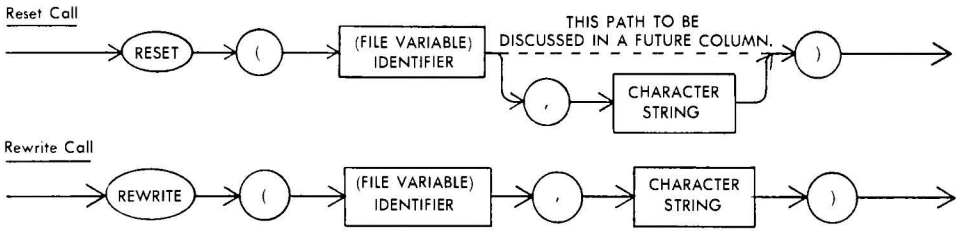


Figure 2. Corrections to Figure 2, June 1982 Pascal Path



board) at all. In other words, control-C is not the end-of-file designator for the Keyboard file. What is? Try control-shift-@. That is, press the control, shift, and at-signs keys simultaneously. This generates the ASCII "NUL" character, which corresponds to the Integer 0. It is this character that sets EOF(Keyboard).

Why should Keyboard and Input, which both correspond to the console keyboard, use different end-of-file designators? The answer lies deep inside the p-System, and is properly the subject of another column. You might try an experiment, however. Modify *Mystery* to accept its input from the Input file instead of from Keyboard, and then compile and execute it. Verify that this version of *Mystery* recognizes control-C as denoting end-of-file. Now, try control-shift-@. What happens?

A Correction. Sharp-eyed readers may already have noticed that the diagrams for "Reset Call" and "ReWrite Call," in figure 2 of the June 1982 "Pascal Path," were slightly incorrect. (As picky as the compiler is about proper syntax, calling a railroad diagram "slightly incorrect" is just as absurd as saying someone is "moderately dead" or "a little bit pregnant.") The diagrams should have indicated that, within the Reset or ReWrite parameter list, a comma must separate the "(file variable) identifier" from the "character string." The corrected diagrams appear as figure 2.

Stay Tuned for More Exciting Action! Proponents of Pascal are fond of saying that it is "a superior language for expressing complex data structures." Translated to English, this simply means that Pascal permits you to group related data together in very convenient ways, so as to simplify your programming chores. Next month, we'll look at techniques for doing this by employing three handy groupings: *arrays, records* and *character strings.* You can't be considered a Pascal expert until you understand "data structuring," so don't miss out on next month's discussion. In the meantime, test your expertise with data conversion and file I/O by writing a procedure that conforms to the following definition:

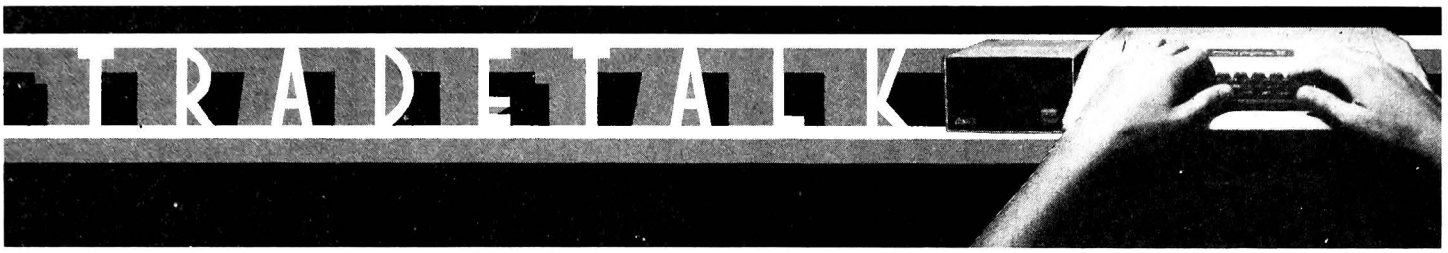
```
PROCEDURE
  IntegerOutput(VAR
                  OutFile
                    :Interactive;
                  Souce
                    :Integer);
(* Send to OutFile the character representation of the
   Integer, Source. Put out only as many characters as
   are necessary to represent the Integer (no leading or
   trailing blanks, etc.). *)
```

Thirty days should be more than enough time to finish; in fact, your challenge is to do it in two hours or less (one hour to think about the problem, and the other to write the procedure)! Good Luck! ◼

What would you give to develop programs for the IBM PC, TRS 80 Model II, T.I. 99/4 Home Computer, and Xerox 820 on your Apple II?



SOFTECH MICROSYSTEMS



☐ **Children's Television Workshop,** producers of *Sesame Street* and *The Electric Company*, and creators of the Sesame Place educational play parks, have announced the formation of the **Children's Computer Workshop.**

Paul B. Firstenberg, former CTW executive vice president and chief executive officer of the new company, says, "The Children's Computer Workshop software is being designed by specialists in computer programming, children's education, and entertainment. They are creating programs that encourage children to think as they play; to check ideas, to formulate solutions to problems, to exercise logic. Some activities will provide practice in particular learning concepts like math and language, but the overall goal is to encourage broad use of a child's intelligence."

The first CCW educational games will be distributed through Apple this fall.

☐ **MicroSoftware Associates** (Tokyo, Japan) has signed a marketing and distribution deal with **Micro Focus** for exclusive marketing rights for Micro Focus products in Japan. They will also provide documentation in Japanese, hold product seminars, and join Micro Focus at trade shows.

☐ **Avant-Garde Creations** has moved to 210 East Third Avenue, Suite C, Eugene, Oregon 97401. Mail should still be addressed to their post office box.

Chris Baldwin has been named the company's new advertising manager. He was formerly with Industrial Publishing. **Robin Tappan**, the firm's new director of marketing, was IP's production coordinator. **Kevin French**, shipping manager, has a background in real estate sales and property management. New artist **Rocky Davis** will design product packaging, and **John Gallagher** will be in charge of the company's customer database.

☐ **Greg Tibbetts,** former product support manager for MicroSoft, has been appointed vice president of software development for **Lobo Drives International** (Goleta, CA).

☐ **Dysan Corporation** (Santa Clara, CA), **Shugart Associates** (Sunnyvale, CA), **Tabor Corporation** (Westford, MA), and **Verbatim Corporation** (Sunnyvale, CA) have agreed to cooperate in the establishment of an industry standard for the micro-floppy computer disk. The move is expected to lower manufacturing costs of the three- and four-inch disks, spur competition, and increase disk and media manufacturers' productivity by allowing them to focus their efforts on standardized marketable products.

"We need to establish overall standards of media compatibility and interchange," says **George Sollman**, marketing vice president of Shugart Associates. "It is imperative that we give users the same convenience of standardized media for their drives that they now enjoy."

☐ **Gary Kildall,** president of **Digital Research** (Pacific Grove, CA), has announced that his company will extend its CP/M line to include graphics products. "Our goal is to develop microcomputer industry standards for graphics, just as CP/M is the standard for operating systems," he says. "Our products will incorporate the emerging graphics standards of the American National Standards Institute and the International Standards Organization, as well as the North American Presentation Level Protocol, where appropriate."

The company will offer its first graphics products through a joint development and marketing agreement with **Graphic Software Systems** of Wilsonville, Oregon. According to GSS president **Tom Clarkson**, "This agreement with Digital Research allows us to gain entrance into the large market of CP/M users. Together, we will be able to provide graphic capabilities to virtually any microcomputer user as well as minicomputer user."

☐ **Epson America** (Torrance, CA) is forming a network of twelve company-owned distributorships for their expanding product line, according to president **Yasuhiro Tsubota.**

"Marketing conditions today necessitated the creation of company-owned and company-financed distributorships that enable focus on a single product line as opposed to multiple and competing lines found in traditional distribution channels," he says.

The company is also opening three new factory-direct warehouses to service the new distributorships.

☐ **Alphacom** (Campbell, CA) has won an "Excellence of Design" award from *Industrial Design* magazine for its Alphacom 40 printer enclosure.

According to the *Industrial Design* jury, the design of the impact-resistant enclosure is "a major step forward over other designs for the home."

☐ **Dick Newsome,** vice president of marketing for **Davong Systems** (Mountain View, CA), has appointed **Randy Knox** vice president of manufacturing. Knox was most recently vice president and general manager at Versatronex, and previously served as engineering manager at Intel's component's production division. He will report to Davong president **Thomas Hong.**

☐ **Garry White** of **Computer Camp** (Santa Barbara, CA) has contracted with Apple to add fifty-five more Apple IIs to the Santa Barbara camp, bringing their total to seventy. There will also be an Apple emphasis at the firm's Lake Tahoe and New York camps. All classes will be taught exclusively on the machine.

☐ **Vogeler Publishing,** publishers of *Micro . . . Publications in Review*, has a new address: Box 489, Arlington Heights, Illinois 60006; (312) 255-6385.

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☐ **Leading Edge Products** (Canton, MA), a microcomputer products distributor, has formed **Leading Edge Products and Research Division.** Says chairman **Michael B. Shane**, "There is a need for a distributor such as LEP to contribute to the development, evolution, and improvement of the product we market. It's our desire to work with our manufacturers . . . to provide them with maximum technical support and input for product improvement."

The new division, located in Bedford, Massachusetts, will be headed by **Phil Florence**, executive vice president. Florence was previously manager of new product development at Wang.

LEP has also strengthened the warranty coverage of its C. Itoh printer line, reduced turnabout time for repairs, and streamlined administrative procedures among the company, its dealers, and authorized repair centers.

John Fisher, newly appointed manager of technical services, was previously with Honeywell for ten years in a variety of management positions in field engineering.

☐ Enthusiastic response during field testing of computer-based analytical and polymer chemistry courses has prompted the **American Chemical Society** (Washington, D.C.) to establish a computer courses program in its education division. Apple II course programs in organic and polymer chemistry are now available for delivery; business concepts and statistics courses will be released soon. Courses in analytical techniques, physical chemistry, biochemistry, and chemical engineering are in development.

"Computer courses require no programming skills but demand frequent user response, collection of data during experiment simulations, or use of user selected data or information," says **Kenneth M. Chapman**, head of educational research and development. "These courses allow users to proceed at their own pace and select entry and exit points at will."

Details on course purchase and rental are available from ACS Computer Courses, American Chemical Society, 1155 Sixteenth Street, N.W., Washington, D.C. 20036.

☐ **George V. Grune**, vice president and director of the **Reader's Digest Association**, has assumed the position of chief executive officer of **Source Telecomputing**. He will retain his membership on the Reader's Digest board of directors and remain director of the books and recorded music division. **Bettie Alexander Steiger** has been named vice president and special assistant to the chief executive officer for corporate relations. She will represent Source Telecomputing to the videotex industry. Says George Grune, "Bettie Steiger's experience as head of our information resource area makes her the ideal choice for this important and sensitive new role."

☐ **Optical Memory Newsletter Including Interactive Videodisks** (San Francisco, CA) has appointed **John Ittelson** technical editor for interactive videodisc-microcomputer software; **Stan Jarvis** as technical editor for interactive videodisc-microcomputer technology; **Leonard Laub** technical editor for optical recording technology; and **Patrick Lee** as Canadian affairs editor.

The newsletter was founded in January 1982 to provide a central source of information about the technology and marketing of laser optical memory read-write and read-only interactive videodisc technology.

☐ **Makovsky and Company,** the New York City based public relations firm, was awarded the **ICP** Promotional Achievement Award at the organization's eleventh annual Million Dollar Awards ceremony in Scottsdale, Arizona, with more than four hundred data processing industry professionals in attendance. Makovsky received the award for a national publicity campaign conducted for **Management Science America.**

☐ After a nine-month educational leave of absence, **Jim Merritt** is back at Apple. He will be working on software utility development (in Pascal, of course) for their POS division.

☐ Apple has entered into an agreement with **Micro Focus** (Santa Clara, CA) to package and distribute Micro Focus visual programming tools, *Animator and Forms-2,* with *Level II Cobol* as *Apple III Cobol.*

"*Apple III Cobol* combines the accessibility of a personal computer with the sophistication of a mainframe," says Apple III marketing manager **Taylor Pohlman.**

☐ **Jeff Rhodes,** representing the Totowa School System at the **Paterson College Conference on New Jersey Studies** (organized to demonstrate New Jersey student-produced computer audio-visuals) was presented with an award for his computer program, written for the Apple with hi-res graphics and sound. Rhodes was introduced to the Apple last October and developed his program with encouragement from Totowa media specialist **Carolyn Zadoyko** and math teacher **Richard Norton.** He had no prior experience in computers or programming.

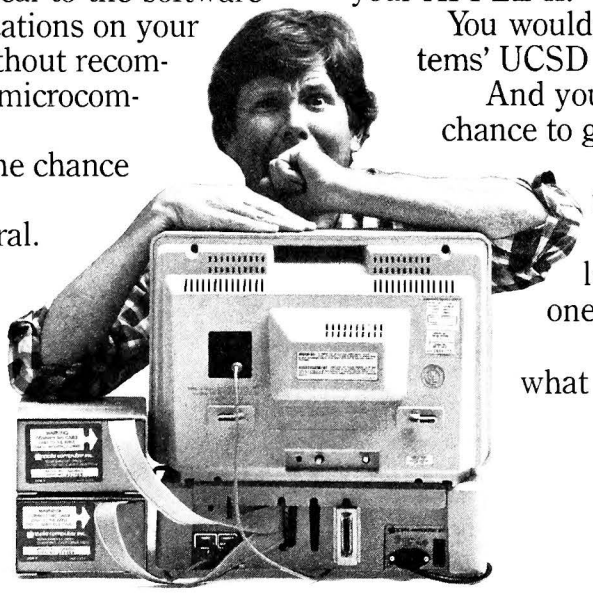
☐ Although the leaders of Great Britain and Argentina failed to take up **Vital Information** (Overland Park, KS) on its offer to let them settle the Falkland Islands dispute by playing the company's *Flockland Island Crisis* game, the firm is setting up a "Victim's Fund" for the islands' natives. All profits from the sale of the game will go to the fund. The fund is being set up by company attorney **Chris Likens** at the Oak Park National Bank in Overland Park, Kansas. Contributions may be sent directly to the bank. ◨

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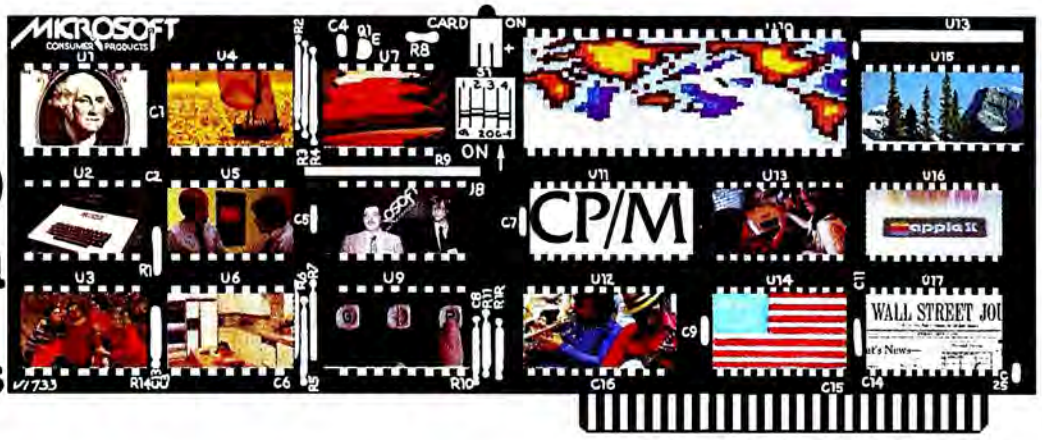
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SOFTCARD Symposium

by Greg Tibbetts



In this month's column we'll deal once again with the DDT utility and cover some of the DDT commands we missed last month. Before we begin, however, a brief recap is in order.

DDT is a software tool that is supplied by Digital Research or its agent with nearly every copy of CP/M sold. Probably one of the most widely used programs in the CP/M world, its initials stand for dynamic debugging tool.

DDT's function is to aid program debugging by allowing control of memory and program execution at a very primitive level. Note that when we talk about programs in relation to DDT, we are generally referring to assembly language programs rather than to programs in Basic, Fortran, or some other high-level language. While DDT can be used to load, change, and otherwise manipulate both the "program files" and data files associated with such languages, it is not primarily designed for these purposes. Assembly language and machine code, however, are DDT's natural environment; when used in this manner DDT is extremely valuable.

Last month we covered the six commands that control the memory manipulation features of DDT. These are:

S—Set/exomine memory locotions
D—Disploy o ronge of memory locotions
L—List o disossembly of mochine code in o ronge of memory
F—Fill o ronge of memory with o specified volue
M—Move o block of memory to o new locotion
A—Assemble in memory mnemonics ond oddresses specified

Inner Control. These commands allow you to exercise control over the memory contents of the transient program area (TPA) without involving anything outside the system (that is, peripheral devices such as disk drives), and without involving program execution.

Essentially, in one form or another, all of these commands involve either reading and display or input and storage of data into memory addresses. The L and A commands are the most sophisticated, since they involve the use and conversion of 8080 assembly language mnemonics from and to their numeric counterparts. Even if this were all DDT could do, it would be a valuable utility. There are, however, six additional functions that involve dynamic interaction with the system. These functions increase DDT's usefulness tenfold. DDT's further usefulness is our focus this month.

During the discussion that follows, we'll use the program DUMP.COM (the one we have spent the last several columns working with) as an example. You'll recall that in our May examination of ED.COM, we used ED to alter the source file for the DUMP program somewhat, and then in June, when we examined ASM.COM, we explained those changes and their relationship to the workings of ASM. The modifications we made to DUMP had the functional effect of separating the dumped data into 128-byte chunks to make it easier to read. They also added a colon after the address to further improve readability, and checked automatically for the presence of an eighty-column device or the lack of one, formatting the line output accordingly. This month we'll use DUMP as a basis for examining the various file and program control functions of DDT.

To do this we're going to make another change to the DUMP program. What we'll do here applies both to DUMP as it comes from Microsoft and also to the modified version that resulted from our previous work.

The changes we'll make will have two effects: first, this new version of the program will ask you at the start whether you want hard copy output or screen display and will perform appropriately based upon your answer; secondly, if you request a hard copy printout, this program will disable the forty-column feature in the modified version of the DUMP program.

Mod Squad. To accomplish our modification to DDT, three routines are needed: one that will print the question on the screen and get a reply; one that will check the reply and manipulate the LST and CON vectors to send output to the appropriate device, and one that will determine whether the combination of forty-column normal output and hard copy is in effect and, if so, defeat the forty-column portions of the modified DUMP program. There is also a fourth routine to be installed. This routine disables all the alterations we will make when the program exits.

Normally, these routines would be added to the actual source of the program you were working with (as we did when we made the other modifications using ED) and then the source would be reassembled with ASM. This, however, in addition to not demonstrating DDT, assumes that you have the source for the original program. In many instances, you don't, and yet you still need to modify the program. We will now learn how to go about it using only DDT. No pretty printouts will be generated, nor will there be an easily understandable source file, but what we're going to do will work and, after all, isn't that what really counts?

First let's describe the routines and see what needs to be done. Although they are trivial in themselves, interfaces to existing programs can often be tricky and such work should not be approached haphazardly. Allow proper time for study and planning when attempting this sort of thing. We have space limitations, so we may shortcut some of the description relating to the planning and study phase; don't assume that because we've left it out, it is not really important.

Printing a message on the screen, our first alteration, is probably among the simplest of things to do in assembly language in CP/M, and yet even for all that simplicity, there's something really satisfying about seeing the visual effect of your efforts as your message appears on the screen. The simplicity results from the fact that there is a routine in the BDOS module that automatically prints a string to the console when BDOS is called with certain parameters in certain registers.

As we've discussed in the past, BDOS performs a number of these functions, called *system calls*; everything from printing characters on the screen to opening files. System calls are initiated by loading the [C] register with the appropriate func-



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tion number and, depending upon the call, loading certain other registers with the parameters, and finally, by entering BDOS itself. Since BDOS may be in different places in different systems, there is a jump vector (a JMP instruction and the address of the beginning of BDOS) stored at location 0005 in every CP/M system. Using this jump vector, we can simply call location 0005 and go directly to BDOS, returning to our code at the completion of the subroutine.

By the Book. These system calls are listed in volume one of the SoftCard manual in the section beginning on page 3-43. Brief descriptions of each of the calls are contained there also and will tell you all you need to know to use them. Looking in this section we learn that the print string function is system call number 9. We also learn that the print string function requires that register C contain a 9 and that the register pair [DE] contain the address of the beginning of the string. We see, too, that the string is stored in memory as ordinary ASCII character values and that the routine will print values until it encounters a "$" character.

Our first task, then, is to define an area somewhere at the end of the DUMP program to hold our question string. Next, we must write code that loads [C] with 9, loads [DE] with the address of the beginning of this area, and then calls memory location 0005 (the indirect vector to BDOS).

The purpose of the next part of our first routine is to get an answer to our question. This involves getting an input character from the keyboard, which we see from the list is function number 1. All we need to do is to load [C] with 1 and call 5. When control returns to our program, the character received will be in register [A]. Assuming that our question is "Output to P-printer or S-screen?", our routine in assembler will look like this:

```
        JMP     PRSTR
MSG:    DB      'OUTPUT TO P-PRINTER OR S-SCREEN?$"
PRSTR:  LXI     D,MSG
        MVI     C,09
        CALL    5
        MVI     C,01
        CALL    5
```

And the hex values for our question string will be as follows:

```
4F, 55, 54, 50, 55, 54, 20, 54, 4F,
20, 50, 2D, 50, 52, 49, 4E, 54,
45, 52, 20, 4F, 52, 20, 53, 2D, 53,
43, 52, 45, 45, 4E, 3F, 20, 24
```

The next routine we need is one that checks our answer and manipulates the output vectors appropriately. We can do this with a simple *compare* for the value of the letter P and perform the operation if we have a match, or skip it if we don't. Before doing the compare, however, we'll want to output a pair of carriage return/line feed combinations.

Since our original message did not have a CRLF sequence appended to it, the cursor will still be left following an echo of the character we entered in answer to our question. The purpose of the extra CRLF is to separate the output to follow. We could output the characters one at a time, but it is just as easy to make one string of four ASCII values— 0D,0A,0D,0A, and a "$"—and then print the string given earlier. We'll need to save the newly received input character during this last print string sequence so we can still make our compare. We can do this by pushing the contents of the processor status word, PSW, and the accumulator [A], on the stack. This is done with a PUSH PSW instruction.

