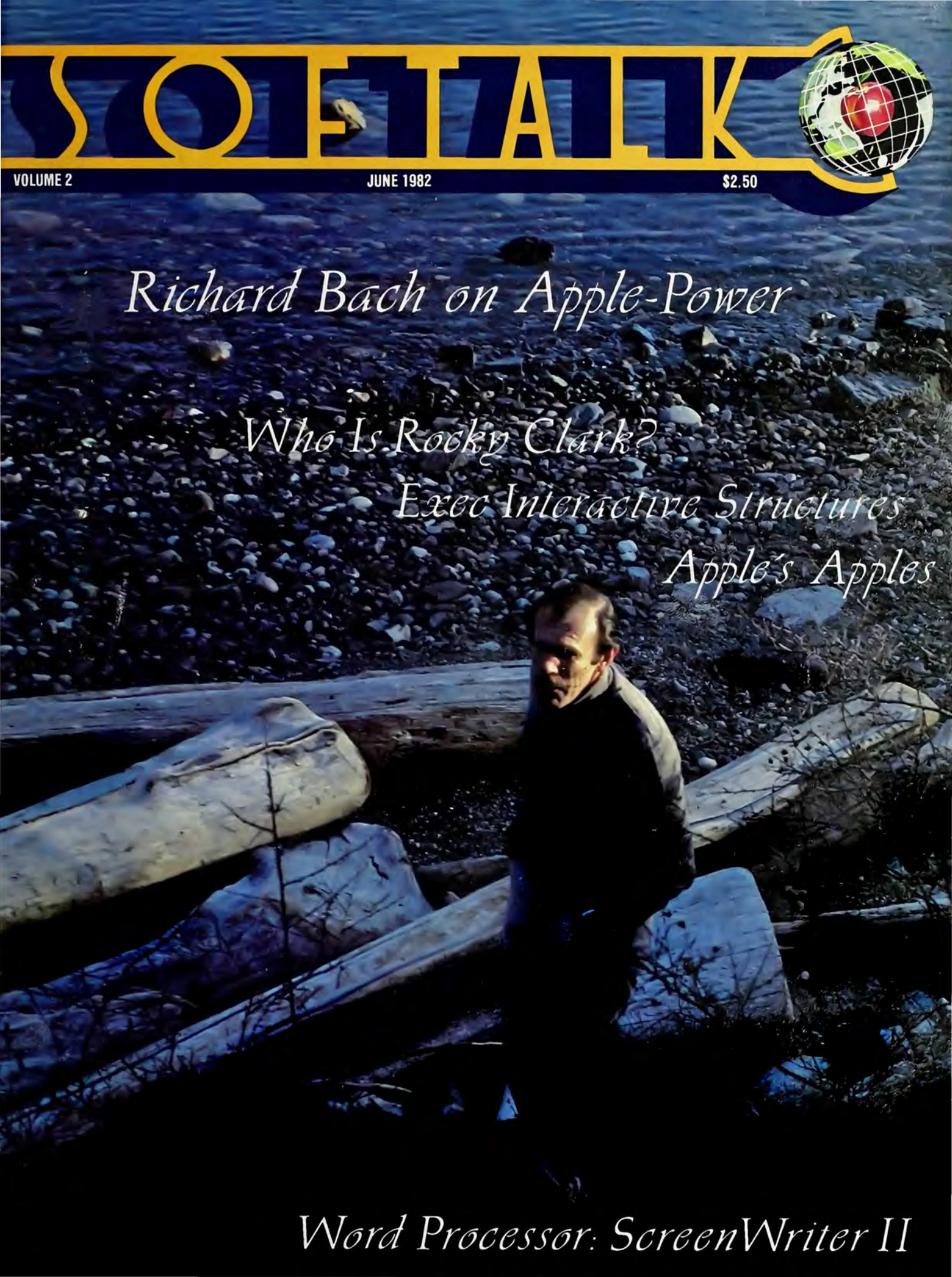

SOFTALK
VOLUME 2
JUNE 1982
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Richard Bach on Apple-Power
Who Is Rocky Clark?
Exec Interactive Structures
Apple's Apples
Word Processor: ScreenWriter II

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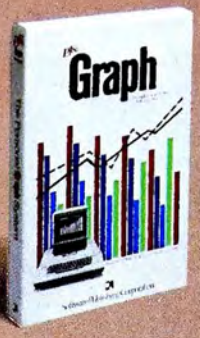
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Cover: Richard Bach on a northern beach. Photo by Maggie McGurk; design by Kurt Wahlner.

Composition by Photographics, Hollywood, California. Printing by Volkmuth Printers, Saint Cloud, Minnesota.

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Postmaster: Send address changes to *Softalk*, 11021 Magnolia Boulevard, North Hollywood, CA 91601.

Free Subscription: Complimentary trial subscription to all owners of Apple computers in the USA. If you own an Apple, but you've never received *Softalk*, send your name, address, and Apple serial number with a request for subscription to Softalk Circulation, 11021 Magnolia Boulevard, North Hollywood, CA 91601. *Softalk* is totally independent of Apple Computer Inc.; sending your warranty card to Apple Computer will not inform *Softalk* of your existence.

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Back Issues: $2 through February 1981; $2.50 from April 1981 through July 1981; $3.50 thereafter. October, November, and December 1980 and January, February, March, September, October, and November 1981 are sold out.

Problems? If you haven't received your *Softalk* by the fifteenth of the month, or if you have other problems with your subscription, Dan Yoder or Hal Schick can help out. Call (213) 980-5099.

Moving? Send new address and old to Softalk Circulation, 11021 Magnolia Boulevard, North Hollywood, CA 91601; telephone, (213) 980-5099.

Contest

Famous Apples in History

Luisa Puig, the computer operator who plays Queen Elizabeth I in the Renaissance Pleasure Faire in California, suggested recently that if Queen Bess had been told about microcomputers, "The first thing she would have asked is how much does it cost and what does it do? She was a very executive woman. If someone could prove that computers would be much more cost effective for the royal scribes and mathematicians, she would have wanted at least three—two for the palace and one for Lord Burley, the treasurer.

"Elizabeth would have done just fine in a corporate job in this century."

Now, if Puig had quoted Liz instead of telling about her, and if she'd thrown in an Elizabethan dialect and maybe put it all in iambic pentameter, she'd have an ideal entry for this month's *Softalk* contest.

Famous Apples in History challenges you to imagine an encounter between some famous person in history and an Apple, where the Apple and its accouterments (software, for example) are the only anachronisms in the situation. Write down what the famous person would have said in your imaginary situation, and try to make the quotation appropriate to the era and circumstance; finally, try to make it possible to guess from the quote who's speaking.

Length is up to you, so long as it's no more than a page, double-spaced. One line is plenty, if it fills all the requirements.

Here are some examples; who they represent is printed upside down at the bottom of this page.

1. "Contrary to what I have proclaimed, I see the Almighty has made a set of men that do all the eating and none of the work, and has made them with mouths only and no hands!"

2. COMMAND? IGNĪTE RŌMA
YOU DON'T HAVE ANY MATCHES
COMMAND? ACQUĪRETE IGNĪUM
OK
COMMAND? IGNĪTE RŌMA
OH WHY DON'T YOU GO PLAY YOUR VIOLIN?

3. "Boot up my campaign again and see what happens if the second army takes the left flank, the third the rear, and . . ."

4. Heard during a nineteenth-century game of *Computer Bismarck:* "Damn the torpedos! Full speed ahead!"

5. "So this is the Apple that fell on Isaac's head. No wonder he's been so down to earth lately."

6. To boot or not to boot: that is the question:
Whether 'tis nobler in the mind to suffer
The slings and arrows of syntax error,
Or to take reset against a break in 512
And by opposing crash them.

7. He lit a cigarette.
The thing would not boot. Its time of booting was over. He remembered the times before. They were happy times. It had booted everything he had. It had been young and strong and its chips were clean and they worked quietly and well, with no smoke. It was old now. Those times were past. "I am sorry, machine," he said. "Tomorrow I must trade you. It is all that is left." The machine said nothing. A light rain was falling. It began to rust.

Entries will be judged by historical ring of truth, probability, wit, and general quality of method of meeting requirements.

Include the name of the famous person you're quoting on your entry in case we're dense.

$100 worth of *Softalk* advertisers' products is the first-place prize. Two runners-up will win $25 gift certificates at their local computer stores.

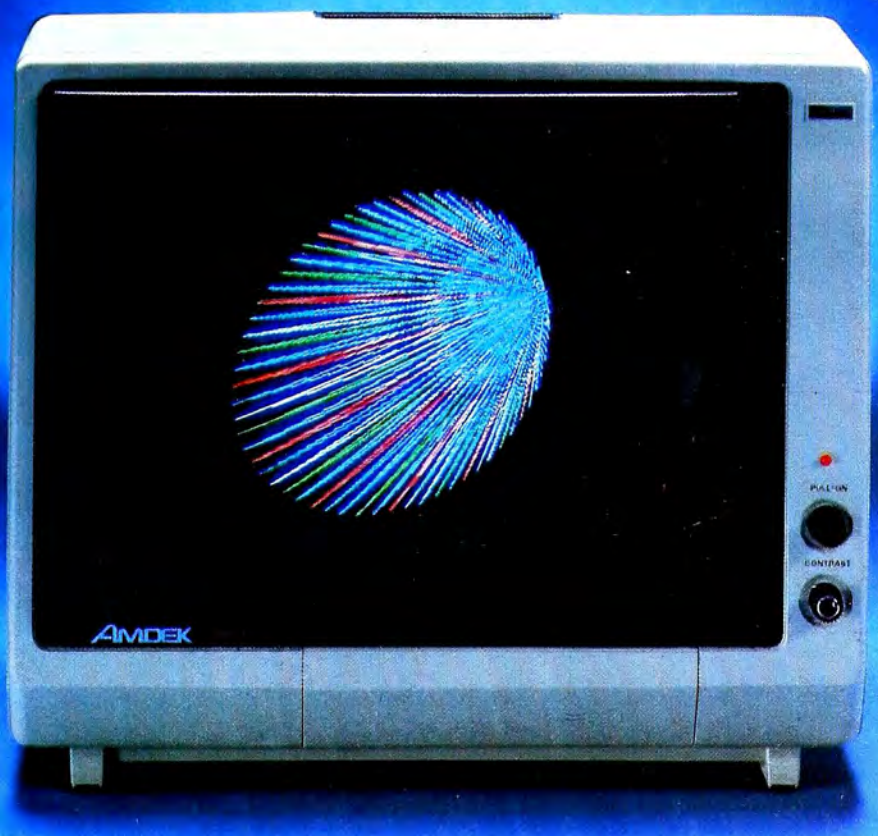
Fill out the entry form or a facsimile and send it with your entry on a separate but-attached piece of paper to Softalk History, 11021 Magnolia Boulevard, North Hollywood, CA 91601. Deadline is July 16, 1982. Every entry must have the entry form information on it or with it and there may be no more than ten entries per envelope. ■

Name:
Address: _____
City/State/Zip: _____
Telephone: _____
Prize you'd like: _____
Your dealer: _____
Your autograph: _____

Mail with your entry to Softalk History, 11021 Magnolia Boulevard, North Hollywood, CA 91601, no later than July 16, 1982.

Answers to samples: (1) Abraham Lincoln; (2) Nero; (3) Napoleon; (4) Admiral Nelson; (5) Isaac Newton's mother; (6) Shakespeare; (7) Ernest Hemingway.

The High-Resolution Color Monitor for Apple II



Amdek's new Color-II monitor with DVM interface board

No video monitor has ever combined Apple II compatibility with exceptional performance like the new 13" Color-II monitor from Amdek.

Color-II features our optional new DVM peripheral board for easy interfacing with your Apple II. And look at the other top-of-the-line features Color-II offers:

- RGB, TTL input for high resolution graphics.
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- Front-mounted controls for faster fine-tuning.

So if you want to get the most from your Apple II system, get the "most" monitor. Ask your dealer about Amdek's new Color-II monitor with the optional DVM interface board.

What is DVM? The DVM, or "Digital Video Multiplexor," is a low cost interface that allows the Apple II computer to be used with an RGB monitor, such as our Color-II.

Amdek's DVM is software programmable to allow transparent operation, and is parallel with existing Apple text and graphic modes. Three of its channels are used to multiplex the existing Apple text, low resolution and high resolution graphics. The 4th channel allows the use of an 80 character line video board.

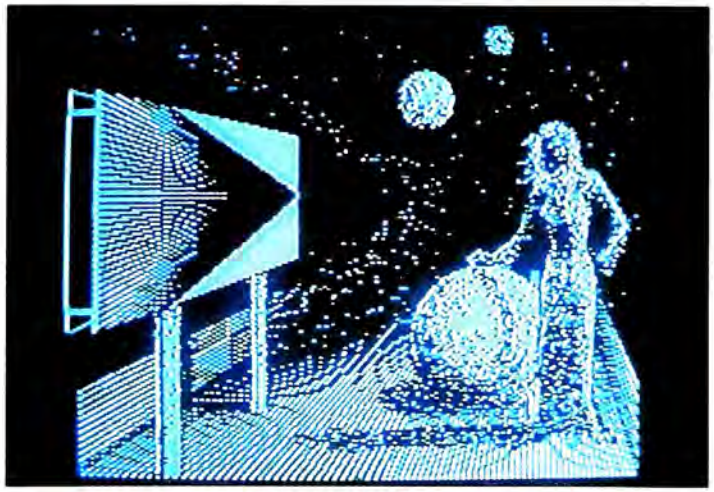
Our DVM is also color channel software programmable, enabling you to turn the three color channels on or off by software control. For example, the red and blue channel can be turned off when the 80 character channel is turned on, resulting in a green phosphor video presentation.

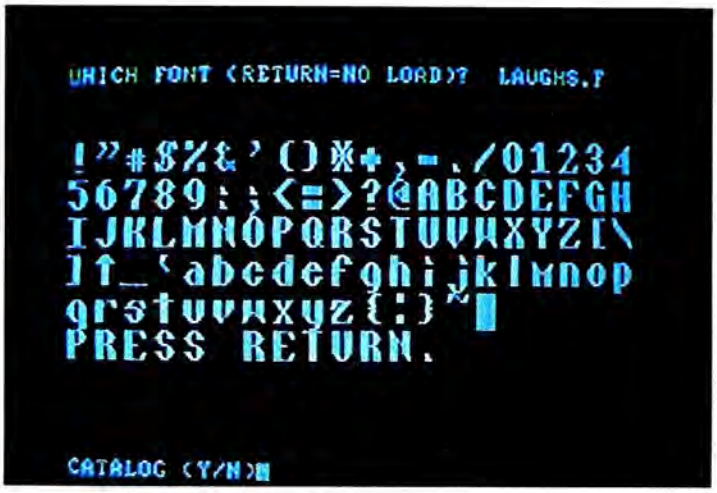
For convenient operation, the DVM board may occupy any slot in the Apple II. The DVM also features low-power consumption and low-power schottky logic.

AMDEK

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Contest Winners: Oracle Speaks; Art Flourishes





Ben Lonterman's spocey *Way Out* took first prize in the still picture category of Penguin's guest ort contest. First ploce for font design went to Elizobeth Riggle for her font, "Laughs."

Oracle, Part 2. There's a brand new winner in the Oracle arena. Part 2 was tough: the number of days on which snow would fall on Manhattan Island after Groundhog Day and before the first day of spring 1982. Meteorologist Warren Hatch of the National Climatic Center reported that the measurable snow rate for that time period at the Central Park weather station was twelve days. From the eight people tied for first place, the random number generator chose Todd Harris of New Athens, Illinois. Harris plans to spend his $100 on *Time Zone*, at his local store, Kappel Computer.

The field is still wide open in the Oracle for the grand prize of the disk drive. Charles Lewis of Richmond, Virginia, leads the race with a score of −.5. His wife Elizabeth was the Oracle Part 1 winner, but her score in the overall contest is −5, trailing behind her husband. Douglas Stewart, Cape Elizabeth, Maine, is in second place with −1.8; Martha Wright of Oceanport, New Jersey, isn't far behind with a score of −3.1; Paul Shanberg with −4.0 (watch him, he won Parts 2 and 5 of Oracle '81); Rick Jones, Spokane, Washington, −4.3; and Jean Armour, Liverpool, New York, with a score of −5.9. Anything can happen in the Oracle.

The Art Gallery Finals. "Pardon me while I collapse."

Poor Ben Lanterman, The aeronautics engineer of Bridgeton, Missouri, was peacefully watching television on an uneventful Friday night when *Softalk* phoned to announce that he was a contest winner not once, not twice, but three times.

Lanterman isn't just lucky—he is immensely talented. *Specter*, his entry in *Softalk*'s Art Gallery contest (November 1981), brought him a first place win in the computer-generated design category. Lanterman had also entered Penguin Software's guest contest in the January issue. Prizes were awarded for the best computer-generated still, best three-minute animation, and best font. Penguin's Mark Pelczarski independently chose Lanterman's *Way Out* for first place in the picture portion of that contest. In the animation category, Lanterman's *The Present* was Pelczarski's choice for second place.

After his "collapse," Lanterman decided he was "floating to the ceiling" instead. Art (oil and acrylic painting) has been his hobby from way back, but when Lanterman acquired his Apple a year and a half ago, he started getting interested in computer-generated graphics. His painting style was always fairly rigid and structured, "I guess I tried to paint too realistically," he says, "but with the computer I became impressionistic. The computer forces you to be freer."

As for the eerie hooded figure of *Specter*, Lanterman says that idea has been in his head for about ten years. He made a pencil drawing of it once, but it wasn't so frightening. However, the bright lights of the computer screen really brought the apparition to life and scared the majority of *Softalk*'s readers into sending in their votes for it.

Lanterman will pick up his loot at Computer Station: $100 worth of goods

GOTO 212

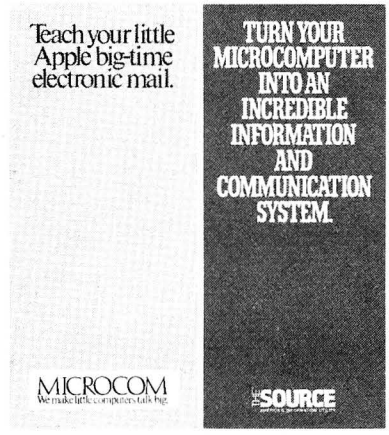


"The Cascade Express" took first ploce for animation in the Penguin contest. It portroys on old steam engine troin entering a railroad tunnel . Then o hond- cor appears, being pumped toward the tunnel's exit. A moment after the hand car hos entered the tunnel, it comes out lickety split, followed by the chugger. Cartoon is by Margaret Park.

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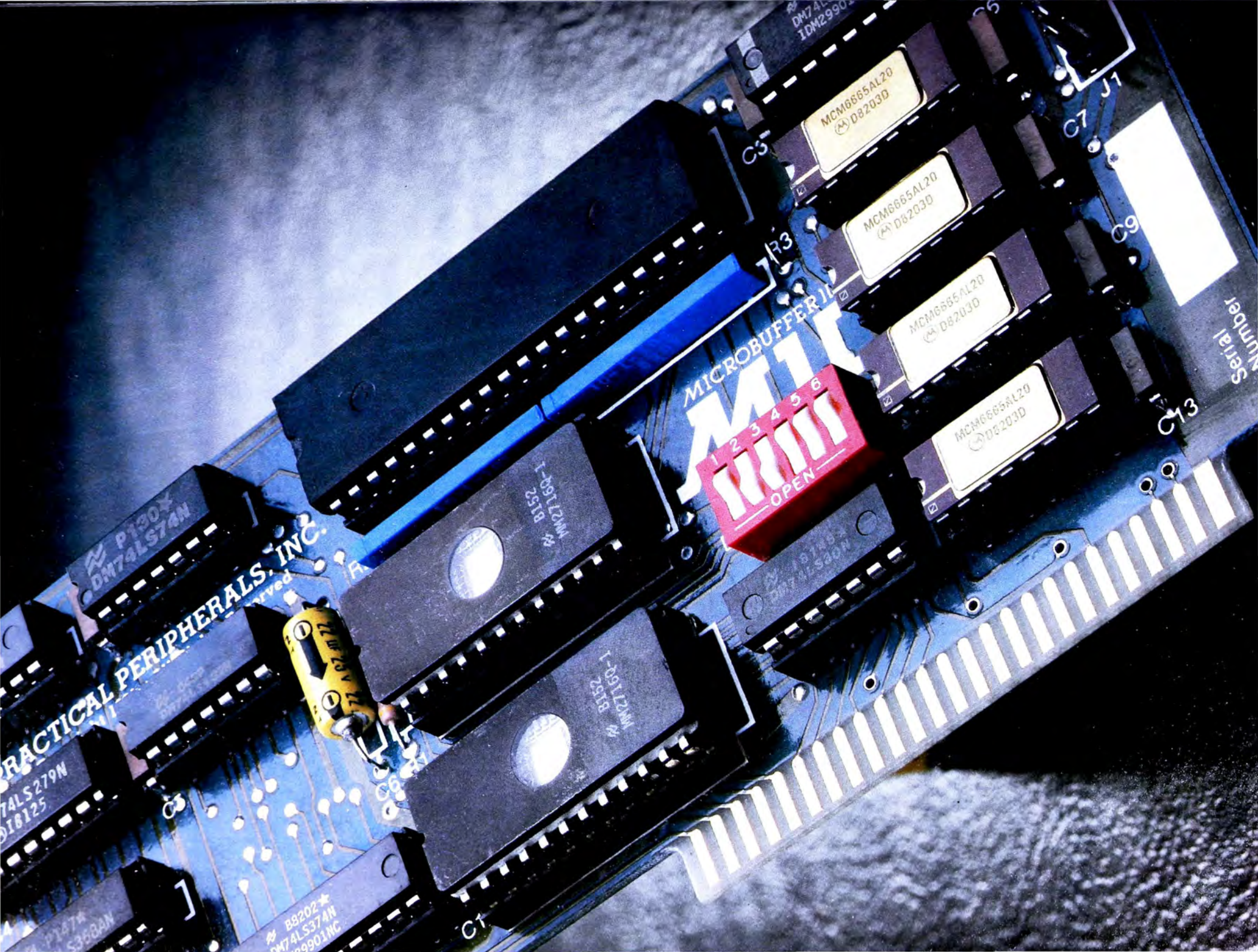
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FASTALK

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 determined by *Softalk*'s editors, based on a program's ability to stand up over time; on significance for its time (breaking new ground or introducing a new genre); or on its archetypal qualities. A classic is identified by a bullet preceding its title.

Where opinion is expressed, *Softalk* has seen the software in question; when listing software that has been reviewed, the capsule is based on the review, and the month and year of the issue in which the review appeared is given at the end of the item.

If you wish to refer to the original review, remember that not all reviews appear in Marketalk; look for overview articles and reviews within columns such as Mind Your Business, Buttonwood Apples, and Ventures with VisiCalc.

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 mainframes, 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, 10800 NE Eighth, Suite 819, 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.

Creature Venture. Hi-res search of the depths of an old mansion to find a treasure. Some animation. Highlands Computer, 14422 S.E. 132nd St., Renton, WA 98056. $24.95.

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.

Hi-Res Adventure #0: Mission Asteroid. Blast off to save Earth from destruction. Twenty-one color graphics; for beginning adventurers. On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $19.95.

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

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

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

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 Software, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *Reviewed this issue.*

Mummy's Curse. Adventure places you in the desert with nothing but greed and a few dozen ways to die. Good puzzle with amusing hi-res graphics. Highlands, 1422 S.E. 132nd St., Renton, WA 98056. $30.

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.*

Space Adventure. Dziabczenko. Hi-res adventure to solve from spaceship cockpit. Onboard computer has six memories to save messages and clues. Animated 3-D color graphics. Sierra, 536 E. Sahara Ave., Las Vegas, NV 89102. $29.95. *1/82.*

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

Zork. Lebling/Blank. Part one of main frame 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 East Bayshore Dr., Palo Alto, CA 94303. $995.

Alpha Plot. Kersey/Cassidy. Hi-res graphics text utility; type text on color drawings, charts. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $39.50.

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.

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.

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 Software, 5221 120th Ave. S.E., Bellevue, WA 98006. $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. $189. MYB, *10/81.*

Dow Jones News and Quotes Reporter. With modem, checks latest financial news and stock quotes for more than 6,000 securities from local Dow Jones databank. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $95. *2/82.*

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

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:Report. Powerful report generator de-

signed 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.*

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.

● **VisiCalc.** Bricklin, Frankston. Electronic worksheet for any problem involving numbers, rows, and columns. No programming necessary. VisiCorp, 1330 Bordeaux Dr., Sunnyvale, CA 94086. $250.

VisiFile. Creative Computer/Jameson/Herman. Database management system for organization and retrieval of information, allowing sort and modification of records. VisiCorp, 1330 Bordeaux Dr., Sunnyvale, CA 94086. $250.

VisiPlot. Kapor. Hi-res plotting and graphics package. VisiCorp, 1330 Bordeaux Dr., Sunnyvale, CA 94086. $179.95. *7/81.*

VisiTrend/VisiPlot. Kapor. Combines *VisiPlot* graphics with time-series manipulation, trend forecasting, and descriptive statistics. VisiCorp, 1330 Bordeaux Dr., Sunnyvale, CA 94086. $259.95. *7/81.*

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-S, Santee, CA 92071. $60. *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, 1330 Bordeaux Dr., Sunnyvale, CA 94086. $129. *9/81.*

Z-Term. Blue. Flexible, customizable communications software written specifically for the IP/M Apple. A quality package. Southwestern Data Systems, Box 582-S, Santee, CA 92071. $99.95. *5/81.*

Fantasy

Akalabeth. Lord British. Dungeon game of considerable depth and challenge. No save function. California Pacific, 7700 Edgewater Dr., Oakland, CA 94621. $34.95. *1/81.*

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., Renton, WA 98055. $40.

● **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., #105, Reseda, CA 91335. $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.

Empire I; World Builders. Mullich. Thinking person's adventure of galactic colonization; characters require food and drink and eventually die of old age—if not before. Interactive Fantasies, EduWare, Box 22222, Agoura, CA 91301. $32.95. *2/82.*

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. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $34.95.

Odyssey: The Compleat Apventure. Clardy. Fantasy adventure far beyond one place and one setting. Castles, catacombs, an ocean voyage, and the orb of power. Synergistic, 5221 120th Ave., S.E., Bellevue, WA 98006. $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, Box 4247, Mountain View, CA 94040. $39.95.

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.

Upper Reaches of Apshai. The next four levels of the *Temple of Apshai*. Automated Simulations, Box 4247, Mountain View, CA 94040. $19.95.

● **Wilderness Campaign.** Clardy. First fantasy game to leave the dungeon for the great outdoors; first in hi-res; first to bargain with merchants; and more. Synergistic, 5221 120th Ave., S.E., Bellevue, WA 98006. $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

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 Fifth St., Davis, CA 95616. $39.95.

The Complete Graphics System II. Pelczarski. A wealth of graphics tools at a reasonable price. Make two-dimensional drawings with game paddles, add text in destructive, nondestructive, or reverse modes, create three-dimensional figures with a panel module, and shape tables with a shape module. Lacks any convenient way to erase; recommended you save frequently. Manual features complete outline of command structure. Penguin, 830 Fourth Ave., Geneva, IL 60134. $9.95. *7/81.*

E-Z Draw 3.3. Rewrite of original, including Higher Text character generator. Any fonts and parts of screen can be expanded and compressed; flipped, slanted, rotated, or mirrored in combination. Twenty type styles. Sirius Software, 10364 Rockingham Dr., Sacramento, CA 95827. $49.95.

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 Software, 830 Fourth Ave., Geneva, IL 60134. $59.95. *5/82.*

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

ABM. Warner. Fast-moving earthbound-invader game featuring multiple warhead missiles attacking six U.S. cities. Muse, 330 N. Charles St., Baltimore, MD 21201. $24.95. *2/81.*

● **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 Fourth St., San Rafael, CA 94901. $24.95. *2/81.*

A2-PB1 Pinball: 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.*

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.*

Asteroid Field. Nitchals. Best and the slickest of the asteroid games. Effective use of sound. Cavalier, Box 2032, Del Mar, CA 92014. $24.95.

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.*

Bez Man. Besnard. Move faster than your adversaries in this improvement on classic eat-the-dots games. Three hi-res mazes, speed increases with each cleared screen. Bez, 4790 Irvine Blvd., Box 19633, Irvine, CA 92714. $22.95. *10/81.*

Borg. Thompson and Allen. Fight your way through a castle full of gun-toting dragons to find and kill the Grud who controls them. Other dragons tend to shoot each other and run into electrified walls, but Borg is immortal. Amusing hi-res animation and first-rate maze design. Sirius Software, 10364 Rockingham Drive, Sacramento, CA 95827. $29.95.

Bug Attack. Nitchals. Sing along with dagger-

FASTALK

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.*

Ceiling Zero. Warady. Three kinds of alien ships issue from a mothership hovering above a lowering micro-deflection beam, 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, Suite 314, Marina del Rey, CA 90291. $29.95. *2/82.*

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.*

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 popsickle 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. Pitting your hi-res space fighter against numerous adversaries. Adventure International, Box 3435, Longwood, FL 32750. $29.95.

Epoch. Miller. Straightforward space battle with refueling bases and time warps. Speed and steering response controls. Sirius Software, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *10/81.*

Falcons. Varsanyi/Ball. A hypnotically good shoot-'em-up with several levels of complexity. Piccadilly Software, 89 Summit Ave., Summit, NJ 07901. $29.95. *10/81.*

Firebird. Nasir. Put out the fires set by the firebird before the apartment building burns to the ground while simultaneously catching leaping victims and escorting them to a rescue helicopter. Hi-res. Gebelli Software, 1771 Tribute Rd., Suite A, Sacramento, CA 95815. $29.95. *2/81.*

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 *Reviewed this issue.*

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 famous hostile-alien types. Normal and expert play. Continental Software, 11223 S. Hindry Ave., Los Angeles, CA 90045. $29.95.

Horizon V. Nasir. Okay followup to *Gorgon* with superb animation, though not much challenge. Gebelli, 1771 Tribute Rd., Suite A, Sacramento, CA 95815. $34.95.

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. Eat-the-dots, *Crossfire*-style, in a constantly shifting maze pattern. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *Reviewed this issue.*

Laf pak. Chuckles. Four-game variety disk by Lord British's roommate: *Creepy Corridors, Apple Zap, Space Race,* and *Mine Sweep.* On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95.

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. *Reviewed this issue.*

● **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., Suite 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.*

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. $24.95. *6/81.*

Peeping Tom. Livesay. Difficult, blind-firing shoot-'em-up requiring estimation of foe's position behind shuttered windows. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $34.95. *5/82.*

Pigpen. TMQ. Latest wrinkle in drop-the-dots, featuring hi-res swine and instant hams. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *Reviewed this issue.*

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

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

Russki Duck. Knopp/Merrell. You attempt to recover stolen missile plans hidden in a fake duck while dispatching enemy agents who try to stop you. Fairly easy. Gebelli Software, 1771 Tribute Rd., Suite A, Sacramento, CA 95816. $34.95.

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 Road, Coarsegold, CA 93614. $24.95. *7/81.*

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.

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

Space Eggs. Nasir. Invader-type game. Crack floating eggs to get at monsters inside. Then face spiders, fuzz balls, spacewolves, and lips (lips?). One of Nasir's best. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *4/81.*

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 Fifth 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.

Thief. Flanagan. Shoot robots before they shoot you in hi-res scrolling rooms. Bouncing ball with evil grin adds more problems. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *11/81.*

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.*

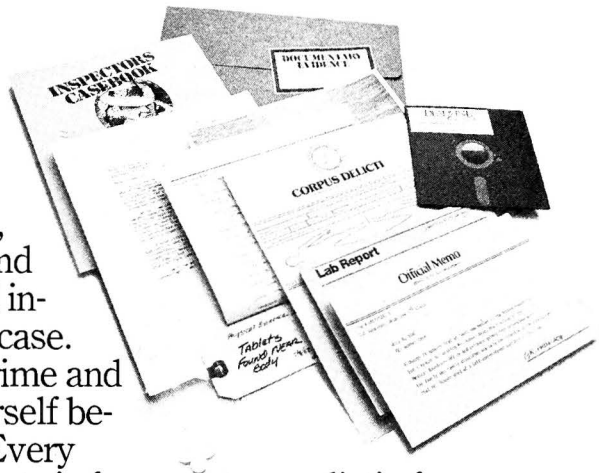
Tumble Bugs. Bishop. Very silly, enjoyably frustrating eating game with excellent graphics and animation. Magnifying glass enlarges where you are, blocks part around you. Datasoft, 19519 Business Center Dr., Northridge, CA 91324. $29.95. *5/82.*

Twerps. Thompson. Home-arcade game with



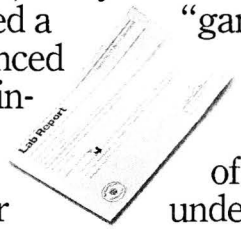
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plot, elaborate animation and audio, and severe fuel shortage. Links several different style games together. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

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. $89.95.

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 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.*

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., Suite 105, Reseda, CA 91335. $39.95. *Reviewed this issue.*

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.*

Data Perfect. Assembly language database companion to *Letter Perfect*; supports lower case in forty-column. 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, Texas 77373. $59.95.

DOS 3.3. Increases disk storage capacity more than 20 percent over 3.2. Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014. $60.

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.*

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; memory compression option reduces compiled program size 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.

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.*

Home Money Minder. Schoenburg. Original of *Home Accountant*; bank reconciliation, transactions by month by budget category. Continental, 16724 Hawthorne Blvd., Lawndale, CA 90260. $34.95. *4/81.*

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. $34.95. *4/81.*

Menu Generator. Compiles inputs and writes menu programs in Basic. Involves filling in several forms on screen. Excellent documentation. Crane Software, 16835 Algonquin, Suite 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.*

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.*

Program Line Editor. Program development and modification program with more than eleven editing commands, listing control, lower case, and programmable cursor control. Synergistic Software, 5221 Bellevue, WA 98006. $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. *5/28.*

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.*

Tax Beater. Lennard/Lennard. Easy-to-use tax software. Adjusts deductions to conform to regulations. Tells whether deductions are high, low, or average for your income. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $129.95. *4/82.*

Tax Manager. Taso. Modularizes data and saves each module. Complete documented results. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $150. *4/82.*

Tax Preparer. Howard. For accountants and those knowledgeable about tax. Contains eleven IRS forms and ten schedules; can do everything your accountant can. Howardsoft, 8008 Girard Ave., #310, La Jolla, CA 92037. $99. *3/81.*

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., Sunnyvale, CA 94086. $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

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.

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, 19273 Kenya St., Northridge, CA 91326. $29.95. *Reviewed this issue.*

Hi-Res Computer Golf. Aronoff. A master-

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Businessmen

Q. Do you have difficulty operating your printer when connected to a time-sharing computer? Are files you're trying to download too large for your system buffer? Does your host computer lose data when you send files to it?

A. "The Professionals" incorporate printer ring buffers which allow slower printers to accept data at their own rates. Very large files are easily received by periodically saving the buffer to disk. Unlike some software which can lose data during disk saves, "The Professionals" not only direct the host to stop, but actually wait for it to respond before performing the save. After a successful save, the host is automatically directed to continue. This process may be repeated indefinitely. Lost data during send is virtually eliminated by the widest variety of send options available in any communications software. "The Professionals" ensure fast, reliable data transfer of any valuable business information.

Authors

Q. Does your line of work involve sending written material to others? Are you a program author who would like to send work in progress to a partner or client and know that it arrived intact? What would the ability to instantly send material or programs to anyone at any time be worth to you?

A. "The Professionals" provide the ideal way to send your articles, manuscripts, reports, programs and technical documents to another computer with phone line access. Now you can work WHEREVER you want, and be assured that your data is sent to its destination quickly and error-free. In fact, compared to the fastest mail services, "The Professionals" offer immediate delivery and will save you the purchase price in just a few uses.

Students

Q. Are you bothered by limited access to your school's existing terminals? Would you like to be able to do your school assignments at home at your own convenience?

A. "The Professionals" allow you to access virtually any dial-up school or college computer system over standard telephone lines. This means no more waiting in line for an available terminal or hassles with malfunctioning school equipment. You can even prepare term papers or reports while off-line and send the completed work to the school computer for final printing. Best of all, you can work from home at the times most convenient for you.

Time Share Users

Q. Are you tired of wasting time and money sending or receiving files with inadequate, poorly designed software? Do you find yourself manually performing the same lengthy log-in procedures over and over again? Would you like to automate these procedures for yourself and others?

A. "The Professionals" allow you to send files which have been prepared in advance. They may then be transferred at any time, as quickly as possible — even to several different systems. No time is wasted reviewing information while on line; data may be captured by your computer or printer (or both) to be evaluated later at your convenience. These features assure minimum on-line time and therefore minimum on-line cost.

"The Professionals" introduce macros that are more sophisticated than anything previously seen in communications software. These "hand-shaking" macros allow you to perform complete multi-stage log-on sequences automatically; all you do is specify the system to be called. This eliminates sign-on errors and greatly simplifies operation of the entire system, not only for you, but for other less skilled operators.

Bulletin Boards

Q. Would you like to be able to take advantage of the information featured on local bulletin boards and information services such as The Source, CompuServe, Dow Jones, and others?

A. "The Professionals" open the world of modem communication networks to you. There are already thousands of these systems and networks in use nationwide. "The Professionals" provide an ideal way of accessing these systems. All 80 column boards, external terminals (even the 40 column screen), and currently available communications devices are fully supported, including the Hayes Micromodem II and Novation Apple CAT. All standard baud rates — 110, 300, 1200 and others — are fully supported; BAUDOT too, if your computer is equipped with the Apple CAT modem.

Clubs

Q. Are there other Apple owners with whom you would like to exchange programs or files, but have been unable to do so because of limitations imposed by the software you now use?

A. Any two Apples equipped with "The Professionals" can transfer ANY type or size file with complete error checking and correction. All of "The Professional" packages are fully conversant with each other and operate almost identically. For the first time ever, you can transfer compatible files to an operating system different from yours — error free!

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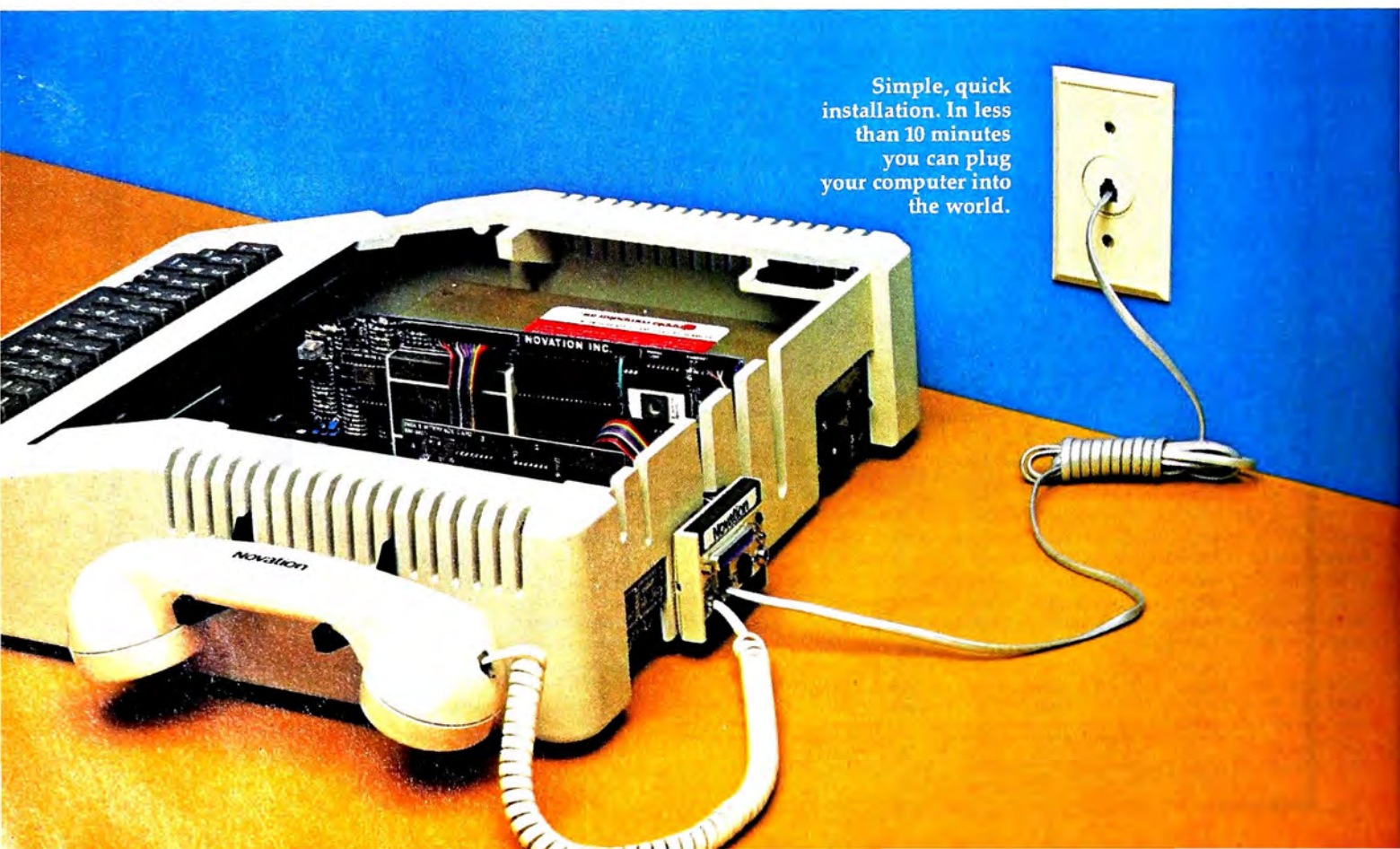
Set it on automatic

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And the variety of speeds available lets you save even more. Switch from the standard 110 or 300 baud to 1200 baud (it's 202 compatible) and suddenly you're moving data four times faster.

New full duplex 212 option

Now for the quickest, most convenient communication, 212 full duplex is available. An additional card just slips into your Apple. It comes with a complete 212 Comware II compatible software package which includes current upgrades for the entire system. This can be added to existing Apple-Cat II cards so you can start with a 212 or start with the basic Apple-Cat II and upgrade later.



Simple, quick installation. In less than 10 minutes you can plug your computer into the world.

It's a phone.

With automatic dial, it's a handy intelligent phone for regular use. But also, you can switch from voice to data at any time without losing the connection.

Important "built-ins"

The Serial RS-232 port to run your printer is built-in. No need for the expense and trouble of a separate card.

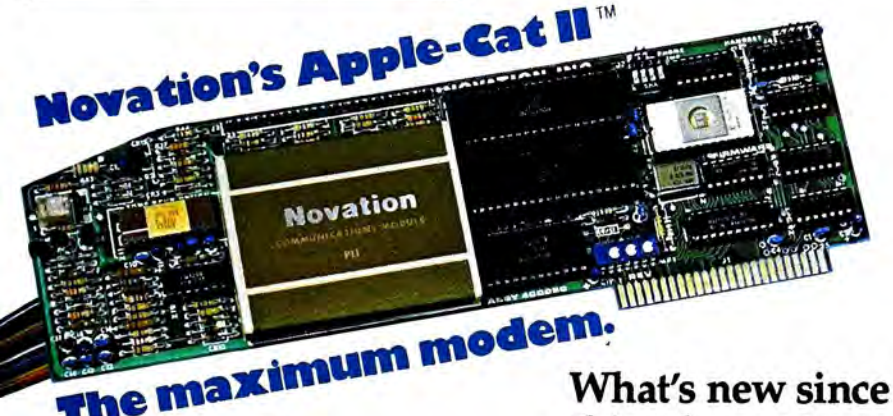
A BSR controller is also built-in. Along with a conventional BSR system, it lets you control electric appliances, lights, whatever through your computer—even by phone. Add a real time clock and you can program it to be activated whenever you want.