Two-Way Street. Our routine to alter the output vectors follows now. As you have learned from previous columns, or from the IOCB section of the SoftCard manual, all output and input for character data is handled through a system of vectors. In this way it is possible to substitute a new output (or input) routine for the existing one by placing it anywhere in memory and simply changing the vector.

We know that the console output vector (by which characters are printed to the screen) is located, low byte then high byte, at location F386 and F387, while the list output vector (which directs characters to the system printer) is at F392 and F393. If we place the contents of the list output vector into the console output vector, all further output will be directed to the system printer. Since we won't be using the list output vector during this period, we can use it to save the current contents of the console output vector. At the end of the program we'll want to change them back.

So far, then, our second routine looks like this if written in assembler:

```
        PUSH    PSW
        JMP     PRST2
MSG2:   DB      13H,10H,13H,10H,'$'
PRST2:  LXI     D,MSG2
        MVI     C,09
        CALL    5
        POP     PSW
        CPI     60H  ┐  These instructions check for a
        JC      NTLWR !  lower case chorocter and, if one
        XRI     20H  ┘  is found, moke it upper cose.
NTLWR:  CPI     'P'
        JNZ     SKPIT
        LHLD    0F392H
        XCHG
        LHLD    0F386H
        SHLD    0F392H
        XCHG
        SHLD    0F386H
SKPIT:  RET
```

Although the routine is getting a little longer, it's still quite manageable so far. We are still not through, however, since we still need to prevent forty-column output from going to the printer, and we need a way to make sure that we switch the vectors back only if we switched them in the first place. We will do the latter through the use of a special program flag that is initialized to zero but changed to 0FFH by the routine that switches the vectors. When we've finished printing the file, we can simply check the flag to see if we need to switch the vectors around again.

The task of disabling forty-column output could be accomplished in a number of ways, but probably the most general one is simply to alter the byte in the slot types table that our new version of DUMP.COM checks to see if an eighty-column device exists. This is a more general way than changing the DUMP program itself, for example, because it doesn't depend on DUMP having every instruction in the same place; that is, it will work on both modified and unmodified copies of DUMP.COM.

In any case, by forcing DUMP.COM to believe that there's an eighty-column card in slot 3, we can ensure 80-column output. We should change the byte back at the end, however, in case some other program or routine checks for it. CP/M itself will not, but programs such as DDT do check this byte on initialization to determine their own output width.

Our second routine, then, now looks like this:

```
        PUSH    PSW
        JMP     PRST2
MSG2:   DB      13H,10H,13H,10H,'$'
PRST2:  LXI     D,MSG2
        MVI     C,09
        CALL    5
        POP     PSW
        CPI     60H
        JC      NTLWR
```

```
        XRI     20H
NTLWR:  CPI     'P'
        JNZ     SKPIT
        LHLD    0F392H
        XCHG
        LHLD    0F386H
        SHLD    0F392H
        XCHG
        SHLD    0F386H
        LDA     0FFH
        STA     FLAG
        LDA     0F3BBH
        STA     FLAG2
        LDA     03
        STA     0F3BBH
SKPIT:  RET
FLAG:   DB      00
FLAG2:  DB      00
```

Return to Sender. Now all we need is the routine to switch everything back when we're done and we'll be ready to install all of the routines we've created. This last routine will be a rather simple one because we are going to cheat a little. When we finish printing the file, we'll check for the value of FLAG. If it is non-zero, we'll replace the value that gets loaded into [A] (two instructions above SKPIT) with the value from FLAG2 and simply reexecute the original switch routine.

The routine will look like this:

```
        LDA     FLAG
        JZ      SKPIT
        LDA     FLAG2
        STA     SKPIT-4
        JMP     NTLWR+5
```

Now it is time to plan the installation portion of our project and to determine how to get our little routines into the DUMP program. Obviously, we won't be able to insert them into the middle of DUMP somewhere, since DUMP, being a COM file, has all of its memory reference instructions set up with hard addresses. If, for example, we were to shift everything down even one byte, nothing would any longer be in the place that corresponds to the addresses.

So, how do we install our routines? Usually, the most efficient way is to determine where such a routine should be installed and replace the instruction (or possibly up to three instructions) with a call or jump instruction to the new routine. Those instructions we replace will have to be repeated in the routine so that everything that was being done before is still being done. While it is easiest to do this with source listings, it is entirely possible to do it strictly using the disassemblies produced by the L command of DDT after loading the file.

As a first step, then, let's take a minute to bring up DDT and DUMP.COM and look over the DUMP code. If you get confused as to what you are seeing, go ahead and refer to the listing of DUMP.ASM, but try first to do it on your own.

Invoke DDT by simply typing its name. After the prompt appears, use the I and R commands to get DUMP.COM into memory. The I command, which stands for input, is always used with a file name and extension. Its effect is simply to place the file name into the file control block, FCB, located at hex address 5C.

The FCB is what CP/M uses to open files and otherwise read, write, or manipulate them. The structure of the FCB is shown on page 3-46 of volume one of the SoftCard manual, and you can see from that that the file name starts at 5D and makes up eight bytes in ASCII, with any leftover bytes (in case the name is shorter than eight characters) padded with ASCII spaces. Following these eight bytes are three more bytes that make up the file extension, again in ASCII with spaces, if necessary, to make up any extra positions.

Number's Up. After you have performed the I command (using the file name DUMP.COM as follows: IDUMP.COM), use the D command to display the memory beginning at 5C. You'll see a number followed by the ASCII values for DUMP's file name. The number you see is the number of the drive CP/M will use to access the file. In this case, it will probably be a zero, meaning that CP/M is to access the currently logged-in drive. A value of 1 would cause CP/M to access drive A no matter which drive was logged in, a 2 would cause CP/M to access drive B, and so on. If your copy of DUMP is on a different drive than the one you are logged into, take the time now to change this byte with the S command to the appropriate number for that drive.

Now that we have the FCB set up properly, we'll use the R (for read) command to read DUMP.COM into memory. Note that the file you load does not have to be a COM file; it can be any file type you wish.

The R command has a default load address of 0100 hex, meaning that an R by itself (followed by a return, of course) will load at 0100H the file named by the current FCB. It is possible to load elsewhere, however, by placing an offset value, expressed in hex, following the R command. The offset value will be added to the default of 0100H to produce the actual load address; for example, an R100 will load the file at 0100H+0100H or 0200H. This capability is useful when you want to connect two files together, as we shall see.

Do the R command. Now that we have DUMP in memory, let's list the first part of it with the L command and see if we can spot where to link in our routine. Notice that the first few instructions deal with placing new values in the stack pointer [SP].

To avoid overflowing the normal system stack (by placing too many values on it with PUSH instructions or by using too many nested call statements), programmers working in CP/M often set up their own stack area, loading the [SP] with the top address of this area at the beginning of the program, saving the old [SP] value, and then restoring it when finished. This en-

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ables them to take as much space as they need for the stack without having to worry about overflow.

Note the new value being placed into the stack pointer at the fourth instruction down. Since this will be the top of the stack, all values stored in the stack will work down toward the end of the program starting from here. Remember this address.

Tracing the Call. Next, we see that there is a call instruction. By listing the code at the address referenced by the call, we see that a system call is being made there (the MVI C,n and the CALL 0005 are what tell us this). We see that the value 0FH is being placed in [C] as the function number. Looking in the manual, we learn that function 15 is the *open file* function. So this routine is the one that opens the file we are to DUMP.

Listing again at 0100H, we find that the next instruction is a CPI 0FFH (comparing the contents of [A] with the number 0FFH). The manual tells us that if after a system call to open a file the [A] register contains 0FFH, then the file could not be found. Knowing this tells us that if the zero flag in the [PSW] is set following the compare with 0FFH, then the file couldn't be found; if the zero flag is not set, it means that the file was opened properly.

The next instruction is a JNZ to address 011BH, which tells us that if the zero flag is not set (the file open was successful), then we go to 011BH; otherwise, we execute a CALL and a JMP. It's obvious that CALL and JMP are used to exit the program; from using DUMP with a bad file name, we see that this involves printing an error message and returning to CP/M.

At this point, we're ready to select the point at which to link in our routine. Since if we want hard copy output, it makes little sense to print an error message on the printer, it would be best to link in our routine after the file has been opened successfully. We can see that the instruction located there is an LDA 0F3BBH (or a MVI A,80H if you are using the unmodified version). Since we have to replace this instruction with a call to our new routine, and since CALLs require three bytes, the call 'addr' will exactly replace the LDA 0F3BBH. In the unmodified version, the MVI A,80H is only two bytes, so we'll have to look at the next instruction, which we see is a STA 'addr'. That instruction is three bytes, so it will be the one we replace. It should be noted that we could have removed both of them if necessary (five bytes), replaced them with our call 'addr' (three bytes), and filled in any appropriate leftover space with single-byte NOP instructions that do not affect the operation of the program.

Who Goes There? In either case, since we'll have to take this replaced instruction and do it in our routine, it's important to know what the instruction does. In the modified version, it loads the [A] register with the value of the card type in slot 3, which is going to be used by subsequent instructions to determine how to format the output. In this case, then, we need to return to where we left off with the appropriate value in [A], meaning that we want this instruction at the end of our routine just before we return.

In the unmodified version, we are storing the contents already in [A] to some address. In this instance, then, we must place the instruction at the beginning of our routine so that the proper value gets stored there. We need to make certain that [A] (or any other register whose contents we will be altering) is not used further on as is, or else we will have to save it (or them) at the beginning of our routine and restore them before we return. By far the safest way to proceed is to save everything at the beginning of such a routine and restore at the end, but good planning can avoid the need for this.

Now that we know how we're going to link in our first two routines, we need to know how to link in the exit routine that switches the vectors back. We know that if the open file routine failed, we did a call and then a jump. It is logical to assume that the address used by the JMP is the key to finding the program's normal exit routine. Listing the code at this address, we find a call, a load of [HL] from the location used to save the [SP], an SPHL that exchanges the contents of [SP] and [HL], and then finally a simple RET.

Since this routine was reached with a JMP and not called, and since the programmer was careful to return the stack to its proper location before the RET, we can assume that the programmer has chosen to exit the program by returning to the CCP. This is one of two ways to return to CP/M. The other is a JMP 0000, which causes a warm boot.

In any case, we now know where the end of the program is. Which instruction do we replace? Really, we could replace either the LHLD or the call. Since we have not been careful about saving register contents, however, replacing the LHLD would involve more effort than replacing the call. We can assume this because there is no reference to any other registers before the RET, meaning that the call probably doesn't leave important contents in them. If we wanted to take the time, we could verify this. We'd find that the call was only to a routine to print a pair of CRLF's, but in this case we can assume it's okay simply to replace it with a call to our routine and re-create it at the beginning of our routine.

Our routine, then, now looks like this:

```
        xxx     xxxx    ( note thot this is where you
                        would insert the STA instruction
                        if you ore working with the
                        unmodified version of DUMP)

        JMP     PRSTR
MSG:    DB      'OUTPUT TO P-PRINTER OR S-SCREEN? $"
PRSTR:  LXI     D,MSG
        MVI     C,09
        CALL    5
        MVI     C,01
        CALL    5
        PUSH    PSW
        JMP     PRST2
MSG2:   DB      13H,10H,13H,10H,'$'
PRST2:  LXI     D,MSG2
        MVI     C,09
        CALL    5
        POP     PSW
        CPI     60H
        JC      NTLWR
        XRI     20H
NTLWR:  CPI     'P'
        JNZ     SKPIT
        LHLD    0F392H
        XCHG
        LHLD    0F386H
        SHLD    0F392H
        XCHG
        SHLD    0F386H
        LDA     0FFH
        STA     FLAG
        LDA     0F3BBH
        STA     FLAG2
        LDA     03
        STA     0F3BBH
        LDA     0F3BBH  (this is the LDA we reploced
                         in the progrom beginning)
SKPIT:  RET
FLAG:   DB      00
FLAG2:  DB      00
        CALL    'oddr' (this is the CALL we reploced in
                        the exit routine)
        LDA     FLAG
        JZ      SKPIT
        LDA     FLAG2
        STA     SKPIT-7 (note thot this is now minus 7 since we inserted the
                         LDA just obove SKPIT)
        JMP     NTLWR+5
```

The next phase is a little complex, so we'll hold off on it until next month. At that time we'll actually create our new routine in memory and link it in. We'll also use the debugging capabilities of DDT to find the error contained in our program. Oh, didn't we tell you about that? Until next month. ◨

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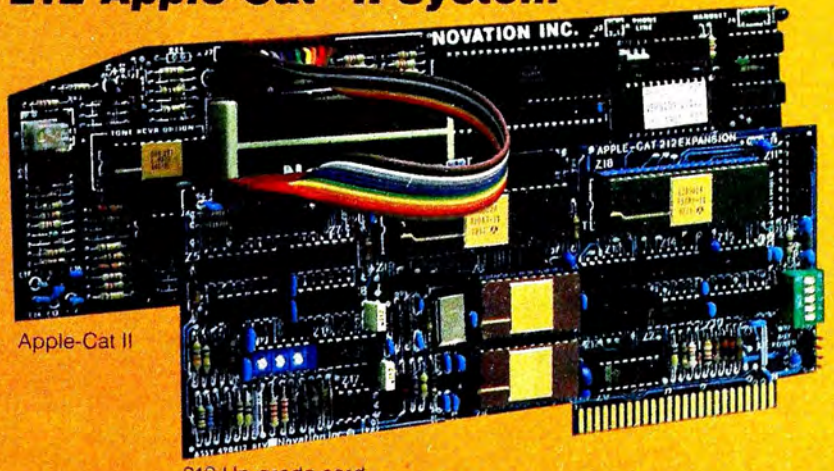
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Mind Your Business

BY PETER OLIVIERI



Welcome old and new friends. We have a variety of topics to discuss this month.

Applications. Arthur D. Little is among the world's oldest, largest, and most diversified science, engineering, and management research and consulting organizations. Headquartered in Cambridge, Massachusetts, its services range from basic and applied research in the physical and biological sciences to the formulation and implementation of economic development programs. The firm performs product and process development, engineering design, market and marketing research, analysis and design of inventory control and information handling systems, and a wide variety of other planning studies.

The Arthur D. Little Management Education Institute is a wholly owned subsidiary of its parent company. The institute was developed to provide educational programs for helping participants (mostly managers from countries all over the world) learn to formulate policies and strategies in international economies. In addition to the master of science in management degree program, the institute offers a variety of specialized programs and seminars.

Apples Abound. Where does the Apple come in? In short, everywhere. Indeed, it is the many different ways the Apple is used at MEI that makes this application so unique.

First, there is the academic role for the institute's Apples. Managers who attend the institute learn to use the computer in two separate phases. Early in the program, they participate in an intensive "computer week," during which the fundamental concepts of computers and programming are presented. Later on, they learn to use specific packages, such as *VisiCalc* and some database management systems. Students get hands-on experience and come away with an appreciation of what the computer can and cannot do.

This valuable experience is gained in a microcomputer lab set up at the suggestion of Dr. Arnold Weinstein, dean of MEI. The lab has ten Apple II Plus computers, each with a disk drive and printer, set up in individual work stations. The lab is open both to students and to staff, which extends the Apple's role far beyond instruction.

Seminars have also been held to acquaint staff members with the major features of the Apple and to teach them to use *VisiCalc*. Managers, consultants, and secretaries have demonstrated enthusiasm for the seminars and have begun to think of ways that the Apple could be put to good use in their own work.

Merging Traffic. One current application at MEI is budget maintenance, using a *VisiCalc* model developed by a member of the staff. This model monitors the monthly appropriations and expenditures in a large number of categories. Another staff member uses the database system *PFS* (*Personal Filing System*) to keep track of the status of proposals solicited by consultants assigned to various sections. The system records data about the client, the client contact, the MEI staff member responsible for the proposal, the dates and amounts involved, and so on. Each week, reports are generated that display the status of the various proposals—which ones have become cases and how much money has been expended on them. A variety of reports, such as listings of all the cases assigned to particular staff members, can be printed on demand.

As you might expect, the Apple is also used to record student grades and to produce official transcripts. This is accomplished by user-written programs. One program accepts grade data about a student and files it; another program reads the file, performs the appropriate calculations, and produces the final transcript. The institute takes advantage of user-developed programs that calculate class rankings, instructors' grade rosters, and the dean's list.

A New Breed? MEI is contemplating the possibility of combining a commercial database package with the programs they have already created. The fact that many database packages now allow interfacing with user-written programs makes this idea attractive. MEI people could use a commercially developed package to create and update their data and then use their own specially developed programs to access the data and print their own reports.

An observer sitting in the MEI computer lab on a typical day would be struck by the many things going on there. One person might be in the process of developing a *VisiCalc* model; another might be creating a "learn about the Apple" program for a client in Saudi Arabia. A student might be examining the possibilities for using the Apple to manage a South American farm, while someone else is in the middle of a statistical analysis or financial modeling application. You might even come across a group of people assigning probabilities to the outcomes of various moves in *Cranston Manor*.

Quite a variety of applications under one roof, isn't it? And this is all the more striking when you remember that MEI is but one small section within the Arthur D. Little consulting organization.

Speaking of Training. All too often, we think of training only in terms of formal educational programs like seminars and workshops. Most organizations also have their own informal training programs, and certainly all organizations have training needs. The Apple can be a valuable resource in this regard, as some examples demonstrate.

The Regional Kidney Disease Program in Minnesota has developed an Apple-based interactive video system as an aid in training nurses and medical technicians. Because the computer keeps track of each student's progress, instructors know which students need their help most and can plan accordingly.

The American Heart Association uses Apples (again with videotape) to teach proper cardiac-pulmonary resuscitation techniques. The Apple II system controls the exchange of student-patient responses.

Apples are also being used to train airline pilots, military personnel, and customer service representatives in various organizations. What makes these applications possible is the ease with which users can create their own instructional programs. You don't have to be a programmer to create your own training programs. You can use various commercial programs designed to make your job easier.

The programs in the *Apple Pilot* family (from Apple Computer) are particularly valuable. These include *Apple Pilot, Apple Co-Pilot, Apple Super Pilot,* and *Apple Super Pilot Log. Apple Pilot* and *Apple Super Pilot* are powerful yet easy-to-learn languages that allow you to use simple commands to

create instructional programs. *Co-Pilot* is a tutorial for *Pilot*. *Super Pilot Log* is a student record keeping system that works with *Apple Pilot* and enables you to monitor students' progress in training programs.

This family of products allows you to take advantage of some effective training aids, including sound, color graphics, and interactive videotape or videodisc. The packages are easy to use and their only real limits are your own creativity in using them.

Another program worthy of your consideration is *The Learning System* (Micro Lab). *The Learning System* is a package that allows you to create multiple choice, matching, or fill-in tests. In addition to providing hints to students, if required, the program monitors student progress. Though not as complete as the *Apple Pilot* family, *The Learning System* is relatively easy to use and has a good many worthwhile applications.

And Now a Word from the Apple Network. Simply put, a network is a system for linking several computers together. It is one way to bring computer power to a group of people (perhaps several of the people in your office). In a typical net you might find several Apples, each with its own disk drive, connected to a hard disk. The centralized storage the hard disk provides enables users to share data and programs easily.

Networks offer several advantages. To begin with, all members of the network have their own microcomputers. This means that people don't have to share time on the computer, although they can easily share data if necessary. If one person's computer breaks down, no one else is affected. Another convenience is that a computer can be removed from the network and used alone. Finally, the cost of networking is often significantly less than the cost of time sharing on a mainframe, especially since members can share expensive pieces of peripheral equipment such as hard disks, printers, and plotters.

CPU Computer Corporation recently announced the availability of a local network that can be used when computers are located within four thousand feet of each other. The firm's software is called CPUnet and permits up to sixty-three personal computer users access to as many as eighty million characters of data on a Corvus hard disk, as well as the data on their own floppy disk. The package is CP/M compatible and easy to operate.

We'll be talking more about networks in the future; in the meantime, if you are considering the installation of a multi-user system, you may want to talk with someone from CPU.

It Figures. Every now and then a product comes along that is sufficiently general and useful that it warrants a place in every Apple owner's library. *VisiCalc* is a good example of such a program; it enables you to do powerful spreadsheet analyses yet is relatively simple to use. *VisiCalc*'s applications are limited only by the imagination of the people who use it.

Another such product has arrived. It's called *MatheMagic* and, as its name implies, this program performs magic with math (International Software Marketing).

We live in a mathematical world. Unfortunately, many of us are math illiterates. Envision, if you will, having the ability to create formulas, enter them into the computer once, and then recall them as needed, with the computer asking you for the appropriate values in a given formula each time. This is precisely what *MatheMagic* allows.

Let's demonstrate. A calculation that is quite useful but often difficult to do, even with a calculator, is determining the future value of an investment. Since all of us have the formula for this calculation on the tips of our tongues, we'll recognize immediately that it is:

```
Future Value = Principle / (1 + interest/N) (N * years)
```

In this formula, *N* represents the number of compounding periods each year. So assuming that you have an investment on which interest is compounded monthly, your interest would be equal to 12. If your investment interest were compounded quarterly, *N* would equal 4, and so on. Years is the length of the investment in years, the * represents multiplication, and the / represents division. As you can see, the exponent (that is, *N* * years) can become quite large.

This sample problem is a perfect candidate for computer solution. In fact, you can write a Basic program to solve this program on an Apple. The beauty of *MatheMagic* is that you can quite easily give the Apple instructions to solve this problem. It's just as if *MatheMagic* had written the Basic program for you.

Your session would be as simple as this. After booting *MatheMagic* you're presented with a menu. In this case, you would select option F (for formula) and be met with a second menu. Here you would choose the C (for create a formula) option. You would then simply enter the formula you wanted, using words that have meaning in the context of the application. You would type:

```
Principle * (1 +Interest/N) (N * Years)
```

When you press return, a three-part screen is presented. The top part displays the available commands, the middle part the ongoing solution to the formula you're using, and the bot-

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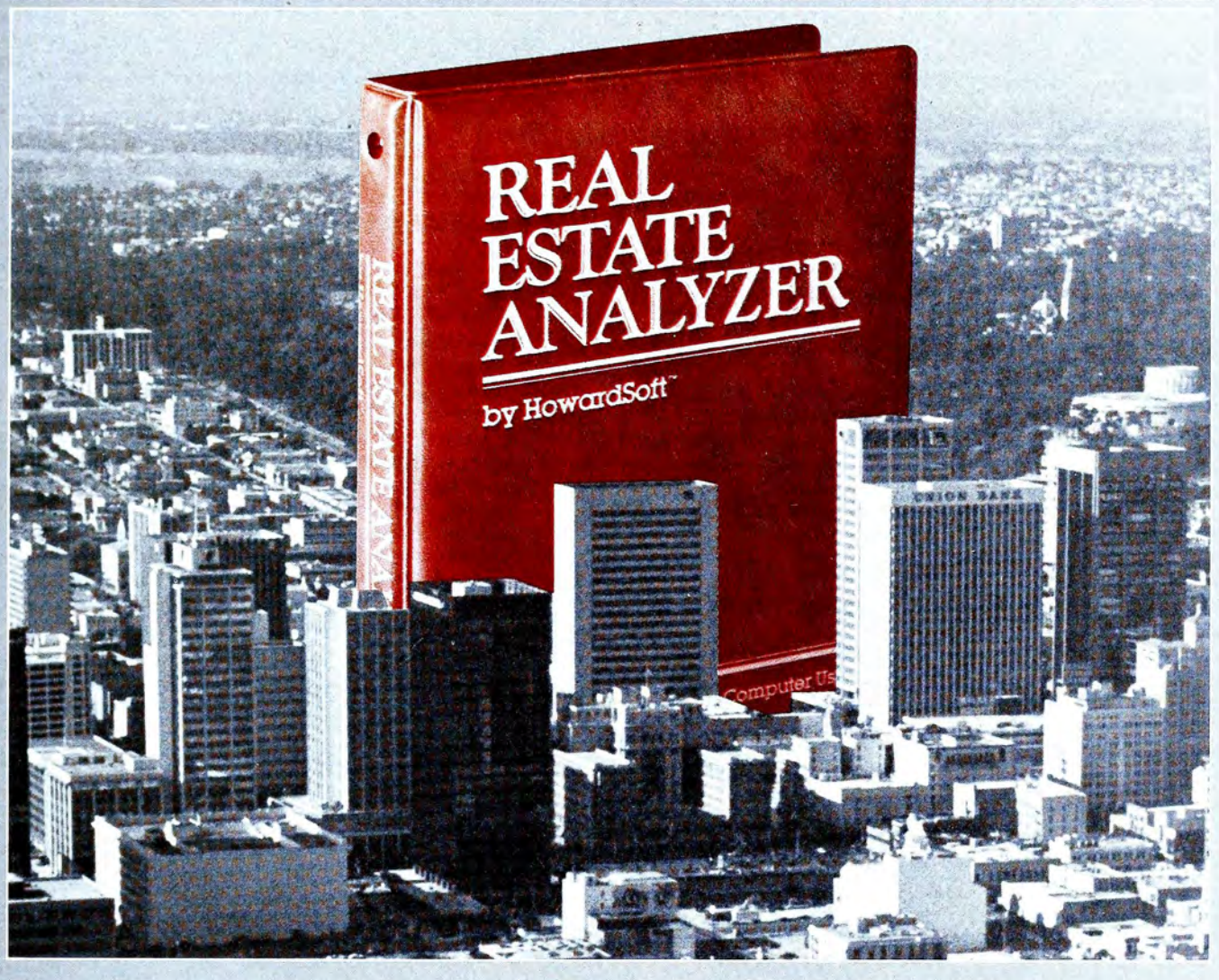
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tom part is where you're asked to enter the values for your formula.

At this point press the / (slash) key (the calculate command), and *MatheMagic* spins its magic. The display area places a flashing cursor over one of the unknowns in your formula and you are asked to "enter value for principle."

After you've done this for all your unknowns, your answer appears in the display area. You can, of course, save formulas and recall them for later use. One formula can also reference another; for example, one of the unknowns in your formula could be another entire formula (you'd be prompted for the appropriate values).

As you can see, this package has myriad applications. *MatheMagic* requires either Apple II with Applesoft in ROM and at least one disk drive (having two is preferable). A printer would also help.

Some special features of this package are:

1. The package's helpful menus. All one letter commands are displayed in full though you need only enter the first letter, for example, (C)reate. In fact, sometimes you need only press return to accept a default entry. Unlike *VisiCalc*, which displays only the single letters of the commands, *MatheMagic* displays the full command words continuously.

2. There is an on-line help feature for all *MatheMagic* commands.

3. Up to nine different users can use a single disk. The system gives each user a unique identification number. This is a nice feature where more than one person might need to use the package.

4. The user may select the number of decimal positions to be displayed in answers.

5. A special feature called "ask variable" essentially allows the user to ask "what if?" questions as a formula is being solved. For example, "What if the length of my investment is two years?" Answering these questions is easily accomplished with *MatheMagic*.

6. Formulas can be solved all at once or one step at a time showing all the interim steps. While you would probably not do it all the time, you're likely to find it fascinating to watch *MatheMagic* solve a formula in steps.

7. You can easily edit and update any of the formulas that you have stored.

8. Interaction with the disk for loading, storing, and deleting formulas is quite simple.

9. There are twenty-one built-in functions (ABS, SQR, LOG, and so on).

10. The documentation includes a user guide and sample applications.

Indeed, several features demonstrate that extensive fine tuning went into *MatheMagic*. These will be left to the investigation of the interested user.

If you work with formulas at home, at work, or in school, you should not be without *MatheMagic*. It is indeed a programmable calculator. Its strength is that it is quite easy to use and has a tremendous variety of applications. Like *VisiCalc*, a database management system, or a word processing program, *MatheMagic* makes an excellent addition to your Apple library.

Once again we have reached the end of a month's column. The Inquisition analyses are now in the final stages, evaluations of various word processing packages are well underway, and the Apple III (with ProFile hard disk) is being put through its paces. Looking forward to sharing some of our findings with you next month. Take care for now. ◨

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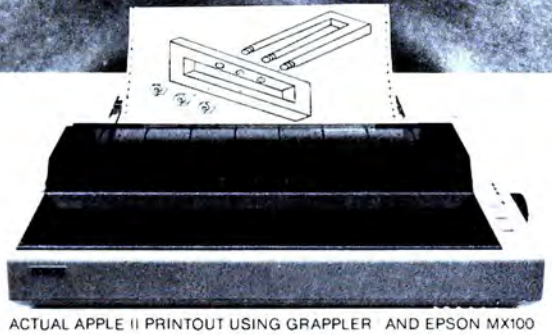
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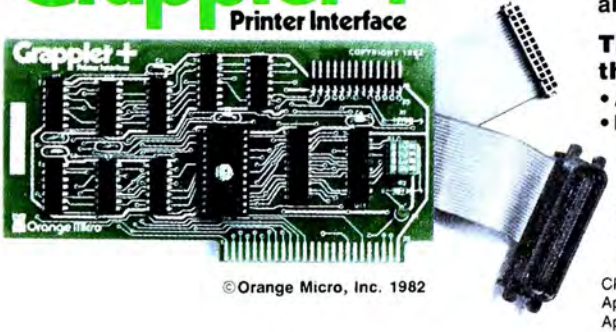
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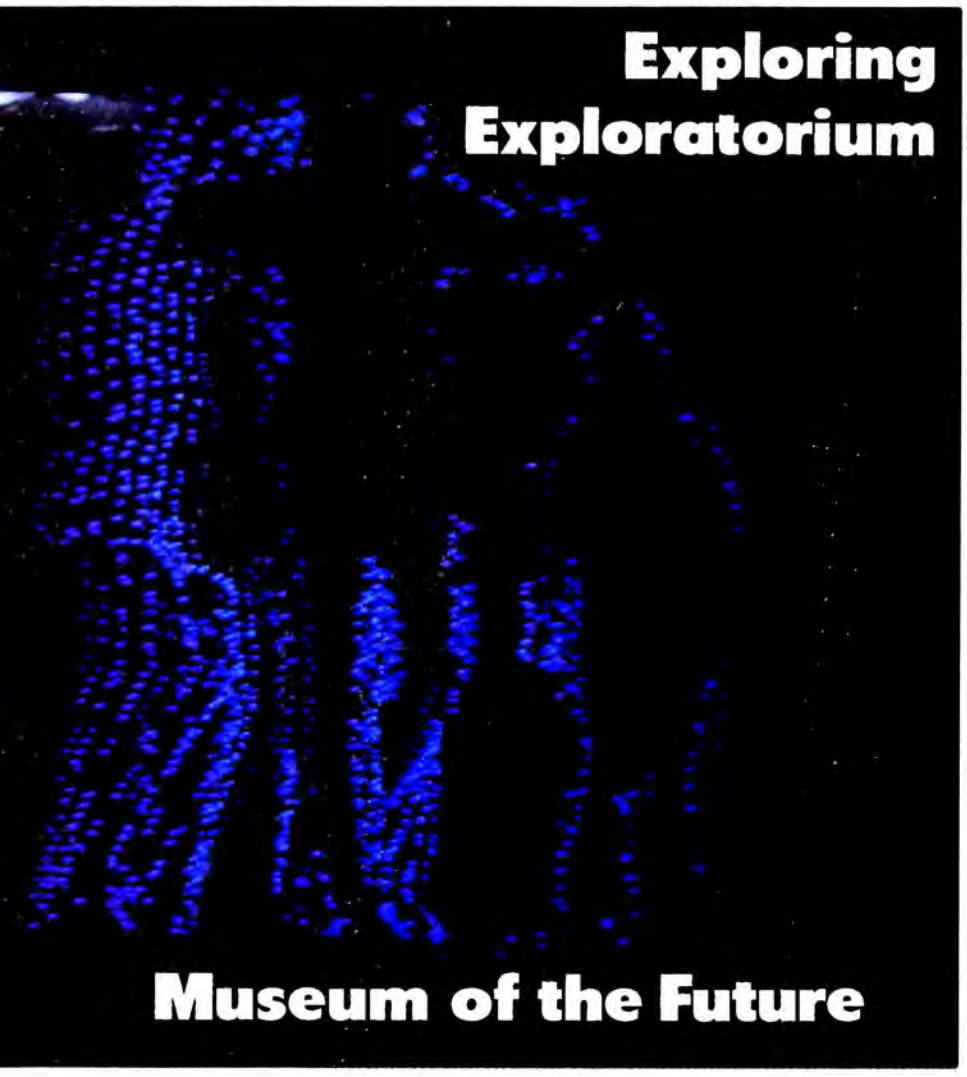
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Exploring Exploratorium



Museum of the Future





BY MATTHEW YUEN

Clap your hands and colored lights ripple from the bottom of the Enchanted Tree to the top. Take a spin on the Momentum Machine and feel your momentum increase. Create with your hands a visual echo on the Pin Screen, an exhibit of 170,000 pins inserted into a screen. Experience the Ames Room where children become adult-size and grown-ups shrink.

Walk into the Exploratorium and you enter a playground for the senses. When you visit this science museum, you don't observe the exhibits, you do them.

It's not often you visit a museum where you actually manipulate the exhibits yourself, but the Exploratorium, located in the Palace of Fine Arts in San Francisco, is one place where that's possible. Visitors to the Exploratorium push, pull, scream, talk, bounce, and swing their way to a better understanding of the world around us through more than five hundred participatory displays.

Things That Go Bump In the Night. We often fear things because we don't understand them: the creakings of an old house, an automobile engine, electrical storms, even computers, to name a few. Founded in 1969 by noted physicist Frank Oppenheimer and his wife Jackie, the Exploratorium was conceived in the belief that forces of nature that at first seem mysterious can be understood and that if we understand such things we won't be as apprehensive of our surroundings.

The Exploratorium provides the tools and environment for such learning, and Apples are among those tools. Filled with ingenious exhibits that enable visitors to learn about light, color, vision, sound and music, patterns of motion, electricity, heat, touch, and animals, it offers experimental opportunities that are difficult, sometimes impossible, to achieve through classrooms, books, or television.

On the Waterfront. The entrance to the Exploratorium is a side door that could easily be mistaken for an entrance to an old storage warehouse. But once inside, you realize that what's in store is more than just a warehouse. Originally the showroom of fine art from all over the world for the 1915 Panama-Pacific Exposition, the hangar-sized hall later housed tennis courts and then a fire station; it now serves as a place of participatory learning.

Most of the exhibits are constructed in-house based on ideas from the staff, although some ideas are contributed by research laboratories, university teachers, other museums, and even by visitors themselves. Carpentry, graphics, electronics, machines, and welding shops are fully exposed so the public can see exhibits being made and repaired. This is to emphasize that everything experienced at the Exploratorium is natural; there are no tricks involved.

The original theme of the Exploratorium was human perception, and it hasn't drifted far from that in its thirteen years of operation.

The one-hundred-foot-long Echo Tube demonstrates the principles of sound and air waves. You can stick up to half your body into this tube and clap, tap, speak, whistle, or scream and hear the sounds bounce back at a moment's delay. Step next into the Distorted Room, one with no right angles, and you'll feel yourself become disoriented.

Everyone Is You and Me is a fun display that demonstrates the principle of one-way glass by allowing two people to see both their faces blended into one, with hilarious results. A strobe light flickers almost unnoticeably, making a crude









Clockwise from left: Recollections by Ed Tonnenboum tronsforms porticiponts into hi-res humons; youngsters exomine their voices with Speech Dissector; ortist-in-residence Poul DeMorinis creotes music ot the touch of his hond; ot Everyone Is You ond Me, similorities ore explored; Hot Light grophicolly plots light; Deloyed Speech con omuse ond confuse; Stereo Sound helps visitors understond ourol perception.

spray of water appear as a smooth stream snaking its way upward.

Hands-Off Learning. And what would a science museum be without computers? There are eight Apples at the Exploratorium, three donated by Apple Computer and five purchased by the museum. But you won't find anyone playing *Choplifter*, *Knight of Diamonds*, or any other Apple games here; in fact, you won't find anyone using these computers at all. Rather, it is the Apples themselves that control several of the exhibits.

One of these is the Speech Dissector, which records, plays back, and picks apart a person's voice and plots a graph to show how much emphasis the person gives to certain parts of words.

Hot Light demonstrates how concentration of a light bulb's energy varies at different levels of brightness by plotting a graphic representation of the light's different intensities.

Survival of the Fittest employs an Apple for data manipulation to teach the concepts of exponential growth, using animal reproduction as a model.

In all three of these exhibits, the Apple is pretty much a number cruncher, doing equation manipulation and data reporting—stuff it was made for. But three other exhibits involve the Apple in musical and artistic creation.

Coming Together. From its inception, the Exploratorium has invited artists to work at the museum. Currently, the artist-in-residence program assists four to six artists per year. Each brings to the museum ideas that are reviewed by an outside selection committee.

One of the artists currently in residence is Paul DeMarinis. He's responsible for the Music Room, a chamber housing five touch-sensitive guitarlike instruments that visitors can pick up and experiment with. "They're not really five separate instruments," DeMarinis explains, "but, rather, one instrument that takes five people to play."

The guitars have twenty-three touch-sensitive keys on the neck and eight on the body. They can be played by touching the keys individually or by running over them with your fingers.

Each guitar is scanned for changes in the controls every three milliseconds by a single-board computer made by John Bell Engineering. The computer then transmits the information to an Apple II Plus, which controls four Casio MT-30s and a Korg rhythm synthesizer. DeMarinis also designed his own interface card that allows the user to record and play back music made with the system.

"The idea for these began when a partner, David Behrman, and I were using synthesizers in performance," DeMarinis recalls. "Turning knobs and pushing levers, we just didn't get the feeling of actually playing music."

The purpose of the Music Room is to allow people—even those who have no musical or technical experience—to pick up one of the guitars and begin creating. Of the five modules, one controls both rhythm and tempo, complete with percussion fills, and one dictates the key and key changes. Controlled by these two, the other three are used to create melodic lines.



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And Going to Pieces. Another Apple-driven exhibit is Discernibility, a display created by electronics and video artist Ed Tannenbaum. When you visit this exhibit, you sit in front of a touch-control grid and vary time, color, and resolution of your facial image on the screen before you. Resolution varies from almost photo-perfect to a grid of four black and white blocks. Now that's lo-res.

You can also delay replay of your image, allowing you to see history of movement. "I began wanting to play with various aspects of recognition between high and low resolution, positive and negative images, and grace steps in movement," says Tannenbaum. "The purpose is to point out that we don't occupy only space, but time as well."

Taking the principles of Discernibility further, Tannenbaum came up with his latest work, Recollections, a much larger and more sophisticated display of body motion that turns participants into performers. Recollections uses an Apple for program control and a video camera to record in color the head-to-toe movement of anyone who stops to have a little fun.

The visitor's antics and movements become a sequence of images that are stored and then replayed onto a life-size screen to create the illusion of a colorful wake left by that person's body. It's just as much fun for spectators; they can watch the action live or on a television screen.

"One of the wonderful and interesting things about this is that people who tend to be a little inhibited step in front of this thing and suddenly open up," Tannenbaum observes. "Again, here, the visitor can see the various aspects of both space and time that he occupies."

Participants of Tannenbaum's Recollections jump, sway, and dance themselves into artistic creation as video sculptures, seemingly in a private world, and always with a sense of wonder.

Opening the Black Box. Though most of the exhibits seem puzzling to the senses, some to the point of almost defying them, none of the displays allows the visitor to leave without knowing what actually happened. Each display is accompanied by two cards: the first, "To Do and Notice," gives instructions on how to work the exhibit; the second, "What Is Going On," explains the phenomenon involved. Even the child who doesn't take the time to read will have fun with the exhibit and probably come away with some new knowledge.

The atmosphere at the Exploratorium is informal. There are no guards and few rules. Visitors who have problems or questions can turn to "Explainers," high school students whose job is to circulate among the crowd and offer assistance.

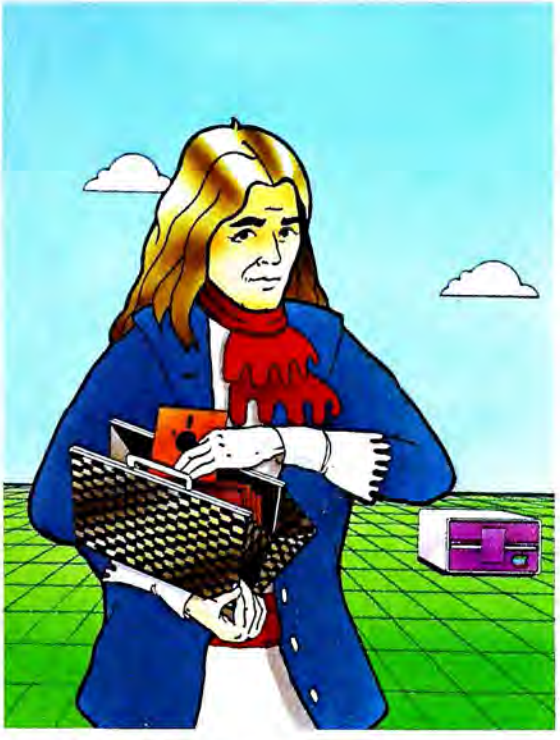
The Exploratorium encourages school groups, which can make reservations to visit the museum during the mornings. The groups are greeted by college-age Explainers who demonstrate some of the exhibits and who meet and talk with teachers.

But field trips are too brief to explore the Exploratorium fully. To provide more in-depth instruction, the Exploratorium conducts classes in which students spend an entire day at the museum once a week for five weeks. Students meet with teachers in a classroom and use the exhibits as their personal laboratory for experimentation and learning. There's also a lending library of props available that students may take home.

Plenty Is Not Enough. Stopping in for only an hour is worthwhile, but even a whole day at the Exploratorium is not enough time to see or play with everything. The staff at the Exploratorium understands this, and encourages visitors to return by honoring a paid admission for six months.

For visitors to San Francisco, it's easy to visit the Golden Gate Bridge and then take a short hop to Fisherman's Wharf and Ghirardelli Square.

But it's an even shorter hop to the Exploratorium, a place where adults can be kids, kids can be kids, and both can discover the wonder of learning. ◨



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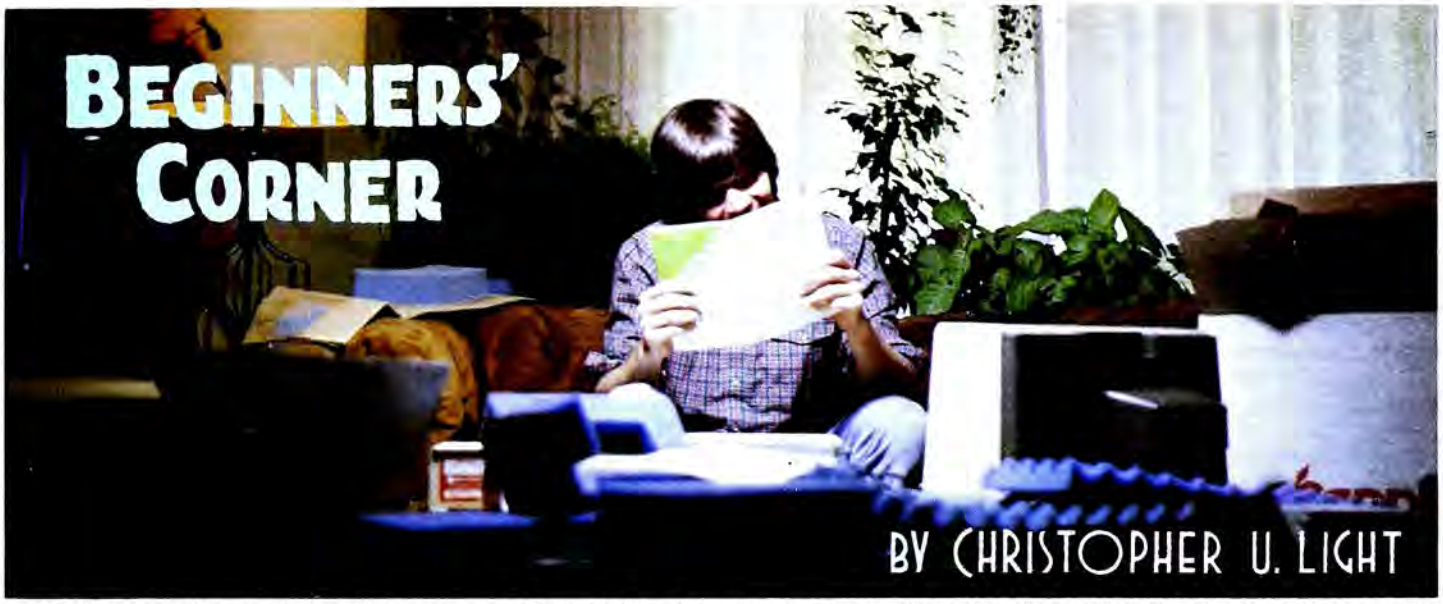


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You've conscientiously worked your way through the *Applesoft Tutorial* and have completed all the exercises. You've drawn a blue horse with a white face and orange feet in lo-res graphics and plotted lines in hi-res mode. You've been introduced to strings and arrays, for/next loops, and subroutines. You're ready to solo, right?