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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.

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 91602. $19.95.

Robot War. 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., #108, Mountain View, CA 94043. $59.95.

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., Suite 108, Mountain View, CA 94043. $59.95. *7/81.*



Word Processing

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 file length. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $150.

Easy Writer. Word processor; choose 40 or 80-column version. Information Unlimited, 281 Arlington Ave., Berkeley, CA 94707. $99.95.

Format II. Single-drive machine code program; incorporate and edit files from other programs, create DOS text files for any communications program, any printer. Kensington Microware, 300 E. 54th St., New York, NY 10022. $375.

Gutenberg. Wagner. User definable character set, split-screen hi and lo-res text editing for text and program files. Performs text block moves and deletes; paint program produces large illustrations integrated with text. Micromation, Yorkdale Place, 1 Yorkdale Rd., Suite 406, Toronto, Ont., Canada M6A 3A1. $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.

Screenwriter II. Kidwell/Schmoyer. Formerly *Superscribe II*. No extra hardware for upper-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 II. Zaron. Basics of text editing plus split screen. Character-oriented, floating cursor edit with add, change, math, print, and preview modes. Muse, 330 N. Charles St., Baltimore, MD 21201. $150.

Super-Text III. Zaron. 40/80 column. Latest *Super-Text* update; letter documentation, footnotes and headers, expandable math mode. Muse, 330 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.*

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OPEN DISCUSSION

Testimonial of a Compulsive Buyer

I am a compulsive software buyer when it involves programs that I can use. The problem is that I keep buying different programs for the same purpose, as each seems better and promises to do more than the one I have. It is very helpful to come to a decision when *Softalk* does articles and comparisons of these programs. On occasion I purchase a program on my own after reading an article or advertisement in *Softalk*.

About a year ago I read in *Softalk* about the PEAR System, a program for investors and stock brokers. I bought the program even though I had other similar programs and have never been happier. It does everything they claimed it would.

Now the compulsive buyer (me) reads the full page advertisement about *Zardax* the word processor in your magazine. I have two already. Who needs another one? Well, I'm not too happy with the two I have. Perhaps it is because I really need simple programs with manuals that don't require a degree in computer science to understand. I still haven't passed chapter three in *VisiCalc*. Back to *Zardax*. After an unsuccessful search to find *Zardax* (what's that?), my local, friendly Computerland special-ordered it for me. After one weekend with the program I am looking for anyone to write to, even testimonials. It's that great.

It really would help all Apple owners if the readers of *Softalk* would write to tell when they are pleased, and at the same time it would show their appreciation to the developers of good software.
Jack Appel, Palm Beach, FL

Mooning for Slipshod's Hi-Res Cows

About your magazine, I enjoy the columns on Assembler, the contests, and the top thirty list. How about expanding the top thirty to a top one hundred list, since it seems that quite a few of your readers like reading the list? You might also include a reader poll of software, much like *Consumer Reports* has a reader poll on movies.

Speaking of reviews, I really think they should be a little bit more critical than they are. What about saying whether or not the game is worth the price? For instance, *Suicide!* is an interesting diversion, but it isn't worth $29.95 to me.

About software pricing and piracy, I don't think manufacturers of software will be able to lower their price for one disk unless they deal in much greater volume; they have to make it worth everybody's while to produce/distribute/stock the product, and if the price for a piece of software goes much below what it is, there won't be enough of the pie for everybody to have a piece. So what can they do? Well, instead of just having one game on a disk, why not do the following: Include on the disk with the main attraction two or three older games that may not be advanced enough for today's competitive market, sort of like the old double feature at the movies that also included newsreels and such.

While leaving a local computer store last week, a large man smelling of fried corn stepped up to me and asked me if I could be trusted to send a letter to *Softalk* for him. I asked him why he couldn't send it himself, and he muttered briefly about a lawsuit using up his spare change, then walked away. Here is the letter he handed me to deliver, and I think it speaks for itself.
Brent Iverson, Boca Raton, FL

The Mysterious Letter

I was generally pleased with your review of *Cropduster*, but there are a few things that I think I should say about the game.

You mentioned that running into power lines at 3000 feet was annoying, raising the possibility that a few bugs had found their way into the program. Rest assured that we dust each disk for bugs before we send it out. These are not bugs that you mention, but rather they are *features*. Uriah has asked me to note that he wrote *Cropduster* not only in COBOL=13, but also in such languages as Fortran, Basic, APL, Pascal, and Forth. In fact, every single one of *Cropduster*'s two hundred interlocking programs is written in a different language. This was the result of a bet that eventually turned out to be very costly for Uriah's brother, Irving M. Stukk. After the 183rd program, Uriah ran out of programming languages to use. So he invented a few of his own, and took it upon himself to write interpreters and compilers for each one of them. One of these languages is CDSEL, an acronym for Crop Duster Spraying Effects Language. This language is primarily of value for determining the effects of chemical spraying on crops in the Midwest. Possible uses for this language include a hi-res arcade-like business simulation, a businesslike hi-res arcade simulation, a simulation of a hi-res arcade business, and an example of a specialized programming language.

YAPL is an acronym for Yet Another Programming Language. This may be the ultimate language for people who don't like structured languages. It does nearly everything tiny Basic does, except more slowly. Examples of statements peculiar to this language are the If/Then/Maybe statement for programmers who don't like their programs to be too predictable, and the *forget* statement, which is obviously the opposite of the *rem* statement. Actually, we haven't found a use for either of these constructs yet, but Uriah is rather proud of the fact that no other language has them.

The lawsuit against our company has made our operations difficult and has caused us to delay our plan of opening Cropdusterland, a theme amusement park (to be located in Summit, SD) for at least a few decades. We have, however, a plan that we hope will recoup much of the losses we may suffer from this lawsuit. We are suing ourselves, claiming that our game, *Cropduster*, is a direct steal from our game, *Cropduster*. In case the opposition hires a lawyer who has taken some law courses, or in the event that our plan fails for any other reason, we have made other plans. As long as we are being sued, Uriah suggested, why not make it worth the opposition's while. (We won't deign to mention the name of this belligerent arcade game manufacturer.) To this end, we are planning to release, over the next few months, *Battle-area, Meteoroids, Missile Commander, Blue Baron, Warring Lords,* and *Centipede Wars*. All of these feature, if only briefly, hi-res cows. To induce a few other arcade manufacturers to join in the fun, we are also

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master charge

developing *Pac-Person, Cosmic Stargate Defender, Galacticans*, and *Spaced-out Invaders*.

Also in the works are a few games that we feel incorporate revolutionary new concepts in computer gaming. One of the ones we will be proudest to release is *Software Pirate*. This game is similar, at least in appearance, to several games put out by Automated Simulations a few years back. The player starts out by buying an Apple computer. With this computer and his few remaining dollars, he ventures into the dungeons of Realworld. There he meets other Apple owners who, he hopes, he can persuade to exchange software with him, he then searches for the various bit and nibble copy programs hidden around the dungeon. He must also beware of the agents of Kilobaud the Green, who seek to turn him in for Kilobaud's Reward. The eventual object of the game is to get out of the dungeon with as much pirated software as possible. However, the real game on the disk is the disk itself. The owner of the disk is challenged to produce a working copy of the disk using any method he desires. The first person to mail a pirated, working copy of *Software Pirate* to us will win one hundred dollars, and a full-time job as Slipshod's software protection specialist.

Thank you for your time. May your harvest be bug-free and your programs the same.

George Spelvin and Uriah R. Stukk, Slipshod Software, SD

In a Spin To Win

I am writing to you to respond to a letter written by Adam Behrens about *Wizardry*. I received my copy one week ago and have only stopped playing to eat. Mr. Behrens stated in his letter that he had trouble with bugs in *Wizardry*, especially in the Training Grounds and the Utility Options. I have not tried every Utility Option, but every one I tried worked fine. My version of *Wizardry* is the January 2.1 version. The only example Mr. Behrens gives is when his *Wizardry* disk spins indefinitely. This is almost always not a software problem, but a case of a misaligned disk drive. What you do is go down to your local Apple Computer dealer and have your disk drives tuned up. *Wizardry* is an excellent game and a good example of what an Apple can do when it has the right software. See you in the second scrennario: *Knight of Diamonds*.

Mike Cameron, Castro Valley, CA

Murderous Mansion Still on Rampage

Today I received your April issue of *Softalk* and was reading through it when I came across a letter from Reed Hubbard of Jackson, Mississippi, regarding *Cranston Manor*. To be sure, this game does not deserve the bad rating that he gave it. You see, I am the person that he talked to at On-Line Systems. While Mr. Cranston's spirit is never seen, his influence is felt in the fact that there are strange forces in the house, i.e. a suit of armour that won't let you get items, and something controlling the computer in the labyrinth downstairs.

I'm glad to see that Mr. Hubbard was able to solve the game so quickly and with such little help. There are others out there who can't. Not every game is meant for everyone. Apparently Reed found a game that was not a challenge to him. That hardly makes his scathing remarks justifiable.

Not an hour after I read his letter, a mother called me for some clues on *Cranston Manor* for her son. She had nothing but the highest praise for the game. Considering that she called long distance, she obviously felt that it wasn't the easiest thing in the world. In fact, I receive many questions each day concerning this adventure from people who are stumped and in need of help.

Perhaps Reed was a little overzealous in writing his letter and referring to twenty-five rooms in the manor. You see, I count over thirty rooms in the house, over thirty rooms in the labyrinth in the basement, and over thirty rooms outside. That hardly adds up to only twenty-five rooms. This totals to about a hundred rooms in the game, which gives a more accurate picture of what is really contained on the *Cranston Manor* diskette.

In checking the April issue of *Softalk* we find that *Cranston Manor* has ranked fourth consecutively for at least two months. That kind of popularity is not achieved through false advertising. Games that achieve this status do so through word of mouth of satisfied customers. My purpose in writing this is not to harass Mr. Hubbard but rather to set the record straight.

Reed brought up an interesting thought, that of rating the games by levels of difficulty; an idea of that nature could have merit. Unfortunately, we do not all experience game difficulty in the same manner. Perhaps a large number of players could independently rate each game and then take an average, or have companies list the difficulty level of each of their own games, giving them in order from easiest to the most challenging. It's something to think about.

If there are people out there who are finding it difficult to locate a challenging game, I'm certain that *Time Zone* will challenge their creative imagination. It can't be solved in just a few hours. I've played it twice, the first time with Roberta Williams, its creator. This game took over a year and a half to develop and has over 1200 pictures. Since then I've developed a glossary consisting of twenty pages of definitions for *Time Zone*, along with refined maps for the thirty-nine time zones that you can visit. Beginning May

1, I'll be available to answer questions for this, the ultimate adventure.
Howard Luthy, On-Line Customer Support, Coarsegold, CA

Helpfully One Step Beyond
I just received the April issue of *Softalk* and wanted to relay to you a compliment of the fine article with the explanation of the *Dow Jones Market Analyzer* program. I was able to see a demonstration of this new program at an investment seminar on its introduction and agree with you that it is an excellent "value" package. However, rather than purchase this program, I decided to go one step further and I purchased the *On Balance Volume Charting* program by Stock Market Software Inc. that uses Joseph Granville's On-Balance Volume concept. For the past year I have been running a similar program called *Stock Tracker* by H&H Trading Company, and now I have the two programs running in parallel, along with tracking other technical data and indicators. If I can be of any assistance in providing information on documentation or problem solving of these programs, I would be happy to do so.
Merle Zmak, Clayton, CA

Personal Investing with Options
To Ken Landis: I have enjoyed your column in *Softalk* as I am scheduled to teach an adult education class about home computers and their use in personal investing programs.

In preparation for this eight-week class, I have written to companies that offer software for this application. Some have sold me demo disks, other have refused any assistance, and one (Options-80) loaned me their unlocked program. I urge you to include this program in your schedule for review. My limited experience with it is very positive. It is designed to do the messy math associated with options but leaves the decisions to the user. It considers dividends, commissions, the prime rate; it can also plot the results, such as annualized percent gain versus annualized percent growth in share value for six different strategies in both puts and calls. The graphs can also be printed via any printer with graphics capability. Two negative comments I have so far are that only one disk drive is supported and the graphs cannot be labeled to identify the company or identify the three different plots. Since the original program is in Applesoft, these shortcomings would be corrected.

I look forward to your continuing series. There is a definite need for your thoughts.
Stuart Meibuhr, Birmingham, MI

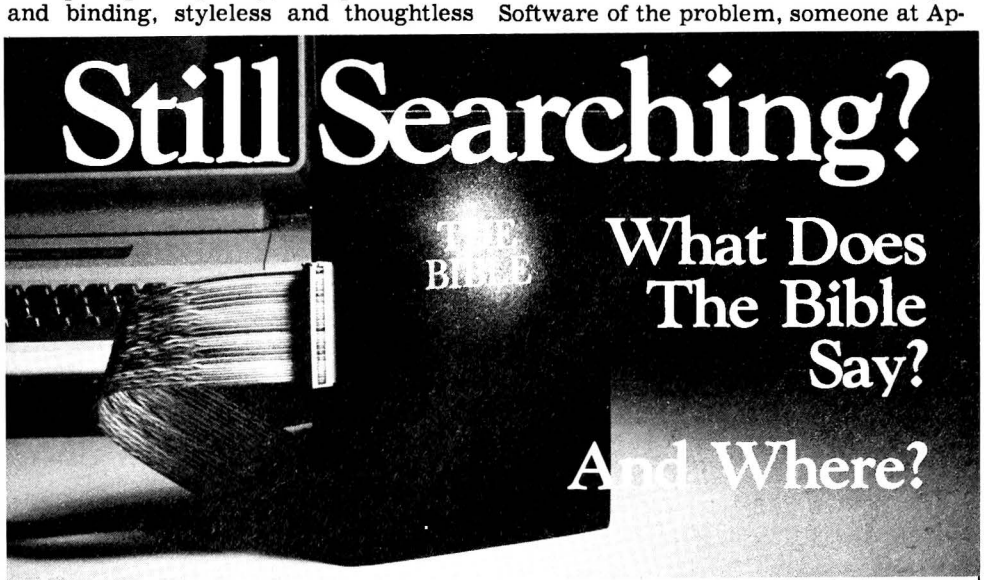
Utopia Calling Earth
Not to prolong a controversy that does not exist, I feel I should offer some information regarding *The Utopia Graphics Tablet System* and Special Delivery Software as the latter pertains to the former.

There is really no argument with the assertion that the manual is inadequate. The system's method of operation is based on a paintbox program developed on a mainframe at the New York Institute of Technology by Alvy Ray Smith and others. If a manual exists for this system, I have not seen it. Ampex Corporation manufactures a unit that is based on the NVIT model and no finished manual exists for this either. These systems, as well as the Utopia system, are menu driven and the user, particularly the inexperienced user, is encouraged to spend the time normally applied leafing through a manual to experiment with the system until an understanding of its scope and operation is acquired. This is not meant to excuse the inadequacies of the manual but to point out the fact that one does not learn to use these systems by reading the manual, but by hands-on experience.

Secondly, Special Delivery Software, though marketed by Apple, is not developed in-house and retains a second class status with regard to quality controls. Although many shortcomings of the line have been or are intended to be overcome, at the time that the *Utopia* system was released certain shortcuts compromised the quality of the manual, to wit: poor print quality, cheap materials and binding, styleless and thoughtless typesetting (note the absence of the little stop signs and pointing fingers characteristic of Apple's front line manuals), and inadequate proofreading which, in the case of our manual, caused one chapter to be tacked onto the end of another with no heading and no indication of the shortcut in the table of contents.

I do not know a programmer brash enough to claim that he has written a program of any substance that is completely bug free. There is no practical way to prove this claim as there will always be a user that can find a way to use the program that will expose some unforeseen weakness. The Special Delivery version of the *Utopia* system is actually 9 major programs and several utility modules which, because of memory constraints, must sometimes alter pointers on the fly. Under normal conditions, a delicate balance will cause the system to operate with the appearance of normalcy.

Apple released and then recalled approximately 1000 copies of the program for the following reason: Apple's copy protection scheme does not allow the usage of "exec" files, upon which the system's memory management depended. Although Apple tested and approved the system as submitted, they neglected to test a copy protected version, resulting in the recall. Rather than inform Utopia Software of the problem, someone at Ap-



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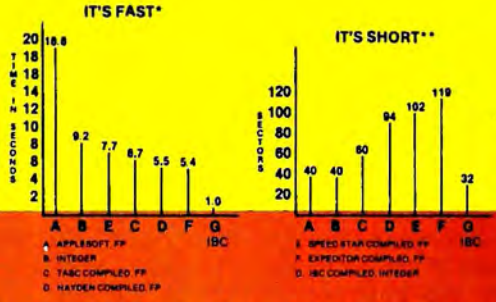
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*Bench mark data obtained from Call-A.P.P.L.E., October 1981.

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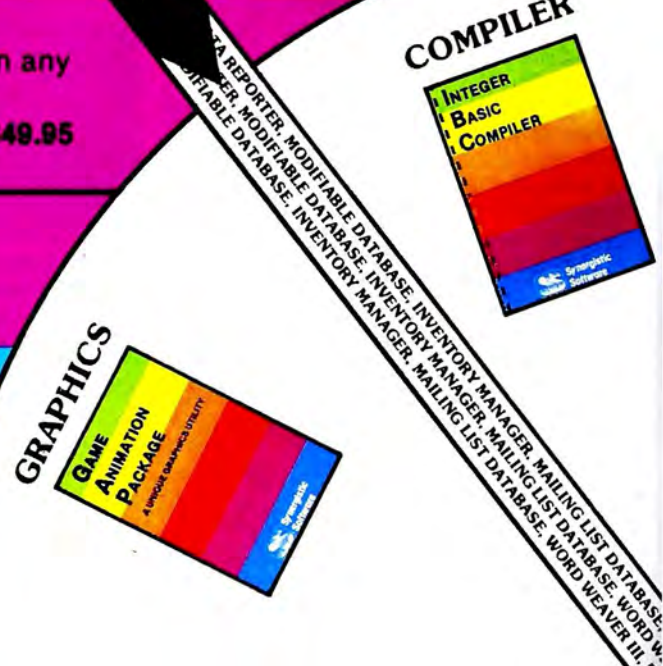
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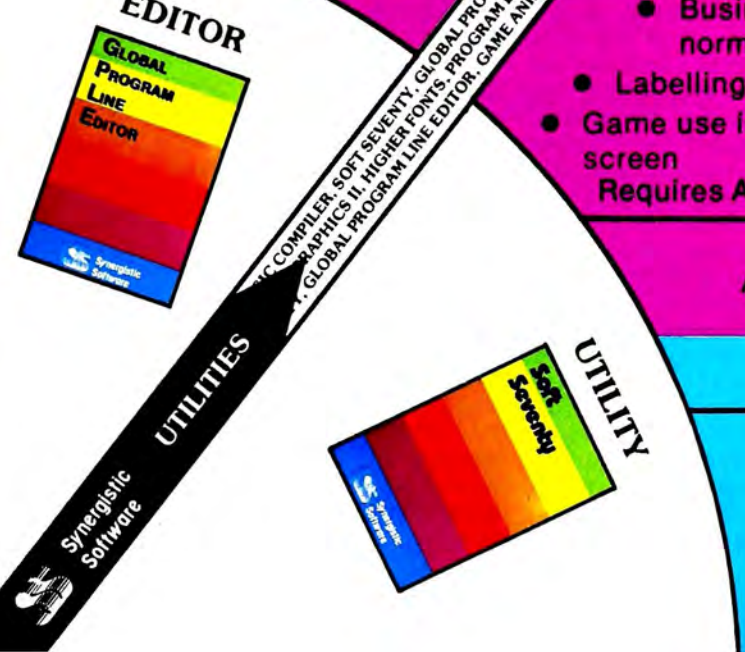
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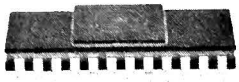
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ple altered the code to make it operational and the system was rereleased. Any subsequent problems with the software may, at least in part, be attributed to these more or less kluged modifications which may or may not have been field tested with the same efficiency as the original version. Such changes will affect the animation program in particular since it operates from a different part of memory than most of the other programs.

Regarding Mr. Blum's contention that "sketch" and "line" are incompatible when tracing: Line mode, as well as every other function except for sketch, operates within a fixed scale. Sketch is the only function intended for tracing. Although Mr. Blum may consider this a design flaw, it is not a bug. Anyone who is satisfied with the five drawing functions available with the original tablet software does not have to deal with this triviality in trading off for a broader range of artist oriented functions. There are not enough little boxes on the tablet overlay to define the options available. This is why the system is screen oriented and why there is little consideration paid to tracing.

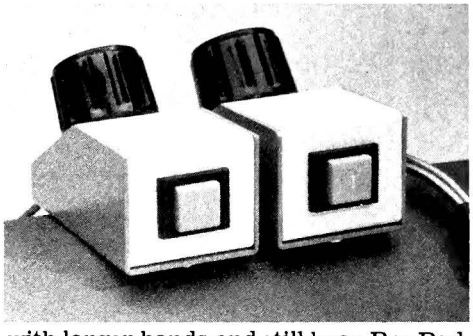
I do not intend for this to appear as an indictment of Apple Special Delivery Software, nor as an alibi for any flaws that may exist as a result of programming iniquities. I have faith that Apple, being the best small computer manufacturer in the business, will not let anything with the Apple name on it remain in question for long. Quite frankly, I have not kept up with the progress of my program for two basic reasons. Firstly, I am in the midst of an extensive rewrite of the entire system including extensions and improvements too numerous to detail here. Secondly, Special Delivery Software's license to the system is being mutually terminated in the near future, not because of a lack of faith in Apple's ability to rectify any problems, but because individual programs in the catalog, particularly specialized ones such as this one, can not get the attention they need (customer servicing, advertising, etc.). Roger Powell and I are founding Utopia Software Distribution to deal with this problem and by the end of 1982 hope to have an initial release of graphic, music and utility programs including the revised graphic system in tablet and joystick versions, all of which will be extensively documented and copyable.

Finally, I would like to thank Saul Bernstein for his support of the system and Brooke Boering for coming to our defense. In composing this letter, I am testing for the first time Brooke's documentation editor, Arthur, and must say that he is the friendliest little typesetter I have had the pleasure to work with (Arthur, not Brooke).

Todd Rundgren, Bearsville, NY

A Good Paddling

Upon receiving our April *Softalk*, we were very unhappy to see our product misrepresented in Hardtalk. Our former distributor failed to submit the proper photos and thus the product shown in the inset is not the current Pro Paddle design. The design was changed as shown in the accompanying photo. This was done primarily to accomodate people



with larger hands and still keep Pro Paddles as compact as possible. This change was made in November 1981.

In general nothing was said about the obvious qualities of the Pro Paddle. The approach of the review seemed swift at best. Pro Paddles have always had the switch numbers hot stamped on the switch buttons so users won't have to guess, decode colors, or perhaps biblical names to find out which paddle they are holding. The switch we use is of the highest quality and rated at one million cycles. The play in the switch button is offset by the fact that the switch will fire with light pressure from almost any point on the one-half inch square button without binding. This may take getting used to for those who enjoy a night of computer games with gritting teeth and stiff shoulders.

Pro Paddle knobs are high quality brass-collet type mounted on a long life mini pot. We make the only game paddles with a three-wire shielded cable, epoxied into an extra-heavy-duty dip plug for flexibility, noise/interference protection and long life. The cables exit from the rear of the unit, away from the action of the hands. Each set comes with four adhesive rubber feet for placement on a flat surface or on the computer.

Although it is not our intention to turn this rebuttal into an ad for Pro Paddles, we feel the article was somewhat misleading. Considering Mr. Mazur's involvement with the highest-rated paddles, one cannot be sure of the authenticity of the review. This is especially evident when we consider the review in *Softalk*'s Marketalk column, September 1981; ". . . Their speed and accuracy are outstanding and a plastic square finger-sized button means total comfort. . . .", ". . . Albeit the trial lasted only a few weeks, Pro Paddles showed no sign of weakening."

We thank Mr. Mazur for his prompt

and pleasant response to our calls and would like to thank him for reviewing our product. In the future we hope we will be contacted for reviews or any inquiries directly. This way we can provide the proper information at the proper time.
Phil Crescenzo, Computerworks,
San Rafael, CA

Switch Without a Difference
To Jeff Mazur: I am employed by The Keyboard Company in Garden Grove, CA, and I thought you might be interested in a market study we did regarding the Hand Controller II for the Apple II. In your article you stated, "The placement of this switch was the only shortcoming found in these paddles and if you were left-handed or if you didn't mind operating the switch with your fingers, these paddles had a lot to offer." Prior to product introduction we did a market survey of two separate prototypes with the switch on the right and the left side. We found that initially the position of the switch did make a difference, however, the preference had no correlation on whether you were right or left-handed, then, after the people used it for awhile, it made little or no difference as to what side the button was on.

Also, you mentioned our Joystick II and talked about the toggle switch that controls input number one. We are planning on a new design that will eliminate the rocker switch and use two fire buttons. This should make playing *Raster Blaster* a lot easier.
Cheryl D. Thurlby, Garden Grove, CA

Buttons Up, Thumbs Down
To Jeff Mazur: The A2D Company was pleased to see your review of its joystick and game paddles in your April issue of *Softalk*. We do use high quality components as indicated in your review. Unfortunately, after reading the review, your readers may be left with an erroneous impression concerning the placement of buttons on our products. As shown in our brochures, our products are designed to be hand held with the fingers activating the buttons. Thus, the buttons are in the front of the case not in the rear as stated in your article. Trying to activate the buttons with the thumb as was apparently done in your evaluation would be quite awkward as you stated, since the product was not designed for use in this manner. We at A2D have enjoyed reading *Softalk* and watching your magazine improve in its breadth and quality.
Hayden Porter, President of A2D Company, Greenville, SC.

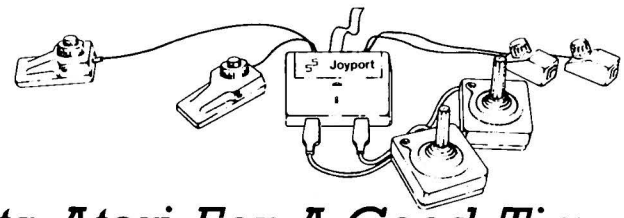
A Case of "Finesse" Elbow
I read with great interest Craig Stinson's "Home Finance Roundup" (April '82). I also read with great interest his articles a year ago on the same subject and was disappointed with the outcome. The problem is that I don't know who I am disappointed with: Craig Stinson for his evaluation, Spectrum Software for their product, or myself for expecting more from commercially purchased software.

For many years I have been keeping track of my monthly bills in a small ledger. I eventually wanted to use the Apple for this purpose but didn't want to take time to write the program. That's when I read your April and May '81 articles on home finance packages. It seemed Spectrum Software's *Home Finance Pak I* was what I'd been looking for! I purchased the software and took it home ready to automate my monthly bill keeping. I'll admit that the program did everything your evaluation and Spectrum said it would, however, it lacked class. There were also some basic criteria I feel should be followed should one sell software. Let me explain.

My first purchased software was from an Apple users club. It consisted of three programs: a programming utility, a text editor, and a mailing list. They were filled with error handling routines *onerr goto* and user messages, were easy to use, and the displays were pleasing to the eye. The best part was the cost of each program, about twenty dollars.

The Spectrum package had no error handling and few messages to tell the user what it was doing. There were misspelled words ("menue" for menu, "enper" for enter), *gotos* that went nowhere (fortunately the lines are not called), no

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trailing zeros on reports, and an overabundance of flashing and inverse video. The Hello program asks for the printer slot and RAM size and then hardcodes slot 5 and 48K into its system parameters display. It does, however, use the printer slot variable in the actual program. The RAM size is never used. The *Home Finance Pak I* cost more than twice any of the other mentioned programs and had less than half the class (or finesse as Craig Stinson calls it).

So you see my dilemma. Should I be disappointed with you for not being more in-depth with your reviews, with Spectrum Software for not cleaning up their product, or with myself for expecting a fifty dollar program to exceed a twenty dollar one? One positive note did come out of this learning experience. I wrote my own bill-keeping program. It was up and running in a short time. Since then I have been giving it "finesse." Who knows, maybe I'll sell it for twenty dollars.

George L. Cox, Jr., Colorado Springs, CO

Double Entry Oversight

A year ago you published a review of home finance packages. For some reason, you decided to review only "single entry" systems. This past January, you reviewed accounting packages in the Mind Your Business section. In that review, Peter Olivieri included *The Accountant Finance Data Base System*, a double entry system intended primarily for use in the home or a small business. The review praised *The Accountant* and concluded that "For the home user (and perhaps in some less complex small businesses), the best package we evaluated was *The Accountant* by Decision Support Software. The documentation was very well done, programs were easy to use, and design was thorough and complete."

DSS was delighted that *Softalk* had recognized that a home finance package need not be just a limited single entry system. However, your April issue included another "Home Finance Roundup," which claimed to review home finance programs—single-entry accounting systems intended primarily for use in the home or in small businesses." We will not argue with the results of the review, but do have great difficulty with your implication that a home finance package must be single-entry. *The Accountant* was designed to provide the full capabilities of a double entry system to users who do not know a debit from a credit.

Many users of *The Accountant* had previously tried single-entry systems and found them to be too limiting. Most users of *The Accountant* do not know how to debit or credit but, nevertheless, find the double entry process easy to use because of the special prompting provided by *The Accountant*. A double entry system is uniform in its approach to every type of transaction. Uniformity is an important characteristic that makes systems easier to learn and easier to use. Single entry systems usually have different procedures for entering checks, cash, and credit card transactions. Transactions that do not involve one of these three categories (such as recording wages withheld for federal taxes) may not even be permitted at all. Inconsistencies and errors can arise easily in single entry systems. A double entry system has enough redundancy to prevent inconsistencies and thwart errors. Your reviewers and readers should be concerned with the sacrifices in ease of use and performance that a double entry system requires in order to provide the increased flexibility and consistency. We have purposely not designed *The Accountant* as an automated version of a manual double entry system. Such a system would clearly not be suitable for home use. Instead, we have used the capabilities of the microcomputer to make the double entry process straightforward to the layperson. We leave it to the reviewers and users to judge the success of our approach. All we ask is that you not dismiss *The Accountant* from consideration for a home finance package on the basis of it not being a single entry system.

Ernest H. Forman, Decision Support Software, McLean, VA

Crystal Clarifies

In response to Mr. Davis's letter, I would like to make the following comments:

1. We believe our current versions of Apple and Atari software to be free of major program errors.

2. Consumers may replace any program purchased within the last thirty days through an authorized dealer.

3. All sales and service are now being handled by our over 3,000 dealers throughout the world. If you would like the name of your local dealer call (408) 778-2966.

4. Crystalware is a corporation and employs many individuals in many countries. Hollywood Marketing will be setting up a factory for Crystalware in Ontario next month.

5. It is usually policy to ignore small independent (less than 40,000) publication's editorial comments. The products speak for themselves in originality, concept, and design.

John Bell, President,
Crystalware Inc., Morgan Hill, CA

Softalk *received word recently from John Bell that Crystalware may be going out of business. Fans of Crystalware products may take heart, however; at the Applefest held in mid-May, some of John Bell's programs were being distributed under the U.F.O. label.*

File Fails Faithful Fan

First let me say that I enjoy my (free, no less) copies of *Softalk* more than any

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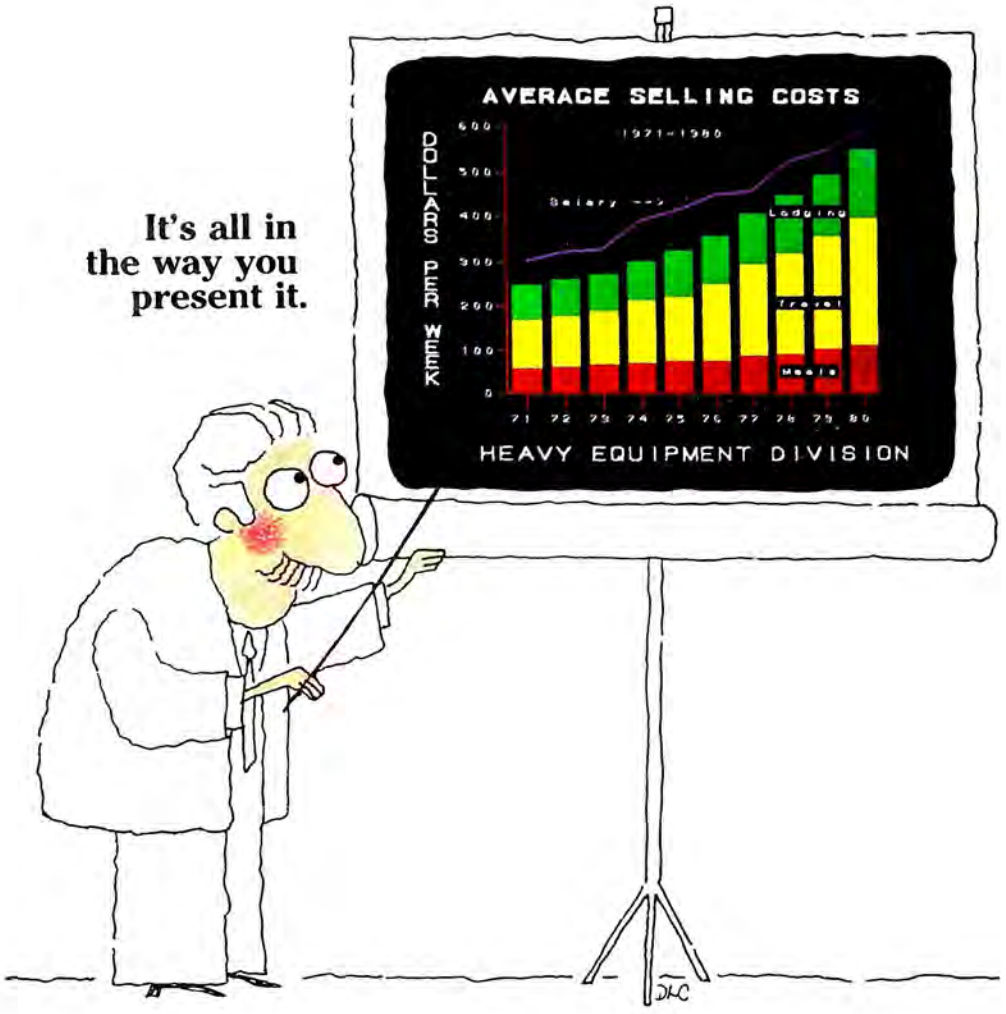
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other computer magazine and I've tried just about all of them. I won't say that I like all the articles, as sometimes I disagree with what is said, but do enjoy them nonetheless. I will be continuing my subscription (paid) when the time arrives.

My main reason for writing, however, is in hopes that you will publish this letter so that others will be aware mainly of incomplete advertising and poor publisher response.

I wrote a letter to Personal Software Inc., now VisiCorp.

I have as yet not received my replacement disks, the delay was unnecessary as noted in my second letter.

VisiCorp did not really answer any of my questions nor offer any assistance with my problems except that the *VisiFile* program will not support a multidisk file. The fact that a program will or will not support multidisk files is a key factor in determining whether or not to buy that program. Visicorp did not reveal this important shortcoming in their *VisiFile* ads, nor in their letter directly to me announcing the program, nor did they reveal any of the other shortcomings I am having problems with.

There are a few things I feel are important that other prospective buyers be made aware of. Space between printed fields must be 2 or more, and the program will single space only. If extra spaces are forced via printer control, then the header and total lines also have extra spaces. Reports always print a page number on its own line, a heading line (blank or otherwise), a solid line across the page, for a total of three lines, like it or not. Files can only be appended in a roundabout, time consuming procedure. When printing files, the disk drive is in continuous operation. This is a lot of wear on the disk and the drive, sometimes exceeding one hour on a full disk of one line in sequence records.

There is no way to catalog a disk without leaving the program. There is also no way to check disk space without leaving the program. This can be critical on long files. The program is extremely slow in internal change of functions, often reading and writing unknown data three or four times for unknown reasons. For example, fifty-six seconds elapsed between selections *print* and the notice appearing on the screen that one can now print. Fifty-six seconds is a long time at Apple speed.

When maintaining files, if an error is made in entering the record number and an attempt is made to correct the error, the program will accept only the first digit of the correction. The program also automatically searches for a four digit record number upon entry of the fourth digit. No correction is possible.

VisiFile is my third program purchased from VisiCorp, the other two being *CCA Data Management* and *VisiCalc*. VisiCorp is well aware of these purchases but put forth almost no effort to help me with my problems. It is this attitude that I have often read about but never expected from such a well-known and respected company, or am I wrong about the respected part? It is fortunate for me that I purchased a backup set of program disks when I first purchased *VisiFile*, otherwise, I would still be unable to process my files.

All in all, the input portion of *VisiFile* is outstanding and extremely flexible, however, the output is slow and rather inflexible as far as page formatting is concerned. Report formatting is flexible enough but not the printing thereof. A data management program as expensive as *VisiFile* and designed to handle only a one-disk file is to me a fraud, that it further is so inflexible as to spacing, heading, and column control is to add insult to injury. *VisiFile* is a great improvement over *CCA Data Management* but does not compare to the usability of *VisiCalc*. I feel VisiCorp so sophisticated the program that they didn't leave any room for simple procedures which are always a part of any data processing function. One of the best ways to check data entry is a double spaced printout just as the data exists on the disk, no spaces, and this simple procedure cannot be done via *VisiFile*.

I think that as a reader service on future program evaluations it would be a good thing to make a list of those things that this type of program would normally be expected to perform, but does not. This would also be a good thing for hardware evaluations. For example, I ordered the Prometheus Versacard and upon reading the instructions found out that the next two lower slots had to be vacant. I wanted this four-function card mainly to save slots and the ads seemed to indicate this was possible, but it is not. I exchanged it for Mountain Computer's MFC, but it arrived minus the installation and operation instructions so I'm still not sure if it needs empty slots or not. This has taken nearly four months and still I do not have a time card in operation.

George L. Smith, Austin, TX

Holy Toledo

At last the whistle has been blown on Bert Kersey. Our neighborhood has known for years that the driving force behind Beagle Brothers, at least since Uncle Louie retired, has been Sophie. Well known to us, for example, is that while Bert designs most of the graphics used in those cramped Beagle ads, it is Sophie who makes up the programs, using the special pad-sensitive raised-letter keyboard created (I believe) out of used tiles from Tecate. No doubt Bert himself was responsible for the recent DOStalk but, alas, it is full of errors as no doubt other readers have told you. The most obvious is that "DOS" does not rhyme with "Boss" but rather with "Toledo", and

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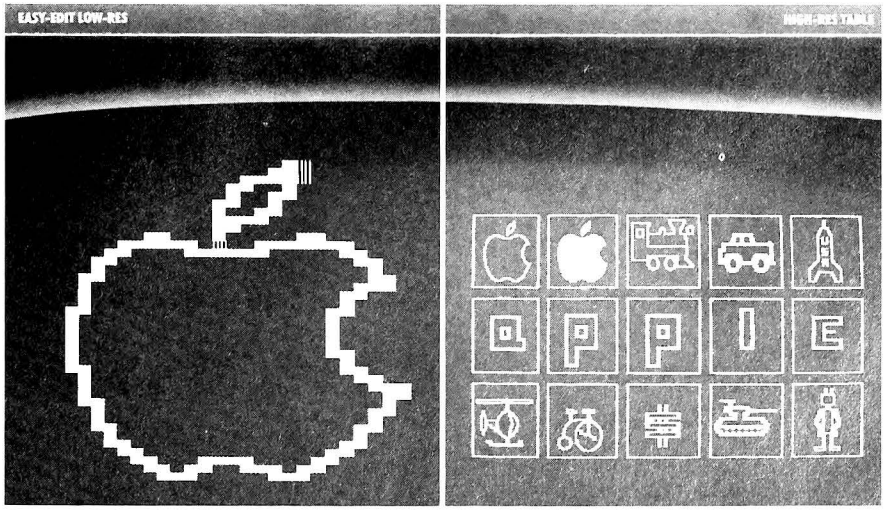
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anyway if the good Lord wanted us to mess around with DOS commands he wouldn't have written them in machine language. But the most glaring error lies in line 10 of Bert's public domain program: GOTO 20 SCRN (+> COLOR= OR AT READ THEN INT COLOR=THEN>INT NEW (sic). Here is not only illogical reasoning but there are also unpardonable errors in syntax; running this will only produce thirteen of the sixteen-lo-res colors on my Zenith twelve inch green-screen monitor when put in hi-res mode. Certainly this sort of misleading programming can only do harm to Apple buffs and dog lovers the world round.
Bob Engberg, San Diego, CA

Actuate the Positive
I've been receiving *Softalk* since its beginning and believe that it's a great magazine and getting even better! I enjoyed DOStalk in the April issue and thought I'd share with your readers a change I made to Bert Kersey's *Decimal Disassembler* program. The following program lines, when added to the original program will convert negative numbers (such as −16384) to positive before conversion to hex.

```
LIST 135: LIST 154, 170
135 IF LEFT$ (ST$,1) = "−" THEN 155
154 REM CONVERTS NEGATIVE DECIMAL
    LOCATIONS TO EQUIVALENT POSITIVE
    VALUE
155 A$ = "": FOR A = 2 to LEN (ST$): A$ = A$ +
    MID$ (ST$,A,1): NEXT A
160 ST = 65535 − VAL (A$)
170 VTAB 24: CALL − 868: PRINT A$; " IS THE
    SAME AS" ;ST;: FOR A = 1 TO 1200: NEXT A:
    GOTO 50
```

Keep up the good work.
Mark A. Taylor, Fort Wayne, IN

Designing Talking Tool
A comprehensive statistical analysis package which is completely conversational in operation would be a valuable tool for researchers and others with limited access to large computers. I am in the process of creating such a package and would like to hear from others with the interest in, and competence for, coauthoring such a program in Applesoft. Anyone interested should contact Mr. Charles F. Cicciarella at the Division of Physical Education, UNC-Greensboro, Greensboro, NC, at their earliest convenience.
Charles F. Cicciarella, Greensboro, NC

Kitchen Help
Help! Since programs along these lines are virtually nonexistent in my locale, I would appreciate hearing from anyone who utilzies the Apple for *any* food or diet program, *especially* diabetic programs; and also for recipe storage, or *any* kitchen related program.