Maybe. Maybe not. But you do know that you've got more to learn, so you turn to the other three instruction books that came with your system: the *DOS Manual*, the *Applesoft Basic Programming Reference Manual*, and the *Apple II Reference Manual*. And all of a sudden you realize that, like it or not, you're up there all by yourself, coming home on a wing and a prayer that none of the worms (they're the gremlins inside Apples) types *int* or *fp* before you have a chance to save your program.

"*Int*?" "*Fp*?" You don't remember those commands from the *Tutorial*? Don't worry; your memory's not going. They're not there. They're also not in either the big Applesoft manual or its Integer Basic equivalent, even though their purpose is to switch between Applesoft Basic (floating point, hence *fp*) and Integer Basic and back. You'll find *int* and *fp* in the DOS manual because, for some reason (probably an afterthought), they're loaded and stored with DOS. Use them with care. They'll zap any Applesoft or Integer Basic program in memory.

Look! It's the End of the World! So you're up there on your first solo when your disk drive starts grinding and clacking so loudly that you think it's blown a gasket, the thermometer reads ninety-five degrees Fahrenheit, and the local power company has just announced that there will be a brownout in ten minutes. In panic, you circle in a holding pattern (*for "Help!" = 1 to 65536 . . . next "Help!"*) while you thumb through three unfamiliar new manuals looking for the command you need. Eventually you either land safely or you crash. And eventually you teach yourself how to program.

Although there have been courses in programming for years, programmers are largely self-taught. An instructor or a tutorial can only take you so far. After that, it's your own ability to hold a couple of hundred partially completed ideas in your head and do mental JSRs (assembler jargon for jump to subroutine) between them until it's all a coherent whole. But until the personal computer came along, there was an intermediate stage between the tutorial or classroom and going solo—help from friends and colleagues standing around the community printer waiting for their output from the mainframe computer. If your program bombed, somebody nearby could help.

Even now that the principle of one person/one computer has been established, it is still possible to learn from others. One way of learning is by analyzing canned programs. Analyzing other people's programs—whether those programs are good, bad, efficient, or sloppy—helps you become a better programmer. So, from time to time in this column we'll present a program for you to enter (and run, so that you know what it does). Then we'll analyze it to see *how* it does what it does.

Here's one that assumes you know the commands covered in the *Applesoft Tutorial* but haven't gotten very far yet with the bigger Basic programming reference manual. It introduces a few new commands and concepts beyond the tutorial. Although it happens to use some mathematics (high school trig level), you can ignore that and concentrate on the programming. Those of you who care about the math will find it discussed later on in this piece.

Plotting a Piece of Paradise. Let's build a garden. Type the following program carefully and save it. As you know, every comma and colon must be right. Don't try to understand the program as you type. Wait until after you've seen it run. When you're finished and have proofread your work, go to the running instructions that follow the listing and, when prompted, enter the numbers given here. Be patient. The program is excruciatingly slow to run. That's part of the lesson. Later we'll make some changes to speed it up.

```
 10 HGR:HCOLOR=3
 20 PRINT "SELECT NUMBER: (1) FLOWER OR (2) WORM." : GET N
 30 PRINT "ENTER PARAMETERS A, X0, Y0": INPUT A,X0,Y0
 40 ON N GOSUB 1000,2000,3000
 50 FOR Z = 0 TO 360
 60 ZR = .01745 * Z
 70 IF FN X(Z) + X0 < 0 OR FN X(Z) +X0 > 279 GOTO 100
 80 IF FN Y(Z) + Y0 < 0 OR FN Y(Z) + Y0 > 140 GOTO 100
 90 HPLOT FN X(Z) + X0, FN Y(Z) + Y0
100 NEXT Z: IF N = 3 GOTO 150
110 PRINT "NEW FIGURE (Y OR N?)": GET A$
120 IF A$ = "Y" GOTO 20
130 IF A$ < > "N" GOTO 110
140 N = 3:A = 25:X0 = 150:Y0 = 50: GOTO 40
150 HPLOT X0,Y0 TO X0 + .4 * A,Y0 - .8 * A
160 END
1000 DEF FN X(Z) = COS (ZR) * COS (2 * ZR) * A
1010 DEF FN Y(Z) = SIN (ZR) * COS (2 *ZR) * A
1020 RETURN
2000 DEF FN Y(Z) = SIN (ZR) * A: DEF FN X(Z) = .2 * Z
2010 RETURN
3000 DEF FN Y(Z) = COS (ZR) * A * (1 + COS (ZR))
3010 DEF FN X(Z) = SIN (ZR) * A * (1 + COS (ZR))
3020 RETURN
```

Finished typing? Saved the program on a disk? Okay, now run it. Be sure to follow the instructions in the next paragraph exactly. This is a demonstration program, not a polished commercial one, and an error may cause it to bomb, in which case you'll have to run it again.

When the prompt asks for (1) flower or (2) worm, push *1*. Note that you do not have to push return. When it next asks for

parameters, type *25,95,10*. You will need a return this time. You'll see why you need it for one and not for the other when we analyze the program.

Now sit back for an incredibly long time and watch the program draw a flower on your screen (bird's-eye view). If it starts drawing a curve, just wait. Go to the kitchen to get a beer or a Coke. Wait for the prompt again. Then type *1* again for flower and *75,45,35* for the next set of parameters. Wait. . . . After you regain control, draw one more flower using parameters of 35,240,40; this time use the second hand of a watch to time how long it takes. Wait, cursing us for wasting so much of your time. When the program finishes, you should have three flowers in three sizes on the screen.

Getting Down to the Dirt. Gardens can't live by flowers alone. They also need worms to aerate the soil. This time push *2* for worm and choose as parameters 10,210,100. This one will plot in much less time. When it's done, type *N* for no new figure. Don't hit reset or turn off the machine yet. Wait. When the program finally stops running, you'll see that we've just drawn the Garden of Eden.

Let's analyze our program. Notice that the first sixteen lines are all ten numbers apart, which, as you know, is good programming practice because it allows you to insert other lines later. Actually, at one time in the writing of this program, several lines were inserted and 63,97, and 999 were used. Later the numbers were changed with the renumbering utility program we talked about last month. Line 160, *end*, signals the end of the main program and the start of the subroutines. Although not always necessary (as in this program), the use of *end* is considered a good programming practice because it ensures that the first subroutine won't mess up your output when it's accidentally run an extra time and then followed by a printed *return without gosub* error.

You'll notice that the program has no rems. They're not needed because any programmer can tell at a glance what each section does by looking at the line numbers. The 1000 group is for the first subroutine, the 2000s are for the second and the 3000s are for the third. Notice also that the subroutines are at the end of the program. Although the program would run faster if they were at the beginning (using a *goto* to get around them when the program starts running), this, too, is typical practice. It's also an anachronism that dates back to the days of Fortran programs on punched cards when subroutines had names rather than numbers and when their decks had to physically follow the main deck.

Line 20 contains the first new command, *get N*; it's also used in line 110, *get A$*. *Get* is like *input* except that you don't need return with it, and the character you type doesn't show on the screen or mess up a neatly printed report. *Get* gets only the first character typed rather than a whole word. Getting arrows, commas, colons or certain control characters may give bizarre results and, according to Apple Computer, if *onerr goto* is in use, *get* errors will cause your system to hang after either two or forty-three of them happen.

This Could Be Courting Disaster. Although both lines 20 and 110 work, the first *get* is considered poor programming while the second is okay. The first is numerical (N = 1 or 2) and is the condition that allows your system to hang when *onerr* is on. The second is a string (A$ = "Y"), which doesn't have the same drawbacks but introduces others; for example, using more than two or three *if-then* tests on string variables in the same program will cause a crash, according to Apple, but this limitation doesn't apply to *if-gotos*.

Line 30 should be old hat by now, while line 60 contains the second new command, *on N gosub 1000,2000,3000*. This command looks at the value of N (1 if you choose flower in answer to the *get* of line 20) and goes to the first line number in the list if N = 1, to the second if N = 2, and so on. It's exactly the same as *10 if N = 1 goto 1000/20 if N = 2 goto 2000,* and so on. Thus, if you choose flower and push *1*, the program will jump to the subroutine beginning with line 1000. A similar command is *on N goto*, which branches the same way but, since there's no subroutine, doesn't come back.

Line 50 is a standard loop. The choice of 0 to 360 simply sends the program around a complete circle of 360 degrees. Line 60 illustrates a strange peculiarity of Applesoft: it doesn't understand degrees. For some unknown reason, the author of Applesoft decided to measure angles only in radians, which are each approximately 57.295 degrees long. This line then converts an angle of Z degrees into one of ZR radians.

Lines 70 and 80 are error traps. We'll define fn X(Z) + X0 and fn Y(Z) + Y0 in a minute. Right now just think of each as X and Y, whose values will be plotted on the screen just as if the screen were graph paper.

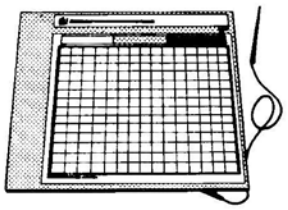
Apple's hi-res screen goes from 0 to 279 horizontally and from 0 to 159 vertically. If you try to plot outside these ranges, you'll get an error message and a crash. These lines allow the program to accept plot instructions outside the legal ranges and then to branch around the plot command to increment the loop by one. The number 140 was chosen for the largest value on the Y axis to keep the figures above the text window at the bottom.

Funny You Should Ask. "Above the text window?" Yup. As you probably know, the origin of Apple graphs is in the upper left corner. Therefore, Y values increase as you go down. Line 90 then plots the values of two variables named fn X(Z) and fn Y(Z). We've added X0 and Y0, values that are entered by the user, to move the origin of the graph from the upper left corner to the point on the screen X0,Y0.

Line 110 offers nothing new beyond *get* and is there to plot that little surprise when you think you've told the program to stop. Lines 120 through 150 set the parameters for the unexpected Apple.

Line 1000 contains another new command: *Def fn X(Z) = ...* Don't worry about the math that follows. Pretend you're plotting a line and let *def fn X(Z) = 2*Z*. Rendered into English, this translates to "create a functional relationship between X and Z such that, no matter what value Z takes, X will always be equal to twice Z." (More formally, it would be

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stated: the function X of Z equals 2 Z.) To use it, we define the value of Z (in this case in the *for/next* loop) and then simply say *print fn X(Z)* when we want to know the value of X for that value of Z. *Def fn X(Z) = 2 * Z* is exactly the same as *let X = 2 * Z*, except that the call for the value of the function also incorporates a *gosub* so that you don't have to make the program run directly past the functional relationship each time you want to solve it with a new value for Z.

Each of the three subroutines then defines a functional relationship that is to exist between X, Y, and Z. This permits one loop with instructions to plot an apparently undefined general relationship, fn X(Z), which was actually defined earlier. When we wish to change this relationship to plot a worm or an apple, we redefine it, first in subroutine 2000-2010 and then in subroutine 3000-3020.

When we timed the drawing of the flower, how long did it take? Your time may be different, but ours was two minutes, twenty-eight seconds. The culprit is our error trap in lines 70 and 80, where the program has to make four *if* tests before it can plot each point. Type *70* and then *80* to delete these lines and time the drawing of the flower again, making sure to choose parameters that won't send the plotting off the screen (25,45,40 will work). Much faster, isn't it?

The Truth about Traps. In terms of running time, it would be much better to have a separate error trap for each figure that could be consulted once before the plotting begins. This situation illustrates one of the tradeoffs in programming. Although separate error traps would improve the program running time significantly, *if* tests would then be required for each subroutine. You'd also need to understand the mathematics of the equations in those subroutines.

The following new lines work together to trap errors for the flower by not allowing you to choose parameters that will later try to plot points off the screen. As a result of this, we're limited to whole flowers, but we avoid the agonizing wait. We'll devote a column to errors and error-trapping later.

```
1013 IF X0 - A < 0 OR X0 + A > 279 GOTO 30
1017 IF Y0 - A < 0 OR Y0 + A > 139 GOTO 30
```

This addition works because, in the case of the flower, the point X0,Y0 is the center while A is the length of one petal. The worm also becomes easy because its height is A and its length is 72 (.2 times 360) with an origin also at X0,Y0. The apple requires 2*A in place of A in lines 1013 and 1017. Despite the extra effort, error traps are the mark of a pro. Somebody else using your program isn't going to put up with very many messages saying *break in line nnn* before telling you where to goto.

Mathematical Appendix. All three equations are best expressed in polar coordinates and then converted to normal coordinates by the parametric equations X = R*cos(Z) and Y = R*sin(Z) where R is a radius of one sort or another and Z is an angle in degrees. The first equation, found in subroutine 1000, is, in polar coordinates, R = A*cos(2*Z). It traces out a shape known as a four-leafed rose. The second is nothing but a simple sine wave of the form Y = sin(X).

Our apple in subroutine 3000 is known as a *cardioid* because it also looks like a heart. Its equation is R = A*(1 + cos(Z)). The stem is a straight line *hplotted* in line 150 from the origin to a point whose distance away is a function of the parameter A to keep the size of the stem proportionate to that of the figure.

Cardioids actually lie on their sides with the indentation facing to the left. Normally, a complicated translation of the axes would be required to get a cardioid apple-side up. Instead, a little trick was used. Because the Apple's coordinate system has its origin in the upper left corner, all that was necessary was to swap the X and Y axes and let Applesoft turn the figure upside down automatically. That's why fnY(ZR) shifts to the cosine of Z (and fn X(Z) to the sine) in subroutine 3000 instead of following the other two subroutines.

Enough of math for a while. Next month: Letters to Dear Appley. ∎

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HARD TALK

BY JEFFREY MAZUR

Last month we presented a general introduction to PROMs (programmable read only memory) and EPROMs (erasable PROMs). We also reviewed three boards that allow you to program EPROMs with your Apple, and three cards you can use to interface PROMs and EPROMs with your Apple through one of the expansion slots.

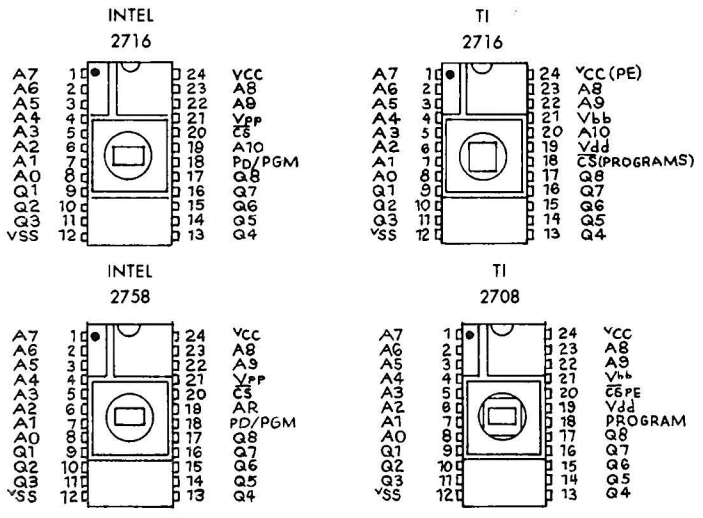
This month we'll give a more technical description of the procedures for programming both the Texas Instruments 2716 and the Intel 2716 EPROMs. Then we'll explain why Microproducts's EPROM programmer is designed to work only with Intel chips and how you can modify it to work with Texas Instruments's EPROMs.

Giving Personality to an EPROM Programmer. The Microproducts EPROM programmer is designed to program only +5-volt EPROMs. But by making a few modifications, you can use this board with a variety of EPROMs.

Refer to figure 1 for the pinouts of the EPROMs we will discuss this month. As you can see, nineteen of the twenty-four pins have the same function for all EPROMs. The remaining five pins reflect the differences between 1K and 2K chips and between Intel (+5V) and TI (+12V, +5V, −5V) types. Note that some pins may have a different function during programming than they have when reading.

All EPROMs require a relatively high voltage during programming. This is necessary in order to create a strong field that places charges into the floating gate region of the cells that are to be programmed to the zero state.

Judging by figure 1, it would appear that only a few minor wiring modifications are necessary to program any EPROM. But there is also a major difference in the way high voltage is used to program the various EPROMs. To be more specific, let's examine the programming requirements for the Texas Instruments and Intel 2716s.



A0 - A10	Address lines		
Q1 - Q8	Data lines	CS	Chip select
Vss	0V (Ground)	Vpp	Programming voltage (25V)
Vcc	+5V	PD/PGM	Power down/Program pulse
Vdd	+12V	Program	Program pulse (25V/1mS)
Vbb	−5V		

Figure 1. Pinouts of various EPROMs.

Programming the TI 2716. The procedure for programming the Texas Instruments 2716 is as follows. First pin 24 (Vcc/PE) is brought to either +12V or ground to convert the data pins to inputs. Next, the address and data lines are set up with the proper information. The address lines specify which byte within the EPROM is to be programmed, and the data lines determine the bit pattern for the eight cells at that location. After information on these lines is stable, a 26-volt program pulse is applied to pin 18 (CS/program). The duration of this pulse should be between 0.1 and 1 millisecond (msec.). The address is then changed to the next sequential location, the new data is set up, and another program pulse is applied. This procedure must be continued until all 2,048 bytes have been programmed (one loop). The entire sequence is then repeated again and again until the number of program loops multiplied by the program pulse width is greater than 100 msec. Thus a minimum of 100 loops is required to program the EPROM. When the last loop is finished, pin 24 is brought back to +5V, which takes the device out of the program mode.

Programming the Intel 2716. To program the Intel 2716, pin

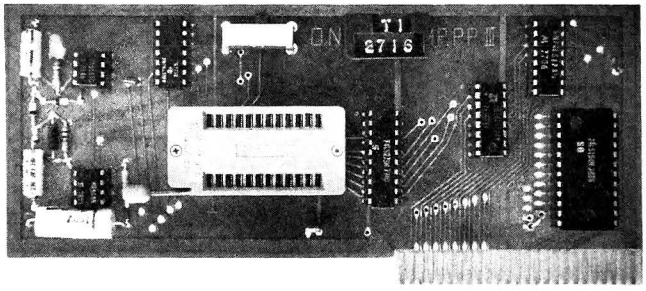


Photo 1. Microproducts EPROM programmer with modification.

21 (Vpp) is brought to +25V. Then the address lines are set up with the location to be written, and the data is presented to pins 9-17. Once the address and data are stable, a 50-msec. high TTL pulse is applied to pin 18 (PGM). This location is now completely programmed and we can move on to the next—not necessarily sequential—location to be programmed. Note that anywhere from a single byte to all 2,048 bytes can be programmed at one time. Bringing pin 21 low disables any further programming.

Making a Universal Programmer. With all this information at hand, we can see the basic differences in the methods of programming the Texas Instruments and Intel EPROMs. Intel requires a steady 25-volt programming source with a TTL pulse, and TI uses a 25-volt programming pulse. Intel also programs each address once with a 45 msec. pulse while TI uses a 1 msec. pulse and must program the entire chip many times in succession.

The Microproducts programmer is designed only for Intel-type EPROMs, so we need to modify both the hardware and the software in order to use it with TI EPROMs. Fortunately, the hardware required to make these changes is fairly simple. To get the most from the programmer, the company decided that all modifications would be made through the use of an added IC socket and DIP component carriers. With those changes, the programmer could work with all of the EPROMs mentioned.

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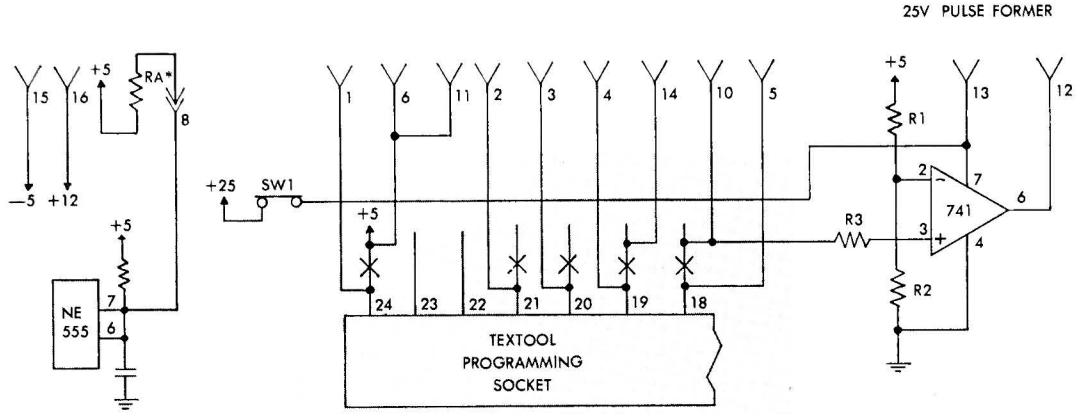
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R4 11K ohm ¼W (on TI only)
Misc. 16 pin IC socket,
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corriers, smoll gouge wire

*R4 only on TI personolity modules.
Shoded oreo is existing circuitry.

Figure 2. Schemotic of chonges to progrommer.

the installation of an extra IC socket. This is done in the location shown in the photos to avoid hitting any circuit traces (except for +5V, which is needed anyway). The remaining wiring is done with 30-gauge wire-wrapping wire, soldering point to point. The only components added to the board are one IC and three resistors, which can easily be supported on the back side of the circuit board. These parts take the 25 volts from the on-board upward converter and generate the 25-volt pulse. An additional resistor is added to the component carriers for the TI personality modules to change the programming pulse from 45 msec. to 1 msec. The schematic in figure 2 illustrates these changes.

Here are detailed wiring instructions for the hardware modification.

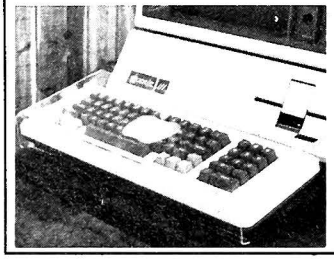
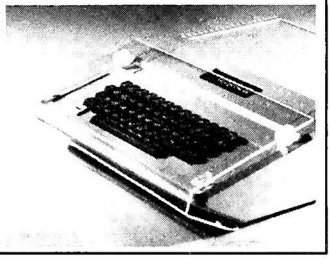
EPROM Programmer Hardware Modification Procedure.

A. Mount the 16 pin IC socket.

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1. Viewing the board from the component side, the socket will be mounted just to the right of the "on" nomenclature by the switch. Pin 1 will be in the lower left corner. Pins 6 and 11 will pass through the thick trace that connects to the +5V bus.

2. After marking the position of the socket pins, use a number 60 drill (or a similar one) to make sixteen holes. Note IC pin spacing is .01-inch pin-to-pin and .03-inch row-to-row; a printed circuit drafting aid can be placed on the board and used as a drill guide. Also, make sure that the holes for pins 6 and 11 are centered on the circuit trace. Vertical position of the socket should be such that the pins are centered between the existing traces on the back side of the board; see photos.

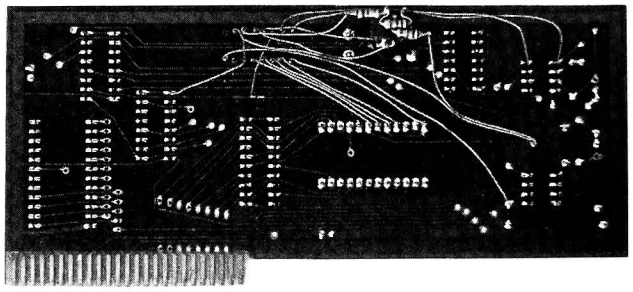


Photo 2. Circuit side of board showing odded wiring ond ports.

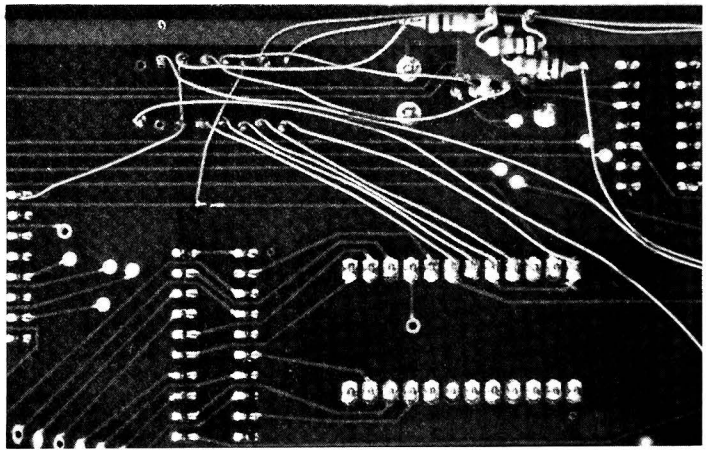


Photo 3. Close-up of odded socket ond 25V pulse former circuit.

3. Mount the socket on the board, making certain that all the pins come through the holes.

B. Isolate the necessary pins of the Textool EPROM socket.

1. Cut the trace from pin 18 to the feed-through hole (this can be done just to the left of the hole).

2. Cut the trace from pin 19 to 74LS174, pin 10 (this can be

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done just over center of 74LS273).

3. Cut the trace from pin 20 to pin 24.

4. Cut the trace from pin 21 to the power switch (on component side of board; this trace goes directly under center of switch).

5. Cut the trace from pin 24 to the +5V bus (on component side, this is the thick trace to the left of the switch).

6. Make sure all traces have been broken completely (use an ohmmeter to verify, if necessary).

C. Add 25V pulse former.

1. Cut off pins 1, 5, and 8 of the LM741 as close as possible to the chip.

2. On the circuit side, glue the 741 "on its back" to the right of the added socket. Wait for the glue to dry before continuing.

3. Cut the leads of the 10K resistors to about ¼-inch. Mount one resistor between pins 2 and 4 of the IC. Connect another resistor to pin 2 and the last resistor to pin 3. See figure 3 for details.

D. Wiring (unless otherwise specified, pin numbers refer to added socket).

1. From the Textool socket to the added socket, connect the following pairs of pins to one another:

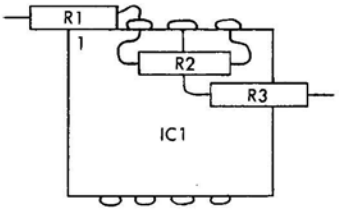


Figure 3. Mounting the resistors.

18—5
19—4
20—3
21—2
24—1

2. Connect pins 6 and 11 of added socket to 74LS174, pin 16. Also connect pin 11 to the remaining lead of R1.

3. Connect pin 8 of the added socket to pin 6 of the lower NE555 IC (junction of 0.1 MFD and 470K).

4. Connect pin 10 to the feed-through hole that was isolated in step B1. Also connect the remaining lead from R3 to this point. Note: both wires go into hole before soldering.

5. Connect pin 12 to LM741, pin 6.

6. Connect pin 13 to LM741, pin 7 and also to pin 2 of the switch (the middle lug).

7. Connect pin 14 to 74LS174, pin 10 that was isolated in step B2.

8. Connect pin 15 to pin 1 of the upper NE555.

9. Connect pin 16 to pin 8 of the upper NE555.

10. Connect pin 4 of the LM741 to ground at one of the switches' mounting tabs.

11. Check all wiring for accuracy and to make sure that there are no solder shorts.

E. Construct personality modules.

1. Intel (5V) 2716, 2758 EPROMs.

On a component carrier, jumper the following pins:

1—6
2—13
3—11
4—14
5—10

2. TI (+12, +5, −5) 2716 EPROM.

a) On a component carrier, jumper the following pins:

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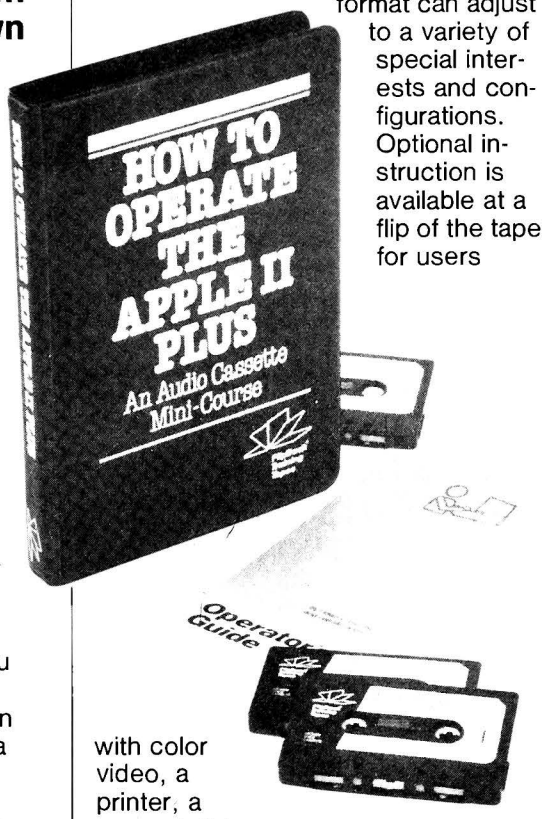
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1—16
2—15
3—14
4—16
5—12

b) Connect an 11K resistor between pins 8 and 11.

3. TI 2708.

a) On a component carrier, jumper the following pins:

1—6
2—15
3—16
4—16
5—12

b) Connect an 11K resistor between pins 8 and 11.

Software Modifications. Using the existing EPROM mover program would be sufficient except that it would have to be run more than one hundred times. With its present timing characteristics, that would make programming time unbearably long. Therefore, two changes are made—the delay time between changing addresses is shortened and a small looping routine is added to make the mover program execute 125 times and then stop. These changes are made from the Apple's machine language Monitor as shown below.

Modifications to the EPROM Mover Program. The EPROM mover program supplied with the programmer loads in from $800 to $9FF. To create a new version for use with TI EPROMs, use the following procedure:

1. Load the mover program from tape or disk.
2. From the Monitor (*call−151* if necessary), enter the following steps:

```
*853:4C F6 <return>
*85B:15 <return>
*9DA:EC 09 <return>
*9EC: 48 A9 7D 8D 01 0A 68 4C 2D 08 <return>
*:CE 01 0A 10 03 4C 51 09 4C 2D 08 <return>
```

3. Save the new version.

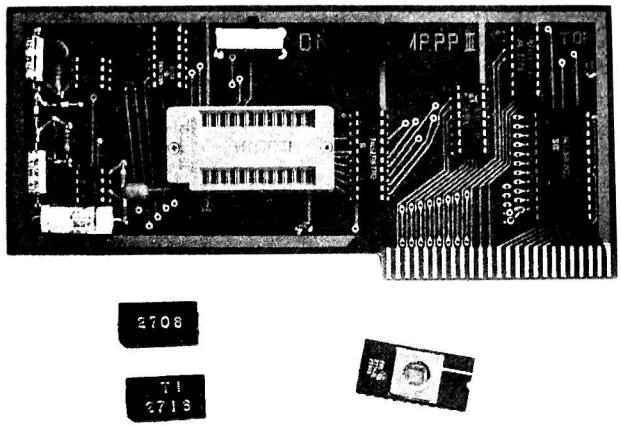


Photo 4. Programmer complete with personality modules.

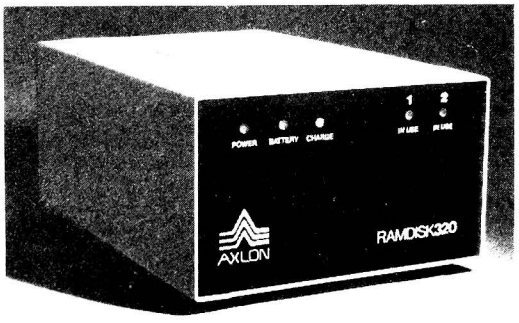
To tape : *800.A00W <return>

To disk : *3D0G <return>
>BSAVE EPROM.MOVER.TI, A$800, L$201 <return>

Similar changes can be made in the Microproducts 4 Character Assembler to enable its EPROM burner feature to work properly. If you have the newer 6 Character Assembler, use the OBJ pseudo-op to deposit the program in RAM; then use the mover program to burn the EPROM.

Armed with these programs and the individual personality modules, you can now program any of the 2708/2716 family of EPROMs. Simply insert the EPROM and its corresponding module and then run the appropriate program to burn the EPROM. When the program finishes, your code is then permanently (that is, until erased) stored in EPROM. ◨

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The Axlon RAMDISK™ 320K Memory System for the Apple II and Apple II Plus* provides access speeds never before available. The Axlon memory system is designed to interact with Apple DOS 3.3* and Apple Pascal 1.1* like two standard floppy disk drives while delivering the lightning fast access speeds of RAM memory. This also leaves 32K of RAM for advanced programming techniques. The interface board is slot independent and draws no power from your Apple. The rechargeable battery system built into the unit provides three hours of backup in the event of a power loss. Drop by your local Apple dealer or contact Axlon, Inc. for more information.

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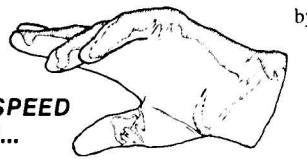
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- Same size as the Apple Disk II* Drive
- Invisible memory refresh - even with the Apple turned off
- Rechargeable battery system built-in to provide 3 hours of auxiliary power
- Slot independent interface board - draws no power from your Apple
- All firmware is in static RAM on the interface board
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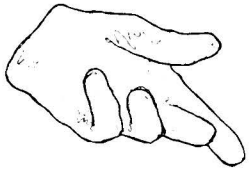
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Disassemble memory	Move memory	Search string array
Dump variables	Multiple poke decimal	Speed up Applesoft
Find substring	Multiple poke hex	Speed restore
Get 2-byte values	Print hex $	Store 2-byte values
Gosub to variable	Print string	Swap variables
Goto to variable	Print w/o word break	

These routines and more can be attached and accessed easily. For example, to allow typing of commas and colons in a response (not normally allowed in Applesoft), you simply attach the Input Anything routine and put this line in your program:

```
xxx  PRINT "PLEASE ENTER THE DATE.  "; : & INPUT,DATE$
```

Price:$75

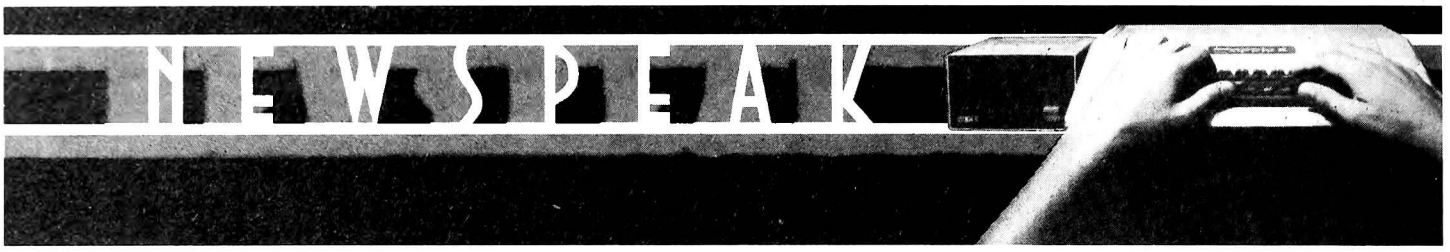
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☐ **Over Here.** Foreign competitors, claiming superior research and development of new technology, have long been threatening to outpace American companies in the marketplace.

Several large American semiconductor companies have joined to form the Semiconductor Research Cooperative to beef up basic research in universities. Mounting foreign competition and a shortage of highly trained engineers and scientists are seen as the symptoms; not enough money for research is the disease.

Carried out through contracts with universities and nonprofit research organizations, the research cooperative's emphasis will be on long-term projects of three to ten years' duration. Sponsored by the Semiconductor Industry Association in Cupertino, California, the Semiconductor Research Cooperative's chairman is Erich Block of IBM. The proposed budget for the first year is six million dollars.

Integrated circuit use, design, and manufacture will be a main focus of effort in the program. Computer-aided design and the use of materials like gallium arsenide for advanced chips are possible research subjects. Participating companies theoretically will be able to use the results from participating universities in product development and the creation of advanced technology.

But those results may be a while coming. In the beginning, participating companies' financial contributions will look like prepayment of royalties. Nonetheless, the cooperative has reportedly been greeted with enthusiasm in both academic and semiconductor circles.

☐ **Maybe Next Year.** According to Coopers & Lybrand, the world's largest accounting firm, there are three kinds of favorable tax treatment available to buyers of computer software as the result of the Economic Recovery Act.

The Los Angeles based firm says the most aggressive method is to treat the costs of purchased but customized software as a current expense. If it can be shown that the risk of the usefulness of the software is borne by the taxpayer, such costs are deductible for tax purposes.

You may also be entitled to a research and development tax credit for the cost of software if you capitalize the amount and amortize it over the useful life. The IRS has attempted to treat computer software as an intangible asset if bought separately from hardware. Intangible assets are eligible for amortization over a short life, as opposed to being depreciated over five years, under the tax laws.

If the software can be classified as tangible personal property, an investment tax credit and a five-year depreciable life are available. To achieve this, off-the-shelf characteristics must be identified—the software must be purchased as a standard program package.

Personal computer owners as well as businesses should be able to take advantage of these tax benefits. David Oifer, a partner in the firm, maps out a course of action: "It clearly is in the interest of the taxpayer contemplating purchase of computer software to review the tax situation involved and incorporate tax planning into the contractual agreement with the software vendors."

☐ **Innovative Wrongdoing.** The American Academy of Achievement had its twenty-first annual Banquet of the Golden Plate June 26 in New Orleans, Louisiana. The affair "salutes captains of achievement from America's great walks of life and honor students from across the nation." Apple board chairman Steven Jobs was in attendance to address the young honorees.

"One of the funny things about being bright," he observed, "is that everyone puts you on this path—go to high school, go to college . . . but you might want to think about going to Paris and being a poet for a few years, or go to a Third World country. See lepers with their hands falling off. Fall in love with two people at once."

Another funny thing about being bright would appear to be an unusual sense of what is alluring.

Jobs continued:

"If you're going to do things that are innovative—connect two experiences together—you can't go after the same bag of experiences that everyone else does or you're going to make the same connections everyone else does and you're not going to be innovative.

"We're all taking things from the same giant pool. The most ecstatic feeling in the world is to put something back in that pool."

Dr. Marvin Minsky of MIT's department of artificial intelligence recalled, "The first time you do something, it's awful. I simply taught myself to like suffering and to like doing things badly for a while. You look at the difference in the improvement and it's great; it's fun. It's a lot better than doing something well.

"Computer science is going to be the largest industry in the world . . . it hasn't flattened out; it's going to grow for the next fifty years and the next three hundred years, because computers are going to start cleaning the floor, filling potholes in the street—and that's going to be our salvation.

"There's something called basic research that is suffering very badly in this country, and I want to encourage some of you to get into that; to say, 'Am I doing something that's going to make fundamental advances in all fields, or is it just a little bit of marketing or engineering that makes a gadget?' "

☐ **Bencher Liberation.** Before *elegant* became another buzz word for *expensive* when applied to cars, watches, and condominium living, the word was (and still is) a mathematical term for precision, neatness, and simplicity.

Elegance is more than just a word in the world of computer design engineering, it is a necessity. If anything needs to be elegant today, it is the tiny chips and circuits that populate computers.

Achieving a refined gracefulness of concept comes only after much hard work. The pursuit of elegance is a combination of experience, intuition, and persistence. It can often result in a moment of Zenlike satori, or enlightenment, as engineering solutions seem to appear magically on a complex schematic drawing.

All this—providing the designers aren't too involved with tedious clerical work to notice. Theirs is a world of reference manuals, standard formulae, and specification sheets. A lot of pencils get pushed as designs are manually checked for errors, corrected, and modified, usually a three to four week process. At the bench level of engineering, between the logic capture, the documentation, and the calculation, who has the time for elegant thinking?

Today's computer market demands competitive innovation; companies are pressed to be the firstest with the mostest. This is making products more complex than ever before, yet they seem to have a shorter life span. Second generation products are released seemingly be-

fore the first are settled on the shelves.

Computers themselves have been gradually taking over the back end of the computer design task during the last decade. Developing prototypes and manufacturing are two areas man has gradually given over to the machines. The front end of the design business, at the bench where the engineer works, is the next area scheduled to be opened up to microtechnology, freeing the designers to do what they do best: design. Spending less time calculating and capturing logic, they'll spend more time thinking through implications, analyzing their work, considering alternatives. . . .

In other words, thinking elegantly.

The engineering system that can do this job has been introduced by Mentor Graphics of Portland, Oregon. Called the Idea 1000, it's the first totally integrated computer-aided engineering system. Its credentials: local processing and mass storage at each work station, interactive simulation, and high-speed local networking with a distributed database. Logic designs can be created, captured, analyzed, verified, and documented by computer—tasks previously done by hand.

All of this can now be done before any prototype is constructed, and done in minutes and days instead of days and weeks.

The Idea 1000 system consists of an Apollo Domain computer, its Aegis operating system, and six application software packages. It can be used as a stand-alone engineering station or as part of a network of as many as two hundred stations. The system's power grows with each new addition, unlike most micro or mini processor networks.

The applications programs are: *Structured Logic Design*, an intelligent graphics editor that creates and captures logic diagrams; *Interactive Logic Simulation*, which can build designs either top-down or bottom-up; *Project Communications*, with electronic mail capabilities; *Document Preparation*, which integrates text and graphic information; *Outputs*, which transfers designs to other systems or simulators; and a custom application program that allows designers to write their own analysis routines.

Statistics show that design engineers only spend 50 percent of their day actually designing. The other half is taken up with paperwork. The Idea 1000 looks as if it's going to alter this ratio radically.

An elegant solution, don't you think?

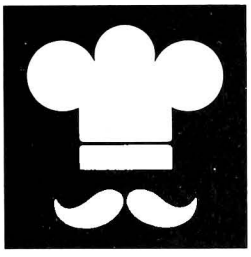
☐ **Pass the Chips.** According to some estimates, sales of 64K dynamic RAM chips will reach one billion units per year by mid-decade. Not quite an industry standard yet, 64K RAM chips posted about $100 million in sales during 1981.

Intel has just announced the release of its second-generation 64K dynamic RAM, the 2164A. The company's first-generation product was withdrawn from the market because of difficulties encountered in certain memory system applications. Intel decided to go ahead with the second-generation product rather than spend money to correct the first one.

Intel's innovative use of redundancy is one of the most interesting features of the 2164A. Basically, a redundant device has extra columns or rows. When leading-edge technology products like the 2164A are made, any minor extraneous impurity in the basic silicon wafer can cause failures to occur in specific bit areas. Redundancy eliminates the requirement to dispose of an entire chip when there's a processing error in a single bit. Because extra rows and columns exist, a bad bit location can be disabled and a new site included.

The 64K chips are expected to be the largest memory market in history. In 1977, 4K RAM chips hit their peak sales of $145 million. The peak year is projected to be 1982 for 16K chips, with sales close to $500 million. The acceleration progression gains emphasis when you consider that Intel introduced the first 1K dynamic RAM in 1970. Now, industry-wide sales of 64K dynamic RAM chips are estimated to peak at $1.5 billion in 1985 or 1986. ❑■

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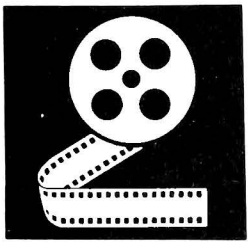


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All About Applesoft

by Doug Carlston

When last we met, we designed a memo minder, a worthy and estimable project indeed, but one that fell just a trifle short on color graphics. So this month, in retaliation, we'll return to graphics, the principal reason so many of us chose the Apple in the first place.

As you probably remember, the Apple has two graphics modes. Applesoft contains a set of commands for drawing and manipulating shapes in the high-res mode. These commands (our only new vocabulary for the month) are:

SCALE	ROT	DRAW

We're going to draw what are called vector shapes and save them in tables in the computer's memory. The Applesoft manual contains a whole chapter dedicated to a discussion of these shape tables, a chapter that should receive the Warren G. Harding Memorial Award for Obfuscation through Indirection and Vagueness.

Vector shapes are shapes that are drawn with short lines (vectors) rather than with dots. One advantage of drawing shapes with vectors is that you can scale them up or down in size rather easily. For example, if you want to make a shape twice as big, you just double the length of each of the lines in your shape. Another advantage is that you can rotate the shape on the screen fairly simply. We'll be discussing how to do both of these manipulations in a little bit.