I am also interested in learning if there is a simple way to get Apple's *SDS Diet Analysis* to give a printout. How about *adding* foods to the composition disk? Any input from *Softalk* readers would be *greatly* appreciated.
Mrs. Ray Gada Jr., Modesto, CA

Colors and Clubs
I would like to ask if you have any information on the Apple II in regard to the color kill on text and also, how to receive the additional four hi-res colors which are available on newer models. I have heard that there is an Apple bulletin available concerning this problem. I have not been able to locate a copy of the document. I would appreciate it if you have any information which might solve the problem. Also, if you have any information regarding an Apple club in my area, I would like their name and address.
Michael L. Lue, San Jose, CA

A Taxing Situation
To Peter Olivieri: HELP! I have an Apple. I purchased it the summer of 1979, nearly three years ago. Last month I started a business, called Skysoft Enterprises, in conjunction with a software package I am marketing; I do consulting work, and muster any revenue I can from writing articles. I now use my Apple strictly for business, mainly because I don't have time for anything else.

How can I depreciate my Apple as a business expense? What will the IRS accept? I figure the fair way to do it is establish the fair market value for the Apple in 1982 through ads for used equipment and depreciate from there, but fairness has never been one of the virtues of our beloved bureaucracy.
Michael Schuyler, Kingston, WA

A Soft Appeal for Basic Charity
I am interested in translating some Integer Basic program listings I have into Applesoft. I need to know what the command "MOD" and the symbol "#" mean. I appeal to any charitable editor or reader knowledgeable in Integer Basic for the answers.
Tim Klein, Wilmington, NC

III's Good Company
I have been receiving *Softalk* since you started publishing it and mailing it free to Apple owners. I would like to commend you for your decision in having articles and columns about the Apple III in your magazine. I am a former Apple II owner and I am also one of those who bought an Apple III when things with it were not so good. Fortunately those days are gone, and I find the Apple III now even more reliable than my old Apple II.

The article in your April issue by John Jeppson about the character sets in the Apple III is very informative. It is also useful, and it works. I hope you will continue to have more like this as well as all the good information and routines in your regular column by Mr. Pohlman.
Richard Ferrandiz, Garden Grove, CA

Low Riding a High Horse
While I'm sure that neither you nor Mr. Brown wants an argument within the pages of *Softalk*, I cannot resist the impulse to comment on his letter in the April issue.

I will be brief. First, it seems likely to me, although I do not know it for a fact that the expenses and markups affecting the price of software are not entirely dissimilar from those in the book publishing industry. Certainly the author of a book spends an equal if not greater period in laboring over the work. Yet book prices are generally five or ten dollars less than the prices charged for entertainment software. Nor does the author feel entitled in suing the purchaser who loans his book to a friend.

Mr. Brown also seems to be saying that the motive impelling software authors is not the hope of profit, but pride in seeing their efforts used and enjoyed. While I've no doubt that this is true in Mr. Brown's case, I very greatly doubt that it is typical. It seems to me in fact that the very nature of the microcomputer market at present is one which would tend to encourage entrepreneurism and the hunger to make a quick buck. The fact that there is so little shoddy product and dishonest dealing in this market is a tribute to those in business in it. Not that it is, any more than anyone, lily-white. Much of the game market is filled with products which, if not shoddy, are imitative, basically unimaginative and which do nothing to further the cause, if I can call it that, of personal computing.
Bob Crafts, Edgartown, MA

Advancing in Pascal
To Jim Merritt: Thank you for your many fine articles on Apple Pascal. They are consistently interesting and helpful.

Could you suggest references to help understand the Apple Pascal Operating System? I am moving out of the beginners' ranks and would like to understand and explore the Pascal features more thoroughly than they are explained in the manuals. Examples of things which are not explained well include the *(*$U-*)* option; what protocols should be observed in pushing and pulling parameters on/off the stack in external assembly language routines; how can the filer be dated directly (i.e., during SYSTEM STARTUP). I would value your suggestions for helpful reading. Thanks again for your interesting articles in *Softalk*.
John P. Stokes, Kettering, OH

Teacher's Pet?
To Roger Wagner: I read and study your articles in each issue of *Softalk* and I attribute my meager knowledge of assembly language programming to you and Assembly Lines. Your descriptions of the different commands plus the many examples are superinstructive. I've even gone off and written (with much pride) a couple of my own programs. This is quite an achievement for me and you should consider it a gold star for yourself.

In addition to the ten thousand articles you have lined up to make me even smarter, please consider presenting a couple on how to structure a program before beginning to write the code. What should be a JMP, what should be a JSR? How do you set up your EQU table at the start? Since these questions apply to other than assembly language, if there already exist some good articles that contain the answer could you please refer your readers to them?
Ed Worst, Westmont, IL

Truth Hurts
I still can't believe it! Separate Top Five listings for Adventure and Fantasy, but none for Arcade Games? What gives?
Randi J. Rost, Davis, CA

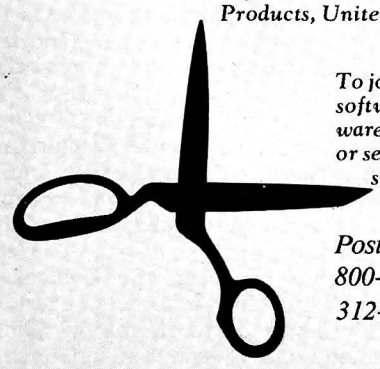
More than ten arcade games have consistently made the top thirty; to break them out would be mere repetition.

Dr. Fixit, Bug Exterminator
In those halcyon days when Apple Computer Inc. was trying to establish its position in the home computer market a number of valuable programs were offered free of charge to Apple users. I was fortunate enough to obtain some of these at that time. One of the better ones was a

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data management program *File Cabinet*, a program which still seems to be widely used.

I have employed this flexible program for maintaining a variety of records. Data are entered into an index file for each database that is established. A header file contains the labels for the various categories of each database. The system is useful, but on a number of occasions I have been deeply distressed to have the data from one of the index files unaccountably replaced on the disk by headings. This has resulted, of course, in irretrievable loss of data. Fortunately, even though this bug is very sporadic in its occurrence, I have been able to find its source and to design a very simple fix.

In writing to the disk (steps 4280-4430 in my version of the program) a flag register, *FF*, is set with the statement: *IF F$ <> "INDEX" then FF=1*. If *FF* has a value of 1 then the contents of the *R(*)* array containing the headings are written to the disk. Under ordinary circumstances *FF* has a value of 0 and then the *N$(J,I)* array is written to the disk. The difficulty apparently arises when the program tries to write the index to the disk, so that *F$="INDEX"* but *FF* already is equal to 1. The conditional statement is not executed, but since *FF=1* the *R$(*)* array is written to the disk. Although the *FF* register is set to 0 when exiting from the subroutines which write to or read from the disk, this may fail to occur if an exit from one of these subroutines occurs through execution of one of the many *onerrgoto* routines with which this program is replete. The difficulty is easily overcome by inserting the statement *FF=0* just before *IF F$ <> "INDEX" then FF=1* on line 4290, and, to avoid a possible problem in reading files, on line 4120 (in my version of the program).

Since making these minor alterations I have not encountered this difficulty with my program, and feel that my data files are much more secure. I hope others find this change to be useful.
Ernest Buetler, M.D., San Diego, CA

New Info on Old Subject

First, I'd like to say your magazine is enjoyed and used a lot in this household both by me and my 14½-year-old son, who is the real programmer in the family. These are my responses to some Open Discussion letters.

1. I agree with M. Lee and C. Graham about Apple's new policy. Not every one has a good dealer with good support nearby. I do, namely Computer Forum in Santa Fe Springs, CA. I also have dealt with Huntington Computing in Corcoran, CA, and they were most helpful when I had a problem. If Apple had dealers everywhere I could understand their policy. Can Apple dealers mail order?

2. George Anderson's letter illustrates the need for making backup copies. If he could and didn't he lost a program unnecessarily. In this regard I applaud Penguin!

3. I agree with D. Doumakes and object to sexist ads.

4. In answer to R. Arnold's letter, I stated in the letter you printed of mine that the list of entry addresses I sent had not been tested and might be inaccurate. I didn't have the *Apple Orchard* article then. I now have a copy and I know Crossley's addresses are more accurate, so use them, Mr. Arnold. One of your readers contacted me with information and I am grateful your readers sometimes answer and share their knowledge. (Even Crossley states, "This list is believed to be correct, but be warned that it was a spare time project.") Concrete examples of how to use these routines are discussed in "Apple Machine Language" by Inman and Inman (for instance, page 73 shows how to plot a point on a screen). Closer at hand, Mr. Arnold should read Assembly Lines by Roger Wagner (the early articles are in book form if he doesn't have all the back issues of *Softalk*) but, more important, he should look at pages 155-158 of the March issue in which his letter appeared and also part 17 in the February issue, which might answer his question about basic informative examples of the uses of subroutines.
C. Colter, Whittier, CA

An Army Travels on Its Software

I had expected you to start charging for your excellent magazine sooner. I'm happy to send a check because you give value for your efforts. I'm sorry that your staff is underpaid; as a member of the Armed Services I can appreciate the thankless position.

I'd like to thank Mark Pelczarski of Penguin Software for his making modifiable programs available. I enjoyed his tenure with *Softside* and his programs with Co-Op. Though I usually set about to break uncopiable programs, it is with the intent to personalize them. No, I won't rip-off the efforts of authors considerate enough of my integrity and abilities to leave their wares unprotected. I do reserve the right to modify and improve the product for my personal use. And, if a dealer will give me a discount, I'll exploit that avenue, too. If ever I should improve a product sufficiently that I feel others would benefit, then I'll inform the author of my changes. Perhaps we could work something out?

I'd like to condemn the Goldcoast Computer Club which is based in Florida now. It used to be in Kentucky. They have dealt unfairly with me and have failed to answer my letters or even

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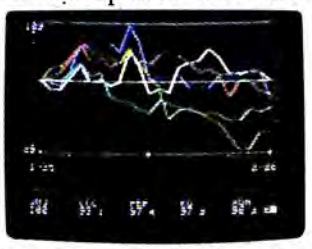
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acknowledge that I've sent them. I even sent them certified mail with no response. I would recommend that all computer owners avoid them and thus avoid my frustrating experiences. They owe me a good sum of money and when I return to the states I'll seek legal redress.

Your magazine merits all the kudos lauded upon it. I'd like to see a column dealing with hi-res graphics routines if possible. Perhaps a discussion of DOS and its "mysteries" would be of interest to your readers, too. I really enjoy Assembly Lines, Ventures with VisiCalc, The Pascal Path, SoftCard Symposium and your Open Discussion. Of course the News, Reviews and Ratings are tops, too. I wish continued success to you and "our" magazine. Thank you!
David Lee Powell, Somewhere in Germany

Gender Bender

As my husband and I were reading the latest issue of *Softalk*, we came across the letter from the Media Associates group which we both found very offensive. Since I am a woman (not just a "person"), and am very proud of my female status, I was moved to write this in rebuttal, something I have never done before.

May I first say that we have been the recipients of your fine publication now for several months, and believe it to be the finest of its kind. I feel that the writer of the above letter expressed a very narrow-minded viewpoint in "its" extremely undeserved remarks towards your publication (no gender used, since apparently the writer wants to be neither male nor female)!

In reference to the remarks about ads utilizing women, I would assume that those women who appear in magazine ads have been paid for their participation in the ads, or the picture would not have been printed. Therefore, one could not say they have been exploited. Also, many magazine ads use a man "as an enticement to sell a product totally unrelated to his presence." So why not a woman?

As to the Howard Software Services ad, I agree that there is no connection between the photo and the product, but I do not feel that it is sexist or degrading since obviously the model was paid for her participation.

In answer to "its" last comment, please do not assume all women want to be down at "its" level, (with no identity of gender). Some of us are proud to be feminine!
Viola Corp, Lompoc, CA

Goodness Has Nothing To Do with It

It is rare indeed that I take the time to write to magazines, but the current complaints concerning the pornographic nature of *Softalk* seem to me to be about the dumbest things I have seen in print in a long while. How an advertisement showing three ladies, up to their clavicles in water, can be construed as to be so erotic that it can be called pornography is difficult to understand. The word "porn" that appears in the title of the program also hardly seems to me to be shocking. Also the ads for *The Dirty Book* and *Street Life* do not cause me to recoil in horror. What do they think of such words as thief, avenger, raider, and invader in program titles? Do they protest adventure game commands such as kill, hit, shoot, stab, destroy? If the puritans are so concerned about what appears in a magazine ad, I suggest they sell their Apples and use the money to hire private tutors for their children lest they be exposed to dirty words and ideas at school as they most surely will by the time they reach junior high.

The biggest laugher was a hot letter from a man protesting the adverse influence *Softalk*'s "pornography" was having on his teenager. His address was listed as New York City. Goodness, what is this man going to do, chain the kid to the door of the apartment? He had best devise some form of restraint or the youngster may break away and wander into Times Square.
Tom Hunt, Kansas City, MO

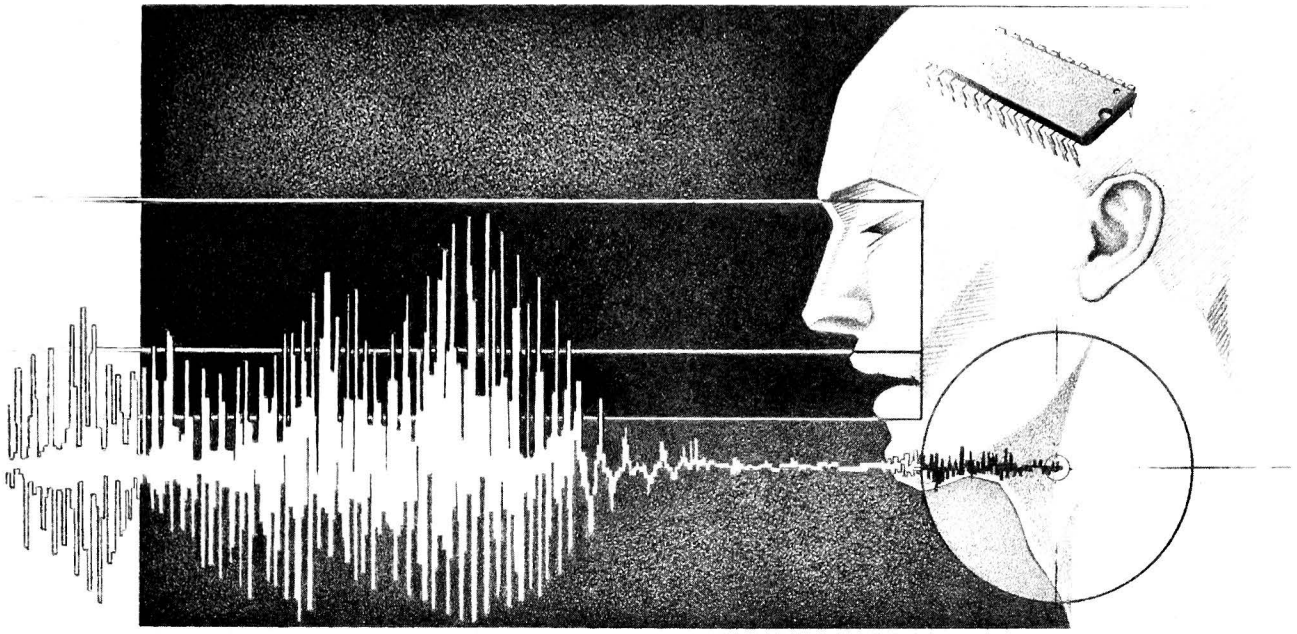
I agree with G. Anderson's letter about software problems. One of the worst for me is a program that after completion leaves the computer hanging and it will not even accept a reset.

Then there is Don Doumakes. Sexist views are taught in the home, and in school, not in magazine ads. I guess *no* products should be promoted with real people, maybe we could use dummies. Don made no mention of the Corona ad in page 5 (March). Are they trying to say that only men work computers and wear business suits? On page 54, is Sirius saying that only men are bad guys? Why not quit trying to read between the lines, and accept ads for what they are—ads. If you look for trouble, you will find it. I do not see sexism, I see pictures of people and never stop to worry about suits, aprons, or hardhats.

Darrell Hunsaker reminds me of a lot of people on welfare or the food stamp program. They soon forget that it is not a constitutional right, nor a God-given right. It is a *handout,* something free to the recipient. They also forget that nothing is completely free, somebody pays for it, and I will gladly pay for *Softalk.* Evaluation and backup of all advertised items hardly deserves an answer. If I want *Consumer Reports,* I will go buy one. I feel sorry for any sailing or automotive magazine that Darrell buys if he wants evaluation and backup from them too. The best you can do is deal with a good computer store who lets you try out software before you take it home. Let's come down on the software companies who don't back up their products, and leave *Softalk* alone.
Alan Ratzburg, San Jose, CA ■



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All About Applesoft

by Doug Carlston

At the end of last month we started using one of the most powerful commands in Applesoft, the *for . . . next* loop. Since we have also had a rather fleeting exposure to some other potent commands, this month we're going to eschew new vocabulary in favor of exploring more thoroughly what we already know. After all, you didn't learn English by trying each word just once either.

Let's begin by looking at the *for . . . next* loop again. As a limbering up exercise, let's try to develop an easy way to draw a line of equals signs all the way across the screen. Of course, we could be very simple-minded and do it like this:

```
10  PRINT"=======================
        ================"
```

This is popularly known as the brute force method and wins no kudos for grace or style. Instead, let's try to come up with a technique that uses a loop. In fact, why don't you go ahead and do it yourself before continuing—after all, what's the point in owning an Apple if you're going to spend all day sitting around reading magazines?

We've got two different kinds of loops available to us now. Traditionalists will prefer:

```
10 PRINT"=";: X = X + 1: IF X < 40 THEN 10
```

However, the *for . . . next* loop is equally effective:

```
10 FOR X = 1 TO 40: PRINT "=";: NEXT X
```

If you find that really exciting, you might want to fill the entire screen with equals signs. Since there are twenty-four lines, with forty characters in each line, we could get this effect by changing the 40 in line 10 to 40 x 24 (anybody have a calculator?), but if we wanted to leave line 10 strictly alone, we could get the same effect by looping through it twenty-four times:

```
5 FOR Y = 1 TO 24
10 FOR X = 1 TO 40: PRINT "=";: NEXT X
20 NEXT Y
```

These are called *nested loops*, which has a nice domestic ring to it. The X loop is wholly contained within the Y loop. You can nest as many loops within one another as you like within reason (moderation is the key word). Good loops will look like this:

```
FOR X . . .
  FOR Y . . .
    FOR Z . . .
    NEXT Z
  NEXT Y
  FOR A . . .
  NEXT A
NEXT X
```

Get the picture? Always avoid crossed loops. Think of it this way. Imagine that you have a sink full of dishes, each labeled with a letter of the alphabet. Each time you come to a *for . . .* statement, you will pull out the appropriately labeled dish and place it in a stack. Then, when you come to a *next* statement, you will want to take a plate off this stack. If you write your code properly, when you come to a *next* X statement, the top plate left on the stack will be the one marked with the X. There are rumors that the inventor of the *for . . . next* loop was once a busboy in the undergraduate cafeteria at Dartmouth, which may explain how this particular concept leaked into current computer lore.

Let's try one more example that uses nested loops and also resurrects the subroutine:

```
5  HOME: GOTO 100
10  FOR X = 1 TO 40: PRINT"=";: NEXT X
15  RETURN
20  FOR Z = 1 TO 3
25  FOR A = 1 TO 6
30  PRINT "!     ";
35  NEXT A: PRINT "!"
40  NEXT Z: RETURN
99  REM *****  MAIN PROGRAM  *****
100  FOR Y = 1 TO 5
110  GOSUB 10: GOSUB 20
120  NEXT Y
130  GOSUB 10
140  GOTO 140
```

Here's an example of triply nested loops. The A is inside the Z, and the Z is inside the Y. Run the program. Now you can fill the screen with lots of little boxes, which has to be good for something.

Before we move on, one caveat. Don't ever leave a *for . . . next* loop other than by the exit. Here's an example of terrible code that does just that:

```
10  FOR X = 1 TO 10
20  GOTO 50
30  NEXT X
50  ....
```

The same stricture applies to subroutines, incidentally. Sneaking off into the code without exiting via the *return* statement leaves unwashed dishes on the stack. Try the following program if you want to see what happens if you violate this rule to an immoderate extent:

```
10  GOSUB 20
20  GOSUB 10
```

Let's move on to more esoteric matters now, specifically two commands that complement one another, however little we may think of them. They are ASC(*n*) and CHR$(*n*). As you may recall, the Apple thinks only in numbers and will convert any alphabetic information you may give it into a number before processing. For example, the letter A is changed into the number 65 by your computer—Z becomes 90. These numbers, called *ASCII codes*, can be used in the CHR$(*n*) command to generate any character in the Apple's repertoire (which actually contains a few characters that aren't even found on the keyboard).

To see the full range of characters available to your Apple, enter the following line in immediate mode:

```
FOR X = 1 TO 128: PRINT CHR$(X): NEXT X
```

You knew those *for . . . next* loops had to be good for something, didn't you? With any luck at all, you heard a beep and

then the Apple character set appeared. The beep, in case you're curious was CHR$(7) being printed. That's the same as control-G, which is marked on the keyboard as "bell." The first thirty-two characters in the character set are control characters and are invisible (and mostly inaudible too).

If you would like to know what number to use in the CHR$*(n)* command to create a particular character, you can use ASC*(n)* to find out. Type in the following short program (after *new*):

```
10 GET A$: PRINT A$;" ";ASC(A$): GOTO 10
```

When you run this, you can read the ASCII value of all the keys. Even keys like return and the arrow keys have ASCII values. The escape key is the same as CHR$(27). You may notice that control-H is the same as the left arrow and that control-M is the same as return. In fact, if you try to use the control keys in place of left arrow and return, you will find that they work perfectly well (the next time we write an Applesoft program, try ending each line with a control-M).

The ability to convert characters to a numerical format can be very valuable, since the Apple is mostly a number cruncher, and there are many occasions when it can perform its tasks more easily if you speak to it in its own language. Perhaps an example is in order. Type *new* and try this:

```
5  FOR X = 5000 TO 5026: POKE X,0: NEXT X
10  HOME: PRINT "TYPE IN A SENTENCE"
20  PRINT "AND PRESS @ WHEN YOU ARE FINISHED . . ."
30  GET A$: IF A$ <> "@" THEN PRINT A$;
40  A = ASC(A$) - 64
50  POKE 5000 + A, PEEK (5000 + A) + 1
60  IF A$ <> "@" THEN 30
70  PRINT: PRINT: FOR X = 1 TO 26
80  PRINT CHR$(X + 64);"          ";PEEK(5000 + X),
90  NEXT X
```

All this little program will do is give you a count of the number of times each letter of the alphabet appeared in whatever you typed. Let's look at how it works.

Line 5 will clear a little area of the Apple's RAM to zero. The area chosen (5000 to 5026) is, if you remember your memory map, somewhere in the region where the Apple stores Applesoft programs. Since it starts storing programs at 2048 and since our program is pretty short, 5000 seems a good bet to be free (if we were wrong, we would certainly find out very quickly).

Lines 10 and 20 put the instructions on the screen. The interesting part is the loop from lines 30 to 60. Line 30 grabs the first character you type, stores it in the variable A$, and prints it to the screen unless it is a @ (the < > symbol stands for "not equal to").

Line 40 then sets the numerical variable A equal to the ASCII value of A$ less 64. Why? Well, hark back to the ASCII character set that we printed on the screen not too long ago. Then hark right on back here and consider that, since the ASCII value of the letter A is 65, line 40 would take 65 and subtract 64 from it if you typed the letter A, leaving a value of 1 (and 2 for B and so forth). The variable A (not to be confused with the letter A which we may or may not have just typed on the keyboard) is set equal to this value.

Line 50 is a single command, a *poke* command. First, it figures out which byte in memory to poke by adding A to 5000. If we just typed the letter Z, then A is equal to 26 and so we are going to poke address 5026 in RAM. Next, the *poke* command figures out what number to poke into this address (the comma separates the two parts of the *poke* command). As you can see, first the Apple *peeks* into location 5026 to see what's already there (there should be a zero to start out, thanks to line 5). Then it adds one to this number and *pokes* it back into the same location.

In this way we set up twenty-six separate counters in memory to keep track of each of the twenty-six different letters of the alphabet. Line 60 keeps us looping back to get another character until the @ sign gets pressed. When we're all done, the *for . . . next* loop in lines 70 and 80 will print a little table showing the frequency with which we used each of the letters of the alphabet. Line 80 uses the CHR$*(n)* command to print each letter of the alphabet, followed by the number *peeked* out of the appropriate location.

Peeking and *poking* can be quite dangerous, especially if you start *poking* into areas you know little about. As a little experiment, try *poking* a few random numbers into the addresses between 2048 and, say, 2100. Then try to *list* your program. Hope you saved it first.

A far safer way to store this table of information would be in an array. We used an array briefly when we were designing our word processor. Any array with more than ten elements has to be predefined early in your program, however, so the Apple can set adequate space aside to handle it. Therefore, we start the program off with a *dim*ension statement that reserves adequate space for our variables:

```
5  DIM ARRAY(26)
50  ARRAY(A) = ARRAY(A) +1
80  PRINT CHR$(X + 64);"      ";ARRAY(X)
```

There! With those three changes we have set up an array that keeps all of our values intact. We don't need to fear the consequences if our program gets too large. There is another advantage, too. A byte of memory can only store values up to 255. This array can handle numbers of any size. Of course, we had to sneak a new vocabulary word in, but that's a small price to pay.

CHR$*(n)* has many uses. One of the most valuable is to insert control characters into your program. You can enter control characters directly, of course. Try *new* and then type this:

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```
10  PRINT "" [hit control-G obout ten times between the quates]
```

When you *run* this, the Apple bell routine will sound ten times. In fact, if you want to make an unholy nuisance of yourself, you can add a *goto 10* command right afterward and probably drive your entire family out of doors. However, if you try to edit line 10 by copying it over with the right arrow, the control keys will disappear. And if you try to read your listing five years from now, it may not be entirely clear that was supposed to be between the quotes either.

Here's another way to handle it:

```
10  A$ = CHR$(7): FOR X = 1 TO 10: PRINT A$;: NEXT X
```

There's another use important to those of you who have disk drives. DOS commands like *catalog* are usually typed directly without line numbers. Since DOS checks whatever you type *before* the Applesoft interpreter can get its hands on it, you don't ordinarily have to worry about what Applesoft thinks of a DOS command. What if you want to use a DOS command in your Applesoft program, though? There has to be some way to warn DOS to pay attention to what's going on.

The way this is handled is by having the Applesoft program *print* the DOS command preceded by a control-D which warns DOS that this isn't a normal *print* statement coming up. Look at this example:

```
10  PRINT"THE PROGRAMS ON THIS DISK ARE:"
20  A$ = CHR$(4): PRINT A$;"CATALOG"
```

CHR$*(4)* is the same as control-D, of course. We could have typed an invisible control-D before the C in *catalog,* which would have worked just as well, but if we had ever edited the line, the control-D would have disappeared, in which case line 20 would have printed the word *catalog* on the screen instead of doing a catalog of the disk.

Another use of the CHR$*(n)* commands comes into play if you have a printer. Type in the following:

```
FOR X = 1 TO 128: PRINT CHR$(X); : NEXT X
```

You should see a lot of punctuation, then the entire alphabet, then more punctuation. Now try a little experiment. Using the edit keys, move the cursor up to the beginning of the character set and then pass over the set with the right arrow.

What happened to all that punctuation at the end of the character set? The truth of the matter is that that wasn't punctuation at all; that was Applesoft's effort to print lowercase letters. Only since the Apple's character generator doesn't have lower-case letters, all that came out was garbage. And when you edited over these characters, your obliging Apple converted them into upper-case letters so you could read them.

If you wanted to use your printer to print letters, you might want to use lower-case as well as upper-case. Here's an example showing how you might handle that:

```
10  PR#1 [used to direct output to o printer in slat 1]
20  GET A$: X = ASC (A$)
30  IF X > 64 AND X < 91 THEN X = X + 32 [if A$ is a copitol letter, then convert it to lower-cose]
40  IF A$ = "@" THEN FLAG = 1: GOTO 20 (if A$ is @, it means that we want the following letter to be upper case)
50  IF FLAG = 1 THEN X = X - 32: FLAG = 0 (convert the letter back ta upper-cose ond reset the flog)
60  PRINT CHR$(X);: GOTO 20
```

By adding thirty-two to the ASCII value of whatever letter we type, we get the lower-case equivalent of the same letter.

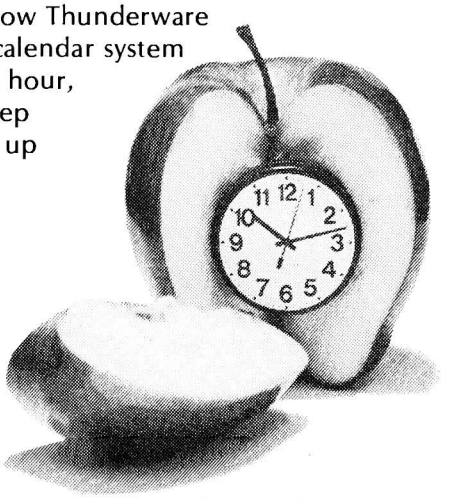
Incidentally, if you don't have a printer, just delete line 10 and run the program anyway. Lines of garbage will appear on the screen as you type, but if you interrupt the program by pressing *reset* (remembering that control-C doesn't work when you are using the *get$* command) and then edit over the garbage, your actual meaning will appear like magic.

Well, we didn't get very far along on our word processor this time, but we should make some progress on it next month. Promises, promises. ◨



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 *A 006 CLOCK                06/08 09:07
 *A 004 FRAME                06/08 09:08
 *A 004 DISK INFO            06/17 16:13
 *B 003 BACKOFF              06/17 16:13
 *B 005 SCREEN               07/24 17:32
 *B 002 TCPUTIL              06/17 16:13
 *B 004 SDTIME.O             06/17 16:13
 *A 007 ADIGCLK              05/19 08:05
 *A 011 SET TIME             06/08 09:08
 *I 009 IDIGCLK              05/19 08:05
 *A 007 TIME                 06/08 09:08
 *A 003 SLOTFINDER           07/07 16:56
 *A 014 DEMO                 06/17 16:14
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Buttonwood Apples

BY KEN LANDIS



In this installment of Buttonwood Apples, we'll discuss a family of programs known as decision generators.

A decision generator is a program that performs calculations on input data—such as stock price highs, lows, closes, and stock volume—and provides recommendation as to whether the security in question should be bought, sold, or held.

The results of the analysis done by these programs may be depicted graphically or may be presented in a report that indicates the strategy to be followed.

Most of these packages have a facility that allows them to make use of such electronic databases as Dow Jones, the Source, or Compuserve for their input data. Since most programs of this class rely on technical analysis techniques for their decision criteria, it's important that investors understand the theoretical foundations of technical analysis.

One of the dominant themes in financial and academic literature since the 1960s has been the concept that capital markets are efficient. Efficiency in this sense means that security prices reflect all available information. There have been numerous studies of the efficient market hypothesis. The results have varied, but all seem to show strong evidence that past price information and public information are quickly incorporated into security prices.

The traditional argument against technical analysis is that if all past information has been incorporated into the price of the security, then analysis of the data will not yield any indications of future performance.

A technician would argue that if all past information were reflected in the price of the security, then analysis of the data would reveal the security's response to varying market conditions and events. Technical analysis will also highlight movements that may otherwise be ambiguous. The patterns distilled from the data identify movement or actions in the market we might not be aware of otherwise.

Now that we have established the theoretical framework for examining decision generators, let's look at this class of software en masse, rather than at specific packages.

If you have ever looked at a chart of past security prices or at a market index, a pattern must have become apparent to you. Perhaps prices appeared to have increased every fourth week in each third month on the second Monday. Presto! A decision rule is born! It's possible that you noticed that security prices increase every fourth month of the second year from the start of the cycle; here again, you created a decision rule based on a perceived pattern.

There was a famous decision rule that related the behavior of the market to the length of women's skirts; as skirts rose, it was reasoned, so would the market! In essence, the human mind looks for order and, in the absence of order, creates order.

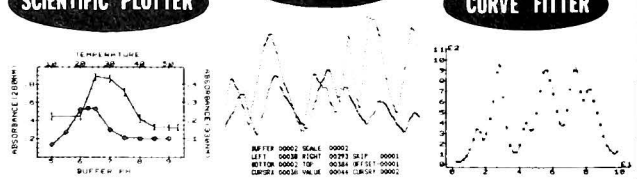
The decision generators presently marketed for the Apple are normally based on technical analysis of price and volume information. Some authors of these packages refuse to discuss the analytic technique they've incorporated in the software.

There are problems inherent in this type of software and in the attitude just mentioned. If the author refuses to discuss or publish the technique being used in the package, how can the investor have faith in the recommendations generated by the package? The package may perform well under a specific set of market conditions and then cause disastrous results when these certain specifications are not met.

When students in a graduate business school were given a series of pure random numbers and told that these numbers

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represented relative price movements of securities, they began to formulate decision rules based on the patterns they perceived in the data, even though, by definition, no pattern exists in a random number series. If the authors of decision generators begin to see patterns that are illusionary but base their packages on these rules, what's to become of the capital of the investor who follows the recommendations of the package? In all probability his money will also become illusionary.

The second problem with this genre of program is how to evaluate it. If the execution of the package is poor, but you can earn a profit using it, at what point does the inconvenience of running a poorly executed package outweigh the financial rewards of using it? This decision is a highly subjective judgment, one that should be left to the individual investor.

Rather than convey to you the results we have obtained from using and testing these packages, here's a set of criteria investors should use in determining which packages to purchase for their particular applications.

Ask the publisher or your dealer to supply you with the hardware specifications of the package. Does it use a modem? If so, which type of modem does it require? How many disk drives are required? Is a printer a necessity?

Once you have determined if the software is compatible with your system, you're ready to evaluate the package's value to you in carrying out your investment objectives.

Ask the dealer or manufacturer to supply you with any descriptive literature on the software. What is its track record? In what types of markets has it performed best? What are the credentials of its authors? Request to be referred to investors who have used the program. Contact these people and get their impressions of the software's reliability, execution, and performance.

If after gathering this information you are satisfied that the program may benefit you, call the authors of the program. Ask them what type of support they will give you when you purchase the program. Will they be available for telephone consultations and, if so, on what basis? What about disk back-up policy or, in the case of a hardware protection key, what is the replacement policy?

You should also ask what analysis technique is being used by the program. Make it clear to the person to whom you're speaking that you won't consider purchasing a program of this nature without being aware of the analysis technique employed. Don't settle for esoteric, cloudy answers. It's your right as a purchaser to know what you're buying. If the authors are unwilling to supply you with this information, then you should be suspicious. Buying a protected program in which you can not examine the algorithm to determine what analysis is taking place is analogous to purchasing a used car when the owner will not allow you to test-drive it.

If you do decide to purchase the software, press for a money-back guarantee for a period of thirty to sixty days. This may seem an unreasonable request, but when the consumer purchases a piece of investment software that promises to deliver profitable investment decisions, the publisher should warranty the product to that effect. This is not to say that if you lose money in the short run when using a package you should return it and demand your money back. But if the package does not meet the specifications set forth by the manufacturer for reliability and profit performance, and is not supported as promised, the investor should have the remedy of returning the product for a full refund.

Decision generator software differs from other types of software for microcomputers; users not only invest their money in the software but, by following its recommendations, they risk more money. In essence, we are describing an automated securities analyst/advisor. Human securities analysts/advisors are registered and disciplined by the Securities and Exchange Commission, the various exchanges, and trade associations, but there is no agency charged to protect the public interest concerning decision generator software. In essence, *caveat emptor,* let the buyer beware. ■

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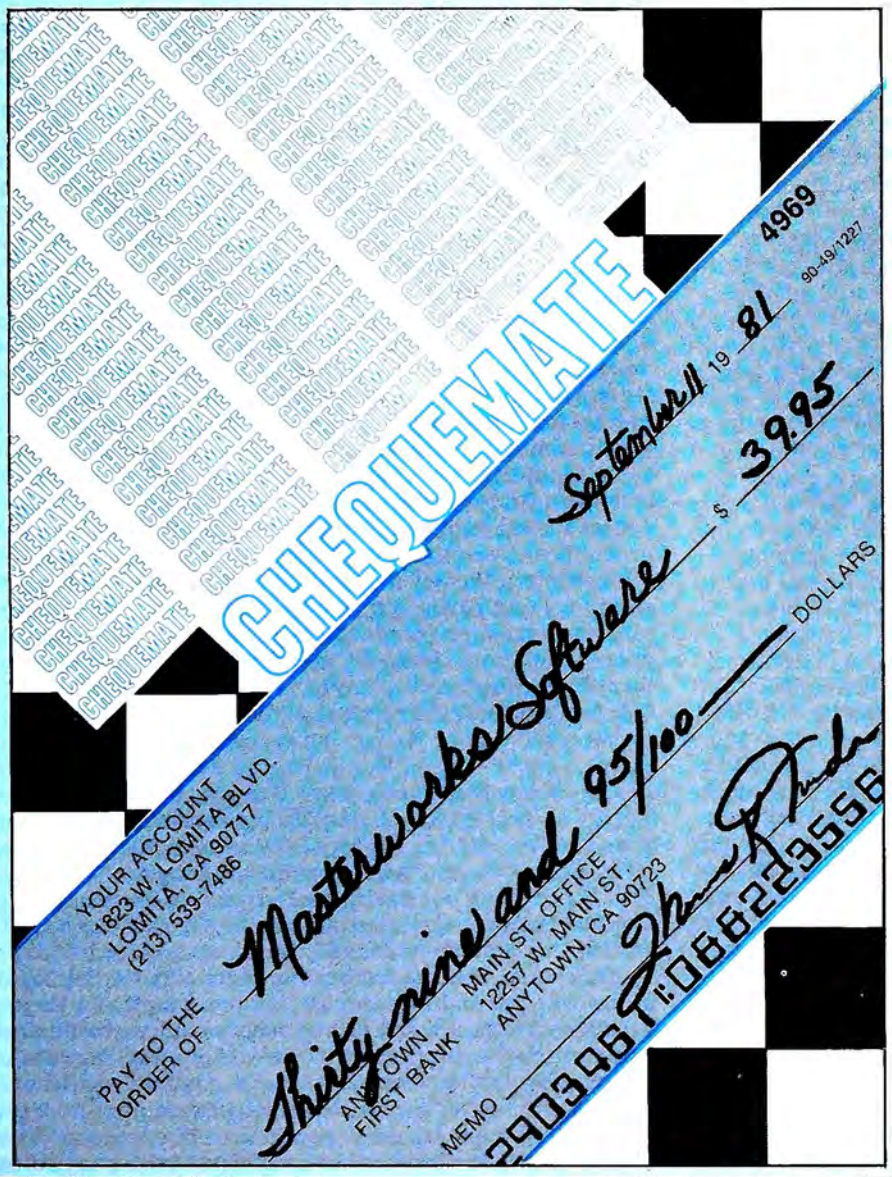
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The Interactive Structures staff: front row, Rich Denver, Jameela Walker, Michelle Kindt, and Joan Hayden; back row, Adam Sherman, Joe Willson, Dave Turner, and Helean O'Brien.

Exec Interactive Structures is On the Pulse of the Future

BY JIM SALMONS

Perhaps what is most remarkable about Interactive Structures is what is unremarkable. This is not the tale of a company that has a tiger by the tail. Its corporate goals are not the lofty rhetoric of an entrepreneurial egomaniac who sees the future of microcomputing and envisions himself at the industry's top. Its strategies have not demanded meteoric growth, which too often mask inadequacies of the business plan and management team. In what it is not is a lesson to be learned for all who may be considering the start of their own high-tech companies or who are considering what to look for in the company behind the products they plan to purchase.

"In what it is not, it is" is an interesting linguistic convolution relevant to the Interactive Structures story. Interactive Structures designs, produces, and markets interfaces. Considering the word *interface* crept into the language barely one hundred years ago to describe "a surface lying between two portions of matter or space, and forming their common boundary" (*Oxford English Dictionary*), it is certainly remarkable that anyone can make a living selling them.

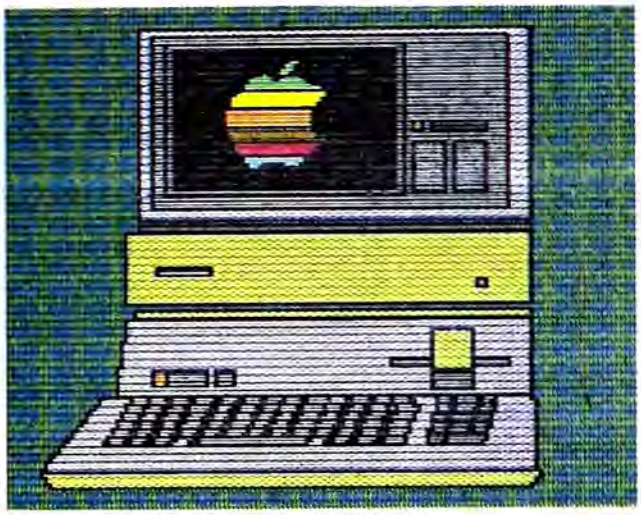
A Dozen Donut Holes, Please. As a scientific term, *interface* was a noun describing something that wasn't, a basic conception within the body of knowledge which has come to be known as General System Theory, a way of thinking that helps our understanding of the interrelations of one thing with another. As our conceptualizing became more formalized and complex reflecting the reality of complexity in real-world systems, elementary ideas were enhanced by our expanded understanding. An *interface* was not simply a theoretical common boundary, but a vital linkage in the process of transaction between two discrete systems or organizational structures.

Herein lies the conceptual pun of Interactive Structures's corporate name. "It is what it isn't." By implication, the structures interact by theoretical necessity through their interface. And because a system, which is an information storehouse, can become more organized, and by understanding the functions of its boundaries incorporate them into a new, larger, more inclusive system, the systemic territory of the interface is elusive. By its corporate name, Interactive Structures has demonstrated its recognition of the elusive nature of the realm within which it does business. This understanding is fundamental to the business strategy that will increase its chances of survival and growth into a long-term successful company.

In the microcomputer peripheral products industry, which includes interfaces as well as the multitude of add-on special purpose expansion boards and hardware devices, today's product can become a standard feature of tomorrow's version of the system the product enhances. Certainly the market for eighty-column cards will suffer slower growth due to this feature's inclusion as standard on many of the newly introduced microcomputers. Some flash-in-the-pan peripheral products manufacturers find they have merely polished the rough edges of a product until the original manufacturer has the time and resources to tidy up its own house; the proverbial castle in the sand.

Only Fools Rush In. So what kind of mind would venture into such an area looking to build a business where solid foundations are few and far between? To answer, we have to take a look at Joe Willson, Ph.D., president of Interactive Structures. For, if one thing is certain, the current realization of Interactive Structures is the result of Willson's creative technical expertise and persistent sound business judgment.

This is not to detract from the contribution made by those who work with and for him. Yet the opportunity for these contributions is again the result of Joe's sound business strategy and nurturing management skills, which encourage the realization of his partner's and employees' potential. And most certainly, the future of the corporation will depend on the growing contribution made by these significant others, whose personal skills are growing to meet the challenge of the evolution of Interactive Structures into a healthy medium-sized company.



A color graphics printout using Pkoso.



Joe Willson, the man behind Interactive Structures.

The Darwinian analogy raises the question, "Where did it all begin?"

The Dawn of Time for Willson was 1945 in Texas. At age five he left the land of rhinestone cowboys for the land of rhinestone sunglasses: Miami, Florida. As is not uncommon with technical whizzes in the micro industry, Willson developed an early interest in playing music, the guitar having a special attraction. The possibility of adding electricity to the instruments to amplify and modify the sounds introduced Willson to the endless fascination of electronic sound amplification and visual special effects.

A healthy measure of native intelligence and some well-directed educational guidance swept Willson from the sun and fun capital of the world to the hallowed halls of intellectual inspiration, Princeton University. As is often the case in a good liberal arts academic environment, Willson was challenged and stimulated by a first-rate faculty while pursuing his undergraduate degree in electrical engineering.

Among his inspirational teachers, E. J. McClusky and Ken Steiglitz opened the world of logic and systematic thinking to Willson. Information, *soft* structures, met the hard structures of electronic systems. Having confronted, understood, and incorporated the relationships between the soft information systems existing within the hard systems of the electronic physical world, Willson had moved the interface outward between what he conceived of as the realm of his professional concern and what was none of his business.

The Bride Came C.O.D. Joe Willson was becoming one of a new generation of electrical engineers who are as comfortable creating software systems as they are creating the physical hardware that brings these soft systems to life. This marriage of interest in information and electronic systems inevitably led to Willson's introduction to the computer, the ultimate electronic information machine.

Yet his introduction was at arm's length. The Princeton computers were noninteractive mainframes which were only accessible to electronics students for use in their class assignments. Willson diligently punched cards and delivered them to a work-study student who informed him, "The results of your run will be ready Tuesday. Next?"

Upon his 1967 graduation, seeking a more intense exposure to the combined application of electronic and information sysems, Willson headed straight to graduate school at the University of Pennsylvania. He went to the source, the Moore School of Electronics, where the first full-scale electronic computer, the ENIAC, had been built some twenty-two years earlier. While soaking up vast amounts of technical knowledge relevant to his professional training, Willson was again allowed to express himself in the areas that had originally attracted him to electronics as a towheaded beach boy back in Miami: music and visual effects, concepts he began professionally thinking of as signal generation and image processing.

Morris Rubinoff, another formative instructor, invited Willson to become involved in an educational film production. Choosing no ordinary educational film, Willson's programming skills were challenged by the objective of using computer graphics to visualize the propagation of electromagnetic waves through space; electric field begetting orthogonal magnetic field begetting orthogonal electric field out of theoretical textbook and into the student's eye.

He was in electronic computer heaven. During the film project and throughout his studies, he was at last within the realm, the interface, between hard and soft systems; the realm of interactive computers. Willson began hands-on/mind-into interaction with accessible computers, Interdata 7/16s, 2901 processors, LSI-11s and a host of mini and emerging micro technological componentry.

And the Bands Drooled On. Bringing a research and teaching specialization in computer-generated music, the timely addition of Steven Smoliar to the university's faculty provided a unique opportunity for Joe to combine intimately his long-time interest in music with his highly technical studies in electrical engineering. The result of Joe's work with Smoliar could make the members of the state-of-the-art German micro-assisted synthesizer band, Kraftwerk, collectively drool. Joe's music system would boggle the minds of the English techno-pop punkers, The Human League.

Joe built a multiprocessor music synthesizer. This unique system used a 2901 processor for signal generation to produce the sound and an Interdata 716 served as a controller/manager, a kind of cybernetic Arthur Fiedler. This two-machine "performer and conductor" system provided fertile ground for the development of Joe's doctoral dissertation on advanced applications in signal processing with a focus on the man-machine-machine interfaces.

With so complex a topic, it took Joe the better part of ten years to complete the dissertation that, in 1979, earned him a doctorate in electrical engineering. But don't let this ten-year time span frighten those of you who might be considering advanced studies in electrical engineering, for Willson was busy accomplishing many things concurrent with work on his degree. Aside from his growing involvement in independent consulting, Willson met, married and started a family with Michelle Kindt, a psychiatric nurse destined for a career change.

In April of 1974, Joe and two colleagues from school incorporated as a systems house to give an identity to their consulting activities. Interactive Structures was born a think tank and would evolve into a manufacturer in an industry which wasn't itself yet born. Along the way Joe and his original partners found exciting opportunities for the release of the creative professional skills. Among the list of impressive projects, mostly

sophisticated business graphics and management information systems, one stands out as a singular achievement: *Design for Fun.*

Booting Up the Stars and Bars. As a part of the bicentennial celebration, the city of Philadelphia decided to showcase the history of American leisure and entertainment activities. In addition to displays of how folks have had good times in the past and present, Philadelphia wanted to include a speculative exhibit on good times in the future. In response to a request for proposal, Interactive Structures outlined a massive undertaking, the creation of a futuristic amusement park—an electronic playground.

It was no contest. Interactive Structures won the contract and began an eighteen-month effort in the design and construction of the exhibit. Though his original partners were still intimately involved and contributed significantly to the project, it was the ultimate realization of Willson's lifelong fascination with music and visual special effects.

Since video games were little more than a Pongish gleam in Atari's eye, the exhibit featured many large-scale interactive displays that dazzled visitors' eyes and ears. It is fascinating to think how much different the focus of the exhibit might have been had the micro industry started a little sooner or had our Founding Fathers taken a bit longer to ratify the Constitution, thereby postponing the two hundredth birthday party until after the advent of *Raster Blaster* and *Castle Wolfenstein.*

But what Interactive Structures delivered kept Philadelphians fascinated for more than two years, that is, until so many visitors had interacted with the displays that they suffered physical deterioration. An entire generation of Philadelphia schoolchildren will tell their grandchildren, "I saw this kind of stuff at the Design for Fun exhibit back in 1976!"

And what they saw, heard, and touched was a sight and sound extravaganza. Imagine thirty first and second graders jumping around on a gigantic rubber daisy where each petal was connected to an input channel of a computer which fed back musical sounds and colorful special lighting effects. Imagine a three-thousand-bulb, nine-foot-square panel connected to a video camera by a computer image digitizer that produced full-color images of the visitors in a way they had never seen themselves before. Imagine a platform to stand on where each visitor was treated to a "reflection" of themselves in the format of a colorful laser light display with synthesized musical accompaniment, each display unique as a fingerprint. Imagine a translucent tunnel where each step created a light and sound environment that followed the visitor from one end to the other. Where we have to imagine these things, Philadelphians experienced it.

Your Horror Show of Shows. Interactive Structures had created a cybernetic fun house where visitors' reflections were a far cry from traditional warped mirrors. Underpinning this dramatic display was a complex system of computers, digital-to-analog and analog-to-digital converters, signal generators, loudspeakers, video cameras, lasers, switches, and miles of wires. It was an "interface nightmare." Not only did the visitor/display interface have to be considered, but each electronic component had to be interfaced to other components within the entire system. The fact that the exhibit was able to remain functional long after the scheduled close was a testimony to the quality of the work Interactive Structures had done.

Changes in the professional directions of Willson's original partners created a transition period for Interactive Structures in 1977. With his original partners gone, Willson began to focus his attentions on the emerging generation of microprocessors. On a visit to one of the first microcomputer retailers, Willson saw his first Apple.

It was an Apple I and was little more than a box of component parts, as micros were still in the hobbyist kit stage of development. Since no one else knew what to do with it, the retailer lent the kit to Willson. It was soon together and working. Impressed with what he had done, the retailer was happy to sell the system to Joe.

Soon after he completed the Apple I kit, Willson saw an advertisement for the Apple II. He couldn't believe what he read. Someone was actually thinking ahead and had designed a micro with full-scale applications and hardware expansion potential. The sophistication of the input/output features, the memory expansion capability, and the provision of slots for peripheral devices created a vision for Willson. Interactive Structures would develop and market a full range of Apple peripheral products.

So, Willson now relates with mixed emotions, he traded in his Apple I for a II and began design work in earnest. The result is a full range of interface devices that enable scientific and industrial applications.

"I didn't want to try to do everything at once," Willson explained. "Knowing how volatile the peripherals market is, I knew it would be difficult to raise the capital to develop and distribute products across the full spectrum of the market. So I decided to stick to what I knew best."

Count Pennies, Count Friends. And Willson knows best the needs of scientists in academic and industrial laboratories. "With limited department budgets and grant-funding ceilings, most academic researchers are very cost conscious. The same is increasingly true for industrial researchers who want to demonstrate a new idea without having to spend a lot of money on equipment," Willson said. "So our strategy has always been modular design; the customers buy what they need. Some of our competitors try to bundle an entire lab-support system in one package and make an all-or-nothing sale. At Interactive, we would rather service each need individually. You do a good job on one, and they come back for more."

And what an increasing number of scientists from all over the world kept coming back for was a solid product line of sophisticated interface devices. It started with the AI02 Analog Input device, the first sixteen-channel analog-to-digital converter to hit the Apple market. The full DAISI product line now covers a multitude of data acquisition and signal generation applications. The A003 is a two, four, or eight channel digital-to-analog converter. The DI09 is a thirty-two-line digital interface with timers, which can be expanded by the addition of a UI16 universal isolated interface to control and monitor various types of circuits. The SC14 Signal Conditioner is a one, four, or sixteen channel device to amplify and filter very low voltage analog signals. And, after collecting and crunching so much data, a researcher may purchase a PL12 plotting system with interface to make visual displays of experimental results.

With a growing product line and a solid niche in a special interest market, Interactive Structures had made the transition from systems house to product design and marketing. So strong was Interactive's growing reputation in the laboratory systems market, that when University of Pennsylvania biologist Allan Brown needed a special experimental controller, he came to Willson.

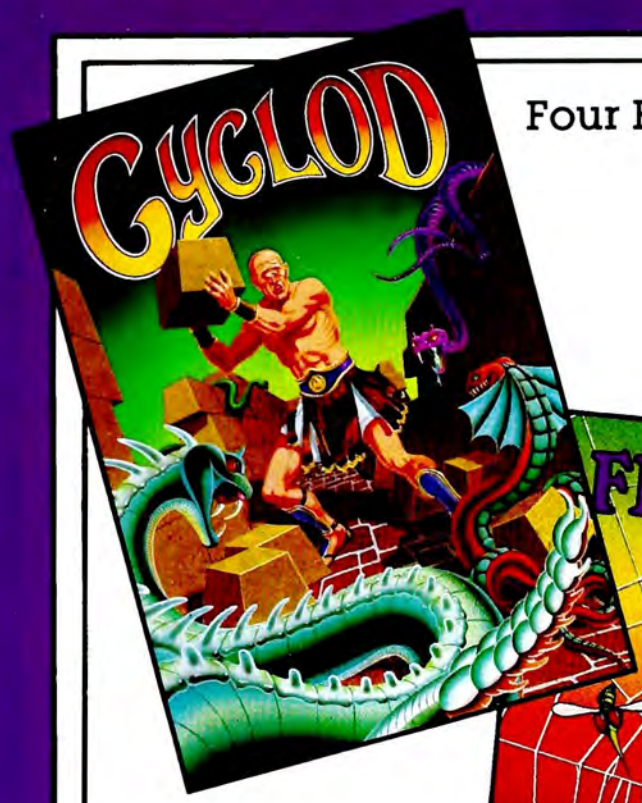
"Allan had been studying circumnutation," explained Joe. "It's a process whereby a growing sprout will take a helical path upward rather than just shooting straight up. There's been speculation about why plants do this and some of the explanations make a connection between the process as it relates to the strength of the sprout growing against the force of gravity.

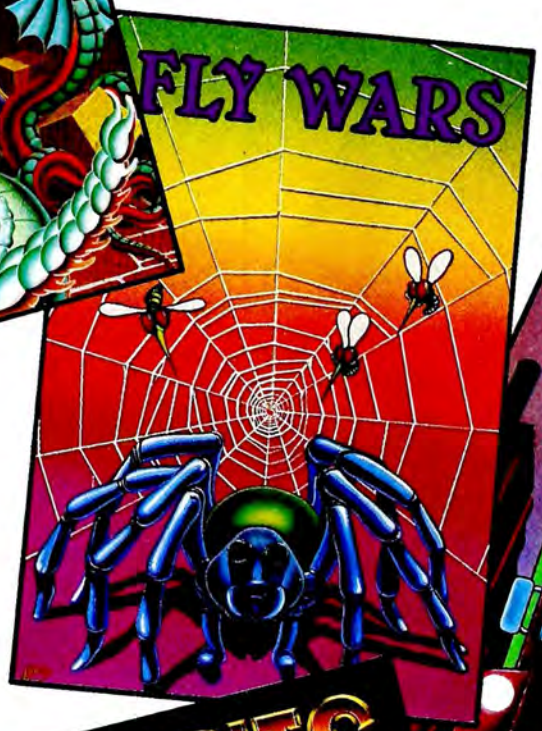
"The experimental controller we developed used a standard Apple II Plus motherboard and a variety of our off-the-shelf interface modules to control and gather data from a number of environmental sensors and video cameras," Joe continued. "The entire system is not really an unusual Apple-based laboratory installation—putting aside the special preparations."

Where the Enemy Is Orange Juice. Preparations, that is, for space flight. Early next year, Interactive Structures's experimental controller will blast off aboard the Space Shuttle with a payload of sunflower seeds to perform Dr. Brown's experiment in the weightless conditions of space. The extraordinary packaging requirements to withstand the rigors of space flight were demanding. Every connector and plug had to be se-

Four For Fun - Games For The Apple II

By Sirius™

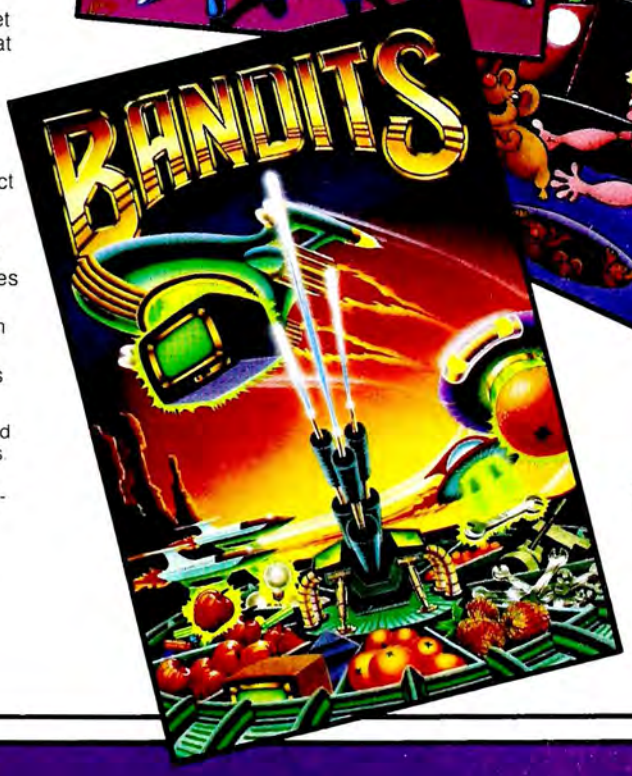




Long long ago, in a garage far, far away, a brave alliance of Spider-Fighters were at war with the tyrannical Raygunites. Regenerating Fly-Fighters, Black-Hearted Beetles, or a quick shot of B.S. (Bug Spray) sent many a Spider-Fighter to bug heaven. Fly back in time with us as the last surviving Spider fearlessly spins his web of purple energy in a valiant effort to keep the flame of freedom aglow.



What's a Cyclod? 1. In Ophidian legend, the name of three bug-eyed brick fighters known as Mascara, Glaucoma, and Cornea; 2. In Myopian legend, a cross between a clumsy mason and a one-eyed snake charmer, 3. In Sirius legend, the video game wherein an eyeball fights snakes with bricks. The craziest game yet from the masters of crazies at Sirius.



"The game that'll steal your heart" Bandits is the hottest fast-action game to come along in many moons! Protect your lunar supply base by blasting a variety of greedy galactic pickpockets to bits! They come after your supplies with a non-stop barrage of heat-seeking bullets, napalm bombs and nerve gas balloons. Be prepared for hours of intense video action.

"Join the mass migration" Forget the whales, save the Lemmings! These furry-faced rodents are in need of population control. Catch and lock up non-breeding pairs of Lemmings or you'll be held responsible for their tragic mass suicide jump into the sea. Lemmings — they're everywhere!

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The Adventure Continues . . .



TWERPS

NOW! From the company that brought you Sneakers, Beer-run and a host of other blockbusters: TWERPS! Sirius does it again. Another whimsical, challenging game with a cast of top-starring characters. Meet Captain Twerp! Thrill at the shooting Orbiters! Be amazed by the swooping Glingas! Gasp in terror at the drooling Gleepnoks! A game you'll want to tell *all* your friends about.

Requires an Apple II or II+ Computer with 48K and Apple disk drive. Twerps is playable with keyboard, Apple paddles and joystick, or with Sirius Software's Joyport and Atari-type joysticks.

SNAKE BYTE

***What has 48K BYTES and is addictive?* SNAKE BYTE!** A game that works like a charm. A tail of Perilous Purple Plums that's ahead of its time. A game you can sink your teeth into. An antidote for boredom. Snake Byte. Fangs alot, Sirius Software!

Requires an Apple II or II+ Computer with 48K and Apple disk drive. Snake Byte is playable with keyboard or with Sirius Software's Joyport and Atari-type joysticks.



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. . . Sirius Software



BORG

DERANGED GRUD TERRORIZES COUNTRY-SIDE! Protected by Borg, the invincible Drage-roo, and a notorious band of dragons, the infamous Grud has surrounded his hide-out with electrified mazes. Can no one crack the code and rid us of this menace? —Sirius Press Service, Grundonia

Requires an Apple II or II+ Computer with 48K and Apple disk drive. Borg is playable with keyboard, Apple paddles and joystick, or with Sirius Software's Joyport and Atari-type joysticks.

KABUL SPY

TO: KABUL SPY **FROM:** S.S. HQ **MISSION: FIND PROFESSOR PAUL EISENSTADT.** Captured in May of 1981, he is being held by the KGB somewhere in North Afghanistan. You will be given: a money belt, 300 Rubles, a small pistol, a sharp knife and . . . a cyanide pill. We will help you if we can. Caution advised.

Requires and Apple II or II+ Computer with 48K, AppleSoft and Apple disk drive. Kabul Spy is playable with keyboard.



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curely mounted to resist vibration during liftoff and re-entry. And every exposed circuit required meticulous coating with an insulating film to resist the inadvertent damage of a freefloating undissolved particle of Tang or other microscopic shuttle debris.

"It was just the kind of commercially available technology NASA was looking for," Willson said; "low-cost applications to demonstrate the practicality of the shuttle program."

Involvement in the development of the shuttle experiment controller and a generally healthy growth in the demand for Interactive Structures's lab support products necessitated the first of two corporate relocations. In 1980, Interactive moved from a metropolitan area to outlying Bala Cynwyd, a suburb of Philadelphia.

"While we were at a point where the company did need larger facilities," Joe reflected, "Michelle and I were interested in providing a healthy environment for our two sons. Bala Cynwyd seemed like a great place to live, and we're finding it a great place to do business. Shortly after moving, the pace of business picked up so much that I needed help, so I asked Michelle to come in and help out."

"That's when I started my career change," interjected Michelle Kindt, who now performs a myriad of functions as a fully committed partner in the company.

Joining the Cause to Grow. "My father was a businessman, and a good one," Kindt explained, "so I guess business is in my blood. I don't see myself going back to psychiatric nursing, though sometimes around here it seems like I've never left!" She and Willson laughed along with a few disembodied employee chuckles from around the corner.

"Actually, managing people is a good application of my professional skills," Michelle continued more seriously. "I'm looking forward to the challenge of developing this company into a solid medium-sized business. As corporate treasurer, I have taken on the responsibility for cash management and have worked increasingly at basic administration and sales organization. I want to free Joe up to design to develop new products.

"We've consistently funneled a significant proportion of our profits back into research and development," Michelle explained, donning her management strategist's hat. "We've already experienced the positive impact of research and development stimulating corporate growth following our development of the Pkaso product line, growth that allowed us to move here from around the corner where we only had about one third the space and a smaller staff."

Kindt was referring to the introduction of Interactive Structures's first entry into the general consumer market. On the market since August 1980, Pkaso was officially unveiled at Apple Expo '81 and was the first commercially available interface board to offer sophisticated graphics capabilities for Apple-compatible dot matrix printers. The Pkaso series has expanded to include models that support most popular dot matrix printers, including the latest model, which allows dramatic utilization of the graphics capabilities of the IDS full-color printer.

"We've always been committed to customer support," Joe said. "It was essential in our early support of scientists assisting with their technical applications. And it's becoming even more important as our products begin attracting the more general user. Customer support means handling questions after the sale, but also means providing the user as close to a turnkey system as possible.

"All our products come with a demonstration disk that includes helpful software utilities to get the user up and running without having to become a sophisticated programmer. This software support is especially important in bringing full graphics capabilities to the general user market."

Everything but Lick the Stamp. Not only does Interactive Structures provide a disk of software with each interface, but the label of the disk carries the full corporate mailing address and telephone number. Some manufacturers would say that's asking for trouble. Joe believes it is part of customer support.

And who is around to support Joe and Michelle in support of their growing customer base? A tour of the new facility revealed an able staff. Each team member had a ready answer when asked specifically what his or her job was, a rarity in fast-growing companies. The old-timers spoke of what jobs they had held upon joining the company and how they had grown into greater responsibility. The recent additions told of learning a lot, quickly. All spoke of looking forward to opportunities to grow with the company.

Buttressing the management team, Morris Rubinoff has recently joined the company as manager of corporate development. A veteran of high-tech planning and a mentor from Joe Willson's Penn days, Morris is managing strategic planning with a special emphasis on research and development. Willson expressed "tremendous respect for his technical and managerial skills. His contribution has been significant not only to the company but to my personal development as well."

Joan Hayden, director of marketing, reflected on her career at Interactive, "I came here as an office manager after having spent most of my life raising six children. Joe and Michelle have encouraged me to accept more responsibility. I see an exciting job in spreading the good word. We have excellent products that I enjoy selling. This coming year, marketing will concentrate on increasing our advertising as well as our dealer support program. And, of course, we'll continue to expand our users' support newsletter communications."

Interactive Structures is probably one of the few manufacturers that actually does follow through with keeping the user informed. Its newsletter, *Tips & Techniques*, is a superb example of what can be done on a low budget with a dot matrix printer using a Pkaso interface.

Show Us Your Super-Res Cows. On the technical side, Dave Turner is senior engineer. His Interactive roots go back to the Design for Fun exhibit. "I get to apply about everything I ever learned in computer science, splitting my time about equally between hardware and software development. Look what we've got the IDS doing," he proclaimed, showing a super-resolution full-color picture of a beach ball that took days to print. The ball looked as if it would roll off the page.

In the room next to Dave's development den, Adam Sherman was busy adjusting an oscilloscope to run quality control checks on interfaces being readied for shipment. "Since we sell a number of complex products used in precision applications, quality control is extremely important," Adam noted. "As an applications engineer, I'm getting to see product development as well as learn the importance of good quality control. I'm currently enrolled in the master's program in electrical engineering at Drexel University. This is a great opportunity—getting to work with Joe, Dave, and Morris."

At the opposite end of the technical lab was Rich Denver, laboratory assistant, busy unpacking and testing a shipment of memory chips. In the area between the lab and the front office, Jameela Walker was busy carefully packing interfaces for delivery, while manager of shipping and receiving Helean O'Brien was hard at work expediting material flow from suppliers to component assembly site to the quality control lab and into the product distribution channels.

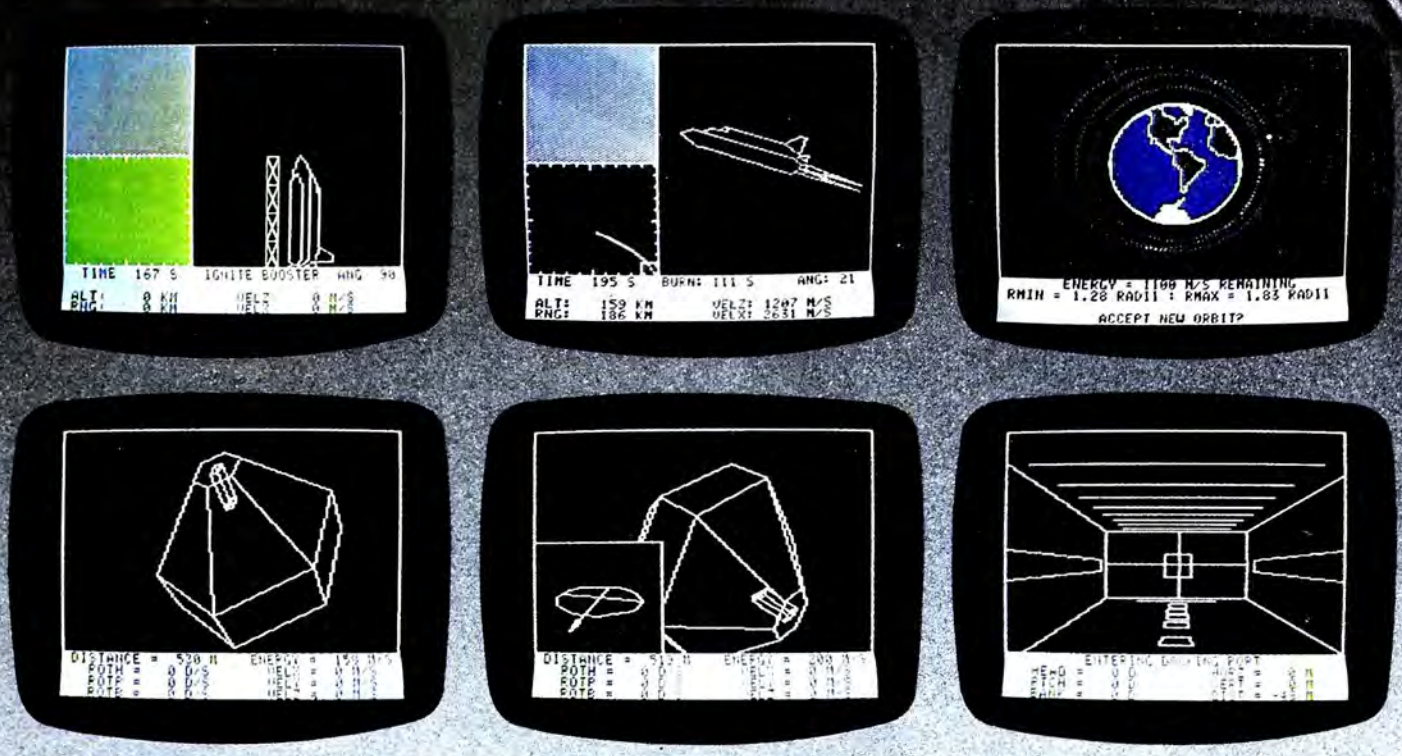
Upon returning to the front office, Michelle Kindt noted, "We have three new employees starting tomorrow; a receptionist, a bookkeeper, and another applications engineer. It's all a part of our expansion plans to use the new space and meet demand for our products."

What's next for Interactive Structures? "By the end of this summer we'll be adding new modular products to our lab support line as well as adding to our printer interface models," Joe Willson explained. "We have some exciting things in development—which I really can't talk about at this time." A creative gleam came to life in his eyes.

We should probably keep an ear to the ground for advance warning of whatever Joe Willson has in store for us. It is doubtful anyone would want to miss his next design for fun. ■

RENDEZVOUS™

When reality is challenge enough.



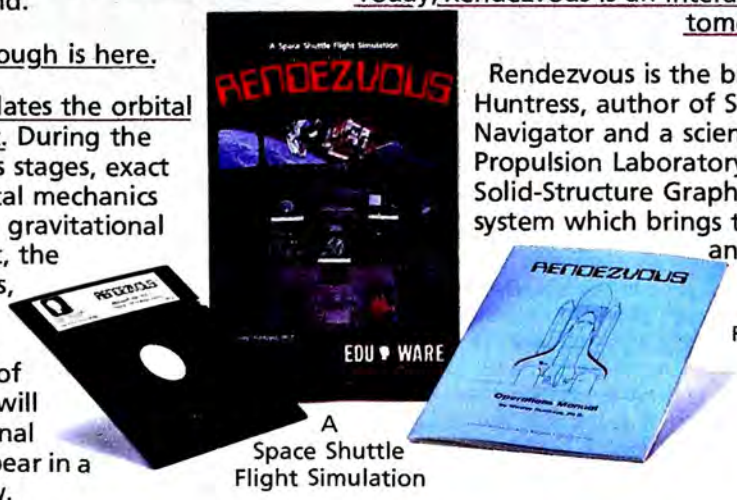
Breakthroughs occur once in a great while, when a product emerges that goes beyond imagination. It defines new territory. If that product is a computer simulation, it will leave the crowded field of carbon-copy Space Invaders far behind.

Rendezvous . . . the breakthrough is here.

Rendezvous accurately simulates the orbital flight of a space shuttle craft. During the liftoff and orbital rendezvous stages, exact systems of ballistics and orbital mechanics require you to master Earth's gravitational force. Once you achieve orbit, the disorientation of a frictionless, zero-gravity environment complicates your maneuvers. Throughout the final stages of alignment and docking, you will view the rotating, 3-dimensional space station as it would appear in a space craft's anterior window.

From liftoff to docking, Rendezvous tests the limits of your technical understanding, mathematical judgment, and raw perceptual skill.

Today, Rendezvous is an Interactive Simulation . . . tomorrow it will be reality.



A Space Shuttle Flight Simulation

Rendezvous is the brainchild of Wes Huntress, author of Sub Logic's Saturn Navigator and a scientist at NASA's Jet Propulsion Laboratory. Huntress created Solid-Structure Graphics™, a 3-D animation system which brings to life the massive bulk and solidity of the station and docking bay.

Recommended for individual players, 13 and over.

Applesoft, 48K, DOS 3.3

$39.95

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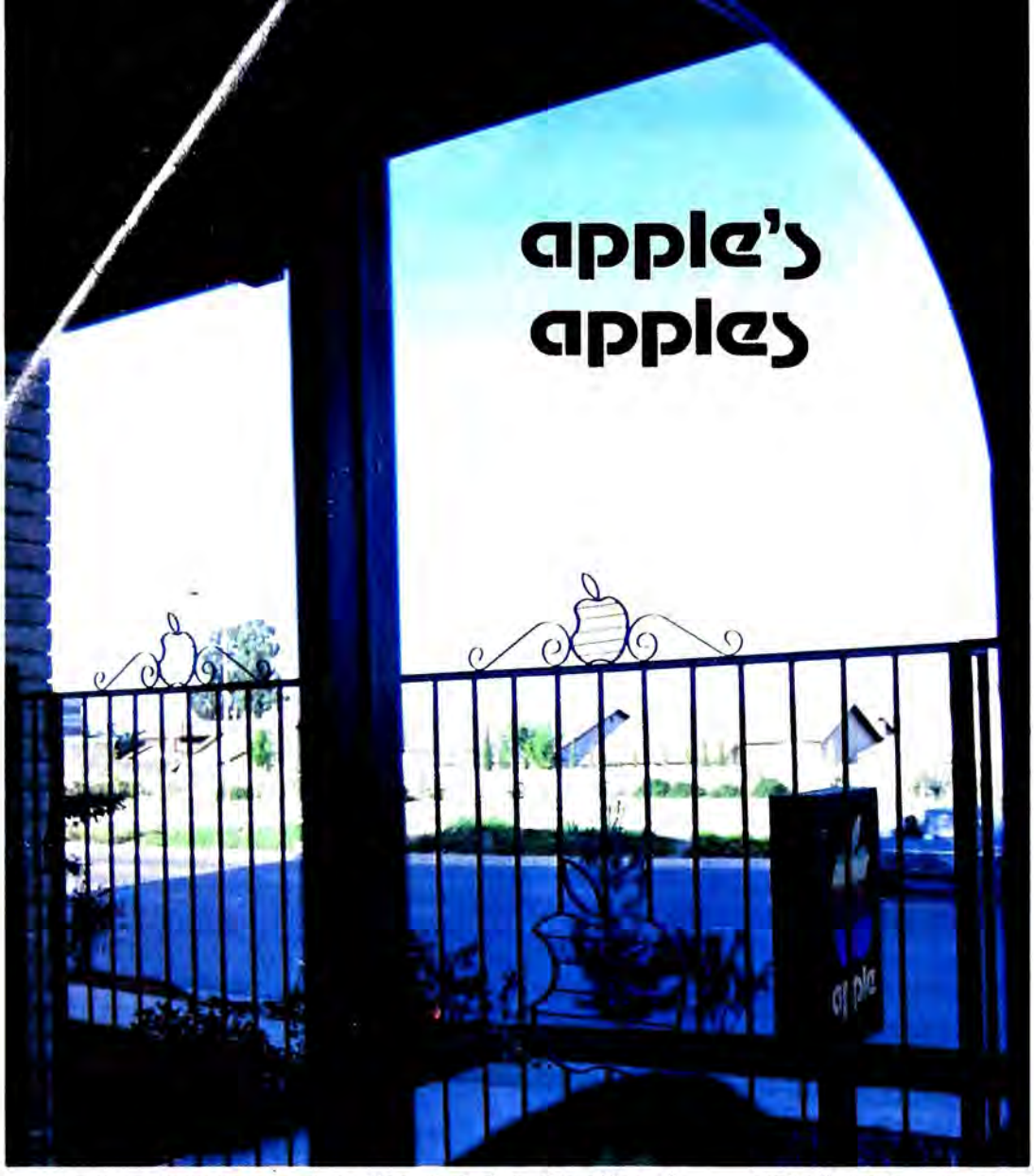
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Equipping For The Promised Land

BY DAVID HUNTER

For many businesses—no matter what size—the office of the future represents the Promised Land. Computers and automated equipment will theoretically improve productivity in administrative and information handling departments.

The $60 billion a year office equipment market has vitalized and given birth to many competing computer companies all wanting a piece of the pie. But the pie isn't getting sliced as fast as predicted.

Fortune (May 3, 1982) tried to evaluate the problems holding up the office of the future. The myth that computers are only good for secretaries and word processing is partially to blame. No one denies that word processing accounts for a huge chunk of that $60 billion each year. But, as *Fortune* points out, office automation has to go beyond secretaries and reach managers and professionals, who amass 80 percent of white collar salaries. Communicating data, writing documents, storing documents, and distributing written work are the four main activities of professionals, according to a major office equipment manufacturer.

Some word processing systems make the control room of a nuclear power plant seem easy to understand. Professionals, like everybody else, can be intimidated by the myth of computers. Resistance to change in these quarters generally centers on the notion that learning to use a computer is a long, complicated procedure, with uncertain benefits.

Rumbling on through the P.L. Learning to use a microcomputer can be as easy as learning to drive a car. You must follow signs, be cautious, and never make certain mistakes. Several years ago, Steve Jobs came to the conclusion that both personal computers and cars have a wide range of applications, most of which are not apparent at first.

Apple Computer makes a business of selling microcomputers and they use their own machines for much of the daily operations of the company. Every employee with their own desk has an Apple II Plus or Apple III. Furthermore, Apple gives each employee a computer to take home after two months in what is known as the "loan to own" program.

The use of microcomputers in the individual work station, along with a superb style of training employees, makes Apple a darn good example of the fabled Promised Land.

Walking through Apple Computer's spacious nest of buildings in Santa Clara Valley, one is strongly tempted to move into the garage and start tinkering with old TV sets. Six years ago, none of it existed. Now, the sun never sets on the Apple empire. Seeing the American Dream work so well is almost painful. For the many who fail at business, the dream is filled with holes.

Jealous musing aside, the labor of the moment entails an overview of how Apple Computer uses Apple computers. The following individuals do not account for all the uses Apple makes of their own computers; more articles would be needed to paint a complete picture. Nonetheless, we have covered many different departments, with the goal of showing as wide a spectrum of users and applications as possible.

For Whom the Type Tolls. Teri Carver is area associate for Rob Campbell, product marketing manager. Area associates are graded A, B, or C. Carver is a B. She works in the personal computer systems division building, otherwise known as Bandley Three.

Working most on an Apple III using Apple software, Carver produces memos, reports, mailing lists, and other paperwork. She is in charge of maintaining the office, scheduling

meetings, sorting mail, taking incoming phone calls, and trafficking electronic messages through Micro-Courier and Access III, Apple's time-sharing network.

"I'm on the Apple III almost 40 percent of the day. It saves so much time and it's very easy to use. I'm learning new things all the time."

Before she came to work at Apple eight months ago, Carver knew nothing about computers. A native of San Jose, Carver had grown weary of secretarial jobs that involve routines and procedures that eventually get stale. Apple, with its spectacular growth and energetic pace, is far from dull and routine yet.

In keeping with a sometime tradition for new employees, Carver unpacked and assembled her Apple III the second week on the job. Demythologizing the computer is a good training procedure that starts with this preliminary introduction.

Besides using their own computers, Apple incorporates their own software wherever possible. Carver uses *Apple Writer III, Mail List Manager,* and *VisiCalc III* and is just learning *Apple III Business Graphics.*

Generally, Carver has had little trouble adapting to the technology, but if something is not clear, she doesn't have far to go to find help. The combination of Apple's easy-to-use products and employee training makes incorporating relatively untrained newcomers into the company a simple thing.

"They made me feel like part of the team right from the beginning," explains the now veteran Carver.

Carver's boss, Rob Campbell, is an example of a manager using the computer for purposes that normally would have been part of a secretary's job. Instead of dictating memos, Campbell writes them up on *Apple Writer* and gives the disk to Carver. It saves both the bosses and the associates time.

Other area associates in the personal computer systems division building praise the Apple. Lynn McCleery, Ken Gilbert's associate, proclaims happily: "No retyping of memos!"

Where Legal Eagles Dare. The legal department of Apple holes up on the second floor of Bandley Six. They use Apples for word processing and telecommunications.

Audrey Keltner is area associate for David Kopf, an associate counsel. She calls the Apple "a glorified typewriter," but admits after a spell, "that's probably an understatement." Keltner started working at Apple March 1, this year, and she had had no previous experience with microcomputers. "I hadn't even seen one."

Contracts, letters, agreements, guidelines, and manuals (procedures for dealers) are all composed on the Apple. The bosses probably use them as much as the associates.

Jackie Johnson, area associate for Dan Wendin, another associate counsel, puts it like this: "The computer has really broken down the barrier between the chiefs and the Indians."

Johnson has been at Apple ten months and works exclusively on a III. Her boss does all his own typing and "frees me to do other things. There is very little of the deadly repetitive work usually done by a secretary."

When a company is growing at a healthy pace, fast and painless training of new employees is of paramount importance. The promise of computer technology in the office no longer has to raise fears of employees losing their heads out of frustration.

Where the Big Boys Are. *Inc. Magazine* (May 1982) rated Apple Computer number one on their list of the 100 fastest growing publicly held companies. In the last five years, Apple showed an increase in sales of 43,154 percent. The runner-up, Electro-Biology (Fairfield, N.J.), posted an increase in sales of 11,184 percent.

The end of fiscal 1982 may see Apple in the *Fortune* 500. With sales in excess of $450 million expected this year, the production department has its work cut out. Many business tasks cry out for a personal computer, but the bigger the business, the bigger the demands.

Located somewhere in Bandley One are four DEC 1170 mainframe computers, diligently hauling in the mass of data from Apple's manufacturing sites.

Apple has three main manufacturing plants, two of them overseas. The biggest one, in Dallas, with more than 600 employees, makes all the Apple IIs for the domestic and Asian markets, Apple IIIs, and disk drives. The plant in Singapore concentrates on circuit boards, while the plant in Ireland has been making Apple IIs and is just starting IIIs.

Keeping track of the production effort is the function of the manufacturing and materiel planning department. Manufacturing systems manager Mike Jamison uses an Apple III, *VisiCalc,* and Access III to wrestle the information to the mat.

"The DEC is too impersonal. A user cannot manipulate data in a large system like this because it's not in the right format."

Providing exact information on the overall production is the ultimate goal of Jamison's department. Many smaller tasks are incorporated within this larger effort. Chief among these is the daily production schedule but there is also inventory, bill schedules, the purchasing master schedule, traffic, and forecasting.

The production schedule is downloaded to the specific sites through the DEC. In the same way, figures on the cost of building product, component failures, inventory levels, labor reports, and efficiency reports are sent to Cupertino.

With the up-to-date information coming in on the DEC, Jamison and his co-workers can make work in progress reports. They generate real time inventories. Labor data and yield data help to organize the production schedule.

The MRP, short for materiel requirement plan, shows how much materiel needs to be ordered at the beginning of each month. Running all weekend, the DEC handles the actual MRP, but the Apple III with *VisiCalc* offers the opportunity for quick and dirty "what if?" calculations.

Besides *VisiCalc,* Jamison uses *Magic Window* for word processing, and Apple's *Apple III Business Graphics* for making charts and diagrams. The latter he says is "really great."



Teri Carver
Area Associate,
Personal Computer Systems Division

Jamison, a former materiels manager at Texas Instruments, was one of the first eighteen people hired on at Apple's Dallas plant. He left two months ago to come to Cupertino. He prefers the III over the II because it can act as a terminal in addition to being a personal computer.

Needless to say, Jamison decries the lack of game paddles for the III. A big fan of computer games, Jamison often leaves the world of materiels and manufacturing far behind when he gets home to his own Apple.

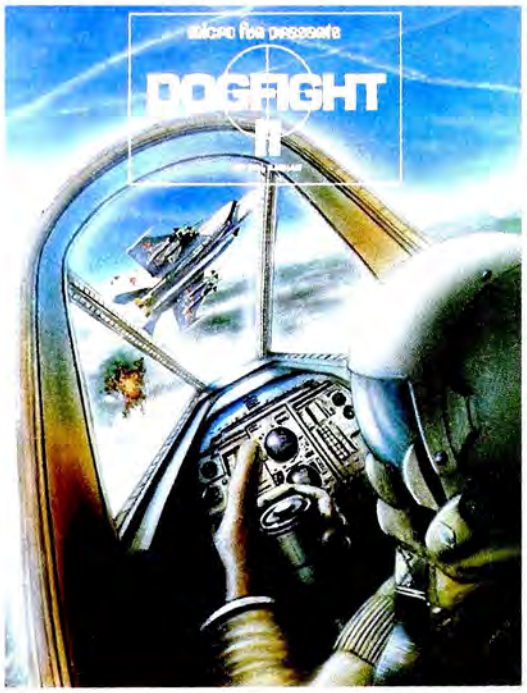
Where Taxes Never Set on the Empire. Combining a large computer system with personal computers as work stations is a good way to outfit large information-handling departments. Apple's accounting department uses the DEC system in much the same way as materiels and manufacturing. Accounting information from many locations comes to Cupertino, where it is

EXCITING GAMES

FOR THE APPLE* FROM

micro fun

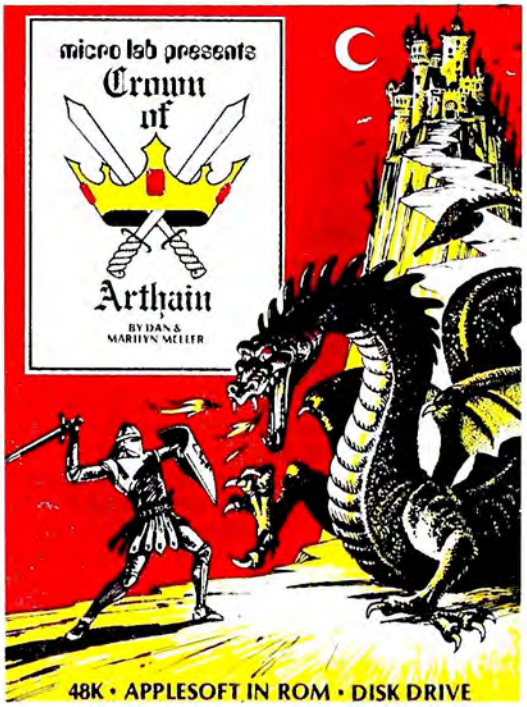
entertainment division of micro lab



DOGFIGHT II. An established classic Arcade game. Set up a game for one to eight players each piloting a jet into combat. Play on one team, two, or against the computor.



PEEPING TOM. Another fast-acting arcade thriller. Shoot various aliens you peep at through windows. It takes perception, luck and skill to defeat the invaders.



In CROWN OF ARTHAIN, you, and another player battle realistic, animated monsters for the crown. Skill and excitement for youngsters under thirteen.



ROACH HOTEL. A high-res, fast-action, arcade game. Stamp out roaches before they take over. Points, bonuses, and additional rounds are earned as your skill increases.

★ For Apple II & 48K

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then processed on Apples.

Making a lot of money means paying a lot of taxes. Preparing taxes for a large corporation usually entails a small army of irritable clerks battling a mountain of paperwork.

The tax department at Apple is barely a year old. Before it was set up, taxes were sent to an outside accounting firm.

Joe Forgy is manager of Tax Compliance and Linda Villarreal is a tax accountant. Together they work with tax director Mike Rashkin and a small staff in Bandley One preparing the quarterly and yearly tax reports and returns.

Apple is actually comprised of twenty corporations spread out over the world. They are all part of Apple Computer Incorporated, but for legal purposes, the corporations are treated as separate entities. Each corporation has its own taxes and tax laws, depending on where it's located.

Every year state and local taxes have to be filed for each Apple company. Then there are the taxes for Apple Computer altogether. This is just the beginning; it gets much, much more complicated.

The Apple III and *VisiCalc* make the labor of tax compliance not quite such an uphill battle. It still takes four people working full-time, but not fifteen. Forgy's previous job involved a tax department with just such a number of employees.

Each quarter's tax provision involves numerous financial statements, and when it comes to the closing process, numbers can change fast and frequently. *VisiCalc* allows for far more flexibility in this process. You just drop a number in its proper spot and the program changes all the other numbers to reflect the new one.

In the old days, if there was a last minute change in the consolidated profit total, for instance, it would mean manually adjusting every calculation—a matter of days. Now a change like this takes only a matter of hours.



Mike Jamison
Manufacturing Systems Manager

Last minute changes are not the only thing *VisiCalc* is good for. In the area of forecasting and planning, it allows for a much larger degree of decision making.

"With the analytical functions built into the program you find more people using brain power instead of pencil pushing," explains Forgy.

Forgy and Villarreal use *VisiCalc* for forecasting—projecting what the taxes for next year will be like. They can take into account property, sales, payroll, and more subtle factors that effect the outcome.

Time is important to the tax department and electronic mail has helped to speed up the process a great deal. Each division of Apple sends its tax information to Cupertino in a faster and more reliable fashion than the U.S. Postal Service.

"When you're trying to figure out the labyrinth of sales tax for different states and you have a deadline of a couple of days, there is no time to wait for intercompany mail."

Filing state taxes involves calculations concerning apportionment factors, taking into account special increases or decreases in the tax rate. By the time you get to deductions, the whole job seems like a colossal headache.

A veteran of past tax wars, Forgy is very pleased with how the department performs and has nothing but good words for the computer.

"If people would learn to use this tool, with a format that never changes like *VisiCalc,* you would see a lot of tax departments in big companies cut in half."

Enjoying the Company of Computers. A common characteristic of Apple the company and Apple the computer keeps popping up—friendliness. The offices look a little bland, but the atmosphere and oft-touted esprit de corps more than make up for the landscape.



Joe Forgy
Manager of Tax Compliance

If new employees are what Terry Carver defines as "really motivated and energetic," they'll discover the environment challenging as well as friendly. At Apple the company it's easy to get people to listen to new ideas.

Mark Vermilion started working in Apple's public relations department a little over two months ago. He's never used an Apple II, but he's taken to the III fast enough. Before this job, Vermilion had only had some brief experience in word processing.

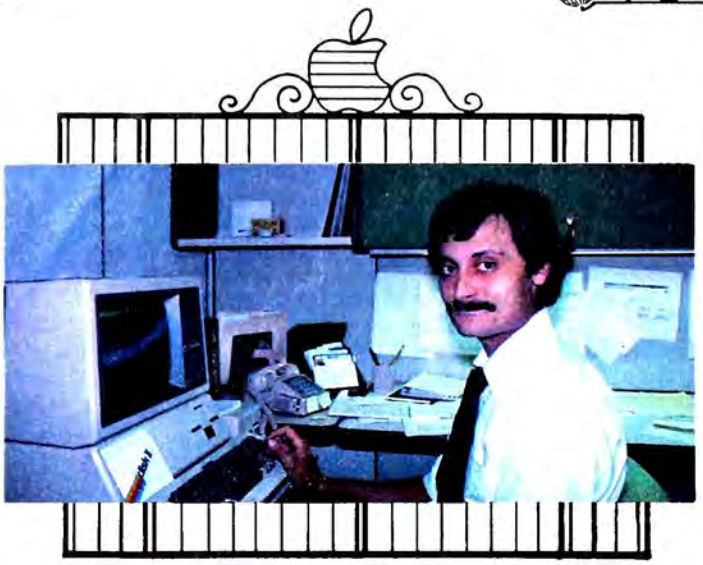
Writer and editor of technical publicity is Vermilion's main occupation; he also contributes to Apple's monthly employee newspaper. Vermilion has ideas for improving the public relations' clipping department, and interested ears have turned his way.

Apple's public relations agency, Regis McKenna, among their other toils, collects all the stories and mentions of Apple and competitors printed in newspapers and magazines. A clipping service in Arizona was hired by McKenna to do the enormous task of flipping through mountains of periodicals, both foreign and domestic.

The clippings are sent to Regis McKenna where they're Xeroxed and then sent over to Apple. Once they're at Apple, the clippings have to be routed to the proper managers, supervisors, and executives. The whole process can take up to eight weeks and is somewhat inefficient.

There are already ten to fifteen newspapers available on telecommunications networks like the Source and CompuServe. Soon there should be hundreds, in addition to magazines and even books. An electronic clipping service would pull those items relating to Apple Computer and put them in storage.

With an intelligent photocopier it would be possible to digi-



Mark Vermilion
Technical Publicity

tize articles from magazines and send them over modem to any Apple employee who should desire such a thing. A manager in Dallas could call up with a request and, in a matter of minutes, he would have the whole article, more or less how it looked when originally published.

Vermilion's grand scheme would include a catalog of employees on disk that would indicate what kinds of clippings go to each one. When items came in they would be coded and a program would automatically send them to all the right people.

None of this has happened yet, but Vermilion is very pleased with the response he's gotten from Apple. With 3,100 employees, some are bound to be unsatisfied. Most are like Vermilion, excited and happy.

The public relations department on the whole uses Apples for many things. The process of putting out a press release alone is usually complicated enough to warrant a headache or two. The PR department writes up the initial copy which is sent to the department that it concerns for verification. The finished release is sent to Regis McKenna, who'll use it as background data for dealing with the media.

McKenna has recently been outfitted with Apples, modem, and Micro-Courier to speed up the process. What could take almost a week of physically routing paper, now takes a day or less.

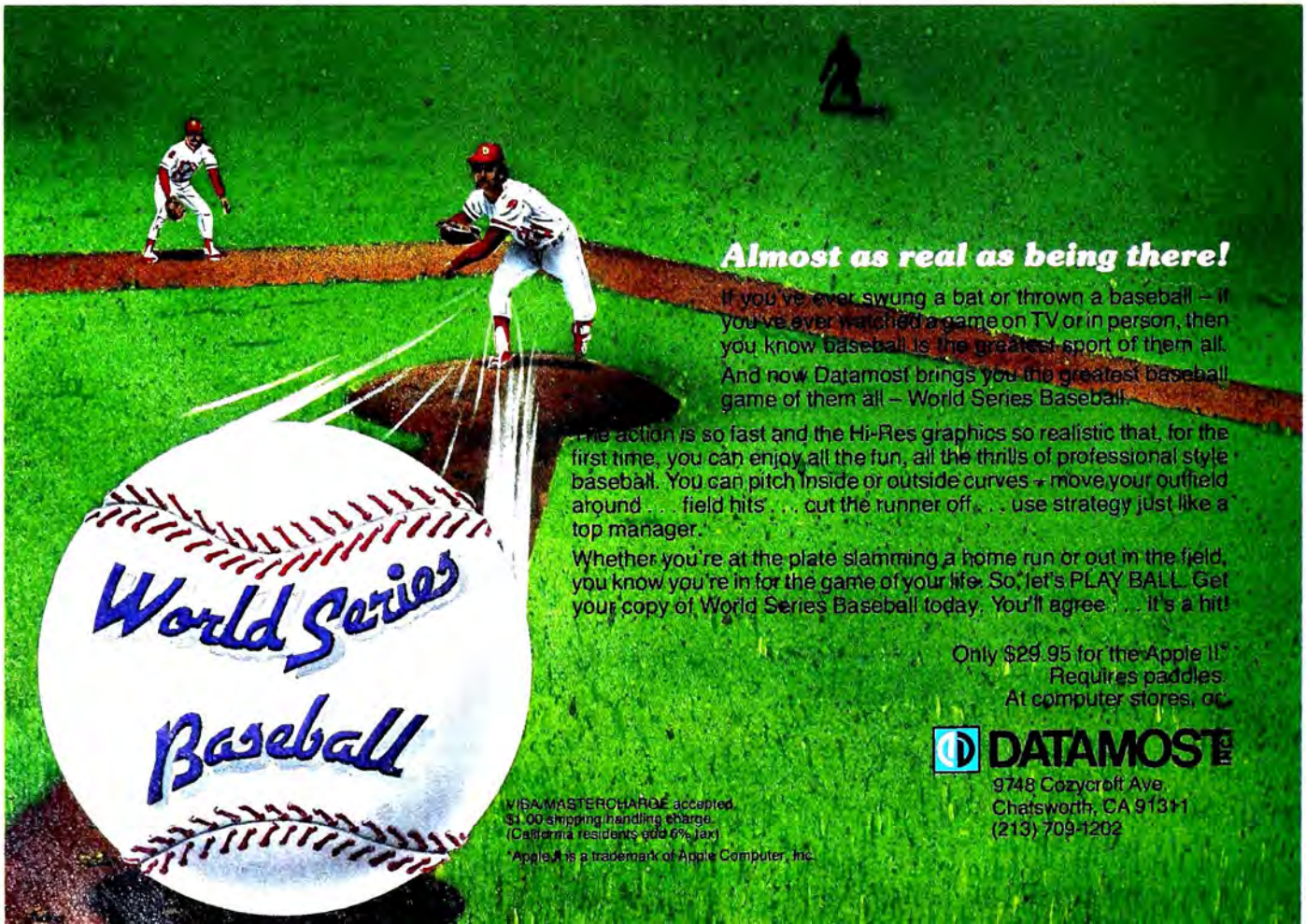
Renee Olson, manager of community affairs and internal communication, as well as a writer of technical publicity, says that without the Apple her work would take twenty times as long.

Olson's boss, manager of consumer programs Phil Roybal, uses *Apple III Business Graphics* and *VisiCalc* to track budgets. Everywhere you look, Apples are lurking.

Where There Are Sounds of Silence. Building a large company involves a myriad of details, some of which must come later than others. Fairly crucial parts of the company organism are often undernourished until the most important parts are healthy.

Information is the major commodity of the new age and Apple exists because it's in the business of information handling. A central knowledge-gathering organ for use by all Apple employees will become increasingly important in the hectic years ahead.

About six months ago Apple hired on Monica Ertel as the corporate librarian. They gave her an office and told her to start putting together a collection of computer books and periodicals. Ertel has a masters degree in library science and has organized libraries for several large companies, including



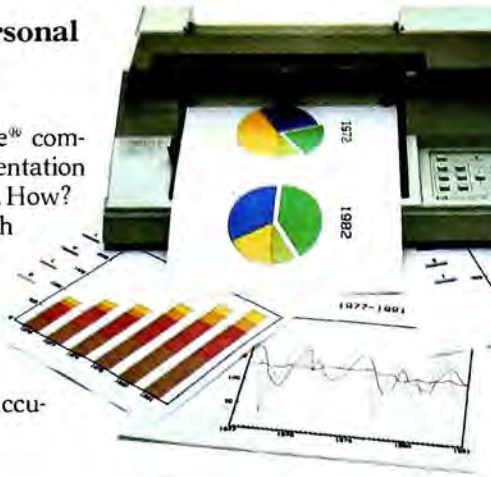
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Renée Olson

Manager of Community Affairs and Internal Communication

Acurex, Memorex, and SRI.

"At Memorex it was very slow at the beginning. I had to shop for customers. At Apple it's been a different thing altogether. People here are information oriented. They're already familiar with on-line data services and are capable of having a dialogue with an information system."

Apples are used in the library for just about everything but putting the books on the shelf. Robotics may fix that in a decade or so.

With the help of *Datalog*, an electronic card catalog program, the Apple III hooked up to Profile takes the place of a traditional card catalog. Circulation records are kept up-to-date using *Datalog* as well.

It takes a matter of seconds to determine who has checked out a particular book or periodical, when it is due, and how much it costs to replace. Lists containing the total amount of books circulating and who has them can be generated easily.



Monica Ertel

Corporate Librarian

With Access III, Ertel and library technical assistant Rosanne Macek make interlibrary loans to and from thousands of other libraries. Stanford and Lockheed offer database services that include catalogs from many collections across the country. Books can be looked for by author, title, subject matter, or ISBN number.

Paper? Ah, We Don't Need No Stinking Paper. The actual exchange of materials with other libraries goes on in the usual fashion, by U.S. mail. The day will come, hopefully soon, when the complete magazine article or book can be easily obtained directly from a remote location. Ertel dreams of the day when there will be no paper in the library. Everything will be gotten through and stored in the computer.

Ertel and Macek keep a list on *Apple Writer* of Apple employees who regularly request certain magazines. When the latest issue of, say, *Call-A.P.P.L.E.* comes in, the list is polled for all the requests. The interested employees are then sent a Photostated copy of the table of contents.

Journals are not often circulated out of the library, but a phone call or letter to the library garners Photostated copies of specific articles. This whole process could benefit from elec-



Rosanne Macek

Library Assistant

tronic mail. With Access III and Micro-Courier there would be a lot less phone-calling and photocopying.

Macek works with *Personal Filing System* to keep track of purchasing and book orders. Libraries have to keep on budget like everybody else. It is important to determine how best to spend your money before you actually spend it.

Located temporarily in the building affectionately called Big Bub, the library is a mile or so from the main hub of activity at Apple. This means fewer people are dropping by to browse in person, but all the other services are booming. Sometime soon the library will move over to the Bandley Two; Ertel "can't wait to get back to civilization."

Electronic mail is used for sending short library messages. It's a funny thing, but according to Ertel, there is some laziness on the part of some Apple employees. "They forget to check their mail boxes." The whole idea is so new that even people working in a high-tech company are not used to it yet."

One thing that Ertel would like to see happen, but she is not sure just when that might be, is a collection of software. At this point, there isn't even a centralized collection of Apple's own software. The employee store offers Apple software at cost, in conjunction with the loan-to-own-program, but the store is a good half hour away by car from Cupertino.

A software collection and getting actual articles on-line from other libraries are the two main improvements that Ertel would like to see. For the moment, the library at Apple is growing, striving to meet the information needs of an growing information company.

Where Beautiful Downtown Cupertino Presents. Every big company should have a library and every big company should have a newspaper. Apple has its house organ; it's called *Apple Times*. No one has mentioned a radio station yet, but let's not

be hasty.

In the April issue of *Apple Times* there is an article about the personal computer systems (PCS) division publications department. These are the folks that write software manuals and they use Apples all through the process.

According to the article, manuals are written in four stages starting with the document design. Project members review the first, or "alpha" draft of the manual and their comments may affect the product itself as well as the second, or "beta" draft of the documentation.

Selected individuals and outside companies review the beta draft. Once again, comments bring about a few changes that the writer incorporates into the final draft. This final draft is checked thoroughly by an editor in the PCS division publications department.

Manuals start out as Pascal text files, each containing all or part of a chapter. The files are run through Apple's text formatting program *Script.* This prints all the files as one continuous draft with space for illustrations, page numbers, and correctly positioned section titles. The completed manual is printed out on a Qume printer, sent to graphics for paste-up, and finally to a local printer.

Try as you might, there's no denying hindsight. Products often go through corrections and changes once they're on the market. The manual update group uses the Apple III and Access III to tap the mainframes and produce addenda, errata sheets, and other revisions.

Typesetting is accomplished with a Compugraphic machine that accepts Pascal text files. Formatting commands imbedded in the text instruct the Compugraphic's typesetting activities. It saves time in proofreading because the process uses the author's diskette files rather than re-keyboarded copy.

The *Apple Times* is produced in this fashion. Editor Judy Ann Christensen uses *Apple Writer* to compose articles and then converts them to Pascal. After that the Compugraphic machine does its stuff.

Christensen works at home one or two days a month and works odd hours at Apple, whenever the writing mood strikes. "You'd be surprised at the number of people still here at 11 p.m."

Although she really wanted to be a freelance writer, Christensen found Apple "a better deal." Nevertheless, she writes an occasional article for an outside magazine and truly appreciates the generosity of Apple. Bonuses, in the guise of "author incentive," are given to any employee who is published.

"What I got from Apple was about four times what the magazine paid me."

Where the Sphinx Keeps Its Secrets. It's safe to say that Apple's current product line will not dominate the office equipment market of the future. That's current product line.

A perfectly normal-looking building is the home of future products. Few people hear about what goes on in there; industrial espionage is not a casual threat.

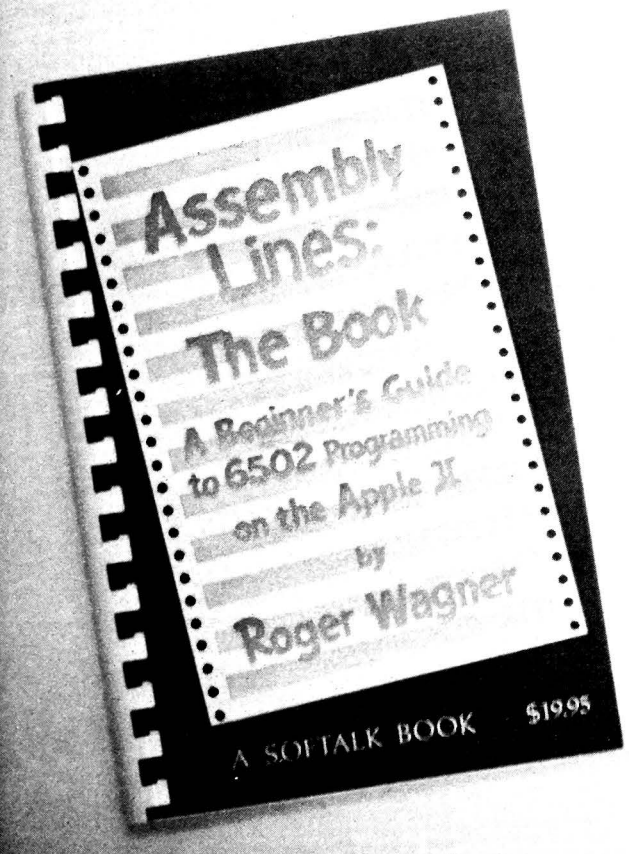
We haven't delved into hardware and software development and how Apple uses Apples in these areas. Rest assured, they're used, but how and for what purpose must remain a mystery.

Not terribly surprising is the fact that Apple uses Apples all throughout the company. It's good advertising to practice what you preach.

The surprising thing is how well the technology works when put through such rigorous tests. The Apple III, in particular, is depended on for so many things. Apple is a smoothly-run company and their own products are a major reason why.

The uncertain economic climate of the future makes conducting business even more of a gamble than usual. Increasing office productivity must occur if American companies are going to survive against foreign competition and the high cost of survival itself.

Each company's Promised Land may or may not have an Apple computer in it. Nonetheless, there's at least one company that uses them a lot and has found them reliable tools of the information age. ◨



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For months we've been telling you Roger Wogner's *Assembly Lines: The Book* is greot. We've been telling you it'll moke your Apple's 6502 jump up, spit in the oir, ond donce oround like Jomes Brown.

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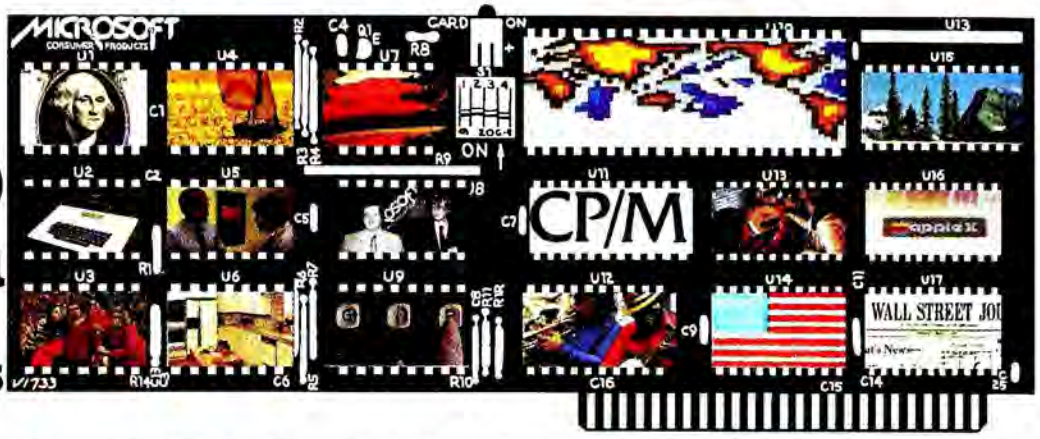
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SOFTCARD Symposium

by Greg Tibbetts



Welcome to the Symposium for June. After your experience with ED.COM last month in the alteration of the source file for Digital Research's program DUMP.ASM, you are ready to put that work to use by assembling the program with ASM.COM, the subject of this month's column. Those of you who have not had the opportunity to work in assembly language may not have a clear grasp of just what these terms mean, so we'll take a few paragraphs to cover the basics.

Most of you know that the heart of a microcomputer is its microprocessor. It is this unit that performs most of the work in the system. Although there are many such processors, the three of concern to us are the 6502, the Apple's primary processor; the Z-80, the processor used on the SoftCard; and the 8080, the processor CP/M was written to run on and for which the standard CP/M utilities were designed. The fact that the Z-80 was designed to execute code written for the 8080 is the reason that many CP/M products are still distributed in 8080 form, since that way they will be compatible with systems having either processor.

Each processor is designed by its manufacturer to recognize and respond to a certain set of numeric codes. Each of these codes corresponds to a specific instruction or operation; consequently, the set of codes for a processor is called its *instruction set.* By arranging the instructions in various ways we can create programs that cause the processor to perform useful functions. Since these programs are made up of the numeric instruction codes executed by the machine, the programs are said to be written in machine language and are sometimes called *machine code* or *object code.*

Although the processor responds to these numeric codes, we humans need something much more descriptive. While it is possible for us to program using only numbers, a set of character representations or words that sound like the operation they describe make life much simpler. Such words in the field of assembly language are called *mnemonics.* The 8080 mnemonics JNZ, for *Jump if condition is Non-Zero,* and SCF, for *Set Carry Flag,* for example, are far easier to remember and use than the hexadecimal numbers C2 and 37.

Each microprocessor manufacturer publishes a list of instruction mnemonics corresponding to the processor's instruction set. Volume I of the SoftCard manual contains a list of the Intel 8080 mnemonics, along with brief descriptions of the operations performed. Obviously, though, some method of translation is needed to create the numeric machine instructions from the mnemonics. This is where the special utility programs called *assemblers* come in, performing this translation in a process called *assembly.*

The other primary function of assemblers is to allow the substitution of names—called *labels* or *symbols*—for actual addresses and data during the creation of a source file. This is a critical facility, since a great many machine instructions reference memory locations in their execution, whether to load or store data from or to the address, to jump to an address, or to perform some operation on the data at an address. Without this substitution feature, all of the address references and other information would have to be figured out by hand before typing in the program since many, if not most, are within the program itself. Also, once completed, a program would have to be extensively rewritten if even a single instruction were added or if the starting address were changed.

An assembler source file is said to be completely relocatable, since when you change the address that tells the assembler where to start the program, the assembler will calculate the addresses of the various labels and install them wherever they are later referenced. In the same way that the instructions and features of Basic go together to form the Basic language, the mnemonics and features of assemblers go together to form assembly language. And just as with Basic, which comes in many varieties, there are many kinds of assemblers, each with greater or fewer features and different ways of handling the same essential function.

Nearly all assemblers operate in a similar manner; they act on a text file (called the source file) that contains mnemonic instructions, labels, and symbols to produce an object code file that is executable by the processor. Different assemblers carry out this process somewhat differently—some in a series of stages that use special linking or loading programs—but the general principles are the same. Although some *pseudo* or *mini* assemblers require typing in the mnemonics and actual addresses directly into the memory locations at which they will run (as with the A option of DDT.COM), suffice it to say that a true assembler deals in files and has label and symbol substitution capabilities.

There is one other factor all assemblers share; it is the use of pseudo-ops. The term *pseudo-op,* which is derived from the fact that processor instructions are often called *op-codes,* refers to mnemonics that are actually directives to the assembler itself, rather than processor instructions. Pseudo-ops are used in cases where something must be done that does not involve the processor, such as having the assembler place data into a program to be used by the program at run time, or telling the assembler where in memory you wish a program to run. Typically, the number of pseudo-ops is in proportion to the versatility of the assembler itself. The statements, then, that comprise a specific assembler's version of assembly language are made up of the processor op-codes and the assembler pseudo-ops. A description of the allowed ASM pseudo-ops follows:

ORG xxxx	Sets start oddress op-codes or data that follow to xxxx.
END xxxx	Indicotes program end. If xxxx present, it indicotes thot the first instruction of the progrom is ot xxxx.
yyyy EQU xxxx	Used to set o label or symbol yyyy to volue xxxx. Once defined, yyyy may not be redefined to o new volue.
yyyy SET xxxx	Has same function as EQU but unlike EQU, yyyy moy be redefined later in the progrom with onother SET.
IF x	Begin conditionol ossembly, that is, test volue or expression x. If true, assemble the op-codes that follow until ENDIF encountered. If folse, ignore same statements.
ENDIF	End conditionol assembly.
DB x	Define byte(s) x. x may be numbers, symbols or ASCII doto in quotes. Volues corresponding to x will be ploced in memory. Any number of volues may follow seporated by commos.
DW x	Define word(s) x. Same as DB, except two byte volues.
DS x	Define x bytes of space.

With the exception of the conditional assembly capability, it would be hard to find an assembler that did not include the

pseudo-ops just described, since they are probably the minimum number needed to make the assembler a useful tool. In actuality, though, if you're just starting out in assembly language, a simpler assembler like ASM is best, since it allows you to do almost everything without adding the confusion of the extra bells and whistles. The discussion of ASM found in Volume I of the SoftCard manual is brief, but gives a good overview of the terminology used in assembly language and of the function of ASM under certain stated conditions. It is recommended that you familiarize yourself with this section and the instruction-set description before proceeding. A tutorial-type text on 8080 programming would be of value to you as well.

ASM.COM is a relocating 8080 assembler that uses Intel mnemonics and produces an intermediate file in the Intel hex format that is then converted to object code with a loader called LOAD.COM. The machine instructions it generates will be executable on the SoftCard Z80, but since it is an 8080 assembler, it will not be able to take advantage of any of the extra Z80 features. For that reason, you can assume that you are dealing with an 8080 environment, and in addition to the 8080 op-codes, you will be limited to the following registers and internal processor structure.

To simplify matters, there are only seven discrete parts to the processor we will discuss. They are: The accumulator [A]; The flag byte [FB]; The program counter [PC]; The stack pointer [SP]; The HL register pair [HL]; The DE register pair [DE]; The BC register pair [BC]. In order, their characteristics follow:

[A] This unit is an eight-bit register. It is where one of the operands used in any arithmetic or logical operation must reside and where the result of that operation will be placed. Free movement of eight-bit values may be made between [A] and any other general purpose register or memory location, and values not exceeding eight bits may be placed into it directly (called immediate moves).

[FB] This unit is an eight-bit register that does not contain data per se, but rather consists of eight single-bit flags (only five are actually defined) that change based on the operation just completed by the processor. Typically, operations performed in [A] affect the flags based on the result. The flags are *sign, zero, aux., carry, parity,* and *carry.* The only two we're concerned with are *zero* and *carry.* If, after an operation affecting it, the result left in [A] is 00, then the *zero flag* is set to 1; if not, then the *zero flag* is reset to 0. Note that it is not affected by load operations. The *carry flag* is used during arithmetic operations to indicate overflow of binary calculations into the ninth bit position (borrow and carry). It is also used in rotate instructions (where all bits in [A] are shifted left or right) to hold the bit that is shifted out and to supply the bit to be shifted in. [A] and [FB] from a sixteen-bit unit called the processor status word [PSW].

[PC] This sixteen-bit unit contains the memory address of the next instruction to be fetched and executed by the processor. Based on the length of the instruction (predefined by the manufacturer), it is incremented to where the next instruction should be each time the current instruction is completed. With a few exceptions, it is not directly accessible to the programmer.

[SP] This sixteen-bit unit contains the memory address of the processor's next stack location. The stack is where register data, return addresses, and such are stored when there is need to preserve them during subsequent operations. [PC] is stored there, for example, when calls to subroutines are made, so that at the end of the subroutine, a *return* instruction will pull the old [PC] contents out of the stack and place them back in [PC]. Execution will then continue where it left off. Although [SP] cannot be said to be a general purpose register, its contents are under the control of the programmer so the stack can be relocated to a different area if desired. All other register contents, including those of [PSW], can be placed on the stack using PUSH instructions and retrieved using POP instructions.

[HL] This sixteen-bit unit is a general purpose sixteen-bit register which can also be treated as two eight-bit registers—[H] and [L]. Operations done between registers are much faster and shorter than between registers and memory locations, and therefore movement of data between registers is preferable. Also, since addresses are always sixteen-bit numbers, using the sixteen-bit register instructions is preferable when addresses must be calculated or otherwise manipulated.

[DE] This sixteen-bit unit is functionally the same as [HL], with the exception that it cannot be used for certain kinds of load operations. Those are not of interest to us here.

[BC] This sixteen-bit unit is functionally the same as [DE].

For our purposes, the description just given, though incomlete, is sufficient. Now that we have defined the basics and you have familiarized yourself with the ASM documentation, we can begin to examine what we did last month in our modifications to DUMP.ASM. We said that we would functionally change the program in three ways: we would make it recognize whether it was in a forty or an eighty column environment and format its output accordingly; we would cause it to separate the address from the data with a colon; and we would cause two blank lines to be printed to separate 128-byte records.

The first change, forty versus eighty columns, is by far the largest and most complex change; we'll examine it first. In this and our other changes, refer to the listing shown in figure 1. Line numbers referenced will be those running down the left margin. Note the preceding 0 and trailing H whenever we specify a hexadecimal number in the column. This is the normal notation with 8080/Z80 assemblers to specify hexadecimal numbers and it's a good idea to get used to it. Most assemblers default to decimal for numeric constants and require an explicit H for hex and B for binary if you wish to input in those forms. The preceding 0 is needed because when he numbers have A,B,C,D,E, or F as the first digit, the assembler needs a way to determine whether it is a number or a label.

DUMP's normal operation is to open the named file, read in its contents and then take each numeric byte and translate it into two ASCII characters to be output to the screen. DUMP also keeps track of the relative address of the byte (beginning at 0000H) and prints this address every sixteen bytes. The problem with DUMP for the Apple is that many SoftCard owners still use their forty-column Apple screen, and since sixteen displayed bytes (32 characters plus spaces plus addresses) exceeds forty characters, the output wraps around and gets hard to read.

To correct this problem, we first need to determine whether a terminal or eighty-column board is installed in the Apple. This is made easier by the fact that SoftCard CP/M requires such devices to be in slot 3 and only slot 3. As discussed in previous columns, SoftCard maintains a slot-type table in the I/O Configuration Block. The value of the card in a particular slot can be found at 0F3B8H + slot number, or 0F3BBH for slot 3, and will be one greater than the type number found on page 1-2 of Volume I of the SoftCard manual. Since, for the purposes of this program, we can assume that any serial card, com card, or newer type-6 firmware card in slot three is an eighty-column device, we really only need to exclude values of 00, (no card), or 05 (Apple parallel printer card). Once the presence or absence of a card is determined, we need program statements to test the environment for the number of columns and then, if it is forty, break the output of bytes when that line's byte count reaches eight. At that point, we will output a Carriage Return/Linefeed (CRLF) sequence and also print sufficient spaces so that we start the second eight bytes immediately under the first.

Implementing this first step requires that we examine the slot-types table and set up a data location within the program (called a flag) that will be set to 00H if forty columns, or 0FFH if eighty columns when execution begins. It will be easier if we can refer to the flags as labels or symbols, so we will define the label SLT3 to be equal to 0F3BBH using the EQU pseudo-op in line 16 and set up the flag location with the label FLAG using the DS pseudo-op in line 247. Now we can use SLT3 and FLAG in future instructions to reference these addresses. We will do this now in lines 52 through 60 where we examine the slot type

table and set up the FLAG data area. These nine instructions perform the following logical sequence of operations.

1. LDA SLT 3 [A] is loaded from memory location SLT3.

2. ORA A A logical OR is done between the value in [A] and itself. This has no effect on that value since any binary number OR'd with an equal binary number results in no change. It is used here because ORA affects the zero flag in [FB]. If the value is 00, then the zero flag will be set.

3. JZ COL40 This op-code causes a jump to the indicated label (line 57) if the zero flag is set, i.e., no card in slot 3.

4. SUI 5 This instruction subtracts 5 from the value in [A]. The result will set or reset the zero bit based on the result. Since we wish to do forty-column output only if the value in SLT3 is 00 or 05, this instruction tests the remaining case.

5. JNZ ONWRD This op-code causes a jump to the indicated label (line 59 if the zero flag is *not* set. If the value was not 05, the result will be nonzero and the jump will occur.

6. MVI A,0 This instruction, with the label COL40:, is where we go if we have a forty-column environment. Here we load [A] with 00, since MVI A,0 stands for MoVe Immediate 00 into [A].

7. DB 1 This pseudo-op places an 01H into memory at this point in the program. Its purpose is to install the numeric op-code for LXI B into the program without defining the two bytes which would have to follow if we used the LXI B mnemonic, a sixteen-bit load of [BC] with the two bytes that follow. As such it is a programming "trick" and should probably not be used here. However, it is a way to save space and is mentioned only for that possible value. Its effect in this case is to load the next two bytes (which form instruction #8 below) as data into [BC] rather than execute them as an instruction. Effectively, this is a way to skip over them with a single byte rather than using a separate jump instruction that takes three bytes.

8. MVI A,0FFH This two byte instruction, with the label ONWRD:, loads [A] with 0FFH, indicating an eighty-column device in slot 3. It is this instruction that gets skipped by the LXI B above if we were in forty columns and already loaded [A] with 00.

9. STA FLAG This op-code STores the contents of [A] in the data location FLAG, and sets our flag location to either 00 for forty or 0FFH for eighty columns.

Now that we've set up our flag, we can check it at any time during program execution to see what our environment is. We now go on to make the modifications to perform forty-column output if required. We do this starting at line 76 and proceeding for seventeen instructions through line 92. Originally, the DUMP program at this point checked the address counter ([HL]—high-order byte in [H], low in [L]) to see if sixteen bytes had been printed. If not, a jump to the label NONUM: at line 108 was performed and execution continued outputting the next byte. If sixteen bytes had been printed (i.e., the low four bits of register [L] = 0000B), then a new address was printed on a new line and the process continued. We need to also test for eight bits printed, so we'll continue to test for the low four bits being 0, but this time we'll branch to the new address code if it is zero, rather than branching over the new address code if it is not. We'll then put our test for the eighth byte printed immediately after that test and if so, perform our own line break. If not, we'll simply proceed to NONUM: as normal. The program flow is as follows.

1. JZ SKIP The instruction before this leaves the low four bits of [L] in [A] and affects the zero flag based on their contents. This op-code then causes a jump to SKIP: (line 94) if the zero flag is set, meaning we've printed sixteen bytes.

2. MOV C,A This op-code MOVes the contents of [A] into [C] and is done to save them while we use [A] in the next phase.

3. LDA FLAG Here we load [A] with our forty/eighty-column flag.

4. ORA A We now OR it to affect the zero flag.

5. JNZ NONUM If the zero flag is not set here, then we are in eighty-column mode and therefore should go on to NONUM: (line 108) to continue printing all sixteen bytes on a single line.

6. MOV A,C If we get here, then we are in forty-column mode and must apply our eight-bytes-printed test. This op-code moves the contents of [C] into [A], putting the original value back.

7. CPI 08H This instruction, meaning ComPare Immediate the contents of [A] with the value following (eight in this case), essentially subtracts eight from [A], affecting the zero flag; but, unlike SUI, does not store the result in [A], thereby preserving it. Since [A] still contains the low four bits of [L] and is a count of the number of bytes printed, the zero flag will be set if we have printed eight.

8. JNZ NONUM If the zero flag is not set, then we need to continue printing, and so should jump to NONUM: (line 108).

9. CALL CRLF If we are here, then we have printed eight bytes and need to output a CRLF sequence. This instruction will cause a jump to the label CRLF: (line 143), but also put the address following it on the stack so that when the CRLF routine finishes, the RETurn instruction will cause us to continue at instruction ten below (line 85).

10. PUSH H This op-code causes the contents of [HL] to be placed on the stack, saving the address, while we use [HL].

11. MVI L,5 This MoVe Immediate instruction places a value of 5 in [L] as a counter for printing five spaces, to line up the second eight bytes with the first, i.e., past the address and colon.

12. MVI A,' ' This instruction at label PRSPC: moves the value of an ASCII space (the character between the quotes) into [A] so that we can print it.

13. CALL PCHAR This instruction calls the PCHAR: subroutine (line 135) that prints the character in [A] and returns.

14. DCR L This op-code DeCRements the contents of [L] reducing the space counter by one and sets the zero flag if 0.

15. JNZ PRSPC If the counter's nonzero, we jump to PRSPC: (line 87) and continue printing spaces.

16. POP H This op-code retrieves the original contents of [HL] now that we are through using [L] as a counter.

17. JMP NONUM Since we are now ready to continue printing the remainder of the sixteen bytes (having finished breaking the line), this instruction causes a jump to NONUM: (line 108), skipping the code which prints a new address (at label SKIP:).

This completes the modifications for our first functional change and the program will now deal with a forty-column environment. Our next step will be to install the change that prints the colon after the address. This is done with two instructions at lines 106 and 107 as follows:

1. MVI A,':' This instruction does a MoVe Immediate of the ASCII value for colon into [A].

2. CALL PCHAR This is a call to the print-character subroutine that prints the value in [A] to the screen.

These two instructions are inserted at the end of the print address code so that each time the address is printed, they too will be executed.

Our final functional change involves printing two blank lines after the printing of each 128 bytes. To do this we will have to install code to test the address low-order byte to see if it is 00 or 80H, since this byte increments from 00 to 7FH for the first 128 bytes and from 80H to 0FFH for the second. If we are at a 128-byte boundary, we will do two CRLF sequences prior to printing the normal CRLF and the address. The easiest place to implement the test is at the subroutine CRLF: that prints the CRLF sequence at the end of each line. The test comprises five new instructions that are placed ahead of the normal CRLF: code at lines 143 through 147. We will leave the CRLF: label in front of the test so that it is executed every time the subroutine is called and will create a new label CRLF1: at the old code so that we can call it ourselves from within our new code. The instructions are as follows:

1. MOV A,L This op-code MOVes the contents of [L] (the low order address byte) into [A] so we can test its value.

2. ORA A This op-code is performed this time not to set the zero flag, but to clear the carry flag to 0, which it always does. This is to prepare for the next instruction.

3. RAL This op-code has the effect of shifting every bit in [A] 1 position left. The leftmost bit goes into the carry flag and

the contents of the carry flag go into the rightmost bit of [A]. The effect here is that if the value in [A] is either 80H or 00, this will produce 00 in [A]. This is due to the fact that since 00H is 00000000B and 80H is 10000000B, shifting one bit left will produce 00000000B, providing the carry flag was 0 when the shift was done. Now the reason for the ORA earlier to zero the carry flag becomes clear.

4. ORA A This op-code will now set the zero flag if [A] contains 00, meaning that [A] was originally 00 or 80H. Any other value would have left (1) bits in [A] after the rotate.

5. JZ P2 This instruction causes a jump to P2: (line 156) to print the extra CRLFs, if the zero bit is set. If not, execution continues at CRLF1: immediately after this instruction to print a single CRLF as it did before.

This completes the test and the only modification remaining is the addition of code to print the extra two CRLFs. Since the old CRLF code was a subroutine *called* by the main program, the RET op-code at the end of it caused program control to return to the main program when the CRLF was printed. Now our new test code checks for whether one or three CRLFs need to be printed. If one, the old CRLF code is executed just like it used to be. If three, then we need to execute this code three times. We do this by treating the old CRLF code as a subroutine of our new code. This is done with three instructions at lines 156, 157, and 158 by simply *calling* the old CRLF code (now CRLF1:) twice for the extra CRLFs and then finally doing a jump to that same code to print the normal CRLF. The last instruction is a jump so that the RET at the end of CRLF1: will return to the main program instead of our P2: subroutine. The same thing could have been done by *calling* the code three times and putting a RET at the end of P2:, but this would have taken an extra byte.

Now that all modifications have been made, we are ready to run the source file through ASM and create our HEX and PRN files. The command structure for ASM is very simple and easy to use. There are only two forms of the command:

ASM filename, or

ASM filename.parms, where parms are the assembly parameters.

The first form will assemble a file on the logged drive of the name *filename.ASM* and create two files, *filename.HEX* and *filename.PRN*. The .HEX file is the object code in a special structure called *Intel hex* format. It is this file that is later used with LOAD to create the actual object code in a .COM file. The .PRN file is a listing file containing the source code, the addresses, and object code, as well as error codes for lines that generate errors. Note that you cannot assemble a file that does not have a .ASM file extension, since any other extension you place after the filename will be treated as parameters.

The parameters allowed with ASM.COM are also very simple. These three characters represent the parameters for the source file, the .HEX file, and the .PRN file in that order. They can be drive designators (for SoftCard CP/M these are limited to A through F), in which case they are the drive to get the source file from and the drive to write the .HEX and .PRN files to, respectively. In the case of the .HEX file, it can also be the letter Z which will cause the .HEX file not to be generated. There are two special characters for the .PRN file—Z, which suppresses the .PRN file the same as it does for the .HEX file, and X which causes the .PRN file to be sent to the terminal rather than to a disk file. You should note that the ASM command scanner will read parameters until it encounters a space, at which time it will assume it has them all. For this reason the parameters AZ will process normally—source file taken from A:, .HEX file suppressed, and .PRN file on the logged drive. A Z, however, will take the source from A: but will not suppress the .PRN file. This is because it never saw the Z, due to the space between it and the A.

Errors during assembly result in a single-letter error code and in the line containing the error being printed on the screen. These error codes are listed on pages 3-114 and 3-115 of the SoftCard manual, with the exception of the error code S, which was left out of both Microsoft's documentation and early Digital Research ASM manuals as well. The S means syntax error and results from misspelled op-codes, MVO instead of MOV, for instance, or from bad characters in the source file.

Once you have assembled the DUMP.ASM program, you can now use LOAD.COM to convert the DUMP.HEX file to an

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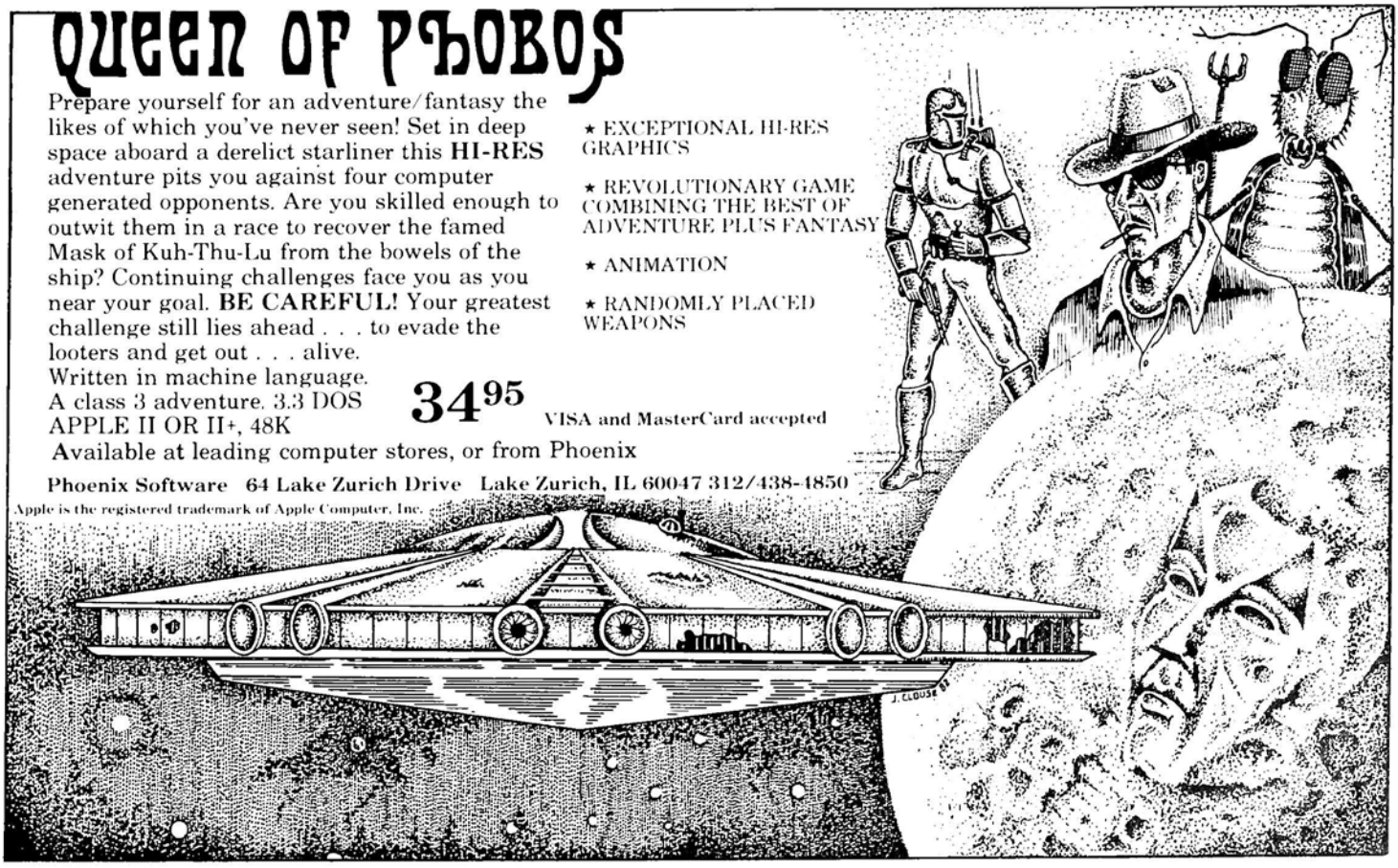
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executable DUMP.COM file. This is done by simply typing LOAD DUMP. Note that there must be a DUMP.HEX file on the logged disk or you must preface the name DUMP by the drive letter that the file is on, as in LOAD B:DUMP. Once LOAD has finished saving the new .COM file, try running it. The format for DUMP is: DUMP filename.ext

If you encounter problems, go back and check your work against the listing in this column and reassemble. Remember, just because there are no errors during assembly is no guarantee the program will do what you want.

SoftCard snafu: On page 193 of April's SoftCard, in the fourth line, first paragraph, column two, "SAVE 1 BOOT.COM" should have read, "SAVE 2 BOOT.COM."