Right now we're going to build a program that lets us draw a shape and manipulate it on the screen. Next month we'll write a program to handle most of the detailed pencil work that goes into creating a shape, but we'd better work our way through the process by hand first, just so nobody thinks that it's all done by voodoo (although a strong argument to that effect can still be made).

A shape table can contain any of eight different commands. Half are *move* commands; the other half are *plot and move* commands. Each has a numerical value, as shown in table 1.

Dot, Dash, Dot. Imagine that you have a cursor on the hi-res screen. The move commands will cause the cursor to move one dot in the appropriate direction. The plot and move commands will plot a short line from the current position to the next dot in the appropriate direction.

Your entire shape can be made up of a series of these commands. If you have graph paper available, you can figure out your shape by sketching your object on the graph paper and then redrawing it in connect-the-dots fashion, waving a single line along the lines of the graph paper, using move and plot as much as possible and move only whenever you need to lift your pencil from the paper.

In this manner you should be able to convert your sketch into sequence numbers. Let's take an example. Look at this simple shape:



If we want to convert this cross to a shape table, we'll have to follow the motion of our pencil as we draw the cross. Imagine that we start by placing our pencil at the bottom of the vertical line. We then move upward three dots. Translated into shape table commands, that means that we move and plot upward three times (giving as the first three numbers in our preliminary shape table: 4,4,4). We might then move twice to the left without plotting (3,3), then downward once without plotting (2) to position ourselves for the cross stroke. We can then finish it off with four move right and plots in a row (5,5,5,5). Our preliminary table, when finished, would look something like this:

4,4,4,3,3,2,5,5,5,5

This is a preliminary shape table, not a finished one. We still have some work to do on it. The first thing we want to do is compress its format so that it doesn't take so much memory (computer people are very thrifty). Now it happens that every byte of memory can store an integer from 0 to 255. Therefore, it occurred to one of Apple's thrifty founders that it would be possible to store at least two of these shape table digits in each byte. With this in mind, we are going to do a little manipulation that turns each pair of numbers into a single large number.

First off, let's divide our preliminary table into pairs; thus:

4,4
4,3
3,2
5,5
5,5

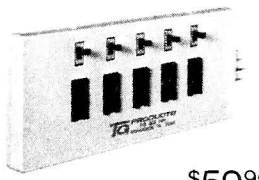
Move Only		Plot and Move	
Up	0	Up	4
Right	1	Right	5
Down	2	Down	6
Left	3	Left	7

Table 1.

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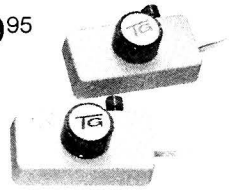


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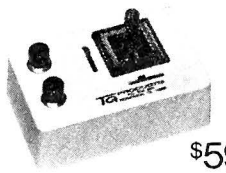
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Now we'll convert each pair into a single number by multiplying the second number by 8 and then adding in the first one:

```
4,4    4 + (8 * 4) = 36
4,3    4 + (8 * 3) = 28
3,2    3 + (8 * 2) = 19
5,5    5 + (8 * 5) = 45
5,5    5 + (8 * 5) = 45
```

Now We're Cooking. You can easily separate out the first and second digits from these new numbers—just divide by 8. The remainder is the first digit; the quotient is the second digit.

Next there are a few trimmings to add, and then our shape table is done. Every shape table needs a table of contents at the beginning. This consists of four numbers if the table has only one shape in it (it can have as many as 255).

The first number is the number of shapes in the table. The second number is completely irrelevant and is stuck in merely as evidence that, however thrifty programmers may be, they are nonetheless human and foul things up on occasion. Most people just type a 0 here, but you can actually type any number you please.

The third and fourth numbers act as a pointer telling how far it is from the beginning of the shape table to the beginning of the first (and, in this case, only) shape in the table. Take the first number in this pair and add it to the product of the second number times 256, and the result tells you how far it is from the beginning of the shape table to the shape you are looking for. In the case of a shape table containing only one shape, the distance is always 4, but if you had two shapes you would have to figure the length of the first shape in order to calculate the starting point of the second one.

This is not of great importance to us now, since we are only going to build a one-shape table. However, it should be clear that a shape table can get a lot more complicated if you build a table with many shapes in it, since the table of contents needs a pointer to the beginning of each shape. We'll have to come back to this and look at it in greater detail some other time. But for the time being, what we've done here will suffice.

Our shape table now looks like this:

```
1 0 4 0 36 28 19 45 45
```

We have to add one last thing: a zero at the end of the table. Then we're done! Now all that remains is to figure out what to do with it. (The use of a zero to indicate the end of a shape in a shape table does have one unfortunate consequence that we ought to mention before we go on—the move up command is a 0, and if you use two move up commands in a row, you could generate a 0 in your table that would be mistaken for an end-of-shape zero. So don't.)

Hide and Peek. Shape tables generally get poked into some unused part of your Apple's memory for later reference in your program. There are several good places to put such tables. If you have a very short one, you can sneak it into the beginning of page 3 ($300 hex or 768 decimal), which is right below the text page area. Or, if you have more than 16K of RAM in your Apple and are not going to be using your second hi-res page, you can load your table at $4000 hex (16,384, for those who persist in thinking in decimal). A third good location, if you only have 16K, is just underneath the hi-res pages, say $1D00 (7,424 in decimal). Let's use 7,424 for this example.

Here's one way to poke the table into memory:

```
10 FOR X = 7424 TO 7433: READ A: POKE X,A: NEXT X
20 DATA 1,0,4,0,36,28,19,45,45,0
```

Now we have to tell the Apple where we've hidden the shape table. (You might think your Apple would be aware of our efforts to date and might be sufficiently astute to have figured out what it is we're trying to do. Although it is undoubtedly true that all Apples are not created equal and that some are more perceptive than the rest, it is too much to expect the garden variety Apple to follow this column with a great deal of comprehension, particularly considering the subtle allusions and delicate nuances that color so many of our discussions.)

There's a pair of memory locations in which Apples customarily keep the starting address of shape tables. They are decimal locations 232 and 233. The reason you need two memory locations to store a single address is simple: one memory location (called a byte) can only store a number between 0 and 255.

In order to store a big number (like 7,424, for example), we have to use two bytes. The way we do this is similar to the way we "unpack" the pairs of numbers in shape tables. First we divide our big number by 256. Then we poke the remainder into location 232 and the quotient into 233. This allows us to store numbers up to 65,535 in a pair of bytes (which just happens to be all of the addressable space in a 48K Apple).

So let's do it. Dividing 7,424 by 256 we get 29, with no remainder. So we add the following statement to our program:

```
30 POKE 232,0: POKE 233,29
```

Now we're ready to draw our shape! Here's a little program that does just that:

```
40 TEXT: HOME: INPUT"SCALE = ";SC
50 INPUT "ROTATION = ";RT
60 INPUT "COLOR = ";CLR
65 HGR: X = 100: Y = 100
70 SCALE = SC: ROT = RT: HCOLOR = CLR
80 DRAW 1 AT X,Y
90 GET A$: GOTO 40
```

Lines 70 and 80 contain all the new vocabulary. You can fiddle with scale and rot when you run the program. Scale sets the size of the shape and runs from 1 (small) to 255 (very huge). Zero is treated as the largest size of all, so it is best ignored. Rot runs from 0 to 64. The number of actual rotation positions increases as the scale increases. Fine adjustments of *rot* at the smaller sizes will not result in any changes at all.

Line 80 uses the draw command. Read it like this: *draw (shape number) 1 at (x coordinate) 100, (y coordinate) 100.* You may want to play with this routine some by putting lines 70 and 80 in a loop and gradually changing the values of X, Y, SC, RT, and CLR.

Next time we'll design a little utility that helps us put shape tables together and save them to disk or tape. In the meantime, practice up on those shape-drawing commands! ◻■

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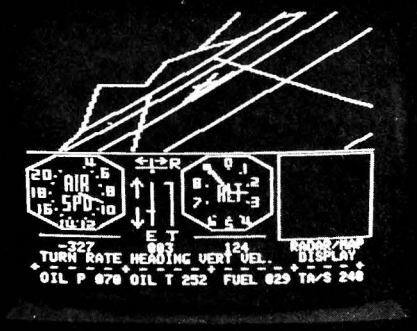
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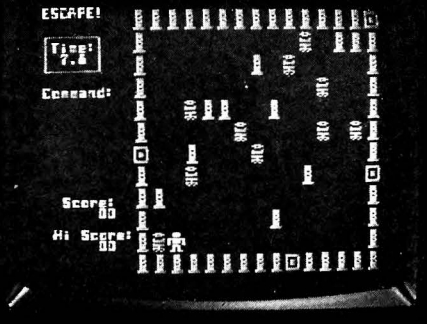
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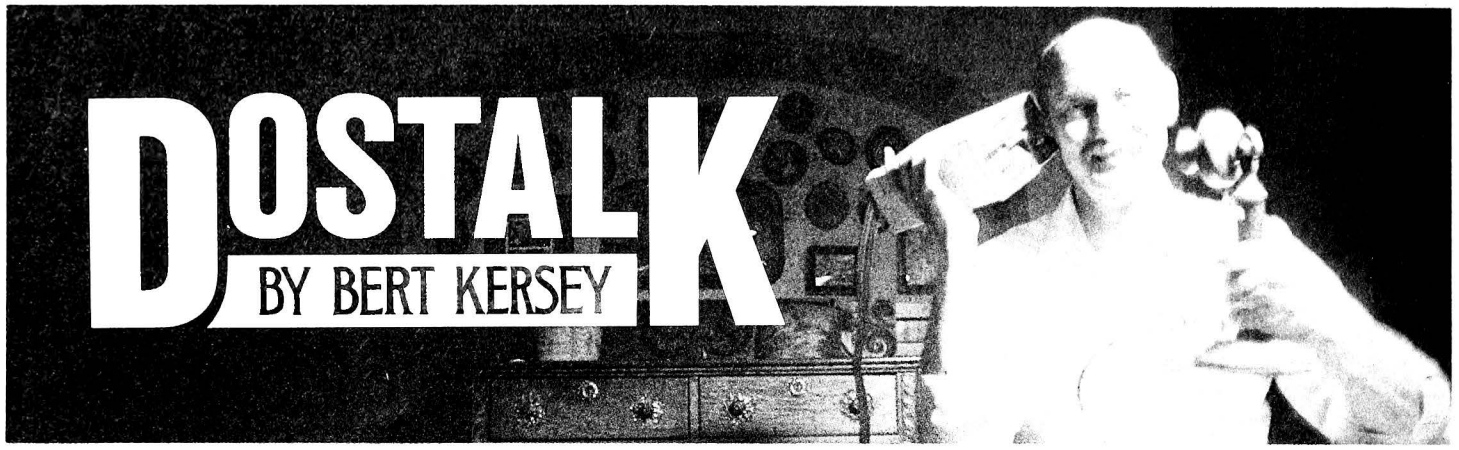
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DOSTALK

BY BERT KERSEY



Last month, we promised you a few more Apple utility programs. Well, stay tuned; we'll get to them in a paragraph or two. But first, we've got some mysteries of the month to unravel.

Pr#4 Mystery. In April, we scratched our heads over this little two-liner:

```
10 PR#6: REM DISK DRIVE SLOT
20 PR#4: REM EMPTY SLOT
```

The question is, why doesn't running this program boot your disk when line 10 is encountered instead of (apparently) jumping to line 20 and hanging there because of the empty slot? And why, if you delete line 20 or trace the program, does the disk then boot? We were swamped with answers and comments ranging from, "Come *on,* that's *easy*!" to, "I give up; *help*!" Everyone who figured it out seemed to agree on this rather machine-language answer.

All the command pr#6 does is store a number ($C600) in page zero at locations $36 and $37. Slot 6 will *not* be activated until something, anything, is printed via COUT. Without line 20 (which stashes a $C400 at $36 and $37), a carriage return is printed. With trace in effect, line numbers are printed. If you add just this line:

```
15 PRINT
```

the program behaves more "logically," booting your disk as expected and never encountering line 20. Thanks for all your input on this one, but where were you the following month?

Is-the-Printer-On? Mystery. In May we asked if anyone knew a way, under program control, to detect a printer that is turned off (or simply not connected) and to print a message to that effect on the screen. Most programs skid to a hanging halt when an off-line printer is encountered, often leaving you wondering what's wrong. Most *Softalk* readers were apparently mystified, avoiding this challenge like the mnemonic plague. But a few of you realized that there is indeed a way to do it. It's as simple as this:

```
1010 VTAB 21: PRINT "PLEASE TURN ON YOUR PRINTER."
1020 PR#1: PRINT
1030 HOME: REM CONTINUE PROGRAM
```

If your printer is on, the screen message from line 1010 will be printed, but will be erased immediately by line 1030's home. If your printer is off or disconnected, the program will hang but the message will stay on the screen! Almost too easy, isn't it? You can use this as a subroutine every time a program starts to print. It's one more way to make your printer programs more friendly.

You'll find another interesting mystery at the end of this column. See if you can crack it. But now, on with the utilities.

Note: This utility requires a 48K Apple with standard DOS in memory.

Cat Killer. DOS's catalog routine features a minor, but unnecessary, annoyance that we're about to do away with. When you catalog a disk and the screen is full of file names, the catalog routine pauses, waiting for a keypress before it continues with the next "page" of file names. But if you don't want the catalog to continue, you must (gasp!) hit reset. The disagreeable things about this procedure are:

1. the top file name sometimes scrolls up out of sight—inconvenient;
2. you get *two* flashing cursors on the screen—messy; and
3. the beep wakes up my dog Sophie—dangerous.

It's possible to venture into the Monitor and make some alterations. Why not? Don't be afraid if you're not experienced at machine language; just read and type along. Things won't get too technical. Type these two direct keyboard commands:

```
CALL -151 (return)
AE2FL (return)
```

What you just did is enter the Monitor and list part of DOS's catalog routine, the machine language instructions that tell your Apple what to do and when to do it. Notice the fifth line after your AE2FL command:

```
AE39-    20 0C FD    JSR $FD0C
```

This is the command that triggers the screen-full pause. It says, "Jump to the SubRoutine at location $FD0C" (that's 64780 in decimal). From an Applesoft program, you would say *call 64780.* Your program would halt until any key was pressed and then continue.

Calling It Quits. Let's change our machine language instructions by adding a little subroutine that quits the catalog procedure if control-C is pressed and continues it if any other key is pressed. The first question is, where do we put this subroutine? Inserting it just anywhere between other commands is not as practical in machine language as it is in Applesoft. Page 8-37 of *Beneath Apple DOS* reports that locations $BA69 through $BA95 (47721-47765) are unused in DOS 3.3. This is a handy location for very small subroutines because it's protected by DOS—it won't be erased by normal programming procedures. Let's change the catalog routine so it jumps to the "empty" location, $BA69, instead of to $FD0C. From the Monitor type:

```
AE3A: 69 BA (return)
```

Repeat the list command, *AE2FL* (return), and notice the change in the fifth line, which now reads:

```
AE39- 20 69 BA    JSR  $BA69
```

If you were to catalog a disk now (don't do it yet) with more than one page of file names on it, your Apple would crash into the Monitor (requiring you, in this case, to reboot) because you'd have caused a jump to an unprogrammed location, $BA69. Before cataloguing, let's install our subroutine.

Enter the Monitor if necessary *(call -151* again) and carefully type:

```
BA69: 20 0C FD C9 83 D0 03 4C 2C AE 4C 3C AE 00 (return)
```

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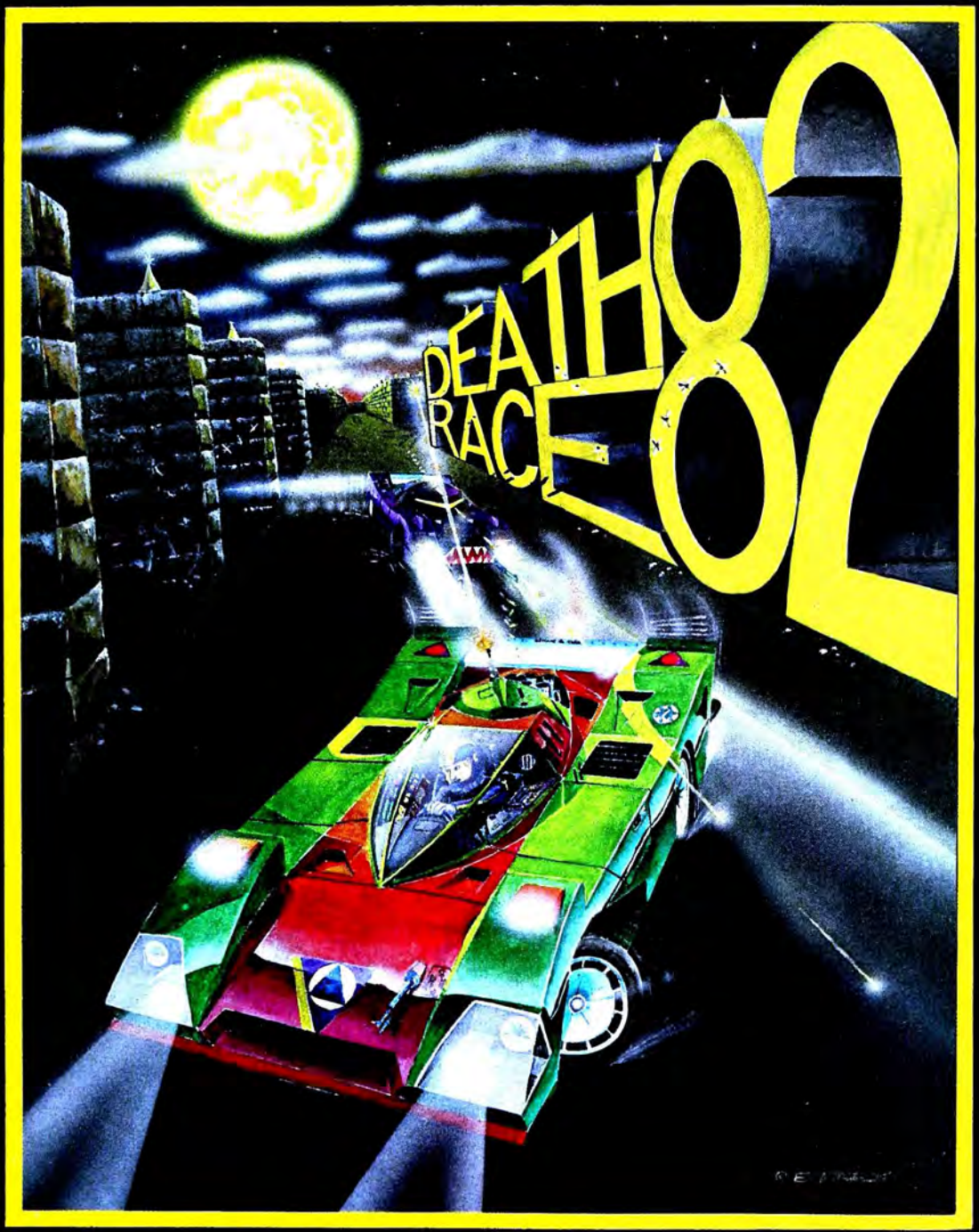
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Be careful; those 0s are zeros, not letter Os. And be sure to type the colon and spaces exactly as shown. Now list what you've just entered by typing:

```
BA69L (return)
```

The top five lines on the screen should read:

```
BA69-   20  0C  FD   JSR  $FD0C
BA6C-   C9  83       CMP  #$83
BA6E-   D0  03       BNE  $BA73
BA70-   4C  2C  AE   JMP  $AE2C
BA73-   4C  3C  AE   JMP  $AE3C
```

Simply stated, line 1 says, "Wait for a keypress." Line 2 says, "See if the key pressed was a control-C ($83 or 131)." Line 3 says, "If it wasn't a control-C, jump to line 5." Line 4 says, "Jump to location $AE2C (which continues the catalog procedure)."

Reenter Basic by typing:

```
Control-C (return)
```

Now catalog a disk with at least a couple of dozen file names on it. After the first pause, type a control-C and watch as a nice, tidy (and silent) prompt and cursor appear! You may even type control-C *while* the catalog is printing.

To accomplish the above DOS patch, we had to change the values of sixteen memory locations. Well, there's more than one way to kill a catalog; you can produce the same effect with sixteen Applesoft pokes. Put these pokes in a disk's greeting program and *Cat Killer* will be in effect whenever you boot that disk:

```
1000 POKE 44602,105: POKE 44603,186
1010 POKE 47721,32: POKE 47722,12: POKE 47723,253:
     POKE 47724,201: POKE 47725,131: POKE 47726,208:
     POKE 47727,3: POKE 47728,76: POKE 47729,44:
     POKE 47730,174: POKE 47731,76: POKE 47732,60:
     POKE 47733,174: POKE 47734,0
```

These pokes write our changes into memory only. To write them permanently onto a disk, simply execute the pokes, then init a new disk.

Well, as they say, one good tip leads to another, and here's another.

Cat Tracer. Apple users everywhere use this catalog trick, and the *Cat Killer* program just given makes it work even better.

To access a file from a catalog that appears on the screen, hit control-C (if you have no prompt and cursor) and move the cursor up next to the file's name by hitting escape and typing I as many times as necessary. Then type the appropriate DOS command (run, load, bload, delete, or whatever) and trace over the file name using the repeat and right arrow keys. Hit return and you've executed the command without having to type the file name! It's fast, it's easy, and it's almost impossible to misspell a file name. Long file names become much more practical this way. If an error occurs (assuming there aren't any hidden control characters in your file name), you probably traced over one or two *sector numbers* after your DOS command. You need to erase these numbers as you meet them by typing between the DOS command and the file name.

Just for fun, here's a little non-DOS trick that won't let you execute a file name trace. It serves no practical purpose (except maybe as a practical joke), but give it a try anyway:

```
10 PRINT CHR$(4); "CATALOG"
20 FOR X=1 TO 47 STEP 2
30 S=SCRN(7,X): IF S=12 OR S=13 THEN COLOR=S-4: PLOT 7,X
40 NEXT X
```

After running this program, try to trace your cursor over one of the file names. Good luck! The plot statement in line 30 converts the first character of each file name to a visible control character (on the screen, not on the disk)—and you can't trace over a visible control character!

Exec Lister. Last month, we fooled around with DOS's exec command. Among other things, *exec* lets you call upon a series of commands that you've stored on disk. You simply write the commands to disk as a text file and then exec the text file. There's no need to remember the commands later, and there is no need to load a program to do the job for you. Whatever program is in memory will stay intact while the text file is being executed.