```
;       FILE DUMP PROGRAM, READS INPUT FILE, PRINTS IN HEX
;
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;       BOX 579, PACIFIC GROVE, CA 93950
;       USED WITH PERMISSION
;
        ORG     100H
BDOS    EQU     0005H       ;DOS ENTRY POINT
CONS    EQU     1           ;READ CONSOLE
TYPEF   EQU     2           ;TYPE FUNCTION
PRINTF  EQU     9           ;BUFFER PRINT ENTRY
BRKF    EQU     11          ;BREAK KEY FUNCTION (TRUE IF
                              CHAR READY)
OPENF   EQU     15          ;FILE OPEN
READF   EQU     20          ;READ FUNCTION
SLT3:   EQU     0F3BBH      ;SLOT 3 CARD TYPE LOCATION
;
FCB     EQU     5CH         ;FILE CONTROL BLOCK ADDRESS
BUFF    EQU     80H         ;INPUT DISK BUFFER ADDRESS
;
;       NON GRAPHIC CHARACTERS
CR      EQU     0DH         ;CARRIAGE RETURN
LF      EQU     0AH         ;LINE FEED
;
;       FILE CONTROL BLOCK DEFINITIONS
FCBDN   EQU     FCB+0       ;DISK NAME
FCBFN   EQU     FCB+1       ;FILE NAME
FCBFT   EQU     FCB+9       ;DISK FILE TYPE (3 CHARACTERS)
FCBRL   EQU     FCB+12      ;FILE'S CURRENT REEL NUMBER
FCBRC   EQU     FCB+15      ;FILE'S RECORD COUNT (0 TO 128)
FCBCR   EQU     FCB+32      ;CURRENT (NEXT) RECORD NUMBER
                              (0 TO 127)
FCBLN   EQU     FCB+33      ;FCB LENGTH
;
;       SET UP STACK
        LXI     H,0
        DAD     SP
;       ENTRY STACK POINTER IN HL FROM THE CCP
        SHLD    OLDSP
;       SET SP TO LOCAL STACK AREA (RESTORED AT FINIS)
        LXI     SP,STKTOP
;       READ AND PRINT SUCCESSIVE BUFFERS
        CALL    SETUP       ;SET UP INPUT FILE
        CPI     255         ;255 IF FILE NOT PRESENT
        JNZ     OPENOK      ;SKIP IF OPEN IS OK
;
;       FILE NOT THERE, GIVE ERROR MESSAGE AND RETURN
        LXI     D,OPNMSG
        CALL    ERR
        JMP     FINIS       ;TO RETURN
;
OPENOK: ;OPEN OPERATION OK, SET FOR 40/80 COL. OUTPUT
        LDA     SLT3        ;GET SLOT 3 CARD TYPE VALUE
        ORA     A           ;SET ZERO FLAG IF ZERO
        JZ      COL40       ;IF ZERO IT'S 40 COLUMN
        SUI     5           ;SET ZERO FLAG IF IT'S 5
        JNZ     ONWRD       ;IF NOT 5 THEN IT'S 80 COLUMN
COL40:  MVI     A,0         ;FLAG=0 FOR 40 COLUMN
        DB      1           ;SKIP TWO BYTES WITH LXI B OPCODE
ONWRD:  MVI     A,0FFH      ;FLAG NON-ZERO FOR 80 COLUMN
        STA     FLAG        ;STORE THE VALUE 40 OR 80 IN FLAG
        MVI     A,80H
        STA     IBP         ;SET BUFFER POINTER TO 80H
;       HL CONTAINS NEXT ADDRESS TO PRINT
        LXI     H,0         ;START WITH 0000
;
GLOOP:
        PUSH    H           ;SAVE LINE POSITION
        CALL    GNB
        POP     H           ;RECALL LINE POSITION
        JC      FINIS       ;CARRY SET BY GNB IF END FILE
        MOV     B,A
;       PRINT HEX VALUES
;       CHECK FOR LINE FOLD
        MOV     A,L
        ANI     0FH         ;CHECK LOW 4 BITS
        JZ      SKIP        ;READY FOR NEW ADDRESS
        MOV     C,A         ;SAVE ACCUMULATOR
        LDA     FLAG        ;40 OR 80 COLUMNS?
        ORA     A           ;SET ZERO FLAG IF ZERO
        JNZ     NONUM       ;IF NON-ZERO IT'S 80
        MOV     A,C         ;IT'S 40, GET ACCUMULATOR
        CPI     08H         ;IF WE'VE PRINTED 8, WE'RE AT HALF LINE
        JNZ     NONUM       ;ZERO FLAG TELLS US IF IT IS 08
        CALL    CRLF        ;OTHERWISE WE NEED TO GO TO NEXT LIN
        PUSH    H           ;SAVE THE CURRENT LINE ADDRESS
        MVI     L,5         ;WE NEED TO PRINT 5 SPACES (1-5)
PRSPC:  MVI     A,' '       ;PUT SPACE VALUE IN ACCUMULATOR
        CALL    PCHAR       ;AND GO PRINT IT
        DCR     L           ;DECREMENT OUR COUNTER
        JNZ     PRSPC       ;IF NOT ZERO, WE STILL HAVE SPACES
        POP     H           ;WE'RE DONE, GET LINE ADDRESS BACK
        JMP     NONUM       ;AND CONTINUE AS BEFORE
;       PRINT LINE NUMBER
SKIP:   CALL    CRLF
;
;       CHECK FOR BREAK KEY
        CALL    BREAK
;       ACCUM LSB = 1 IF CHARACTER READY
        RRC                 ;INTO CARRY
        JC      FINIS       ;DON'T PRINT ANY MORE
;
        MOV     A,H
        CALL    PHEX
        MOV     A,L
        CALL    PHEX
        MVI     A,':'       ;LOAD VALUE FOR : IN ACCUMULATOR
        CALL    PCHAR       ;AND GO PRINT IT
NONUM:
        INX     H           ;TO NEXT LINE NUMBER
        MVI     A,' '
        CALL    PCHAR
        MOV     A,B
        CALL    PHEX
        JMP     GLOOP
;
FINIS:
;       END OF DUMP, RETURN TO CCP
;       (NOTE THAT A JMP TO 0000H REBOOTS)
        CALL    CRLF
        LHLD    OLDSP
        SPHL
;       STACK POINTER CONTAINS CCP'S STACK LOCATION
        RET                 ;TO THE CCP
;
;
;       SUBROUTINES
;
BREAK:  ;CHECK BREAK KEY (ACTUALLY ANY KEY WILL DO)
        PUSH H! PUSH D! PUSH B; ENVIRONMENT SAVED
        MVI     C,BRKF
        CALL    BDOS
        POP B! POP D! POP H; ENVIRONMENT RESTORED
        RET
;
PCHAR:  ;PRINT A CHARACTER
        PUSH H! PUSH D! PUSH B; SAVED
        MVI     C,TYPEF
        MOV     E,A
        CALL    BDOS
        POP B! POP D! POP H; RESTORED
        RET
;
CRLF:   MOV     A,L         'GET ADDRESS IN ACCUMULATOR
        ORA     A           ;CLEAR CARRY FOR ROTATE
        RAL                 ;ROTATE BITS LEFT, IF ADDRESS IS
```

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```
146:            ORA     A               ;80 OR 00, THIS SETS THE ZERO FLAG
147:            JZ      P2              ;IF SO, PRINT TWO CRLF'S
148:    ;
149:    CRLF1:  MVI     A,CR
150:            CALL    PCHAR
151:            MVI     A,LF
152:            CALL    (PCHAR)
153:            RET
154:    ;
155:    ;
156:    P2:     CALL    CRLF1           ;PRINT EXTRA CRLF
157:            CALL    CRLF1           ;PRINT EXTRA CRLF
158:            JMP     CRLF1           ;PRINT ORIGINAL CRLF AND RETURN
159:    ;
160:    ;
161:    PNIB:   ;PRINT NIBBLE IN REG A
162:            ANI     0FH             ;LOW 4 BITS
163:            CPI     10
164:            JNC     P10
165:    ;       LESS THAN OR EQUAL TO 9
166:            ADI     '0'
167:            JMP     PRN
168:    ;
169:    ;       GREATER OR EQUAL TO 10
170:    P10:    ADI     'A'-10
171:    PRN:    CALL    PCHAR
172:            RET
173:    ;
174:    PHEX:   ;PRINT HEX CHAR IN REG A
175:            PUSH    PSW
176:            RRC
177:            RRC
178:            RRC
179:            RRC
180:            CALL    PNIB            ;PRINT NIBBLE
181:            POP     PSW
182:            CALL    PNIB
183:            RET
184:    ;
185:    ERR:    ;PRINT ERROR MESSAGE
186:    ;       D,E ADDRESSES MESSAGE ENDING WITH "$"
187:            MVI     C,PRINTF        ;PRINT BUFFER FUNCTION
188:            CALL    BDOS
189:            RET
190:    ;
191:    ;
192:    GNB:    ;GET NEXT BYTE
193:            LDA     IBP
194:            CPI     80H
195:            JNZ     G0
196:    ;       READ ANOTHER BUFFER
197:    ;
198:    ;
199:            CALL    DISKR
200:            ORA     A               ;ZERO VALUE IF READ OK
201:            JZ      G0              ;FOR ANOTHER BYTE
202:    ;       END OF DATA, RETURN WITH CARRY SET FOR EOF
203:            STC
204:            RET
205:    ;
206:    G0:     ;READ THE BYTE AT BUFF+REG A
207:            MOV     E,A             ;LS BYTE OF BUFFER INDEX
208:            MVI     D,0             ;DOUBLE PRECISION INDEX TO DE
209:            INR     A               ;INDEX=INDEX+1
210:            STA     IBP             ;BACK TO MEMORY
211:    ;       POINTER IS INCREMENTED
212:    ;       SAVE THE CURRENT FILE ADDRESS
213:            LXI     H,BUFF
214:            DAD     D
215:    ;       ABSOLUTE CHARACTER ADDRESS IS IN HL
216:            MOV     A,M
217:    ;       BYTE IS IN THE ACCUMULATOR
218:            ORA     A               ;RESET CARRY BIT
219:            RET
220:    ;
221:    SETUP:  ;SET UP FILE
222:    ;       OPEN THE FILE FOR INPUT
223:            XRA     A               ;ZERO TO ACCUM
224:            STA     FCBCR           ;CLEAR CURRENT RECORD
225:    ;
226:            LXI     D,FCB
227:            MVI     C,OPENF
228:            CALL    BDOS
229:    ;       255 IN ACCUM IF OPEN ERROR
230:            RET
231:    ;
232:    DISKR:  ;READ DISK FILE RECORD
233:            PUSH H! PUSH D! PUSH B
234:            LXI     D,FCB
235:            MVI     C,READF
236:            CALL    BDOS
237:            POP B! POP D! POP H
238:            RET
239:    ;
240:    ;       FIXED MESSAGE AREA
241:    SIGNON: DB      'FILE DUMP VERSION 1.4$'
242:    OPNMSG: DB      CR,LF, 'NO INPUT FILE PRESENT ON DISK$'
243:
244:    ;       VARIABLE AREA
245:    IBP:    DS      2               ;INPUT BUFFER POINTER
246:    OLDSP:  DS      2               ;ENTRY SP VALUE FROM CCP
247:    FLAG:   DS      1               ;40/80 COLUMN FLAG
248:    ;
249:    ;       STACK AREA
250:            DS      64              ;RESERVE 32 LEVEL STACK
251:    STKTOP:
252:    ;
253:            END
```