Let's create a utility that will send program listings to most printers in eighty columns. To do this, you need to communicate the following keyboard commands to your Apple:

```
PR#1: ACTIVATES PRINTER IN SLOT 1
PRINT "(ctrl-I)80N":REM TURN OFF SCREEN OUTPUT
LIST
PR#0: REM PRINTER OFF
```

To write a text file consisting of these commands, type and run this program:

```
10 D$=CHR$(4): REM (ctrl-D)
11 Q$=CHR$(34): REM QUOTE MARK
12 I$=CHR$(9): REM (ctrl-I)
20 PRINT D$; "OPEN LIST80": PRINT D$; "WRITE LIST80"
30 PRINT "PR#1"
40 PRINT "PRINT "; Q$; I$; "80N"; Q$
50 PRINT "LIST"
60 PRINT "PR#0"
70 PRINT D$; "CLOSE"
```

Running this program will write a text file on disk called *list80*. Notice that in order to put quotation marks, **CHR$(34)s**, inside print statements, we defined the string **Q$** in line 11 and used it in line 40. The object is to get the commands to print on the screen exactly as if we had typed them in.

To use *list80*, load any program, especially one with some fat program lines, and type:

```
EXEC LIST80 (return)
```

To proofread an exec utility as it executes, type the direct command, *MONICO* (return), before you exec; this will cause the disk output to be printed on the screen.

DOS Mystery of the Month. This problem actually came up on a rather complex mailing list program when a *disk full* error occurred. The program below demonstrates the dilemma just as well, but with a different type of error:

```
10 D$=CHR$(4): INPUT "TEXT:";T$
20 PRINT D$;"OPEN FILE"
30 PRINT D$;"WRITE FILE"
40 PRINT T$
50 PRINT D$; "CLOSE FILE"
60 PRINT D$; "LOCK FILE"
```

Run the program and enter anything you want in answer to *text*. Everything should work without a hitch; the **T$** string from line 10 is written to the disk as a text file and the file is closed and locked.

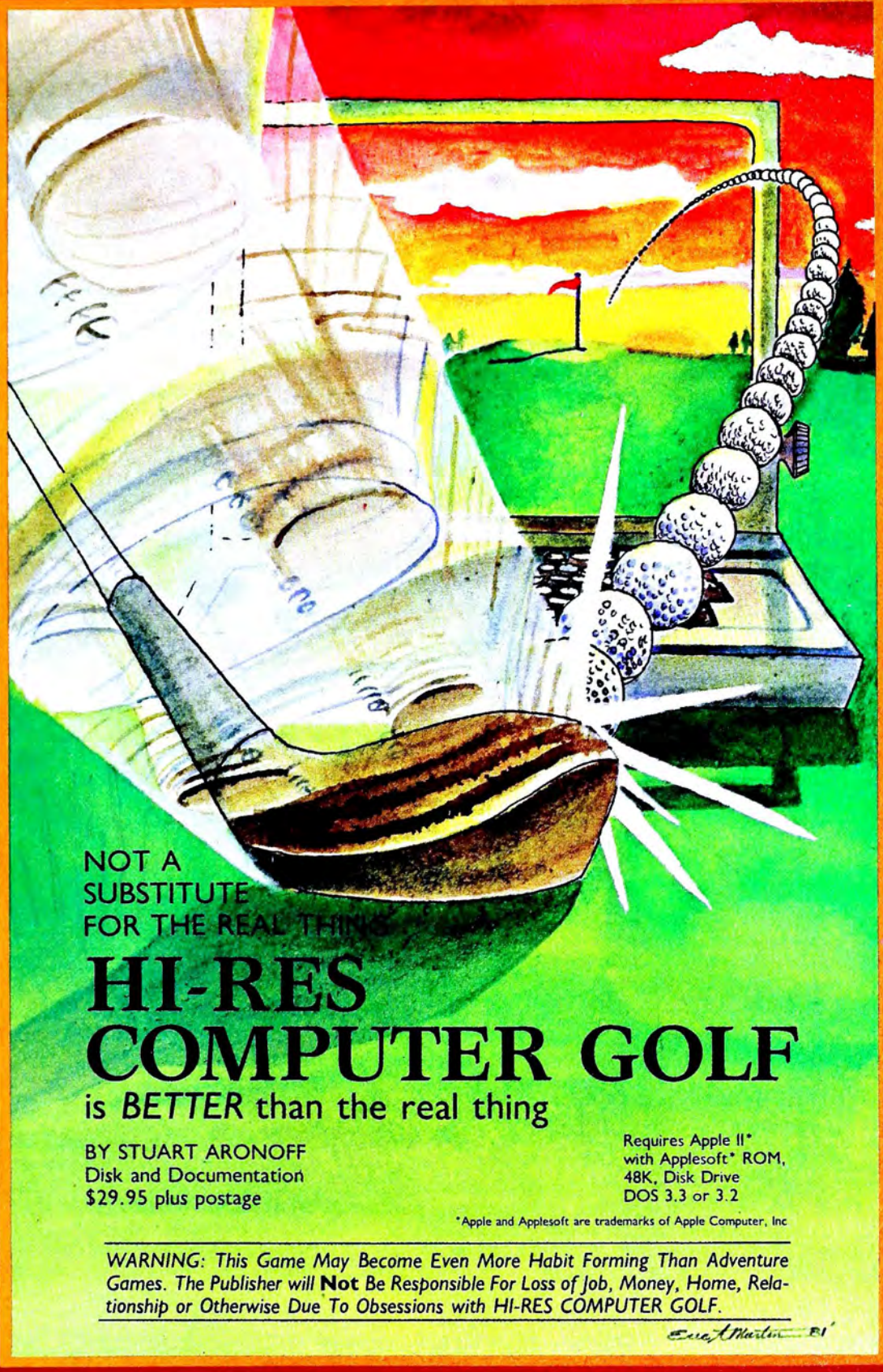
Now, run the program *again*. It will, of course, bomb at line 40 because the file, "*file*," is locked. No problem, right? Just unlock the file with the direct command, *unlock file* (return). Now, to prevent T$ from losing its identity (which would happen if you typed *run*), type *goto 20* (return). Now you get a not direct command error message. Unfair! Why are we unjustly accused of an illegal direct command? And more important, how can we get this program to continue with a *goto 20* command? If you know, drop me a line in care of *Softalk* and I'll report the results.

Until next month. . . .

Correction to the June 1982 DOStalk: The listing that appeared on page 192 contains a misprint in statement number 50. It should read:

```
50 PRINT "TYPE NAME #";N;
```

Thanks to Paul Rego of Albuquerque, New Mexico, for making us aware of this error. ◨



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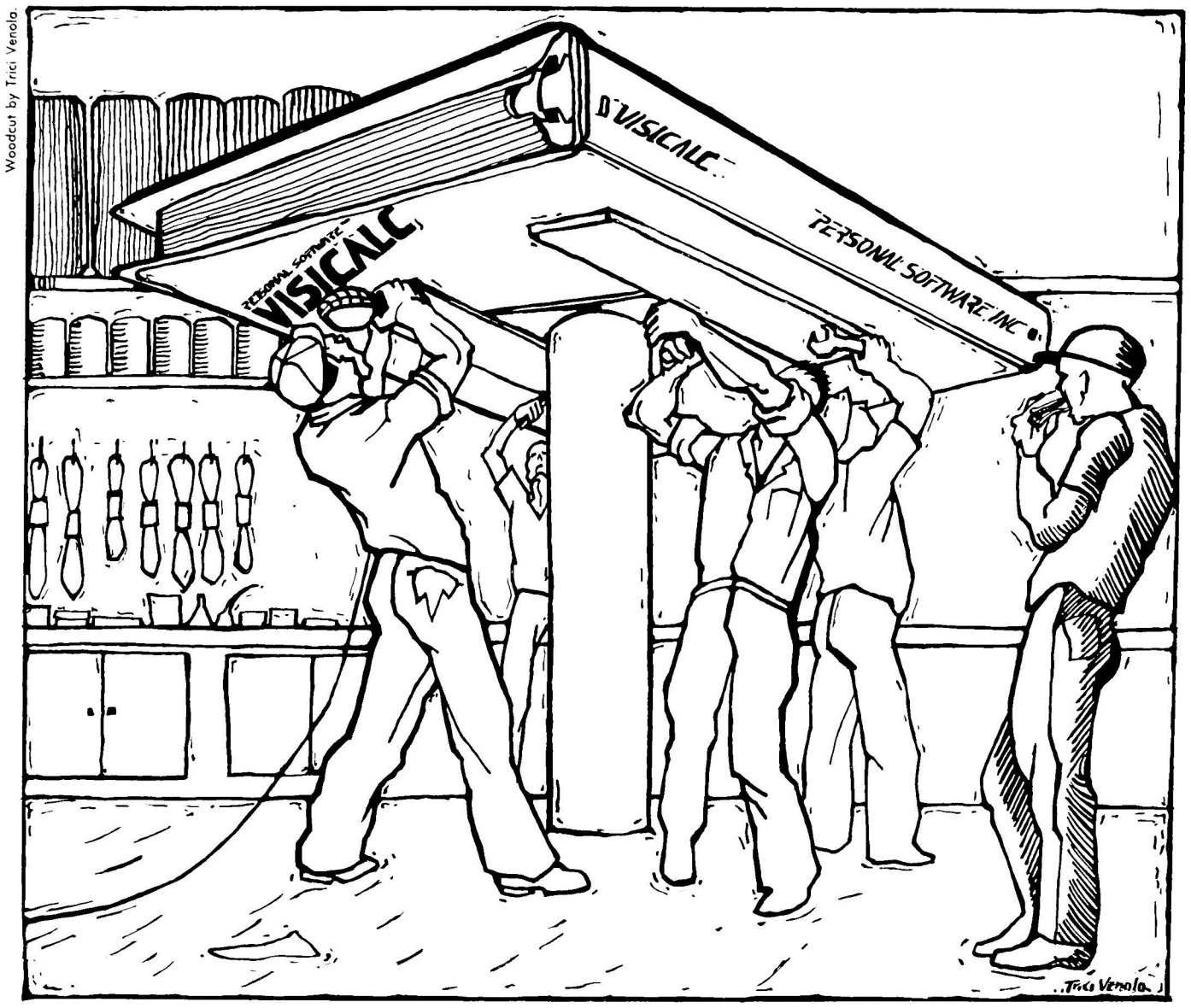
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The Customization of VisiCalc

For the Apple III

BY JOE SHELTON

VisiCorp unveiled *VisiCalc Advanced Version* and *VisiSchedule* for the Apple III at the National Computer Conference in Houston, Texas, in early June. Both are aimed at the professional and corporate world and provide a new spectrum of capability for the Apple III.

VisiCalc Advanced Version. What does a company do for an encore when it already markets *VisiCalc,* the most significant software ever designed for any computer? If the company is VisiCorp (formerly known as Personal Software), it introduces a better *VisiCalc* known as *VisiCalc Advanced Version.*

VisiCorp introduced the original 13-sector Apple II version of *VisiCalc* almost three years ago. Since then, *VisiCalc* has become the best selling software product in the history of computers. It is probably responsible for the personal computer industry having grown as rapidly as it has. *VisiCalc* is now available for about a dozen different microcomputers, including the Apple II and the Apple III.

VisiCalc Advanced Version is not a replacement for *VisiCalc III. VisiCalc III* will continue to be available. If *VisiCalc Advanced Version* isn't a replacement, then, what is it? A project manager at VisiCorp says "it is everything that everyone wanted to add to the current *VisiCalc*." That may be an overstatement, but the credentials of *VisiCalc Advanced Version* are impressive.

Let's start by looking at the market. VisiCorp plans to differentiate *VisiCalc Advanced Version* from *VisiCalc III* by market area and type of user. *VisiCalc Advanced Version* is designed to be very effective in the corporate environment where consolidation of information from many templates increases the usefulness and power of the personal computer.

VisiCalc III requires considerable planning and several steps to actually exchange or consolidate data between templates. If you try to consolidate with the current *VisiCalc,* you must load each template, save a specified area as a DIF file, and then load it back into a specified area of the consolidation template. The more templates involved, the more difficult the consolidation. If you are consolidating a number of templates, you must go through the consolidation steps a number of times.

VisiCalc Advanced Version employs a macrocommand capability called *keystroke memory* that automatically prompts you through a user-defined series of steps to effect a

consolidation. Once the process has been defined, a single keystroke prompts you to insert the proper disks and then automatically loads the correct DIF file into the specified area of the consolidation template. It doesn't matter how many templates are being consolidated, all you have to do is follow the instructions. Now sales managers don't have to spend time consolidating models from different regions, nor do they have to worry about training someone else to do it. Instead, they can have it done. Anyone can quickly learn the steps necessary to boot *VisiCalc Advanced Version* and execute the keystroke memory file.

Novices May Apply. The *VisiCalc Advanced Version* is designed for a wide spectrum of users, some of whom may have little or no experience with *VisiCalc III.*

Templates developed on the current *VisiCalc* aren't designed for the inexperienced user. Users must understand *VisiCalc*'s functionality so they don't destroy a template's integrity (that is, so they don't accidentally erase data or enter information into a cell that already contains pertinent formulas or information). Users must also be familiar with the layout of the template in order to know where to enter the information required, especially if information can be entered in many areas.

When using *VisiCalc Advanced Version,* however, you simply load the template and press the tab key to skip between predefined entry fields. This makes it difficult to enter information in the wrong cell. But even a knowledgeable *VisiCalc* user can accidentally enter information in the wrong cell given enough opportunity. *VisiCalc Advanced Version* protects against that possibility by allowing individual cells or groups of cells to be protected so that either no information or only specified information can be entered. For example, cells can be defined so that only values can be entered.

These capabilities result in templates that can be designed to enable effortless consolidation of many templates and that can be used by many naive users without danger of inadvertent damage. Templates designed for the *Advanced Version* can provide corporations and other environments with sophisticated applications an even better planning, forecasting, and "what if?" tool.

What Else Is New? That is all well and good, but current *VisiCalc III* users want to know how *VisiCalc Advanced Version* is different. It is not different in that it keeps the tried and true *VisiCalc* features, functions, and user interface. Templates developed for *VisiCalc III* are upward compatible. Any templates being used today can continue to be used, or even converted to take advantage of *Advanced Version* features.

Beyond that, it is much more than just a bunch of additional functions. Because the product hasn't been released yet, many of the specific features and functions are still vague.

The keystroke memory capability is one of the major new features. It makes consolidations easy. A user can execute a series of commands with just three keystrokes—/K and any one-character abbreviation. In addition, because it displays user-specified messages, it can be used for training or demonstrations.

Keystroke memory seems to be the most important new feature, and it may even be more powerful than anyone realizes. *VisiCalc* has continued to impress users with its newly found capabilities. Keystroke memory may just be another sleeper that continues to have new uses.

Another new capability is a command called *Attributes.* This command, envoked from the / menu, provides a wide range of different cell attributes. Cell protection, specified data type entry, and tabbing are available through the */A* command. But that is just the beginning.

Values can be displayed with a floating dollar sign. Values can also be displayed with debit (DR), credit (CR), parenthesis for negative values, + and − signs, as well as with commas or with specified decimal places. Information in cells can

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Peelings II, March 1982

Rated number two of the top five utilities in Info-World, March 8, 1982.
John C. Dvorak

*"***Hi-Res Secrets** *makes it possible for a programmer to write a sophisticated game that will compete with anything on the market. How can they sell this for only $125? . . ."*
Stanley Crane, author of DB MASTER**, February 1982

It's the most complete compilation of Apple graphics information on the market . . . well worth the price . . . the color filling routines are the fastest I've seen . . . in a class by itself . . . bound to increase the ranks of good Apple graphics programmers by a substantial margin.
Cary W. Bradley, *Softside Review,* February 1982

The following packages have routines from **Hi-Res Secrets** as a basis for their graphics and are available from Avant-Garde Creations:

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be made invisible to protect sensitive information; formulas in all cells can be displayed and printed to assist in template development. The attribute command has other functions as well.

Flexible Financial Functions. Individual column widths combined with new print command features, such as print margins and lines per page, allow reports to be formatted in a more professional manner. There are new financial functions like present value, future value, periods, interest rate, payment, and internal rate of return. It even has a range of calendar and time functions.

In support of all these new features and functions, there is a help facility that, at the press of the ? key, will provide extensive information about the commands available.

These are not all the new features, but it is important not to get lost in a function-feature comparison. *VisiCalc Advanced Version* provides almost all of the features that anyone might want; however, simple text entry and data sorting are still notably absent. Most current users seldom take advantage of more than a third of the features anyway.

VisiCalc Advanced Version provides something more important: a tool that can be used by experienced financial and mathematical model builders as well as by those with little or no experience. For the first time, *VisiCalc* can be used to develop applications that are safe from accidental destruction and easy to use by beginners.

This is a well thought-out product that will gain rapid acceptance in the corporate world and by other users with sophisticated applications. *VisiCalc Advanced Version* for the Apple III will be available this fall for a suggested retail price of $400. And, *VisiCalc III* is still available for those who don't require the additional capabilities.

VisiSchedule for the Apple III. You might think that VisiCorp would be content with introducing a product like *VisiCalc Advanced Version* for the Apple III. Instead, they have also introduced a more powerful Apple III version of their Apple II product, *VisiSchedule*.

VisiSchedule is a powerful tool for those persons who manage scheduling and project cost control. Even though it is an extremely useful tool for scheduling complicated projects, don't get the idea that the project has to be as complicated as the construction of a submarine. Publishers can use *VisiSchedule* for the development and printing of a book; sales managers can use it to forecast the announcement of a new merchandising campaign; and it is the perfect tool for project managers to determine the schedule for introduction of new products. *VisiSchedule*'s own introduction was planned on *VisiSchedule*.

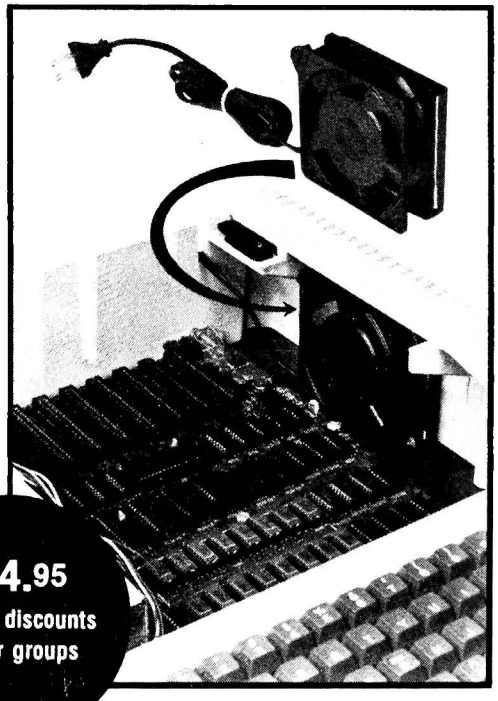
VisiSchedule is designed to be used by project managers to track the start and completion dates and specific activity costs of complicated projects. The user defines the project activities and their interrelationships. For example, if the project is the construction of a building, digging the foundation is an activity that must be completed before the building framework can be constructed.

Let's Get Critical. The more activities a project has, the more difficult it is to accurately schedule the completion date of each activity, much less the completion date of the project. In project planning, there is a concept called *critical path*. This is that path of activities that requires the longest time to complete. There usually are many activity paths in a project, but usually only one or sometimes two critical paths exist.

Once the activities and their relationships and the pertinent dates have been entered, *VisiSchedule* will compute the earliest and latest start dates for each activity, and will show the critical path and specific costs. In addition, it will print summary reports that are useful in controlling costs and resources, meeting deadlines, and allocating resources.

Anyone responsible for tracking and administering projects will find *VisiSchedule* a tool designed to serve their needs. *VisiSchedule* for the Apple III is available at a suggested retail price of $300. ◨

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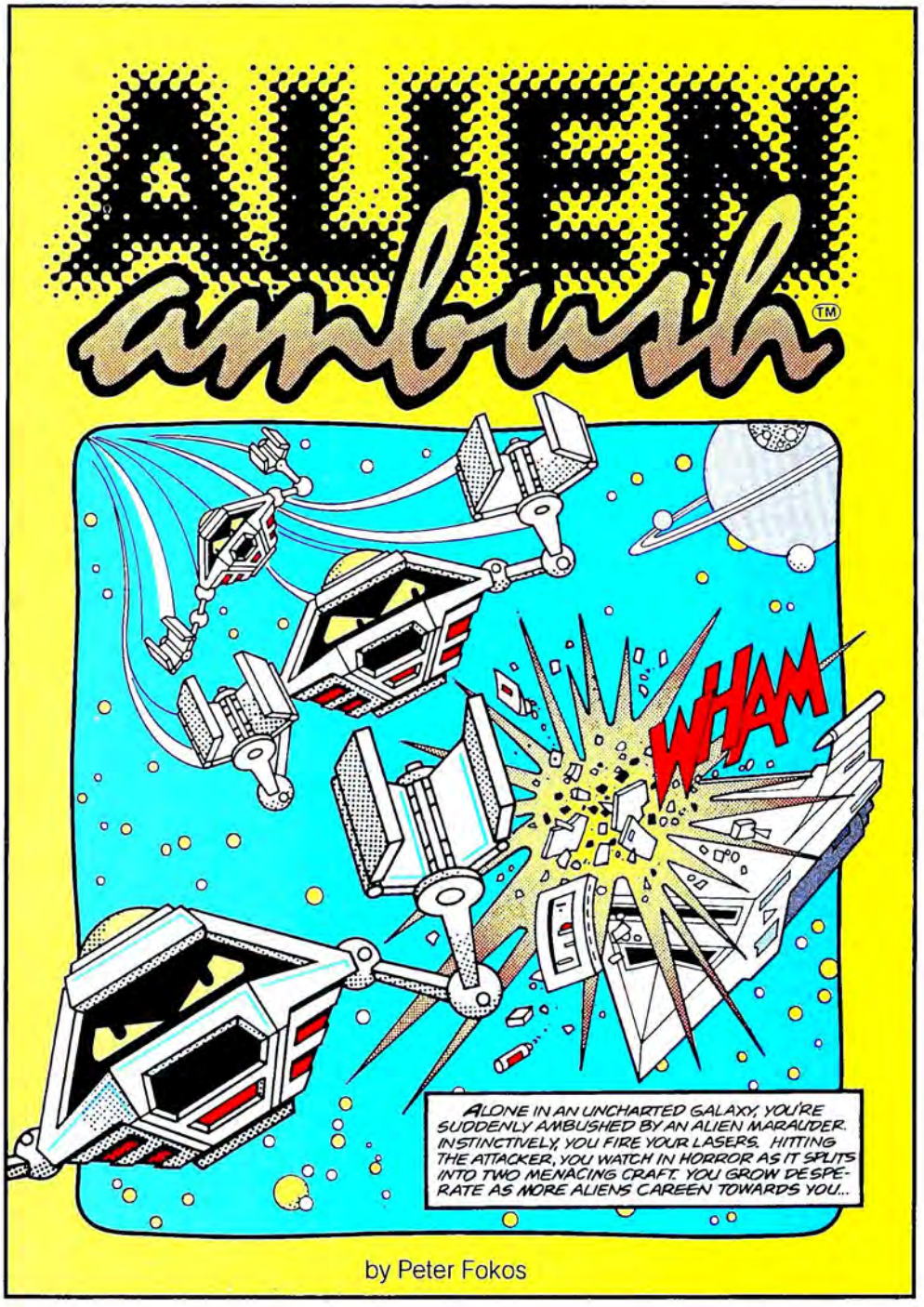
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Hold on there, podnuh! Don't bet your bottom dollar the Cubs won't win the National League pennant. Don't mortgage the farm on the proposition that we can't get inflation under 1 percent a year. Don't ransom your right arm against the possibility of lasting peace in our time. Instead, remember the sign: "Difficult jobs done immediately, impossible ones take a little longer."

For those of you who believe that lightning never strikes twice in the same place, let it be known that now's the time to erect the lightning rods. Because *VisiCalc* has once again been dethroned as the bestselling program in the Apple market. Observers who saw *DB Master, PFS, SuperScribe, Home Accountant,* and *Knight of Diamonds* make runs at *VisiCalc* over the past few months and fail had become convinced that the more serious turn in the attitude of the software buyer ensured *VisiCalc*'s continued reign at the top of the heap.

History does repeat itself. Don't invade Russia in the winter. Don't establish a quiet little hideaway on the Israeli-Syrian border. Don't look for peace under a Democratic president nor prosperity under a Republican one. And, for sure, don't bet Broderbund won't publish a gaming breakthrough that'll dethrone VisiCorp's bellwether program.

Exactly eighteen months ago, heretofore unknown Tony Suzuki rendered unto Broderbund the niftiest arcade game ever seen on the Apple to that time. Doug and Gary Carlston sallied

Apple III

This Month	Last Month	
1.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	**Apple Writer III,** Paul Lutus, Apple Computer
3.	3.	**Personal Filing System,** John Page, Software Publishing Corporation
4.	6.	**PFS: Report,** John Page, Software Publishing Corporation
5.	4.	**Apple III Business Graphics,** Apple Computer
6.	7.	**Word Juggler,** Tim Gill, Quark Engineering
	10.	**Apple III Business Basic,** Apple Computer
8.	5.	**Access III,** Apple Computer
9.	—	**Apple Pascal,** Apple Computer
10.	—	**Executive Accounting System,** Denver Software

Business 10

This Month	Last Month	
1.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	**Personal Filing System,** John Page, Software Publishing Corporation
3.	3.	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
4.	4.	**PFS: Report,** John Page, Software Publishing Corporation
5.	5.	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
6.	7.	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp
7.	6.	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
8.	8.	**Accounting Plus II,** Software Dimensions, Systems Plus
9.	—	**PFS: Graph,** Laura Chin, Software Publishing Corporation
10.	—	**dBase II,** Wayne Ratcliff, Ashton-Tate

contemplating a byte

Robots are here and they are changing the world we live in. From bulky industrial welders to fantastically complex planetary probes, robots are sure to make our lives a little easier. Robots will get much more sophisticated in the decades to come; by the next century they may be our model citizens.

But will robots be immune from the human weaknesses that usually attend a high level of intelligence? On the cover of our August 1981 issue we fantasized what a humanoid robot may look like in the future. We also gave this highly developed mechanical man the hardest task we could devise—contemplating an object and its significance.

Will robots ever be able to sit and think about something that is not directly related to performing a task?

Softalk can't answer that question for you, but we can help you contemplate the unknown future in a special way. We commissioned graphics artist Robert Zraick to do August's cover with a poster in mind. The robot contemplating a bite is evocative both of Rodin's *The Thinker* and the Genesis passage on the Garden of Eden . . . not to mention the possible significance to our favorite technological fruit.

The artist and *Softalk* are sharing in the profits from the poster. *Softalk* will distribute its proceeds to individuals developing Apple tools to help the handicapped. *Softalk* guarantees 100 percent distribution of its monies.

In addition to the posters, which are sold at $6.00 (plus $1.50 to cover shipping and handling), some of the two hundred artist's proofs, signed by Robert Zraick, are still available at $75 each.

The size of the poster is 24 inches by 34 inches. The artist's proofs are hand-numbered and hand-signed, and each is accompanied by a certificate giving its number and guaranteeing that only 200 are being distributed.

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forth from their Eugene, Oregon, apartment to do economic battle with the big guys. They won. *Apple Galaxian*, now called *Alien Rain*, dominated the Christmas 1980 season like the Colossus dominated Rhodes. It sold more copies faster than any program that preceded it and probably marks the watershed between the old cottage industry market and today's high-gloss, volume-oriented market.

Galaxian was followed by *Space Eggs*, which was followed by *Raster Blaster*. For long months, *VisiCalc* quietly bided its time, waiting for the game craze to end and for the Apple market to get down to serious business. And when that happened, *VisiCalc* reclaimed the top spot and appeared as though it would never relinquish it again.

But then heretofore unknown Dan Gorlin rendered unto Broderbund the niftiest, most unique game concept yet. Doug and Gary, fortified by sister Kathy and a host of co-workers, sallied forth from their new corporate fort in San Rafael, California, to again test the market. First returns were disquieting—only eleventh the first month. What was not known was that much of the nation did not receive the program in time to do much, if any, selling during May. But in June *Choplifter* took off.

There's a caveat necessary to insert here. *Choplifter* clearly outsold Apple II *VisiCalc*. But the combined sales of both Apple II and Apple III *VisiCalc* easily outstripped the game to maintain VisiCorp's prestige as leading software publisher.

What of past pretenders to the throne? They didn't do so badly either. On-Line Systems dressed *SuperScribe* in new garb, changed the name to *Screen Writer II*, and made a determined run itself, ending up third in its first month of reissue. *Knight of Diamonds*, last month's challenger, remained strong but dropped to fourth, still showing enough strength to carry big brother *Wizardry* to fifth.

Home Accountant grabbed sixth, *Personal Filing System* was seventh, *Snack Attack* was eighth, and *DB Master* was ninth. If you're beginning to get the idea that the May disarray was superseded by the June bloom, you're catching on fast.

In fact, if *Apple Galaxian* signalled the end of the age of innocence in software marketing and buying, perhaps this June represents the next major turning point.

First, Apple mounted a counterattack to ward off market inertia and various other competitors. They bundled *Apple Writer II* with the system at a special price. Now *Apple Writer II*, created by Paul Lutus, is a pretty fair country word processor itself. And between systems sales and normal sales, *Apple Writer II* was right up there with *Choplifter* and *VisiCalc* in terms of how many end users acquired the package. But after subtracting out bundled sales, the program ended up fifteenth.

If *Choplifter* made June the month of the joystick, *Screen Writer* and *Apple Writer* made it the month of the word processor.

Second, dealers witnessed prosperity even in the face of a stagnant economy. Bruce Burdick of Computerland of Overland Park is in his third year. His sales in June exceeded by six figures what he had once targeted to be his annual sales in his fifth year. The first million-dollar month by a single retail computer location is just around the corner.

Third, Micro Lab quietly began a program that may revolutionize the way software is made available to the public.

Word Processors 10

This Month	Last Month	
1.	—	**Screen Writer II**, David Kidwell, On-Line Systems
2.	1.	**Apple Writer II**, Paul Lutus, Apple Computer
3.	3.	**WordStar**, MicroPro
4.	2.	**Magic Window**, Gary Shannon and Bill Depew, Artsci
5.	5.	**Apple Speller**, Sensible Software
6.	—	**PIE Writer**, Softwest, Hayden
7.	4.	**SuperText II**, Ed Zaron, Muse
8.	9.	**Word Handler**, Elekman, Silicon Valley Systems
9.	6.	**Executive Secretary**, John Riskin, Sof/Sys
10.	—	**Zardax**, Ian P. Phillips, Computer Solutions/Action-Research Northwest

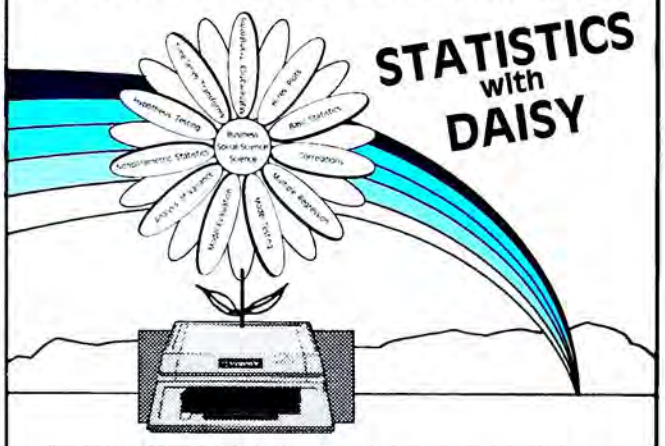
Strategy 5

This Month	Last Month	
1.	1.	**Castle Wolfenstein**, Silas Warner, Muse
2.	2.	**Flight Simulator**, Bruce Artwick, SubLogic
3.	3.	**Sargon II**, Dan and Kathe Spracklen, Hayden
4.	—	**RobotWar**, Silas Warner, Muse
	4.	**AirSim-1**, Ted Kurtz, Mind Systems

Adventure 5

This Month	Last Month	
1.	1.	**Deadline**, Infocom
2.	3.	**Kabul Spy**, Tim Wilson, Sirius Software
3.	2.	**Time Zone**, Ken and Roberta Williams, On-Line Systems
4.	—	**Hi-Res Adventure #2: The Wizard and the Princess**, Roberta and Ken Williams, On-Line Systems
5.	4.	**Zork II**, Infocom

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Under the aegis of Stan Goldberg, the company has hired a network of sales reps and has commenced a stocking program, whereby the dealer has no front money tied up in Micro Lab product and at the end of each thirty-day period, he pays only for that product that he's sold.

The advantages to the dealer are immediate and obvious. He can get a large stock of software without the flooring costs usually attendant to such inventory. Hopefully, this will mean wider selection for the end user at the retail store. The advantage for Micro Lab is obtaining prime display space for its wide range of products in more stores than their prior distributors could deliver. The gamble for Micro Lab is whether these newly reached end users will be attracted to their product line.

As with all things temporal, the reaction from the retail sector is not unanimous. But, for the most part, Goldberg is seen as a welcome stand-in for the Second Coming. Paul Page of Computers Unlimited in Towson, Maryland, made no bones about his approbation: "I think it's a great idea and more publishers should do it. It creates a nice display in the store and increases the manufacturer's exposure." Luke Snyder of Farnsworth Computers in Chicago ventured that "this is the way software should be handled." In his view, the major publishers should go with stocking plans, while the smaller publishers should stop trying to market direct and enlist the aid of the distributors.

It will be some months before the plan is completely implemented. But it's a safe bet that if Goldberg should soon take a walk across Lake Michigan, and it's July instead of December, it would portend momentous changes to come in software marketing.

A fourth change in the marketplace is the unexpected strength of several unprotected pieces of software in the Hobby Ten list. For the second consecutive month, seven of the ten entries are not copy-protected.

Fantasy 5

This Month	Last Month	
1.	1.	**Knight of Diamonds**, Andrew Greenberg and Robert Woodhead, Sir-tech
2.	2.	**Wizardry**, Andrew Greenberg and Robert Woodhead, Sir-tech
3.	4.	**Ultima**, Lord British, California Pacific
4.	3.	**Apventure to Atlantis**, Bob Clardy, Synergistic Software
5.	—	**Curse of Ra**, Tim Bird, Mark Madrid, and Andrew Martin, Automated Simulations

Home 10

This Month	Last Month	
1.	1.	**Home Accountant**, Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	2.	**MasterType**, Bruce Zweig, Lightning Software
3.	3.	**Data Capture 4.0**, David Hughes and George McClelland, Southeastern Software
4.	7.	**Typing Tutor**, Image Producers, Microsoft
5.	4.	**Personal Finance Manager**, Jeffrey Gold, Special Delivery Software, Apple Computer
	5.	**VisiTerm**, Tom Keith, VisiCorp
7.	6.	**ASCII Express**, Bill Blue, Southwestern Data Systems
8.	—	**Apple Logo**, Apple Computer
9.	—	**Dow Jones Market Analyzer**, B. C. Burch, RTR Software
10.	—	**Micro-Courier**, Jim Dow, Microcom

We think our new mailing list program is the best in the world. And we're not alone.

1st CLASS MAIL. By Bob Schoenburg and Steve Pollack. Here's a pair of authors who may be software's answer to Irving Wallace. Wallace is the bestselling author who hears the murmuring of general populace and caters to their desires. Bob Schoenburg and Steve Pollack seem to have the same trait.

Consider.

The pair brought out *Home Money Minder*, a perfectly respectable home finance package. Then they listened to the user feedback. The result was *Home Accountant*, one of the phenomenal success stories of the first half of 1982.

Around the same time *Home Money Minder* hit, the team also tested the market with *The Mailroom*. Mailroom never was the success of *HMM*, but the authors used the same technique – listen to the users and incorporate all the good ideas. The result is **1st CLASS MAIL** – a program that, incredibly enough, manages to live up to its double-entendre name.

All of the above is not to accuse Schoenburg and Pollack of putting out the programming equivalent of stalking-horses to do their market research for them. Their original efforts do stand on their own merit. They just pale next to the sequels.

1st CLASS MAIL is so well thought out and so easy to use that other publishers who call their programs "user friendly" should bow their heads in shame.

SOFTALK got an early release of the program sans documentation. Yet a rank computer illiterate was able to apply the program to two separate uses with relatively little trouble. This is high praise indeed: that a novice operator could use a powerful program with no more than the screen menus.

The program allows for twelve fields, clearly more than the traditional name and address of a mailing label. The implication is that the software can be put to other innovative uses as well. The built-in ability to sort and filter on any field or combination thereof enhances the chances that users will find multiple applications for the program.

Continental Software will actually be publishing four versions of the program.* The one already in release is for the Apple II using floppy disks. A hard-disk version will follow. Both versions are pending for Apple III as well, awaiting the development of a rapid binary sort subroutine.

1st CLASS MAIL is a first-rate program for specialized data base applications.

Reviewed by Al Tommervik, Publisher, Softalk.

***Available for: Apple II,™ Apple III™/III with Profile,™ IBM-PC™/IBM-PC with Tecmar™ hard disk/IBM-PC with Davong™ hard disk.**



Continental Software

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In good times, their continued success would not be so remarkable, but May was the absolute pits. Any reasonable person would have thought that in times of tight money, the unprotected software would be ripped off while the precious dollars went to the otherwise unobtainable protected disks. Instead, Penguin and Beagle Bros, champions of the open software policy, are reaping the rewards while others moan the vicissitudes of the economy.

Three programs made the Top Thirty for the first time in June: *Apple Speller* from Sensible Software, *Marauder* from On-Line Systems, and *Bandits* from Sirius Software.

There were few shifts in the Apple III market, where *VisiCalc, Apple Writer III*, and *Personal Filing System* hold forth as the leaders. The *Executive Accounting System* (*EASy*) from Denver Software displaced *Great Plains* as the accounting package of preference.

The remarkable sales levels of unprotected programs in the Hobby Ten was enumerated previously. Equally noteworthy was the widened gap between leader *Bag of Tricks* from Quality Software and the second-place program. In addition to tightening its hold at the top of the Hobby Ten list, *Bag of Tricks* rose to tenth on the Top Thirty.

Hobby 10

This Month	Last Month	
1.	1.	**Bag of Tricks**, Don Worth and Pieter Lechner, Quality Software
2.	5.	**DOS Boss**, Bert Kersey and Jack Cassidy, Beagle Bros
3.	4.	**Utility City**, Bert Kersey, Beagle Bros
4.	10.	**Locksmith 4.0**, Omega Microware
5.	6.	**Graphics Magician**, Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
6.	2.	**Zoom Grafix**, Dav Holle, Phoenix Software
7.	3.	**The Complete Graphics System**, Mark Pelczarski, Penguin Software
8.	10.	**Alpha Plot**, Bert Kersey and Jack Cassidy, Beagle Bros
9.	—	**DOS Tool Kit**, Apple Computer
	—	**Apple Mechanic**, Bert Kersey, Beagle Bros

The top seven programs in the Home Ten list have been there so long they almost have permanent possession of their positions. But the bottom three programs are new and, in one case, quixotic. *Logo*, an educational programming language, made eighth in the form sold by Apple Computer. The *Dow Jones Market Analyzer* from RTR Software took ninth, and *Micro-Courier*, clearly out of its class, got tenth.

Everyone knows *Micro-Courier* is a business communications package. So why's it listed in the home section? Because that's where the other communications packages are listed, in deference to their wide use for purposes other than business. *Micro-Courier* has no diversity of uses; it's a business package pure and simple. But it's also a communications package, so it's listed here with its compatriots, even if it isn't right.

Micro-Courier would not have made the Business Ten, where changes are rare. The top eight programs held their ground in June, with *PFS: Graph* and *dBase II* taking over ninth and tenth from *General Manager* and *Versaform*. Retailers were voluble in their praise of *PFS: Graph* and the way in which it interfaces with the dandy new Hewlett-Packard plotter.

As noted before, word processors found their way into the hands of end users in unprecedented quantities in June. In addition to *Screen Writer* and *Apple Writer, WordStar*'s sales rebounded nicely from a May slump. *Apple Speller* from Sensible Software glommed on to more than three-quarters of the market for proofreading programs and attained the Top Thirty.

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Infoworld also went on to rate MasterType as Excellent in all categories.

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And coming up fast is *PIE Writer* from Hayden. When *PIE Writer* was *Apple PIE* from Programma, it dominated southern California word processing completely. It was nearly impossible to buy another program. Now it's back in improved form and with a more formidable marketing arm, spoiling for the fray and showing in the early rounds that it intends to increase its market share.

Also new to the Word Processor Ten is *Zardax*, the brash Aussie contender.

Castle Wolfenstein remains firmly atop the Strategy Five list as well as being sixteenth on the Top Thirty. Another Silas Warner creation, *RobotWar*, rejoins the list as the only newcomer this month.

Infocom's amazing *Deadline* continues to best its hi-res cousins in the adventure genre as well as missing the Top Thirty by only one place. The some maligned *Kabul Spy* rose to second while *Time Zone* dropped to third. *The Wizard and the Princess* bounced back to fourth and *Zork II* was fifth.

Sir-tech's domination of the Fantasy Five continues. Consider that *Knight of Diamonds* and *Wizardry* sold more copies in June than all other eligible programs combined. Andrew Greenberg and Robert Woodhead are the first writing team to have two programs in the top five of the Top Thirty for two consecutive months, besting Ken and Roberta Williams. When the Sir-techers wrap up their next volume, they can take a shot at another set of the On-Liners's laurels as the only team ever to put three programs in the top ten.

But for all of the genius of Greenberg and Woodhead and of Williams and Williams, and for all of the impending shifts in the marketplace, one thing seems sure: soon we'll see *VisiCalc* back leading the Apple market. But uneasy should be the head that wears the crown. You see . . . there's still a number of heretofore unknown programmers rendering programs. And there's still another Carlston to be drafted into the fray.

So if *VisiCalc* gets too dominant, around Christmas 1983 we should see Doug, Gary, Kathy and brother Don sallying forth from the Broderbund bauhaus with yet another unknown's first product to prove that fairy tales can come true. ◨

Apple-franchised retail stores representing approximately 9.3 percent of the sales of Apples and Apple-related products volunteered to participate in the poll.

Respondents were contacted early in July to ascertain their sales leaders for the month of June.

The only criterion for inclusion on the list was number of sales made—such other criteria as quality of product, profitability to the computer retailer, and personal preference of the individual respondents were not considered.

Respondents in July 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 3.8 percent, which translates roughly into the theoretical possibility of a change of 2.53 points, plus or minus, in any index number.

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The Top Thirty

This Month	Last Month	Index	
1.	11.	189.96	**Choplifter,** Dan Gorlin, Broderbund Software
2.	1.	173.20	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	—	99.73	**Screen Writer II,** David Kidwell, On-Line Systems
4.	2.	88.84	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
5.	4.	87.16	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
6.	10.	78.78	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
7.	7.	69.84	**Personal Filing System,** John Page, Software Publishing Corporation
8.	3.	62.86	**Snack Attack,** Dan Illowsky, DataMost
9.	8.	50.28	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
10.	18.	43.58	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
11.	—	37.15	**Bandits,** Benny Ngo and Tony Ngo, Sirius Software
12.	—	36.04	**Marauder,** Rorke Weigandt and Eric Hammond, On-Line Systems
13.	5.	35.20	**A2-PB1 Pinball: Night Mission,** Bruce Artwick, SubLogic
14.	6.	34.08	**Star Blazer,** Tony Suzuki, Broderbund Software
15.	9.	32.96	**Apple Writer II,** Paul Lutus, Apple Computer
16.	15.	32.69	**Castle Wolfenstein,** Silas Warner, Muse
17.	13.	32.41	**Cannonball Blitz,** Olaf Lubeck, On-Line Systems
18.	—	30.45	**WordStar,** MicroPro
19.	13.	29.33	**PFS: Report,** John Page, Software Publishing Corporation
20.	19.	28.77	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
21.	16.	27.66	**Taxman,** Brian Fitzgerald, H.A.L. Labs
22.	21.	24.02	**MasterType,** Bruce Zweig, Lightning Software
23.	—	23.19	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp
24.	29.	22.91	**Magic Window,** Gary Shannon and Bill Depew, Artsci
25.	12.	22.63	**Swashbuckler,** Paul Stephenson, DataMost
26.	22.	22.07	**Apple Panic,** Ben Serki, Broderbund
27.	—	21.51	**Apple Speller,** Sensible Software
28.	—	18.44	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
29.	—	17.32	**Utility City,** Bert Kersey, Beagle Bros
	24.	17.32	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer



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