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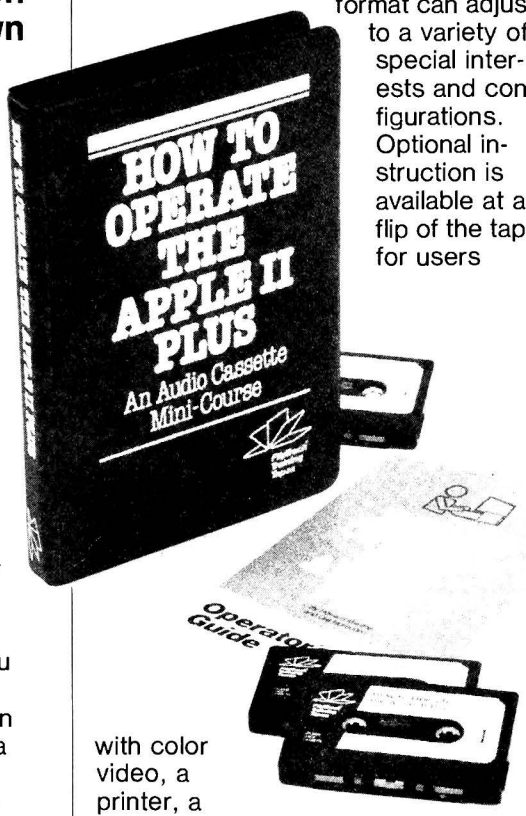
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HARD TALK

BY JEFFREY MAZUR

Six months ago we started this column with a detailed look at what goes on "under the hood" of an Apple II. For the most part, you had to accept this description on faith unless you are one of the few who thoroughly understands the Apple's schematic diagrams and firmware listings.

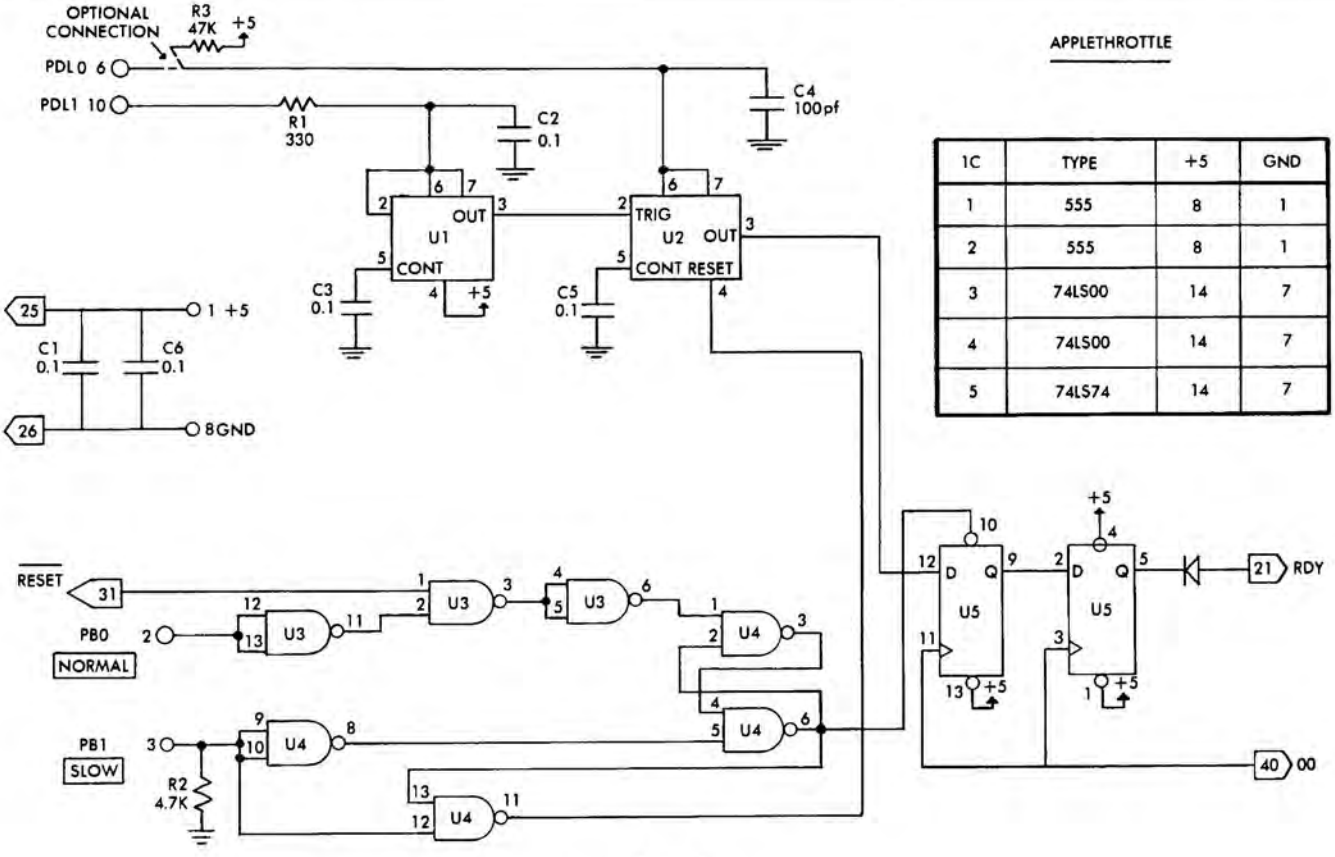
This month we will delve a little deeper into what makes the Apple tick. To aid in our investigation, we will present two hardware devices that can be used to strip away some of the mystery behind the computer. One of these devices is known as the Applethrottle. The complete schematic is included here for those who may wish to build their own.

The Applethrottle can be used to slow down or stop the operation of the cpu. This makes it possible to watch the computer work in slow motion. What normally takes place in the wink of an eye can now be examined in all of its detail.

To enable us to watch even closer, we can add a display board such as the one available from John Bell Engineering. This board contains a series of lamps that constantly monitor the address and data buses. By slowing the computer down to almost a standstill, we can actually watch the cpu executing a program—fetching instructions, loading and storing data, performing branches and jumps, and so on. Even experienced hardware and software experts are sure to find this quite interesting.

Whoa . . . Apple! Since the Apple is constantly performing between two hundred thousand and five hundred thousand operations per second, it is normally impossible to watch how the computer functions. It is possible, however, to build a device which will slow down the computer to a human pace. This is done by controlling the ReaDY line of the 6502. When this line is brought low, the cpu will halt after it finishes its current read or write operation. It will then just sit there and wait until the RDY line goes high again. This capability of a microprocessor is generally used when the cpu is connected to slow memory devices. On the Apple II, this signal is normally held high. Although the RDY line is available on all of the I/O slots, it is very rarely used by other peripheral boards. We can use it, however, to build a handy tool for understanding how the computer works.

Figure 1 shows the schematic diagram of the Applethrottle. At the top are two blocks labelled U1 and U2. These blocks represent two ICs which are known as 555 timer chips. Although U1 and U2 are both 555s, they are connected in slightly different ways to perform different functions. U1 is configured as an oscillator; that is, it puts out a continuous stream of pulses.



APPLETHROTTLE

IC	TYPE	+5	GND
1	555	8	1
2	555	8	1
3	74LS00	14	7
4	74LS00	14	7
5	74LS74	14	7

Figure 1.
Schematic of the Applethrottle.

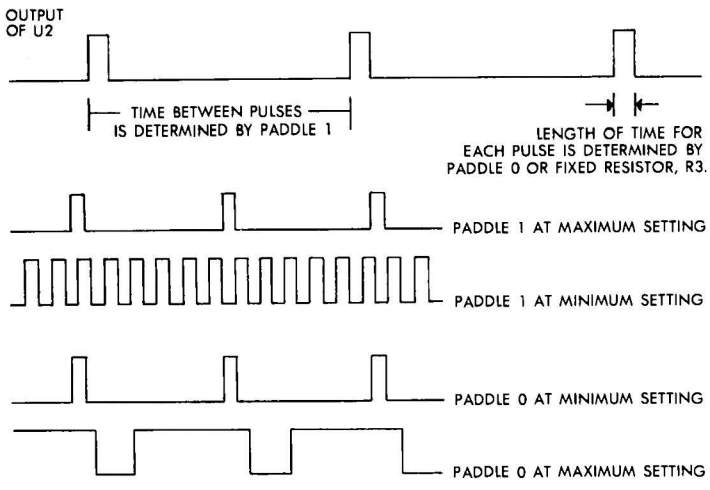


Figure 2.

FIGURE 2. Possible waveforms at the output of U2. Overall observed speed of the computer depends upon the duty cycle of this signal which is the ratio of on-time to off-time.

The frequency of these pulses (how many per second) is determined by the external resistance of paddle 1. The output of U1 (at pin 3) is fed into U2 which is set up as a "one-shot" monostable circuit. This means that for every pulse coming in from U1, U2 will put out a pulse of its own.

The width of this pulse is variable and depends upon the setting of paddle 0. Furthermore, there is another signal coming into U2 at its *reset* pin. Whenever this signal is low it forces the output of U2 low. When the Applethrottle is engaged, the output of U2 will control the state of the Apple's cpu. When U2 is high, the cpu will run at full speed. When U2 is low, the cpu will stop.

The overall observed speed of the computer will depend upon how often the cpu is running versus how often it is stopped. Figure 2 shows how the various controls affect the waveform at U2's output and thus the computer's operation. The ratio of on to off time is known as the *duty cycle* of the waveform. Although both paddles can be used to vary the speed over a wide range, paddle 0 can be replaced by a fixed resistor for simpler operation.

On/off control of the Applethrottle is taken care of by U3 and U4 which provide a collection of NAND gates. To follow the logic of this circuit, remember that both inputs of a NAND gate must be high for its output to go low. Two of these gates (the ones on the right) are cross connected to form an RS (Reset/Set) latch. The output at U4 pin 6 will go low when the input at U4 pin 1 goes low. The output will then remain low until a low signal is sent into U4 pin 5. The inputs to this latch are basically derived from the two push-button inputs. Therefore, pressing the button on paddle 1 will engage the slow motion mode, while pressing the button on paddle 0 will restore normal speed operation.

Two other signals are worth mentioning. The *reset* signal from the Apple bus is also fed into the control circuit to make sure that the Applethrottle is turned off whenever a *reset* is performed. Another output from the *slow* switch (button 1) is fed into U2. This causes the cpu to halt whenever button 1 is held down. R2 is a pull-down resistor to ensure that the Applethrottle is turned off when no paddles are connected.

Unfortunately, the output of U2 cannot be fed directly onto the Apple's bus because of a timing requirement of the 6502. The specifications of this cpu require that the RDY signal change only during the phase one clock time. This means that the pulses coming out of U2 must be synchronized with the Apple's system clock. This is the job of U5, which consists of two D-type flip-flops. The first section is used to control the output to the cpu via the preset signal (pin 10). When this pin is high, it allows the variable pulse signal from U2 to pass through to the cpu. When the pin goes low (notice the small circle at pin 10 indicating that this is an active low input), the preset action causes the output to remain high regardless of the variable pulse signal. This allows the computer to operate in a normal fashion, that is, at full speed. The second half of U5 clocks the final output to the Apple bus at the trailing edge of the phase zero clock. This satisfies the timing requirements of the 6502. Finally, the ReaDY output is connected through a diode to present only an active low signal. This is necessary so that other boards connected to the bus can pull the RDY line low.

Building an Applethrottle. You can build your own Applethrottle using the schematic in figure 1. Start with a blank "prototyping board," available from Apple and other sources. Install the various components and connect them using point-to-point wiring. It is highly recommended that you use sockets for all of the ICs. For simpler operation, start with the fixed resistor in place of paddle 0. Of course, if you've never picked up a soldering iron before, you may wish to purchase an assembled unit from the manufacturer.

Initial Checkout. The Applethrottle requires a set of game paddles for its operation. These paddles plug directly into a socket on the Applethrottle. If you want to slow down games or other programs that also use paddles, you will need another set of paddles to plug into the Apple game I/O socket. After connecting the paddles to the Applethrottle, turn off the computer and remove the cover. The Applethrottle can now be inserted into any slot. Slot 7 is recommended since it is most likely to be empty and because it will allow the paddles to be easily changed from the same I/O connector to the Applethrottle. Dress the cable through one of the rear cutouts and then replace the cover.

Turn on the computer and type *call −151* if necessary to get into the Apple Monitor. If the computer seems dead or does not operate properly when it is turned on, remove the Apple-

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throttle and check for any construction mistakes, solder shorts, bad connections, and so on. After getting into the Monitor you can check normal operation of the computer by typing E000L and viewing the disassembled listing. If your paddles are not labeled, identify paddle 1 as follows:

While holding down the push button on one paddle, hit the reset key. If the computer beeps as usual, repeat using the other push button. The button which prevents a normal reset is button 1. This button can be labeled "slow/stop." Momentarily press the other button to restore normal operation (this button can be labeled "normal").

Next rotate paddle 1 to its midrange position and momentarily press button 1. Type L and hit return. Note that the listing is now slower and its speed can be varied by the paddle setting. The listing can also be stopped at any time by pressing, and holding, button 1. Press button 0 to restore normal speed operation.

Using the Applethrottle. The Applethrottle can be operated at any time to slow down or stop the computer. When engaged, all computer functions except memory refresh and video generation are affected. Thus the Applethrottle can be used in machine language, Basic, Pascal, and so on. It may be called upon during the list, trace, or run of any program. At slow speeds, the video display produces a rolling effect each time a new line of text is printed. This provides a perfect example of how the Applethrottle can be used to probe the workings of the computer.

When the Apple is listing out a long program, it appears as if it is scanning one long sheet of paper from top to bottom. New text continually appears at the bottom of the screen while the existing lines seem to glide up the screen until they disappear at the top. This function of the video display is referred to as *scrolling* and you've probably come to take it for granted. But if you stop to think about it, this is not such a simple task. Every time a new line is to be displayed at the bottom of the screen, the lowest twenty-three lines must each be moved up one line. Due to the Apple's memory-mapped video design, this amounts to moving 920 characters (23×40) and calculating new base addresses forty-six times. Fortunately, the speedy cpu can perform all this in a fraction of a second so we see a rather smooth moving display.

But when the Applethrottle is turned on, the cpu can be slowed down to the point where this ordinary task of scrolling now takes several seconds or more to complete. It then becomes obvious what actually happens every time a new line is printed. Watching in slow motion, you can see the cpu rewriting each line, one at a time, from the top of the screen down. Since the information on the top line is no longer needed, it is replaced by the characters on the second line. The text from the third line is then copied onto the second line and so on. It is also interesting to note that the copying is done from right to left. This process continues until the bottom line is reached. This line is then changed to all blanks to erase the previous information. Finally the new text is printed at the bottom of the screen.

After watching the cpu perform this operation, you should have a good grasp of what is involved in printing text to the screen. If you have a working knowledge of assembly language, or especially if you're trying to develop such skill, you can now look at the software routine that actually is responsible for what you saw. The *scroll* routine can be found at location $FC70 in the Apple's Monitor. It is actually part of the complete video out routine, VIDOUT, which begins at location $FBFD. Taking this back one more step, we find that VIDOUT is usually called by the Apple's character output routine, COUT at $FDED. Study the Apple Monitor listing to see if you can follow the assembly language routine that scrolls the screen. By understanding the software and being able to follow it through in slow motion, you can begin to gain a better understanding of how the Apple works.

One of the best features of the Applethrottle is that it requires no software and can be activated or deactivated at any time. Therefore its uses are almost limitless. You can use it to slow down or stop Applesoft program listings (no more typing *speed*= over and over again). Of course, it also does the same for Integer Basic and even gives you *stoplist* without the Autostart ROM. By adding a toggle switch in parallel with button 1, you can also have a "freeze" control. This would be great when you're playing a game and get interrupted. Just flip the switch and put the computer on hold while you take care of other things. Some games have such a feature built into their program, but this technique will work for any program.

Speaking of games, have you ever wondered how a particular program produces those spectacular graphics on the hires screen? Well, pop on the Applethrottle and watch the figures being drawn in slow motion. The ultimate gaming use for the Applethrottle is to slow down reaction-type games, making them much easier to play. This has accounted for at least one unbelievable score in *Snoggle*! No doubt you will come up with many more uses for the Applethrottle.

Because the Applethrottle slows down the overall operation of the computer, certain time-sensitive operations will not work properly with the throttle engaged. Specifically, cassette and disk I/O should not be performed when the Applethrottle is on. No harm will be done but an error message will (eventually) be printed. Other real-time software routines such as a serial printer driver (including the Apple High-Speed Serial Interface Card, for example) may not function at subnormal speeds. Thus you should return the computer to normal speed before any of these operations are performed.

Another problem can arise when the Applethrottle is set for very slow speed and you are typing at the keyboard. Since the keyboard input routine is slowed down along with everything else, it is very easy to type too fast, causing the computer to miss one or more keystrokes. To avoid this, you may wish to return to normal speed, enter from the keyboard, and then reactivate the Applethrottle before hitting return. Remember, the Applethrottle will always disengage whenever the reset key is pressed or if there are no paddles connected to it.

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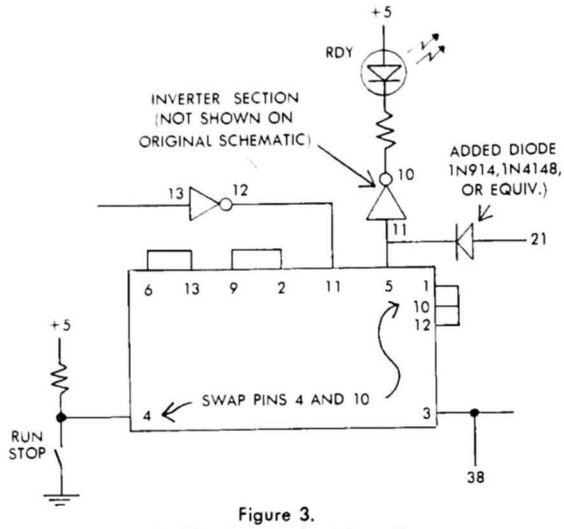


Figure 3.
Modificotions to the John Bell
Engineering disploy boord.

even deeper into the internal workings of the Apple can be accomplished with the display board from John Bell Engineering. This board contains sixteen LEDs to monitor the address bus and eight more for the data bus. These give a constant readout on what information is present on their respective buses. The board also has a three-position switch which can start, stop, or single-step the cpu. Under normal operation the LEDs flash on and off so rapidly that they appear to be on all the time. But when slowed down or stopped by the switch on the display board, they begin to reveal the true nature of how data is transferred on the buses.

Before going any further, we must point out that our evaluation board required two modifications to make it work. It seems that the original design of this board contained a couple of major flaws. Nevertheless, it turns out that both problems can be easily solved with a few simple wiring changes and the addition of one diode. The first correction involves the operation of the *run/stop* switch. Originally this switch was allowed to control the 6502 RDY line asynchronously, that is, without regard for the system clock phase as previously described. This, of course, had the disastrous effect that half the time the switch was operated the computer would hang up. Fortunately, by moving the switch signal to a different input of the same IC, we can make it act synchronously. The other problem was that the RDY output from the display board came directly from a TTL logic device. This does not comply with the Apple bus requirements that this signal be driven by an open collector or active low circuit. This means that any given peripheral board can pull the line low when needed, but should otherwise not interfere with the signal. The display board's TTL signal with its active high would prevent other boards from controlling the RDY line. Again the fix is simple—add a diode in series with the control line. These changes are shown in figure 3.

The manufacturer stated that the boards currently being sold have these corrections. For those of you that may have an older board (and probably couldn't figure out why it didn't work) we suggest you perform the following modifications. Besides the ability to solder, all you need is one small signal diode (1N914 variety), a sharp knife, and some small gauge wire such as is used for wire-wrapping.

1. Start by cutting two traces. The first is on the component side of the board and starts at the right side of R28, going downward toward and under IC6. Using an Exacto knife or similar tool, cut this trace cleanly so that there is no longer any connection. The other trace to be cut is on the back side of the board. It is the short one between pins 10 and 12 of IC6.

2. Using some small gauge wire, connect pins 4 and 12 of IC6. Then connect pin 10 to the right side (the left side when looking from the back) of R28 that was isolated in the previous step.

```
FD1B:  E6  4E     KEYIN   INC   RNDL
FD1D:  D0  02             BNE   KEYIN2   INCR RND NUMBER
FD1F:  E6  4F             INC   RNDH
FD21:  2C  00  C0 KEYIN2  BIT   KBD     KEY DOWN?
FD24:  10  F5             BPL   KEYIN   LOOP
```

Figure 4.
Source code for KEYIN routine in Apple's Monitor.
© Apple Computer Inc.

3. To add the diode, locate the trace that goes to pin 21 of the edge connector. Follow it up to where it meets a hole in the board, flip it over, and note that this trace continues to pin 5 of IC6. Somewhere between the hole and pin 5, cut the trace. Then connect the diode to the same two points; the cathode goes to pin 5, the anode to the hole. That's it!

Using the Display Board. As an example of how to use the display board, we will step through one of the shortest, yet by far the most frequently executed, routines in the Apple Monitor—the keyboard input routine. This routine is located at $FD1B and is labeled KEYIN in the Monitor listings. Whenever the computer is waiting for you to type something in on the keyboard, this routine is being executed over and over again. Aside from getting data from the keyboard, this routine also performs one other task. It is constantly incrementing a two-byte counter in RAM which can be used as a random number generator.

Figure 4 shows the assembly language code for this routine. To follow this routine as it is being executed by the 6502, turn off the Apple and plug in the display board. Set the switch to RUN and then turn on the computer. You do not need to boot DOS, so if your drive starts spinning, just hit *reset* to stop it. Now move the switch on the display board to STOP (or use the Applethrottle). The computer will have stopped somewhere in the KEYIN routine. Activate the single-step switch as many times as necessary until the address bus shows $FD1B. This is the beginning of the routine and the data bus should read $E6, which is the contents of that byte in the Monitor ROM.

As you continue to single step through the program, you should get results similar to what's shown in figure 5. After pressing the switch twelve times (or possibly fourteen), you should be back to address $FD1B. This sequence will continue to loop around unless you press a key on the keyboard. Note that the data in location $4E can be anything but that each time through the loop it goes up by one. Also note that if you stop with address $C000 on the bus, the data LEDs will be arbi-

Address	Dato
FD1B	E6
FD1C	4E
004E	Note 1
FD1D	D0
FD1E	02
FD1F	E6
FD21	2C
FD22	00
FD23	C0
C000	Note 2
FD24	10
FD25	F5
FD26	91
FD1B	E6
.	.
.	.
.	.
Repeats	

Figure 5
Sample results of single-stepping through KEYIN routine.

Note 1: The value in location 4E will be random but will increment by one each time through the loop.

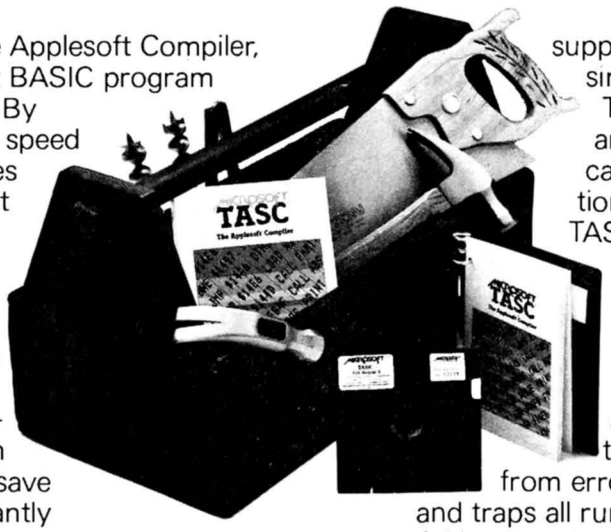
Note 2: The data at C000 (keyboard memory-mapped address) will depend upon the last key pressed on the keyboard.



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trary. If you now type on the keyboard, the ASCII representation of each key pressed will appear on the LEDs. The highest-order lamp, D7, will also be lit. This bit is used to flag the cpu that a key has been pressed.

If you take a close look at the results in figure 5, you should be able to follow the cpu as it performs its monotonous task. With each step, the 6502 puts out the contents of its program counter onto the address bus. This indicates where the cpu expects to find the next byte of its program. The data at this location is read into the cpu and, assuming it is the first byte of an instruction, is interpreted as the op-code for that instruction. In the case of location $FD1B, this data is $E6 which is the op-code for the INCrement zero page memory instruction.

The actual location to be incremented is found in the second byte of the instruction, which is fetched next. At $FD1C we read in a $4E, which is the desired location as shown in source listing (the $4E shows up in the object code listing in the third column; it is referred to in the source code by the label RNDL). The next address put out by the cpu will be $4E with one plus the old contents of this location appearing on the data bus. This new value is then written into location $4E and the cpu moves on to fetch the next instruction from $FD1D. Here it finds a $D0 followed by a $02, which stands for Branch if Not Equal (to zero) ahead two bytes. There is only a one in two hundred and fifty-six chance that this branch will *not* be taken. Therefore, our sample results show this branch as being taken.

But wait, you say! The next memory reference is to $FD1F. That is the beginning of the next instruction which the cpu has just decided to skip past. It turns out that there is a very good reason for this mysterious action which brings up one of the finer points about the 6502. What you are witnessing is called *pipelining* and it refers to the architecture of a cpu that allows it to sort of think ahead.

In the case of our branch instruction, the 6502 must check its internal flags to determine whether or not to perform the branch. While it is doing this, it is also possible to put out the next sequential address to start reading the next byte of code. Therefore, if the 6502 decides that the branch is not to be taken, it already has started to execute the next instruction—no wasted time here! If on the other hand, the branch is to be taken, then the 6502 must calculate the new address to place in the program counter. During this time, the next sequential byte is again being read. However, this time the byte is ignored since the next instruction must now be fetched from the new location.

Figures 6, 7, and 8 illustrate the possible branching actions on a cpu cycle-by-cycle basis. If you are interested in such detailed analysis of how the 6502 works, consult the 6500 hardware and software manuals such as put out by Synertek. They are highly technical but they reveal these subtle points about the 6502's operation. In case you think that this is all academic, there are many times when you may have to figure out exactly how many machine cycles a particular routine will take. Moving a program, even one that is completely relocatable, can have surprising results if relative branches now start crossing page boundaries for example. Even knowing that a branch instruction executes faster if the branch is not taken can be useful in writing speed intensive routines.

Cycle	Address Bus	Data Bus	External Operotian	Internal Operation
1	0100	OP CODE	Fetch OP CODE	Finish previaus operatian, increment pragram caunter ta 101
2	0101	Offset	Fetch affset	Interpret instructian, increment pragram caunter to 102
3	0102	Next OP CODE	Fetch next OP CODE	Check flags, increment pragrom caunter ta 0103

Figure 6.
Illustratian af relative oddressing bronch nat taken

Taken from Synertek's SY6500/MCS 6500 Micracamputer Pragramming Manual, August, 1976. Repraduced by permissian.

Cycle	Address Bus	Data Bus	External Operotian	Internol Operotion
1	0100	OP CODE	Fetch OP CODE	Finish previaus operatian, increment pragram counter ta 101
2	0101	+50	Fetch Offset	Interpret instruction, increment pragram counter ta 102
3	0102	Next OP CODE	Fetch next OP CODE	Check flogs, add relative ta PCL, increment program caunter to 103
4	0152	Next OP CODE	Fetch next OP CODE	Transfer results ta PCL, increment progrom counter ta 153

Figure 7.
Illustration of relative addressing bronch positive taken, na crossing af poge baundaries

Taken from Synertek's SY6500/MCS 6500 Microcomputer Programming Manual, August, 1976. Reproduced by permissian.

Teaming the Applethrottle and Display Board. The display board currently being sold still has some trouble in the single-stepping mode. One way to get around these problems is to use the Applethrottle to slowly step the cpu. This adds the convenience of variable speed and remote operation through the paddle controls. Unfortunately, even at its slowest setting, the Applethrottle allows the computer to execute many instructions per second. The LEDs on the display board still flicker too fast to watch. Adding a 22 MFD capacitor across C3 on the Applethrottle extends its range down to about one instruction per second. Note that this is roughly three hundred thousand times slower than normal. At this rate, the scrolling operation previously described would take nearly four hours to complete.

By combining the Applethrottle and the display board, there are many other secrets that can be discovered. For example, if you see something really interesting in a program that you have, it might be nice to examine the code that performs it. If the program is in machine language, you can use the Apple's built-in disassembler to view it. But how do you know where to look? You might have some clue as to what the code looks like (for example, if it involves the speaker, keyboard, screen, DOS, and so on, you could look for references to their corresponding addresses), but you would still have to run through the entire listing. This might take several passes and lots of time, and you still might not locate it. There is a better way however. Just plug in the Applethrottle and display board and run the program. When the routine of interest starts exe-

Cycle	Address Bus	Data Bus	External Operotions	Internal Operotions
1	0100	OP CODE	Fetch OP CODE	Finish previaus instructian
2	0101	−50	Fetch affset	Interpret instructian
3	0102	Next OP CODE	Fetch next OP CODE	Check flags add relative to PCL
4	01B2	Discarded Data	Fetch discarded data	Stare adder in PCL and subtract 1 fram PCH
5	00B2	Next OP CODE	Fetch next OP CODE	Put out new PCH and increment PC ta 00B3

Figure 8.
Illustratian af relative addressing—branch negative taken, crassing af page baundary

Taken from Synertek's SY6500/MCS 6500 Micracamputer Pragramming Manual, August, 1976. Repraduced by permissian.

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BACKGROUND

I have been with On-Line Systems for almost two years and have dealt with the entire process of graphics development and animation. I would like to share what I have learned with you.

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ng, just stop the computer or slow-step it. One glance at the ›lay board will tell you what address in memory is being cuted. This should be close enough for you to find the be- ning of the routine later with the disassembler.

The Apple II Display Board is available from John Bell En- ering for $49.95, assembled. As a kit, the cost is $42.95. The e board alone can be purchased for $25.95.

Apple II Extender Board. Another handy tool for working n Apple hardware is an extender board. This is simply a ull board that brings out, or extends, the peripheral con- tor inside the computer. This makes it possible to connect equipment to various parts of a peripheral board without rference from other boards in adjacent slots. It can also be d to raise up the display board for easier viewing.

Anyone who works on complex, modular electronic sys- s knows the value of an extender board. The Apple II is no eption. Of course, an extender board is only used when ex- menting with or repairing a peripheral card. The extender rd pictured sells for $12.95 and is available from John Bell gineering.

Mill Update. Last November we reported on the Pascal ed-Up Kit from Stellation Two. This product, in conjunction n the Mill 6809 processor board, offered significant speed rovement for Pascal programs. However, we found that of our benchmark test programs actually ran slower after alling the speed-up patches. This led to the discovery that mathematical functions were still being performed by the le's 6502 instead of the 6809.

Since that time, we have received an additional package ch is referred to as the Floating Point Update for the Speed- Kit. This transfers almost all of the computing power over ne 6809 leaving the 6502 to handle the input/output functions. v the full power of the coprocessor can be utilized. Unfor- ately, the two processors still alternate control—they do not rate simultaneously.

To test the speed improvement, we ran the same bench- k which calculated the squares of 10,000 numbers. The re- s from the previous test revealed that this program would e 47.8 seconds to complete with standard Apple Pascal. ling the speed-up kit increased the time to 54.0 seconds. er installing the floating point patches, however, this pro- m ran in 27.8 seconds. That's over 40 percent faster, which uite impressive!

As an interesting aside, we wrote a program in Applesoft to omplish the same task. In Applesoft this calculation takes ost forty-four seconds. While one of the Applesoft compilers ld be used to speed this up, they would not offer much im- vement to this program since it mostly involves mathe- ical calculations. All of the Applesoft compilers rely on the ne 6502 math routines in ROM that are used by the inter- er. Thus the compiled program performs number-crunch- at almost the same speed as the noncompiled program.

Installing the Floating Point Update is quite easy. All the essary changes are made by executing one program on the AL: diskette. Like the rest of the Speed-Up Kit, the im- ved capabilities are immediately available. There is no d to change any existing source or code files to make use of Speed-Up. Another sample program is also included on the t. This program makes extensive use of the floating point tines and shows a 51 percent improvement over the un- dified Pascal. Speed increases of up to 80 percent have been orted with this package. The Floating Point Upgrade sells $35.

Also just announced for the Mill is the OS-9 operating em with Basic-09. This should greatly enhance the power ne Mill while providing a superior operating system for the le II. Watch this column for a complete review of this em in the near future. ◼

n Bell Engineering, Box 338, Redwood City, CA 94064; (415) 367- . Stellation Two, Box 2342, Santa Barbara, CA 93120; (805) 966-1140. ertek, 3050 Coronado Drive, Santa Clara, CA 95051; (408) 988-5600. t Side Electronics Inc., Box 636, Chatsworth, CA 91311; (213) 884-

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Richard Bach:

On Power, Apples, and Freedom



by Melissa Milich

He swallowed, knowing that if his wings unfolded at that speed he'd be blown into a million tiny shreds of seagull. But the speed was power and the speed was joy and the speed was pure beauty.

Richard Bach, *Jonathan Livingston Seagull*

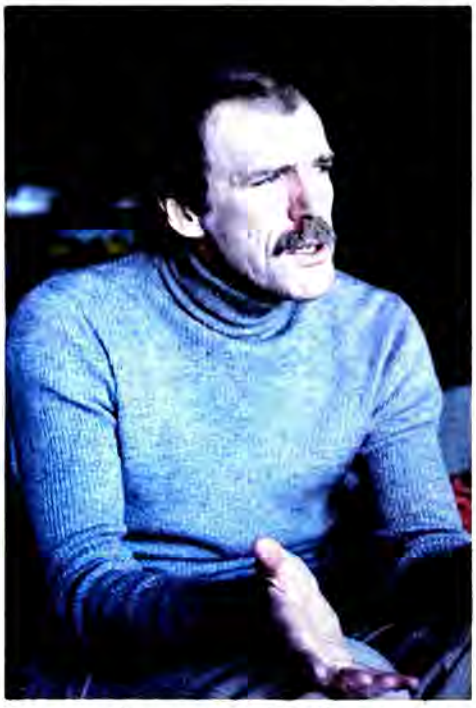
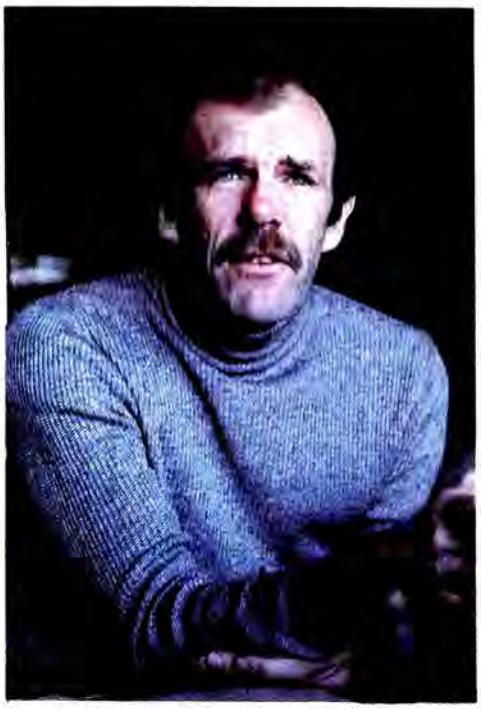
THE SEA chops and the water swells, and the gulls play there as they've always done, oblivious to fame and metaphor. Diving for a fish, swooping toward the sun, a shriek here at a crow there, up again, down again—splash!

In the holy land of publishing there was once a little book that wasn't supposed to make it at all, but instead it made quite a splash. Several major conglomerates, none too wisely, had already shaken their heads no and sent rejection slips to its author, a virtual unknown named Richard Bach. It was finally published in 1970, and then this strange book, whose main character was a talking bird, proceeded to break nearly all sales records in publishing history.

Jonathan Livingston Seagull delivers a simple and empowering message that people needed to hear. It is the story of an independent seagull who decides to go beyond the ordinary limits and normal abilities the feathered and beaked society has dictated, because Jonathan knows he can do it.

Apparently, people still want to believe in the rebellious seagull. Ten years later, a multitude of devoted fans seeking a hero, literary scholars seeking a symbol, and disillusioned mystics seeking an answer are still trying to catch up with Bach because of Jonathan and

with photographs by Maggie McGurk


because of several of the other books he's recently written.

The author now lives on a secret island somewhere in the Northern Hemisphere, a postcard type of place where the seagulls haven't yet become tourist attractions. Some of the local islanders say Jonathan actually lives there. Others say Bach is a magic man and that he is Jonathan. Still others are trying to find out who Bach is, what Bach is, and can Bach really do anything he wants to do?

"Richard isn't home," said his wife when she answered the telephone one day at their seaside home. "He's out flying."

Maybe this man can do everything. Was he out there right now flapping his arms with his feathered friends over the breakers? It was too embarrassing even to ask, but perhaps Bach would return the call if he ever came down.

Richard Bach is a man not easily bound into convention, a man who is ready to take off at a moment's notice, either on a wild idea or into the wild blue yonder. Flying, whether in an airplane or by way of a bird, is a metaphor for freedom and independence Bach frequently uses in his writing.

Grease and cantankerous engines are there too. *Nothing by Chance, A Gift of Wings,* and *Illusions: Adventures of a Reluctant Messiah* are all about airplanes some say. Bach is as ethereal and philosophical and metaphysical as any modern-day author can be, but he is also fascinated by machines, believing they can be a tool to help people attain power.

It was a combination of this practical and intuitive side that lured him into a computer store one day in 1979. It just happened to be a computer store where Apples were sold.

Stormy Seas. "NO! NO APPLE!!" protested his wife, Leslie Parrish-Bach. They were living in a small trailer at the time, already cramped wall-to-wall with books, plants, and a stereo system. "There has got to be a limit."

"But I knew," said an undaunted Bach, "that behind those beautiful blue eyes was a marvelous sense of organization. Where I liked the computer for its sort of gadgetry aspect, I knew she would like it for its enormous power of organization—of ordering the sea of information that was storming about us."

Five minutes in the store was all it took.

"Okay, Richard. You can have your computer." It was, Leslie recalled later, so "instantly obvious" what it could do.

So they shoved things in their trailer off to one side, and Leslie sat down in front of the brand new Apple for fourteen hours straight the first day. The second day was the same and so was the third day and the fourth. . . .

"And Richard never got to play with it," she said.

"That's right," he said.

Finally, after moping around for several days, Bach proposed to his wife:

"Gee, Leslie, do you think I could buy some computer time?"

Behind her intelligent blue eyes was also a strong sense of compassion, so the couple returned to the computer store, shoved more things aside in their trailer, and Bach was finally able to take off with his own Apple. Jonathan would have been proud.

Life in an Electronic Nutshell. Very swiftly the Bachs realized that their lives had changed dramatically with those computers.

"It feels like being a cyborg, doesn't it?" Richard says, liking the idea. "Suddenly you've got these technological appendages that help you know what you want to know and learn the things you want to learn."

But with all the wonderful rainbow of things came the terror only a computerist could appreciate.

"An I/O error." That's all he says and the happy lunch-time conversation goes dead.

"You talk to anybody on the street and you say you've got an I/O error and they say who cares? So what?"

How well the Bachs know I/O errors, and they have a beaut of a story that should go down in the I/O error hall of fame.

It happened on a deadline, of course, as they always do. The Bachs were intensely involved in a struggle with the Bureau of Land Management, which was trying to cut down a forest of trees in a wilderness area. The environmentalists were charging that the proposed project was illegal. The BLM said prove it. They had thirty days.

With the Bachs on their side, the environmentalists dug up every bit of forestry information out there: rules and regulations governing the protection of wildlands; scientific surveys documenting the trees in forests the BLM had previously sheared that had never regrown; as well as legal precedents in case they had to go to court.

The computers at this time proved an invaluable weapon for the cause. The Bachs were storing and organizing all their information and evidence on a database. They were able to contact a computerized information search service and get more facts and figures than they already had. Then they were able to compile all this into readable copy using the *Apple Writer* word processor.

But in the heat of the night, about a week before the federal government's imposed deadline, their faithful computer went *input kaput*! and the Bachs were faced with that all-too-famil-

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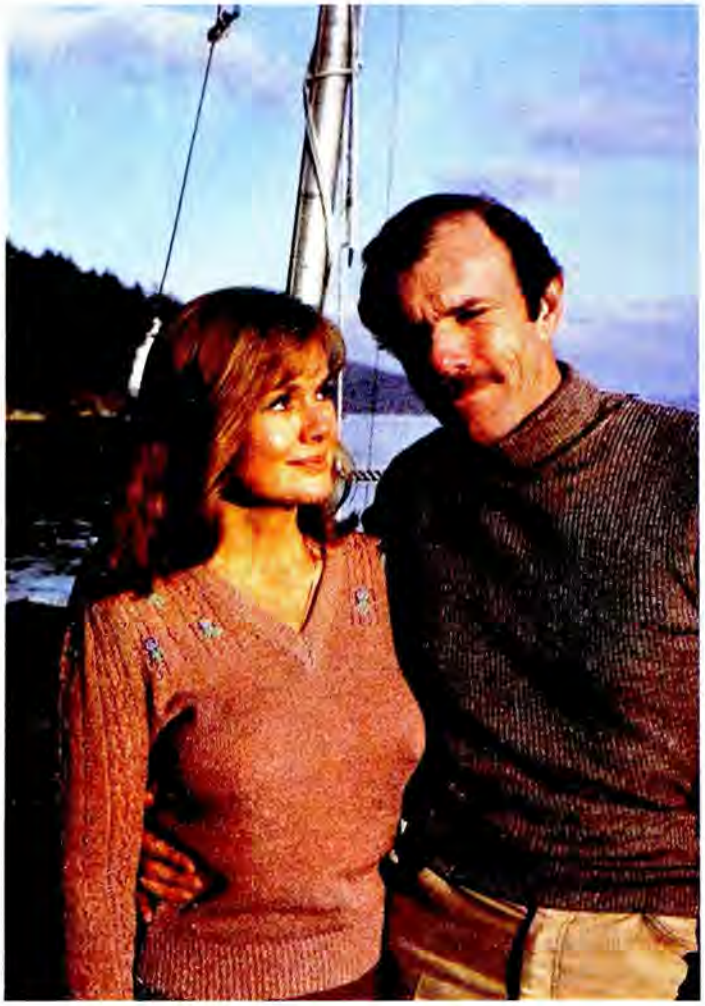
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iar nightmare: A blank screen.

Poems Are Made by Fools on Computers. Give up? Never!!! The Bachs probably cried a little, and then perhaps Richard took a walk and pondered the meaning of life. But they got back in their chairs, and then, side by side, for a week straight, twenty-two hours a day, going to bed at three a.m., waking up at five a.m., the Bachs redid what had been lost, met their deadline, and so far, a small group of people have



kept the Bureau of Land Management from chopping down the trees in that forest.

Still to this day there is some confusion about what happened to their computer that dark and stormy night, and they strongly doubt a BLM agent pulled the plug. Although they still have a way to go in this battle, the environmentalists are receiving some respectful attention from a few state officials who are finally beginning to understand their side—that the trees won't grow back.

"We want to try to communicate that to them and work it out in a reasonable way before we have to get involved in some major confrontation," said Leslie. "We have literally thousands of pages of legal documents showing the forests won't grow back for at least three hundred years. And we want to appeal to them first as reasonable human beings."

Without the computers, the environmentalists would have never been able to compile the documentation so quickly and organize it so well. Even now after moving far, far away from that forest, the Bachs can still keep in touch with their conservationist friends by modem.

And that is why this couple, who are so down-to-earth concerned with the land, are so taken with a hunk of plastic and electrical cords and metal chips. It is, they say, a way to bring information and power and other abilities that were once strictly the domain of large corporations and big money into the hands of individuals who can use them intelligently.

The electronic connection—this is something people dream about and intuitively seek, said Bach.

"I want to be connected to a network of people around the world who share my thoughts and ideas. I want to be able to, at any hour of the night or day, write some kind of communication or respond to some kind of idea that's come in on that special humming, silver web that stretches between us electronically."

The future hummed
and glowed with promise.
—J.L.S.

At that point in the book, Jonathan Seagull had really learned to fly: the loop, the slow roll, the inverted spin, the gull bunt, the pinwheel. Likewise, Apple computer showed people that we can tie their computers into a modem, "and sure enough," said Bach, "networks began springing up like spider webs in a haunted house.

"It's a delightfully haunted place this whole country is slowly becoming with these lines being cast one to another. That is an intensely magnetic element that is appealing to a great many of us."

The portion of the population without computers is networking now with telephones, said Bach. He cited *The Aquarian Conspiracy* by Marilyn Ferguson, a kind of bible for new age thinkers which highlights the networking taking place among those interested in social change. Microcomputerists are coming into contact through The Source, Micronet, the Sourdough Network in Alaska, and all the other bulletin boards and networks in this country.

"As all these bits of information come together, you see the power we the people have," noted Leslie. "The computer links us together."

Bach said he would like to live in a society where people are pursuing the things they most want to do, and he doesn't mean this as a vague, philosophical discourse. He is talking about computer programming, aircraft mechanics, writing books, starting a business; each person has a special dream buried somewhere, maybe since childhood, and probably it's about time for that dream to be realized.

"Are you doing right now what you really want to do more than anything else in the world? If your answer is no, stop doing it, and hurl yourself into what you most want to do."

But what about money, Mr. Jonathan Livingston Seagull Bach?

Somewhere, right now, tied to a dock, is a beautiful little boat waiting for a person who loves the sea. And even if you haven't a cent in the world, Bach said, you can still go to that dock and pick out the boat you most want to sail or own.

"So you say to whomever is around there, 'Do you mind if I just stand here and look at this beautiful ship?' And that person, if they have anything to do with boats, and they do because they've been brought there by that same kind of love, will see, without knowing it, themselves in you. 'Sure, go ahead and look,' they say.

"But you're back the next day and you say, 'Would it be all right, and I'm not asking any pay at all, if I could just polish some of this brass. I see a little oxidation, but it's such a beautiful little boat, and I won't charge you a thing. I just want to touch it.'

"And the owner of the boat, or whomever, thinks you're some kind of nut, and tells you to get lost.

"But you're back the next day, and you've brought your own rag, and you ask if you could just wipe the saltwater off a rail. And after demonstrating an attitude, a love for this boat which is something in common, you've created a bridge and then they'll say: 'If you're going to hang around here, here's a chamois, and all right, do all the teak, and I'll buy you lunch.'

"And you get to know this person a little bit, and you're back the next day and you have hurled yourself into the area of your love—the area that then comes towards you. The boat



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reaches out to take you, till the time comes when they say, 'Well, we're shipping out to Papeete,' so you offer to help in any way you can, and then you find yourself in the middle of the South Pacific, surrounded by the ocean you love. But you have to take that difficult first step.

"The most difficult thing we'll ever have to do is find that love," said Bach. "But find it, and the rest will be difficult and very happy. Find what you want to do more than anything, and all you have to do is hurl yourself towards it."

All of us know this but have learned to ignore our yearnings, according to Bach. Very few children in the school system say they want to grow up and lead a meaningless life. A child's future is usually brimming with all kinds of exciting plans. But it is impressed upon them, against their intuition, that all-too familiar warning: "You can't always do what you want to do."

"It's a lie," said Bach. "You can always do what you want to do, but you hear just the opposite over and over and over and over until you are hypnotized. Isn't that what hypnotism is?

"We can get de-hypnotized. Just ask yourself that utterly simple question: What do I want to be doing? and stop ignoring the answer."

Everything and nothing will then get in the way. In Bach's early days of aviation, when he wanted to be flying his own airplane more than anything else, his problem was money. So he had the bill collectors repossess his car instead of his biplane. Bach's case was unusual though; it is usually fear and not finances that is the major roadblock on the way to a dream.

"If you're frightened of the unknown, there is something so deliciously satisfying in what is familiar. Even though it's boredom, even though it's as dull as slate, a good number of people would rather be able to count on that than take a chance on something different."

Bach told the story of a woman he once met who complained bitterly about her life in the Bronx—how she couldn't stand the muggings, the murders, and the fear of going out at night. So he suggested she move, someplace like rural Wyoming, where she would have the wind and the sky instead of the smog and the dark, dangerous alleys.

The woman pondered this at length, and then finally answered something to the effect that: "I'm more afraid of what I don't know than I hate what I do know."

"It's that fear of the unknown—and that woman put her fin-

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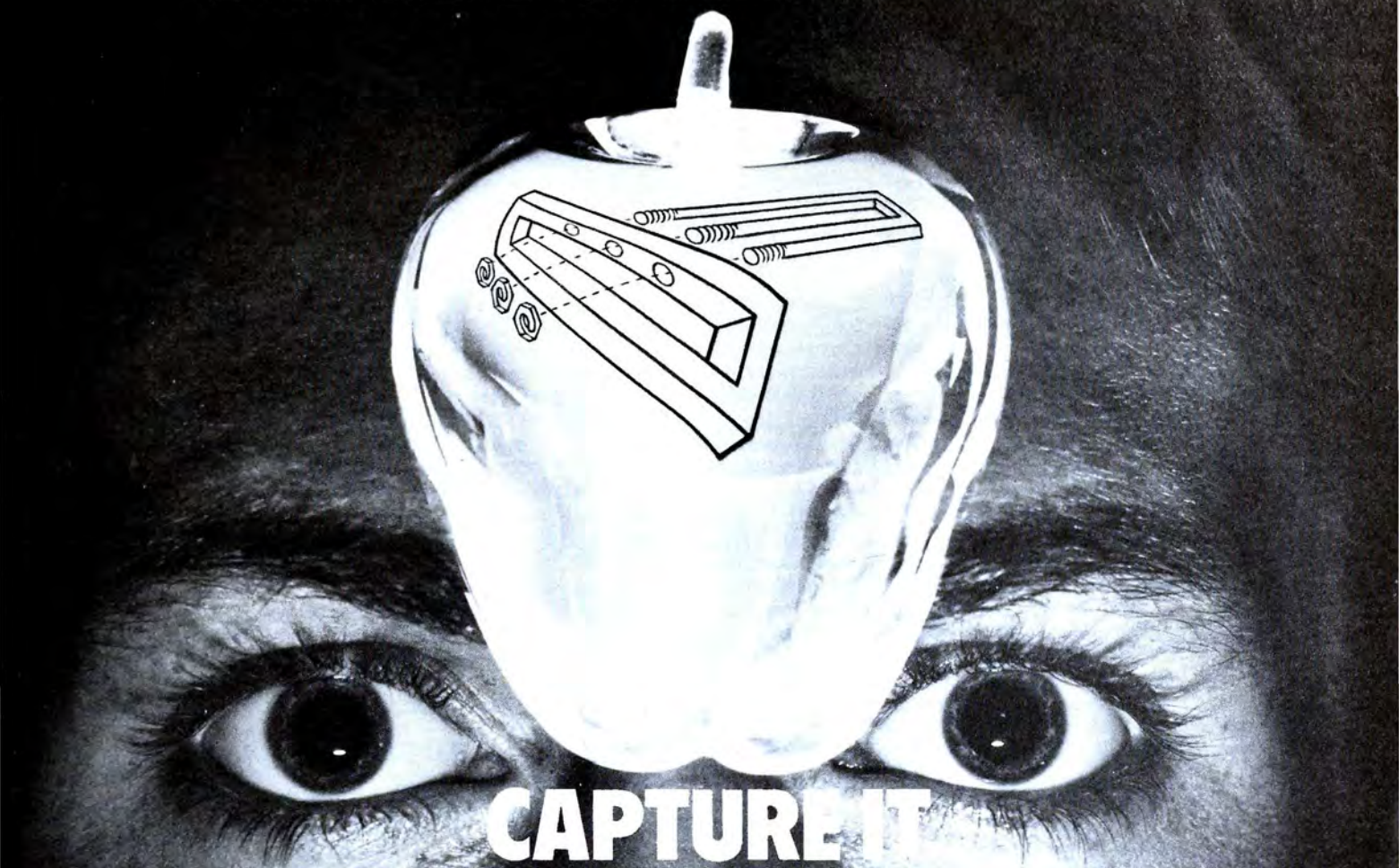
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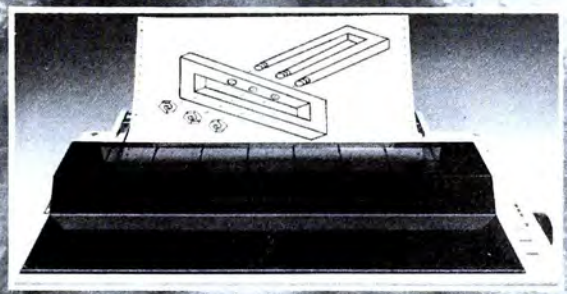
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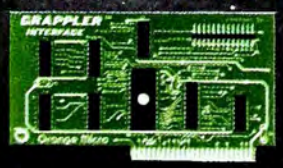


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Mind Your Business

BY PETER OLIVIERI



Aren't you glad June is here? Of course, those of us who have suffered through a long, cold winter are probably somewhat biased in favor of the summer season.

If you've been around awhile, you may recognize the significance the month of June holds for me. It marks my first anniversary with *Softalk*—yes, I've been Minding Your Business for a year now. No cards or letters, please. Just keep reading.

The Marathon. If you attended the West Coast Computer Faire in San Francisco in March, or have attended a similar event during your tenure as an Apple owner, you were probably struck (and perhaps a bit overwhelmed) by the number and variety of products available to you. It can be very difficult to sort out all the different options, packages, and attachments that can fit your Apple, especially after having wandered through an exhibit hall that's overflowing with possibilities. New users—people who are contemplating a small business system or a home computer set-up—may find themselves in a particularly difficult position as they attempt to sort out all the options and keep track of all the products available to them. If these folks were computers, surely they would suffer from a system-overload error message at a show such as this one.

It is wonderful indeed that so much is available to present and prospective Apple owners, but it also means that new microcomputer enthusiasts face an avalanche of information that they may not have the skill/experience to digest, evaluate, and interpret. One function of this column in the months to come will be as a vehicle for organizing and explaining some of this material.

Business User Group. Happily, many of you have sent notes expressing your interest in our Business User Group (. . . do you realize that the acronym for this group is BUG. . .? oh well). Judging from the letters received so far, we are on our way to establishing an information exchange that should prove very worthwhile.

Gary Griffis of Concord, Massachusetts writes in about some freelance consulting he's been doing with small businesses and savings banks. He'd had several years' experience with DEC, so it was not surprising that he was excited about acquiring his Apple last October. Since then, he has successfully installed six other Apples in client locations, and has been involved in such applications as planning, word processing, mailing lists, and a variety of banking applications, including safe deposit accounting, loan tracking, and so on. In addition, he expects to be involved in networking Apples fairly soon.

Griffis has shared this information as a means of letting the group know about some of his interests and some of his frustrations. His biggest problem concerns evaluating software prior to specifying it to a particular client. In trying to select a word processor, for example, he found it difficult to get good information. He purchased the *Executive Secretary,* but now feels that this was a mistake. On the other hand, he is quite pleased with *SuperText* and recommends it highly. Griffis also makes the point that the decision about the product mix of word processor, eighty-column card, database management system, printer, and DIF program interface is not an easy one. He also mentions the difficulty a user can experience when a package does all that its advertising claims but, because of numerous disk accesses, takes too long to do it.

Griffis offers some miscellaneous personal observations as well. The Apple Serial Interface card does not work well with the NEC Spinwriter. The Prometheus CPS card is not helpful if you are going to be doing graphics on a Spinwriter. The M & R Fan is a less optimal choice. A better one is the R. H. Super Fan II. In addition, Griffis recommends the following packages and products: Sensible Software's *Apple Speller,* the Videx Enhancer II, Saturn Systems VC-Expand and RAM boards (essential if you're doing *VisiCalc* spreadsheets), the Keyboard Company's Numeric Key Pad, and an Epson MX-100 dot matrix printer.

Another reader, Byron Kirkwood from Dallas, Texas, writes about *DB Master.* There's a lot that Kirkwood likes about the program, but he also wants to share with other user group members some observations about its use. He finds the requirement to use two or three disks for storage and information about a particular file—no matter how small it is—a bit cumbersome and feels that the backup procedure could be improved. He also feels that the documentation is not the best.

Kirkwood has had some experience with High Technology's *Information Master.* He found it to be a pretty decent database package but did not choose to pay the additional $35 to upgrade his version to a newer one. In this case as well, Kirkwood feels that the documentation is not at all well done.

The kinds of comments represented by the above paragraphs can serve us all well. We need to share with one another. Of course, these remarks represent the opinions of single users. Some vendors may find this annoying, but it can be

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very valuable to share with one another our good and bad experiences. Each of us is sophisticated enough to take what is said with the proverbial grain of salt. What is good for one person may be bad for another. We are all responsible for our own decisions. With this in mind, we will print opposing views from other group members or even from the vendors themselves, so join in.

User Profiles. Question: What do blackjack, nonverbal communication, football, and the state of Missouri have in common? Answer: Ken Cooper.

Cooper and his company (Ken Cooper Communications) are located in Ellisville, Missouri. Cooper's system consists of a 64K Apple II, two disk drives, an Epson MX-80FT, the SUP 'r' TERM eighty-column board, and a BMC CRT. He uses the CCA Data Management System for keeping track of promotional appearances for his business, maintaining customer name and address files, and (as a hobby) keeping a file of real/stage names of famous personalities.

Since Cooper does quite a lot of writing (more on this later), he has *Superscribe II.* He uses it to write articles, prepare book manuscripts, and send out newsletters to his clients. Since he has some programming knowledge, he has developed some applications in Basic and in Pascal. He also uses *VisiCalc.* What for? Well, Cooper is the author of *The World's Greatest Blackjack Book* (Doubleday) and *Pro Football Apples,* which handicaps pro football games using the Apple. Both of Cooper's books contain information generated on his Apple. He is also the author of *The World's Greatest Blackjack Program,* which runs on the Apple. Oh, yes, Cooper has also written and lectured on the role of nonverbal communication in business.

Robert Eckwall, a small businessman and Apple user, also operates his own company—Robert Eckwall Associates. His group consists of management consultants who specialize in designing and producing business proposals for companies that hope to acquire government contracts. Most of the assignments take place at a customer facility and in the past required logistical effort that included packing and shipping several boxes of reference material to and from the job. In addition, there was a significant typing requirement that often involved the hiring of expensive temporary help.

With the introduction of the Apple, the logistical effort has been reduced to simply selecting the appropriate disks and packing the computer in its carrying case. The clerical costs have decreased by more than 75 percent. Eckwall uses commercially available software for all his company's applications, and is quite satisfied with *Microtelegram, Magic Window, APM,* and *VisiCalc.*

New Crop of Products. Marathon Microsystems, Inc. (Evanston, IL); has gathered, tested, and now offers a large variety of farm software, including accounting packages for farmers who are doing single or double entry bookkeeping. These systems write checks, maintain multiple bank balances, and direct the farmer to the appropriate IRS schedule at tax time.

Two of the packages they offer, *Ag-Finance* and *Farmplan,* are designed specifically for use in managing a farm. *Ag-Finance* (Countryside Data) requires 64K, while *Farmplan* (Farmplan Computer Systems) requires 48K. Both programs call for two disk drives. Included are systems for herd management, nutrition planning, and managing feed-lot operations, to name a few. If your recent harvest included an Apple, or soon will, consider requesting more information from MMI. They're a good source of information about available software. Since they act as agent for a variety of vendors, they are in the position to recommend the right system for the prospective user.

Product Review. Dakin5 Corporation (developers of *The Controller* and *The Analyzer*) now have another product designed for the small business. *The Depreciation Planner* is a complete asset management system that keeps track of depreciable assets for income tax purposes. It calculates depreciation automatically for each asset and this creates models to determine the effects that different depreciation methods will have on a particular asset. While the program is certainly likely to interest users of *The Controller* (it can automatically post to *The Controller*), it can be used as a standalone program as well.

This new package is quite complete. It consists of program disks, data disks, and backup copies (eight disks in all); plenty of specially designed disk labels, a practice workbook that takes the user through a sample application, and a thorough user guide.

The package includes the following programs:

1. *The Asset Manager*—allows you to add, change, and retire assets.
2. *Depreciation Modeling*—allows you to experiment with different methods of doing depreciation.
3. *The Asset Register*—provides you with a printed list of all assets and their depreciation status, presented in a variety of formats.
4. *The Retirement Master*—lists all assets that have been retired in the current month and current year. (A distribution journal that shows what accounts are affected by the retirement of the asset is also printed.)
5. *The Depreciation Register*—prints a list of depreciable assets and a distribution journal.
6. *The Investment Tax Credit* module—prints a list of all items that are potentially eligible for an investment tax credit.
7. A close-month routine—allows users of *The Controller* to post any appropriate transactions to their master files. It also provides for a formal "month closing" within the Depreciation Planner packages.
8. *Startup*—a program that takes the new user through the process of starting up *The Depreciation Planner* for the first time.
9. A customizing features module—allows you to tailor the package to the requirements of your own particular business.
10. *Utilities*—provides you with the means of making backup disks.

It's possible to have up to 750 assets retained at any one time and to save up to ten depreciation models on each data

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This portfolio management program allows you to enter, by hand or modem, Friday's closing prices, Standard and Poor, Beta ratings, Value line timeliness and safety factors. Use standard formula or make up your own to project buys, sells and holds.

Asset Manager
Both old and new tax laws are incorporated in this program which uses the straight line method for balance sheets and accelerated method for establishing asset values for amortization and prints tax schedules. 1,000 assets per taxpayer.

The Data Factory
An extremely easy-to-use system with enormous power and flexibility. Data storage on two disks is 225,000 bytes. Relocate records into a new data base; add, delete, or change field lengths anytime.

V Factory
Allows for a marriage between Data Factory and VisiCalc™ files. You can move data in either direction, manipulate it within the chosen program, and store it either way. An exciting tool for research and analysis.

Relocatable Linking Loader
Takes machine language routines that have been designated by an assembler as relocatable, links them together, and then establishes the program at an address the user specifies. Can be used with Language Plus.

The Invoice Factory
Not just an invoice maker. It generates statements, aged receivable reports, product or customer reports, sales analyses. Use a new free form, automatic or standard invoice form.

Tax Manager
For producing federal income taxes and printing the schedules. This easy-to-use program includes the latest tax laws and will remain current with our Extended Warranty option.

Payroll-Manager
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The Learning System
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Language Plus
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disk. The dollar amount used can be up to ten digits in length, with two of these digits being the decimal portion of the number.

The user guide is printed on quality stock using a typeface that is easy on the eyes, and is clearly indexed and organized. Each chapter begins with a highlighted inset that indicates what program should be used. The reader will find actual screen illustrations—enlarged so they can be easily understood—in each chapter. The appendices begin with a section on setting up the hardware you may have connected to your system, along with summaries on data entry, editing, troubleshooting, and interpreting error messages. A list of the calculations that are used to do the depreciation calculations is included, along with a glossary of terms.

In sum, *The Depreciation Planner* is well documented, easy to use, and quite thorough in its coverage of the depreciation process. Even if you don't have *The Controller*, you may want to take a look at this asset manager.

Resource Corner. We recently came across a couple of references that some of you may find useful. They are *Your Small Business Computer* by Donald Shaw (Van Nostrand Reinhold Company) and *A Layman's Guide to Installing a Small Business Computer* by Jack Bender (Petrocelli Books). Both books are easy to read and provide useful checklists to use in evaluating your requirements for a small business computer. There are not yet a lot of books in this area, so it's difficult to rate these two in terms of their competition, but as more candidates enter the field we'll be arriving at a list of the best books and references available on particular topics.

Updates. Remember Olivieri's Inquisition? Well, what seems like two million (probably closer to three or four thousand) replies have come in so far. Analysis is underway and the results will be shared with all of you eventually via this column. If you haven't sent yours in, why not take a minute to do just that. Your opinions are important.

While we're on the subject of opinions, a note came in from Michael Decker of Chicago who justifiably objected to a sweeping statement in a previous column about *Softalk* being the only definitive Apple resource. He is, of course, quite correct—my enthusiasm got the best of me. As Decker points out, *Nibble* and *Apple Orchard* are also excellent resources for the Apple owner, as is *Call-A.P.P.L.E.* These publications often provide program listings, utilities, and technical information; all deserve the Apple owner's attention.

It's important for you to get as wide an exposure to other people's opinions as possible, so take a look also at one of the Open Discussion letters in the April *Softalk* (page 10). It gives a reader response to a Mind Your Business evaluation of Spectrum Software's products.

Coming Up. In future columns you'll be seeing a profile and review of the Apple III, a review of word processing packages, a review of mailing list packages, and a review of graphics packages. Each of these reviews is in various stages of development already. In the case of the reviews of word processing packages, mailing list packages, and graphics packages, we're waiting to share the information until we can give you comprehensive reviews of a number of packages. This is preferable to reviewing, say, one word processing package one month and two others several months later, since it gives you a better basis for comparison.

Thanks again for reading along. Here's hoping you were lying somewhere at the seashore, soaking up sun's rays and listening to the surf crash against the sand. Until next time, take care. ◨

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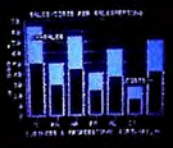
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THE SECOND ACE—A40

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THE THIRD ACE—A70

The A70 is the price/capacity alternative. At over a quarter million bytes per drive, the A70 has the capacity of two Disk IIs or an eight-inch floppy, but costs only slightly more than a single Disk II. One A70 supports a DOS file as large as 270K, a CP/M file up to 254K, and 560 blocks in Pascal.

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THE BASIC Solution

By Wm. V. R. Smith

Back in the early days, before the disk drive, Apple II programmers and enthusiasts had to *save* and *load* their programs from cassette tape. The average library consisted of fifty to one hundred cassettes with information recorded on both sides or, in the case of a low-budget library, a small number of ninety-minute cassettes with dozens of programs recorded on each side.

No matter which type of cassette system (the low-budget method or the multiple-cassette method) was being used, it was still up to the user to write down program names, cassette designations, and locations on the cassettes where programs were to be found.

The availability of the floppy disk drive proved to be a godsend to those with cassette libraries. Not only was this new storage medium faster, it also maintained an up-to-date directory (or catalog) of the files the disk contained. It was now easy to print the catalog of each disk to paper and then attach the paper to the disk. Within a short time the multiple cassette library was transformed into a multiple disk library.

The disk operating system (DOS) was amazing. It would *load, save,* and maintain program and data information with uncanny accuracy and speed. The operator could view the catalog at any time with a few simple keystrokes. But it wasn't very long after cassette users became familiar with the Apple disk system that a serious handicap was discovered. Unfortunately, there wasn't a simple method for a Basic program to access the disk's file names in the directory. Unless you had intimate knowledge of how the disk worked, it was near to impossible to view a disk catalog for the occurrence of a certain file (data or program).

Subsequently, several utilities were created that partially dealt with this problem. The majority of these routines would issue a *catalog* command, extract the file names from the video screen, and convert the names to Basic string variables. In fact, one of the first programs supplied in Basic Solution contained a routine of this sort. However, this way of proceeding had proved to have an immediate flaw: If the disk catalog was larger than one page, the first file names in the list would be scrolled off the top of the screen and therefore lost to view.

The real solution to the problem requires leaving the domain of Basic and handling a little bit of machine language, thus extracting disk file name information to be used by a Basic program. To begin this task, you must first understand how information is stored on the Apple disk and learn the locations of the handy routines in the disk operating system that will help you extract the catalog information.

To understand how information is stored on the disk, let's look at a disk for a moment. A disk is basically a round, flat, plastic circle coated with magnetic material (very much like cassette tape, but resembling somewhat a phonograph record). Information must be organized on this disk in a physical manner.

It was decided to store the information in tracks surrounding the disk center, very much like the grooves of a record. But, unlike the grooves of a record, which start on the outside and slowly spiral inward, each disk track starts a certain distance from the center, travels around the disk, and meets itself at the exact place that it started. This concentric track, or ring, could be treated like a strip of magnetic tape where data could be saved and loaded as the disk spun under the recording head. A disk can have a number of rings depending upon the size of the recording head and various other magnetic properties. The DOS programmers selected thirty-five rings spaced at an appropriate distance to prevent crosstalk or interference from other rings.

It turns out that, at the speed the disk is traveling, almost 4K of information can be stored on each ring. This is a lot of data to be handled at one time by a program attempting to read or write information. Apple decided to break each one of these rings into smaller sections called *sectors.* Those of you who've been with the Apple a while, may remember the thirteen-sector DOS. The current disk operating system contains sixteen sectors on each one of these tracks and each sector contains 256 pieces or *bytes* of information. Each sector is now

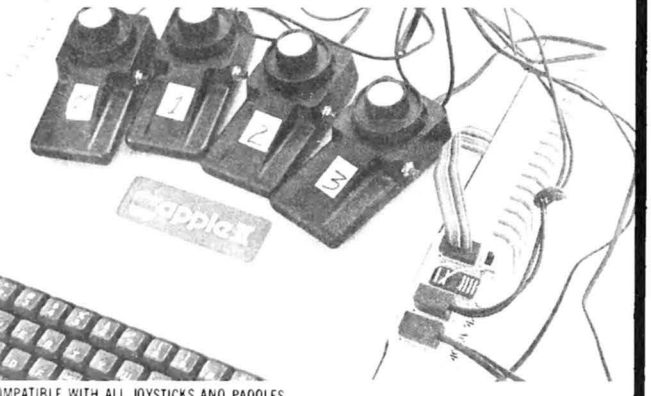


```
0300:                   10  *
0300:            0006   11  CTRK     EQU   $06
0300:            0007   12  CSCT     EQU   $07
0300:            0008   13  UDRIV    EQU   $08
0300:            0009   14  USLOT    EQU   $09
0300:            2000   15  BP       EQU   $2000  ;BUFFER
0300:            000C   16  UERR     EQU   $0C
0300:            00E3   17  UCMD     EQU   $E3
0300:                   18  * MUST BE SET TO COMMAND
0300:                   19  *
0300:            03D9   20  RWTS     EQU   $3D9
0300:                   21  *
0300:                   22  * BELOW ARE LOCS IN IOB
0300:            B7E9   23  SLOT     EQU   $B7E9
0300:            B7EA   24  DRIV     EQU   $B7EA
0300:            B7EB   25  VOL      EQU   $B7EB
0300:            B7EC   26  TRACK    EQU   $B7EC
0300:            B7ED   27  SECTOR   EQU   $B7ED
0300:            B7F0   28  BUFR     EQU   $B7F0
0300:            B7F4   29  CMD      EQU   $B7F4
0300:            B7F5   30  ERR      EQU   $B7F5
0300:            B7F7   31  OSLOT    EQU   $B7F7
0300:            B7F8   32  ODRIV    EQU   $B7F8
0300:                   33  *
0300:            0001   34  READ     EQU   $01
0300:            0002   35  WRITE    EQU   $02
0300:                   36  *
0300:                   37  *
0300:                   38  *
0300:                   39  ********************************
0300:                   40  *     ENTRY CONDITIONS: SET    *
0300:                   41  *     TRACK, SECTOR, SLOT DR,  *
0300:                   42  *     BUFFER AND COMMAND       *
0300:                   43  ********************************
0300:                   44  *
0300:                   45  *
0300:                   46  *
0300:A9 00              47  CLEAR    LDA   #$00
0302:8D EB B7           48           STA   VOL
0305:                   49  *
0305:A5 09              50           LDA   USLOT
0307:8D E9 B7           51           STA   SLOT
030A:                   52  *
030A:A5 08              53           LDA   UDRIV
030C:8D EA B7           54           STA   DRIV
030F:                   55  *
030F:A5 06              56           LDA   CTRK
0311:8D EC B7           57           STA   TRACK
0314:A5 07              58           LDA   CSCT
0316:8D ED B7           59           STA   SECTOR
0319:                   60  *
0319:A9 01              61           LDA   #READ
031B:8D F4 B7           62           STA   CMD
031E:                   63  *
031E:A9 00              64           LDA   #$00
0320:8D F0 B7           65           STA   BUFR
0323:A9 20              66           LDA   #$20
0325:8D F1 B7           67           STA   BUFR+1
0328:                   68  *
0328:A9 B7              69           LDA   #$B7
032A:A0 E8              70           LDY   #$E8
032C:20 D9 03           71           JSR   RWTS
032F:90 05      0336    72           BCC   EXIT
0331:                   73  *
0331:AD F5 B7           74  ERRHAND  LDA   ERR
0334:85 0C              75           STA   UERR
0336:                   76  *
0336:60                 77  EXIT     RTS
0337:                   78  *
```

Program 1.

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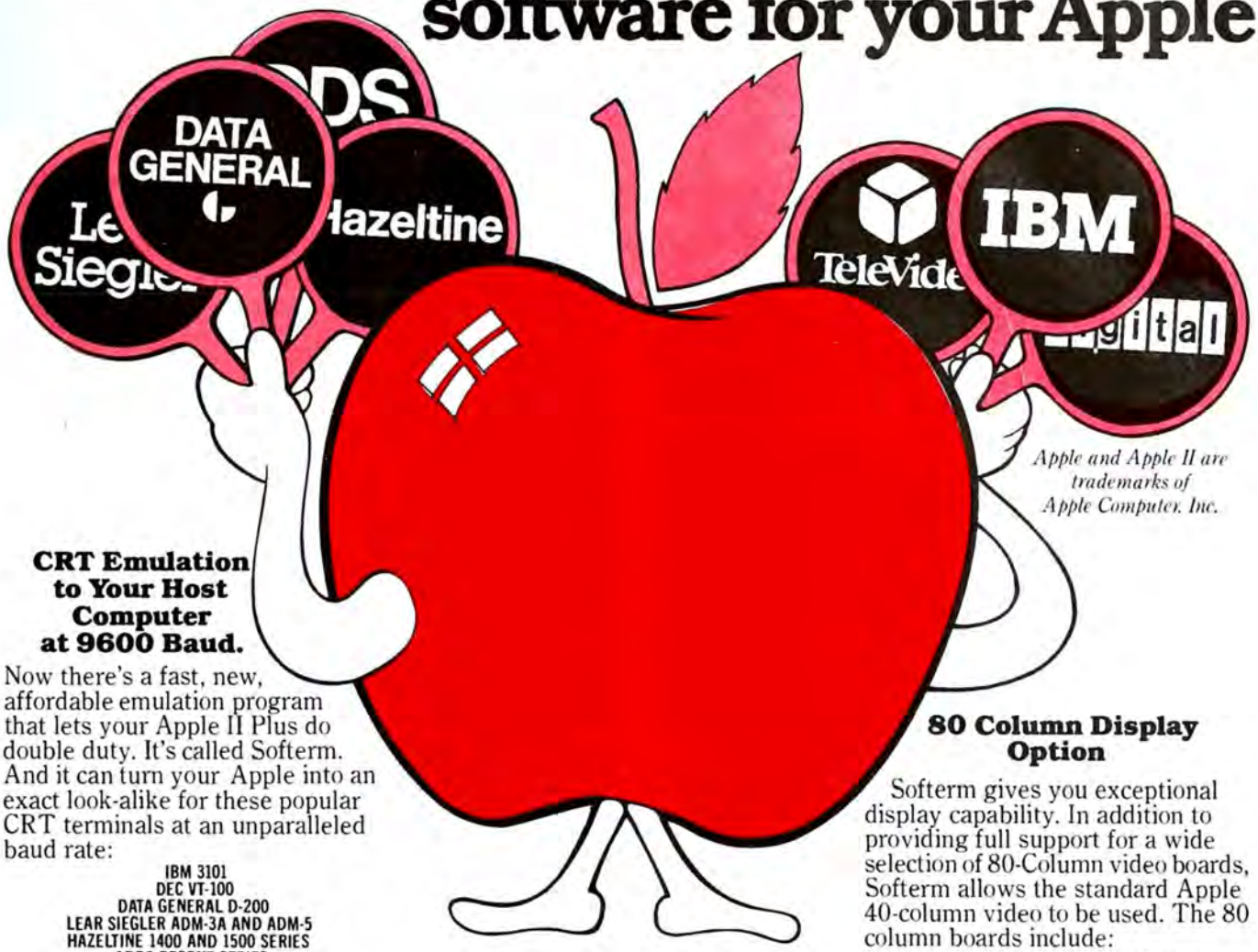
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```
1   REM * ************************
2   REM *                        *
3   REM *CATALOG FILE MAKER       *
4   REM *                        *
5   REM *       (C) ARTSCI INC.  *
6   REM *                        *
7   REM *                        *
8   REM * ************************
10   DIM A$(100):D$ = CHR$ (4)
11   FOR DP = 768 TO 822
12   READ D: POKE DP,D: NEXT DP
13   DATA 169,0,141,235,183,165,9,141,233,183
14   DATA 165,8,141,234,183,165,6,141,236,183
15   DATA 165,7,141,237,183,169,1,141,244,183
16   DATA 169,0,141,240,183,169,32,141,241,183
17   DATA 169,183,160,232,32,217,3,144,5,173
18   DATA 245,183,133,12,96
19   REM ** POKE IN RWTS DEFAULTS
20   FOR X = 6 TO 9
30   READ Y: POKE X,Y
40   NEXT X
45   DATA 17,15,1,96
50   CALL 768
100   S = 8203
110   IF PEEK (S) = 0 THEN 400
115   IF PEEK (S) = 255 THEN 150
120   S = S + 3
125   A$ = ""
130   FOR X = S TO S + 30:A$ = A$ +
        CHR$ ( PEEK (X)): NEXT X
140   N = N + 1:A$(N) = A$
150   S = S + 32
160   IF S < 8192 + 255 THEN 110
170   POKE 6, PEEK (8193)
180   POKE 7, PEEK (8194)
190   GOTO 50
195   REM * ********************
196   REM *    END OF MAIN     *
197   REM * ********************
400   PRINT : PRINT D$;"OPEN CATALOG"
410   PRINT D$;"WRITE CATALOG"
420   FOR X = 1 TO N: PRINT A$(X): NEXT X
430   PRINT D$;"CLOSE"
440   END
```

Program 2.

Finally. High-speed CRT look-alike software for your Apple



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CRT Emulation to Your Host Computer at 9600 Baud.

Now there's a fast, new, affordable emulation program that lets your Apple II Plus do double duty. It's called Softerm. And it can turn your Apple into an exact look-alike for these popular CRT terminals at an unparalleled baud rate:

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DEC VT-100
DATA GENERAL D-200
LEAR SIEGLER ADM-3A AND ADM-5
HAZELTINE 1400 AND 1500 SERIES
ADDS REGENT SERIES
TELEVIDEO 900 SERIES

Softerm gives you the security and convenience of a personal computer *plus* the benefits of an on-line terminal. You can even transfer files simply, quickly, and safely. With Softerm you can access your mainframe, talk to your timesharing service, or communicate with another Apple computer.

Simple to use

Softerm operates on any Apple II Plus with 48K memory and Apple II disk drive. For a connection to another computer directly or through a communications modem, you'll need an asynchronous serial interface board. Here are the boards Softerm supports:

APPLE COMMUNICATIONS CARD
APPLE HIGH SPEED SERIAL INTERFACE
CALIFORNIA COMPUTER SYSTEMS 7710
MOUNTAIN COMPUTER CPS MULTIFUNCTION CARD
SSM MICROCOMPUTER PRODUCTS S10, A10, A10 II™
HAYES MICROCOMPUTER PRODUCTS—
MICROMODEM II™, SMARTMODEM™
NOVATION APPLE-CAT™
BIT 3 COMPUTER DUAL—COMM PLUS™

Flexible file transfer

Softerm makes it simple to transfer text, program, and binary files from one computer to another. You'll enjoy a variety of modes to satisfy your host computer's requirements, including character, block, and the intelligent Softrans™ mode which guarantees error-free transmission and reception.

Other mode selections offered include manual or unattended operation, auto-dial and auto-answer, adjustable character and block delays, character echo wait, handshake sequencing, unattended multiple file transmit queueing, receive to print, and many others.

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M & R ENTERPRISES SUP-R-TERM™
BIT 3 COMPUTER FULL VIEW 80™
VISTA COMPUTER VISION 80™
WESPER MICRO SYSTEMS WIZARD 80™
COMPUTER STOP OMNIVISION™

Most advanced emulator available.

Softerm is written entirely in 6502 assembly language. You simply can't buy a more sophisticated package or one that's easier to use. Softerm is the most advanced intelligent communications software on the market.

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Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

☐ **Bite-soft,** the software mail-order house, has changed its name to **Bright-side.** The company's new mailing address is Box 7460, Burbank, CA 91510; telephone, 213-841-8411. Users in the area are encouraged to come by 3308 West Burbank Boulevard, Burbank, with any questions about software or the Apple.

☐ The *AMS Megabyte Hard Disk System* from **Sorrento Valley Associates** (11722 Sorrento Valley Road, San Diego, CA 92121; 714-452-0101) will add up to twenty megabytes of flexible on-line data storage. Operates with standard DOS, Pascal, and CP/M based systems; compatible with Disk II and SVA 8-inch floppy drives. Plugs into any slot except 0, eliminating the need for extra software. $33.39.

☐ **Applied Software Technology** (15985 Greenwood Road, Monte Sereno, CA 95030; 408-370-2662) introduces an OEM Pascal Interface for the *VersaForm* business form processor, opening the system to custom use. Applications include customized local networks, generic business form processing, and POS bar-wand cash register interface. $245.

☐ Display your own messages with the *Billboard* from **Pacific Micro Systems** (794 Colleen Drive, San Jose, CA 95123; 408-225-1285). Features two display modes (scrolling and left to right), one-inch-high letters, and special characters. $34.95.

☐ The *Excel-9* card from **Norell Data Systems** (3400 Wilshire Boulevard, Box 70127, Los Angeles, CA 90010; 213-257-2026) is DOS compatible; 8K Monitor in ROM with thirty-five commands, programmable interval timer. Comes with the *FLEX* disk operating system, making a variety of disk access and file management routines available to the user's terminal. $450.

☐ *GPS* (Graphics Processing System) from **Stoneware** (50 Belvedere Street, San Rafael, CA; 415-454-6500) creates, manipulates, and edits graphics like a word processor does text. A scaling grid, 2-D rotation, six primary colors that can be mixed, two zoom features, and unlimited duplication of images are part of the package. Professional version, compatible with Apple Graphics Tablet, $99.95; standard version (joystick or paddles), $59.95.

☐ A conference on *Microcomputers in Vocational Education* is being planned by the **Vocational Studies Center,** University of Wisconsin (964 Educational Sciences Building, 1025 West Johnson Street, Madison, WI 53706; 608-263-4367). Educators will have access to beginning and advanced application information; a handbook on a variety of topics will be distributed. To be held at the Sheraton Inn, Madison, August 12-13. Registration is $35; handbook (by mail), $20.

☐ Disk storage albums, pocket binders, and snap-lid box/binders in a variety of colors, grains, and capacities, silkscreened or foil-stamped, can be ordered from **Blackbourn** (10150 Crosstown Circle, Eden Prairie, MN 55344; 612-944-7010). Prices dependent on work and quantity.

☐ **High Technology Software** (2201 N.E. 63rd Street, Oklahoma City, OK 73113; 405-478-2105) has released *P.A.C.E.,* a flexible, general purpose estimating product suitable for any repetitive-unit cost estimating. Each estimate may consist of up to 400 categories derived from like number of cost items, allowing up to 100 estimates per disk. Reports provided include current cost, summary estimate, and current estimate. $395.

☐ *EasyMailer,* from **Information Unlimited Software** (281 Arlington Avenue, Berkeley, CA 94707; 415-525-9452), complements *EasyWriter* with mailing list building and merging capabilities, making personalized form letters a two-step process. Forty-column original version, $69.95; professional eighty-column version, $175.

☐ **Multi-Media Productions** (Box 5097, Stanford, CA 94305; 415-968-1061) introduces *Computer/Video Interactive Instruction* (CVII), a custom-designed hardware/software training system for classroom and business. Components are video cassette recorder and drive, color television receiver, microcomputer, and disk drive. Video disk and voice synthesizer options available. $9,000.

☐ *Softalk* is one of the twenty-four magazines indexed in the 1980-1981 special edition of *The Periodical Guide for Computerists,* an extensively cross-referenced source book with more than ten-thousand entries. Published by **A.C.E.** (470 Slagle Creek Road, Grants Pass, OR 97526; 503-846-6742). $11.95.

☐ *D P Directory* publishes the tables of contents of more than 100 data processing periodicals per month. One year subscriptions available from **D P Directory** (Box 562, Bloomfield, CT 06002). $48.

☐ *Cosmos Screen Mixer,* a set of three modules, provides the mixed screen of any two screens available for the Apple II, using hardware only. Double density hi-res graphics (580 dots per line), and advanced character display; choice of half-intensity and highlighted characters. From Astar International (5676 Francis Avenue, Chino, CA 91710; 714-627-9887). $60.

☐ Strategy and action highlight *Fore!,* a new golf game from **Automated Simulations** (Box 4247, Mountain View, CA 94040; 415-964-8021). Two complete eighteen-hole golf courses to choose from and eight types of terrain; can be played against the computer or with up to four players. Applesoft in ROM. $29.95 ☐ Increasing their *Epyx* line of games, Automated has also released *Curse of Ra,* an expansion module to their award winning *Temple of Apshai,* that gives treasure-seeking players 179 new rooms to explore. Applesoft in ROM. $19.95. ☐ And if you want fully animated real time graphics and sound effects while playing *Temple of Apshai,* current owners can send $5 and their old cassette to the company for a new version of the game. ☐ An expansion module for *Hellfire Warrior* called *Danger in Drindisti* opens up the fantasy role-playing game by one hundred rooms and four dungeons, sending the player on a perilous mission in a magical kingdom. Applesoft in ROM. $19.95.

☐ **Plain and Simple Software** (9003 Lexington, N.E., Albuquerque, NM 87112; 505-293-2448) has released *Sales Order ENTRY III,* an Apple III software package for manufacturers, wholesalers, and sales representatives. Copiable and modifiable; will keep track of fifty vendors, fifty salespeople, 600 customers, and approximately 400 sales orders on two 5¼-inch disk drives. Single-key abort of any entry process. $250.

☐ The summer game onslaught has begun! The big news from **Broderbund** (1938 Fourth Street, San Rafael, CA 94901; 415-456-6424) is *Deadly Secrets,* by L. Corey Kosak and Scott Schram, that company's first adventure. You must escape from a flaming skyscraper, then carry out a secret assignment to save the world from nuclear terrorists. More than a hundred pictures in hi-res; puzzles and short sentence commands $34.95. ☐ In the arcade vein, David Snyder's *Serpentine* is a maze game featuring snakes engaged in the consumption of everything smaller than they are in effort to become the biggest. $29.95. ☐ In

Choplifter, by Dan Gorlin, your joystick-controlled helicopter must go behind enemy lines to rescue prisoners, dodging jets and tanks in 3-D graphics. $34.95. ☐ *Dogstar Raider,* by Mike Wise, puts you at the controls of a master starship as it journeys from its mothership to an underground bunker on the dogstar planet to refuel, take on supplies, rescue prisoners, and return, evading police cruisers and asteroid belts all the way. $29.95.

☐ **Sirius** (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195) has unleashed *Bandits,* by Tony and Benny Ngo, concerning the defense of a lunar supply base against strafing and bombing marauders with sticky fingers. Keyboard, paddles, or joystick. $34.95. ☐ *Fly Wars,* by Duane Later, details the struggle of the last surviving Spider-Fighter, armed only with a web, against waves of Fly-Fighters, raygun-wielding caterpillars, exploding cocoons, black beetles, and bug spray. Keyboard or Atari-type joystick in Joyport. $29.95

☐ The first issue of *Computer Games Review,* a British bimonthly devoted solely to reviewing new and established computer game software, has just been published by **Computer Publications Limited** (10 Star Lane, St. Mary Cray, Kent, BR5 3LJ, England; ORpington 72987). Six issue subscription, $26 surface mail; $38 air mail.

☐ **Standard MicroSystems** (136 Granite Hill Court, Langhorne, PA 19047; 215-968-5966) has announced *Quic-N-Easi 1.4,* an update of an applications development system that combines formatted, edited screens, processing, advanced file handling, and printing. Allows up to twenty columns; capability of breaks, totals, subtotals, and floating dollar sign. Requires Z-80 card. $395.

☐ News from **Muse** (347 North Charles Street, Baltimore, MD 21201; 301-659-7212): *Firebug,* by Silas Warner, puts you at the top of a five-story maze with a burning fuse and gasoline cans. You must outrace shorter, faster fuses as you burn down the floors one at a time. $24.95. ☐ In *Frazzle,* you must vaporize space beasties while avoiding collision with them, your force field, and your own ammunition. Applesoft in ROM. $24.95.

☐ **Zork Users Group** (Box 20923, Milwaukee, WI 53220) is offering various aids for the playing of **Infocom's** adventure and its sequel. Hint booklet, $9.95; map, $2.95.

☐ *Word Division,* a new educational program by **Ahead Designs** (699 North Vulcan, No. 88, Encinitas, CA 92024; 714-436-4071) allows teachers to reinforce identification of prefixes and suffixes and division of compound words, presented in large, hi-res letters. Student has two chances to attempt correct word division, after which correct division is displayed. Modifiable; designed for grades one through three. Requires game paddle. $19.95.

☐ At its April *Peachware '82* convention in San Francisco, **Peachtree Software** (3445 Peachtree Road, N.E., Atlanta, GA 30326; 404-262-2376) announced the adoption of a new company logo and the introduction of the *Peachware* and *Peachpak* units, consisting of disks, documentation manuals, and a presentation/storage box. The *Magic Wand* word processing program was renamed *PeachText,* becoming the center of the *PeachPak 9 Office Productivity Series,* which also includes *Spelling Proofreader* (formerly *Magic Spell),* the *PeachCalc* electronic spreadsheet, (formerly *MagiCalc*), *Telecommunications* (formerly *Magic Messenger*), and *Mailing List Manager* (formerly *Magic Address*).

For dealers, Peachtree's new sales and distribution policy will consist of the *Buyer's Plan,* for those who require software packages in any quantity but do not require support except for the ultimate end user of the package; and the *Authorized Software Center Plan,* geared toward technically competent vendors who add value to the software products they sell through such things as training, integration of software and hardware, or the combination of published software with proprietary or custom packages.

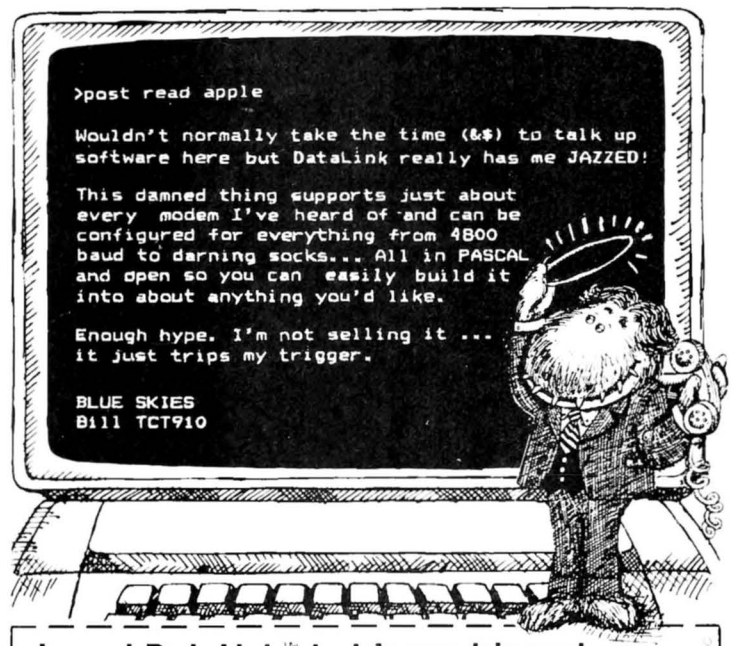
☐ *Success in Software,* a one-day conference exploring the major issues in microcomputer software, including design and applications, marketing, distribution, and the role of venture capital, is being sponsored by **Creative Think** (165 Pineview

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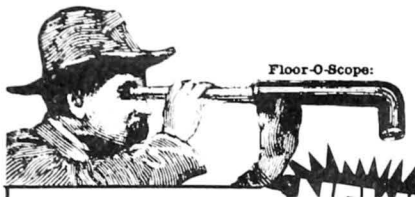
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Gosub City: A useful collection of sounds, text and hi-res tricks **for use in your programs.**

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by Bert Kersey

21 versatile utilities you can list, customize and back-up. **List Formatter** makes properly spaced and indented listings with printer page breaks, each statement on a new line with if-then's and loops called out, a great de-bugger! **Catalog in multiple-columns** and any page-width to printer or screen. Automatically post Run-number and last-used Date in your programs. Put **invisible functioning commands** in your listings. Access program lines in memory for garbage repair and "illegal" alteration. Quickly alphabetize and store info on disk. Run any program while another stays intact. Renumber to 65535. Save inverse, trick and **invisible file names.** Convert decimal to hex & binary, or INT to FP. Append programs. Dump text screen to printer... More too, **21 Programs Total!**

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(All disks DOS 3.3 unless 3.2 requested)



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Lane, Menlo Park, CA 94025; 415-321-6775). It will be held July 20, 1982 at Hyatt Rickeys, Palo Alto, California. Speakers include Bill Budge, Dan Flystra of VisiCorp, Alan Kay of Atari, and John Couch of Apple.

☐ **Interactive Structures** (146 Montgomery Avenue, Bala Cynwyd, PA 19004; 215-667-1713) has expanded its series of *Pkaso* interfaces to include color text and graphics for its IDS color prism printers. The *ID12-Color* includes all the features of the *Pkaso* black and white matrix printer interfaces, plus hi- and lo-res screen prints, swap and rearranges command packages for the color set, change color commands, and commands to create and print with definable sets of colors. Apple II packages, $195; Apple III, $225.

☐ **Synergistic Software** (830 North Riverside Drive, Suite 201, Renton, WA 98055) has released two arcade games on one disk. In *Procyon Warrior,* the player must defend a space station against a variety of drones and a mother ship, using plasma bombs and neutrino missiles. *Appointment at Aldebaran* features asteroids and marauding space pirates in 3-D graphics. Joystick or paddles. $24.95.

☐ **Compuserve** (5000 Arlington Centre Boulevard, Columbus, OH 43220; 614-457-8600) has added the *Business Information Wire* of the Canadian Press to its videotex service, giving online access to all North American subscribers. ☐ *Popular Science* magazine is also available, with a library containing the most recent back issues. Access weekday evenings and all day weekends and holidays, $5 an hour. Weekday daytime access available.

☐ The *Quiet 300,* a line printer from **Local Data** (2701 Toledo Street, Suite 706, Torrance, CA 90503; 213-320-7126) features 30 lpm with sixty-four character set, 220 lpm with ninety-six character set, and 440 lpm with forty-eight character set. Fully-formed characters, quiet operation, and switchable RS-232 and parallel Centronics interface. $4,995.

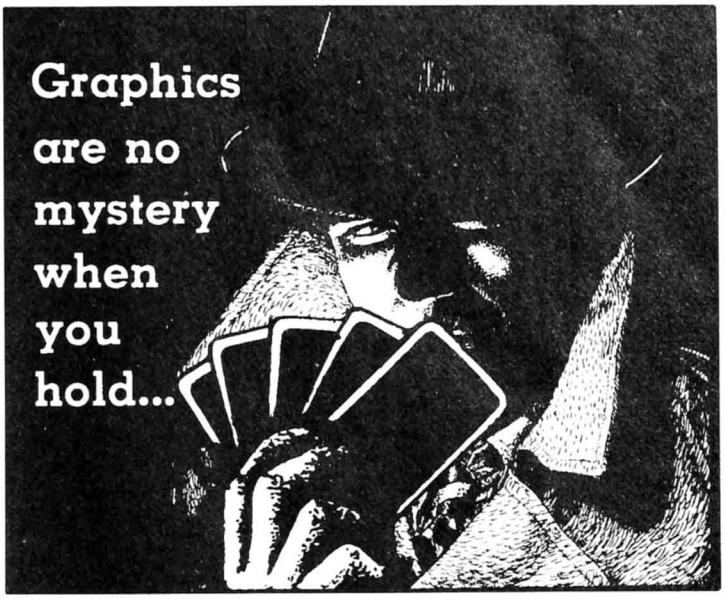
☐ **Wildfire Publishing** (326 Toro Canyon Road, Carpinteria, CA 93013; 805-684-1489) has released a new book series for beginning microcomputer entrepreneurs. *Your Fortune in the Microcomputer Business, Volume I,* shows how to survey the market, select a product or service, get startup capital, and what steps to take in establishing a business. *Volume II* covers the problems and decisions encountered in a successful microcomputer business. Author Victor Wild is a consultant, business writer, and lecturer with a background in medical electronics, computer test equipment, and fiber optics businesses. $20 each.

☐ **MicroMotion** (12077 Wilshire Boulevard, Suite 506, Los Angeles, CA 90025; 213-821-4340) has released *Forth-79 Version 2,* a portable professional software system with floating point and hi-res graphics. Includes screen editor, macro-assembler, string package, 32-bit integer arithmetic, and a 200+ page tutorial and reference manual. $99.95; $139.95 with enhancements.

☐ **Legend Industries** (P.O. Box 112, Pontiac, MI 48056; 313-674-0953) has developed a memory expansion program, the *CP/M Fast Disk,* that can use all the RAM of the Legend 64K card as a speedy, solid-state disk drive. Adding Legend cards increases the drive up to 512K. $69.95 ☐ To retrieve hi-res pictures rapidly, *Slide Select* can be used with both 64KC and 128KDE cards. The program is a combination of software; one, an Applesoft program that is the functional equivalent of a slide projector controlled from keyboard or game paddles; the other, a machine language interface for the Basic programmer that allows easy access to the Legend cards. Free on demo disk, or as update for current Legend card owners, $8.

☐ Special applications templates for use with *VisiCalc* from **Exec Systems** (Box 192, Clinton, MD 20735; 301-868-5487) are designed to save hours of initial setup time and effort. Called *VisiTemps,* the first four packages released are for income tax preparation, common business applications, home and family applications, and sports record keeping and statistics. $19.95 to $59.95.

☐ *AccuRec,* from **Individualized Operand** (Box 3030, San Rafael, CA 94912; 415-459-3383) turns an Apple II into an attend-



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ance recorder/reporting system. Employees enter their in/out time with personal ID codes. System can also structure workweek, paydays, overtime rate multipliers, and more. $179.95.

☐ A starter kit for computer users is available from **Ico-Rally** (2575 East Bayshore Road, Palo Alto, CA 94303; 415-494-9111). Designed to fill the start-up needs of 5¼ and 8-inch disk users, the kit includes library case, head cleaning disk, labels, mylar hub rings and a No Smoking decal. $29.95 ☐ *Soft-Rack*, a take-home software demo package, includes program manual, demonstration and applications programs. Twenty CP/M business and accounting programs can be tried out at $49.95 each. Full payment unlocks the system for permanent use.

☐ If you have a *Textalker* version 1.0 or 1.1 from **Street Electronics** (3152 E. La Palma Avenue, Suite D, Anaheim, CA 92806; 714-632-9950) you can trade it in for an upgraded version 1.2 by sending your old disk, or contact the company for a patch program to correct some problems on the original.

☐ **Quadram** (4357 Park Drive, Norcross, GA 30093; 404-923-6666) introduces *Interfazer*, a microprocessor-controlled input/output expansion unit with buffer memory expandable to 128K RAM and up to ten I/O channels. Can be used for multi-use printer controller, incompatible device interface, peripheral buffer, data transfer rate converter, or as a peripheral multiplexer. Will take up to ten I/O cards. $700 price range, depending on configuration.

☐ A new home-arcade game from **Piccadilly Software** (89 Summit Avenue, Summit, NJ 07901; 201-277-1020) called *Star Blaster* features eight levels of difficulty as you repel waves of attackers from the planet Drago and ultimately destroy the dreaded Dragonian Annihilator. $29.95.

☐ New from **Videx** (897 N.W. Grant Avenue, Corvalis, OR 97330; 503-758-0521): To be used with the *Enhancer*, the *Videx Function Strip* offers up to sixteen additional function select keys. Takes up no table space. $79.

☐ *SuperSpooler*, an intelligent printer interface, is available from **Compulink** (1840 Industrial Circle, Longmont, CO 80501; 800-525-6705). In addition to being a hardware buffer, the base model includes a 16K memory, Centronic-compatible I/O ports, two-digit LED display, plus memory options and RS-232 serial I/O ports for modem transmission and serial to parallel translation. $349; memory expansion, $159; serial option, $95.

☐ A ninth-grade level text book, *Discovering Computers*, has been published by **Science Research Associates** (155 North Wacker Drive, Chicago, IL 60606; 312-984-2053) as an introductory course in computer awareness. Can be used with or without microcomputer; no use of math required. Soft cover. $10.36.

☐ A new 1.0 version of *InterComp* source compare utility program has been announced by **Ithaca InterSystems** (Box 91, Ithaca, NY 14850; 607-257-0190). With both word processing and programming applications, it can be used to compare any two CP/M files and report all differences, sending the output to disk, console, or printer. Comparison parameters are user defined and modified; incorporated in the system is *InterAid*, a help facility that displays all options. $295.

☐ Seven isolated power outlets are offered in the *Stedi-Watt Jr. Model 718* from **National Field Sales** (2660 West Chester Pike, Broomall, PA 19008; 215-359-1004). Features seven-stage transient voltage, FI/EMI filter, and dual protection of fifty joules on both transverse and common modes, and fifteen amp circuit breaker. $189.50.

☐ **Artworx** (150 North Main Street, Fairport NY, 14450; 716-425-2833) has released *The Predictor*, a user-oriented multilinear regression program for analyzing business trends for statistical significance. $29.95.

☐ **Johnson Associates** (Box 1870, Phoenix, AZ 85001; 602-979-4554) has developed *Slot Swappers*, a hardware device that interchanges two slots to avoid hardware damage and eliminate card manipulation. $79.95.

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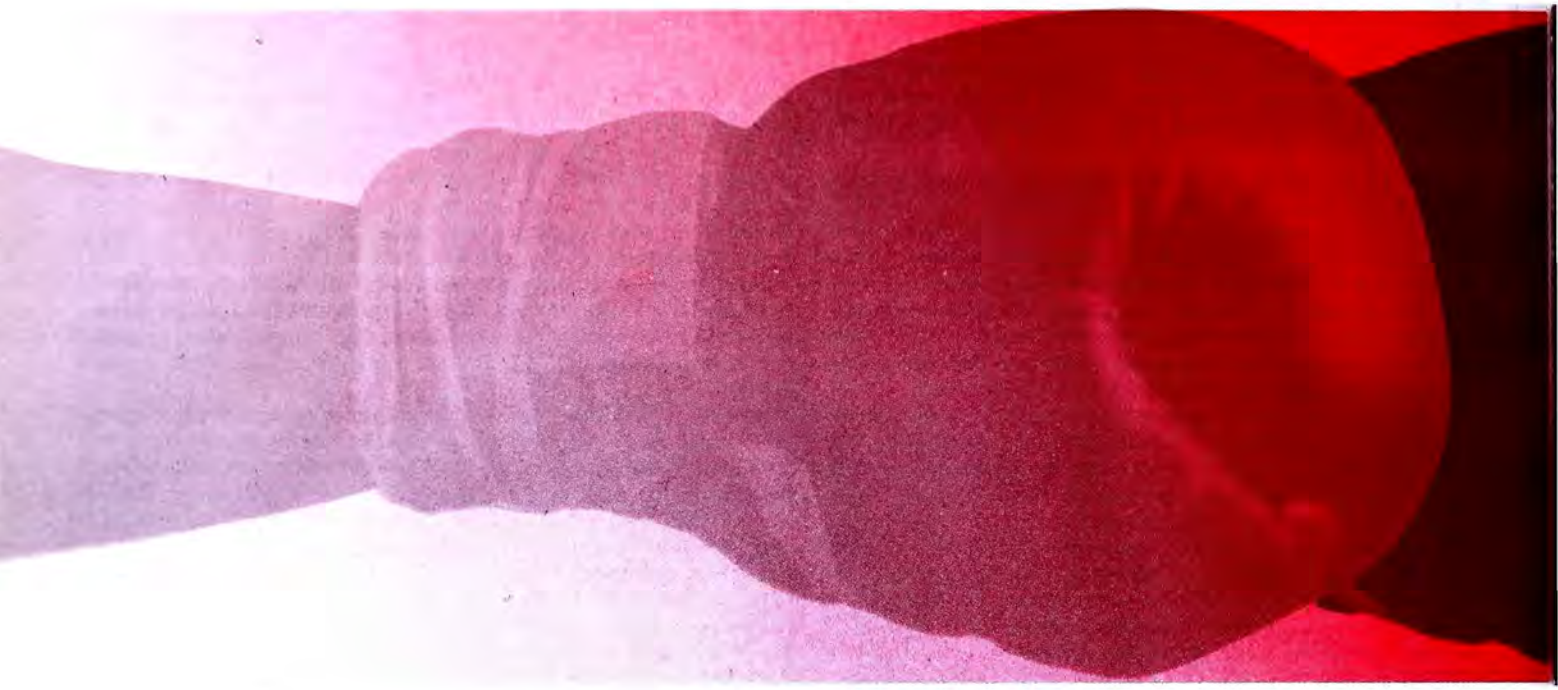
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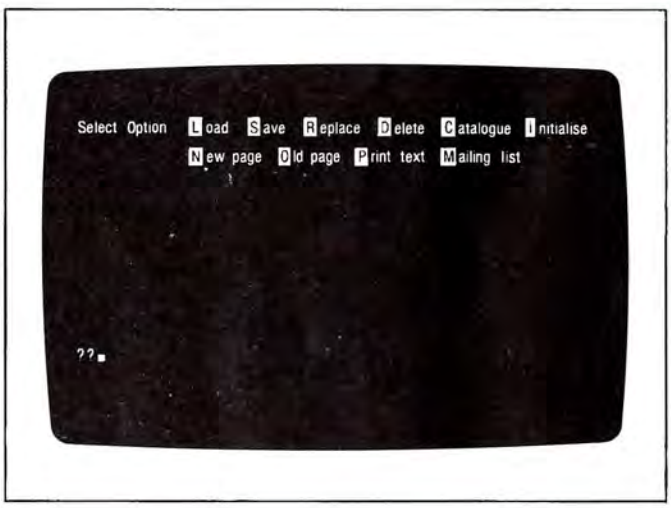
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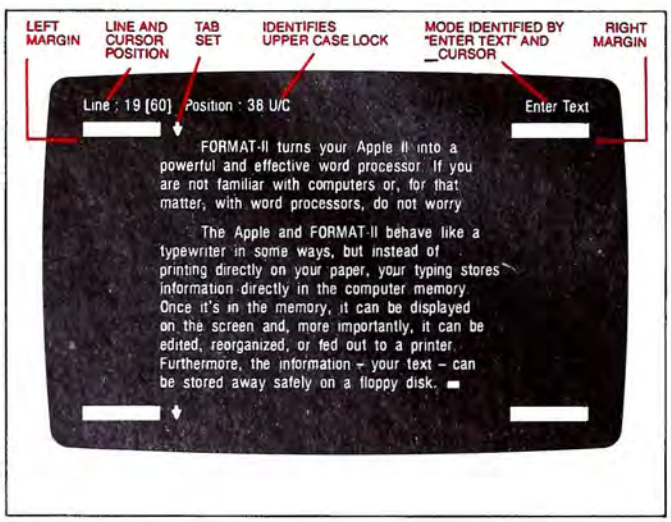
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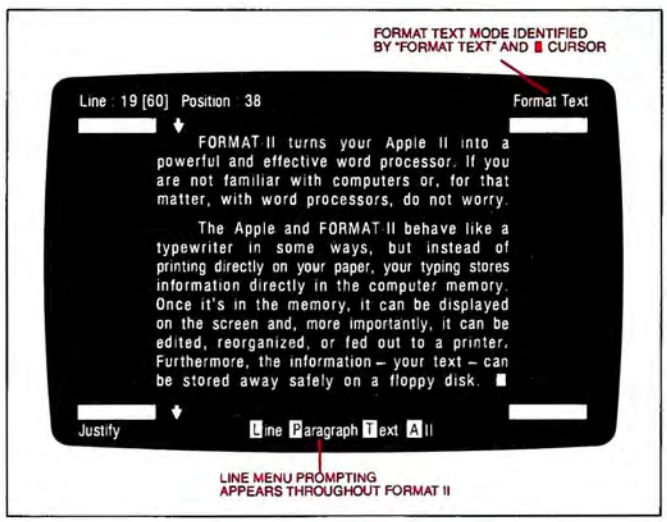
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[B]lank...out text.
[C]enter...text.
[D]elete...text.
[E]dit text.
[F]ind...text on the page.

Illustrated is [J]ustify...text. (Throughout, bottom-of-screen prompting keeps you on track.) The justification on the screen appears exactly as it will print out. Format II is a "what you see is what you get" word processor.

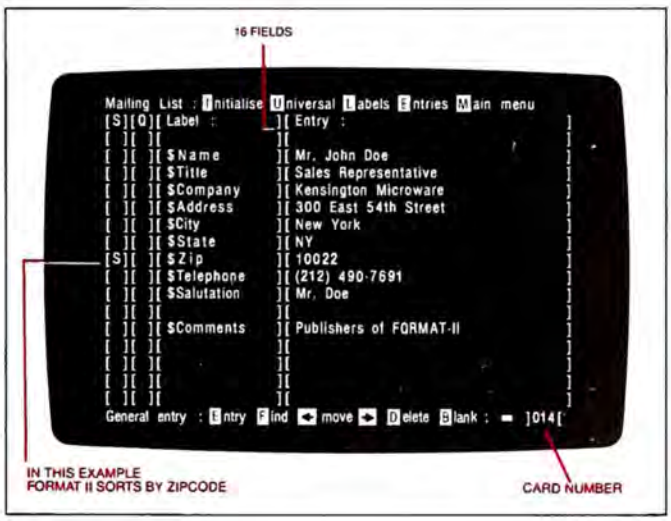
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☐ **Softsel** (8295 South La Cienega Boulevard, Los Angeles, CA 90301; 213-670-9461) has introduced *Headstart*, a service for software retailers to contact to obtain any kind of software. Advance orders accepted for material not yet available; all software evaluated. Softsel is also looking for new software. Minimum purchase is $100.

☐ Now your Apple can talk back to you. **The Micromint** (917 Midway, Woodmere, NY 11598; 516-374-6793) has introduced the *Sweet Talker ST02* board which speaks any word in the English language, using sixty-four phonemes with four levels of inflection. Features the Votrax SC01A phonetic speech synthesizer chip, requiring less than one hundred bits per second for continuous speech. Optional software package contains a 6502-based text-to-speech algorithm allowing any printed word or phrase to be spoken. $149.

☐ **Krell Software** (Dept. 44, 21 Millbrook Drive, Stony Brook, NY 11790; 516-751-5139) is sponsoring a contest in educational software writing. Categories in arts, the humanities, philosophy, social sciences, math, natural sciences, Logo, and other topics. Deadline for submissions is December 1, 1982. Thirty first prizes are $500 worth of Krell software; thirty second prizes are $300 worth, and the thirty third prizes are $200 worth.

☐ *The Rainbow's Edge* is a newsletter for the owners of Apple computers. Volume two, number one has just been published by **Rainbow Computing** (19517 Business Center Drive, Northridge, CA 91324; 213-349-0300), containing forty pages of Apple product description articles by and about manufacturers and authors, reviews, and an information corner to educate new owners about their Apple. $1.00 in the U.S., $2.00 outside.

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☐ *Executive Planning with Basic* has just been published by **Sybex** (2344 Sixth Street, Berkeley, CA 94710; 415-848-8233, outside California call 800-227-2346) to help managers accelerate the decision-making process. Some of the decision model computer programs included are cost/volume profit, linear programming, inventory management, critical path analysis and PERT, financial ratio analysis, discounted cash flow, portfolio management, more. Application examples are provided; appendices contain a summary of Basic instructions, business statistics tools, and Basic programs that perform the algorithms. $12.95.

☐ *Zi-Gard,* a copiable security system package from **Zena Micro Engineering** (2205 26th Avenue S.E., Puyallup, WA 98373; 206-848-4519) includes such software features as dynamic screen status displays, flexible protection, multiple alarm sequence; hardware includes twenty-four sensor inputs, real time clock. Owner-created features include system password and three zone monitoring configurations. Applesoft in ROM; specify DOS. $195.

☐ **Computers in Psychiatry/Psychology** (26 Trumball Street, New Haven, CT 06511) is a clinical resource newsletter for professionals, providing articles, reviews, an ongoing bibliography and program catalog, as well as information on training and employment. Topics that are covered include the development of mental health information systems and instruction, computerized therapy, testing, psychopharmacology, biofeedback, and office management, among others. Fourth year of publication; subscriptions are $35 (for institutions or for outside the United States) and $25 (personal) for volume number 4; previous volumes also available.

☐ *The International Software Database*, listing over 7,000 software packages, is now available on-line through **Lockheed Dialog Information Service**, and in book form from **Imprint Editions** (1520 South College, Fort Collins, CO 80524; 303-482-5574). Fully searchable by machine, operating system, subject, vendor, and price; has full text searching by key words in any or all fields. Vendors can contact Imprint for details on obtaining listings. On-line, $60 per hour. Hardcopy microcomputer edition, $39.95.

☐ **Special Delivery Software** (10260 Bandley Drive, Cupertino, CA 95014) is no longer involved in retail sales. All Apple products are now obtainable through dealers only.

☐ *Micro-Comp*, a new low cost professional quality computer cassette for small businesses and hobbyists has been released by **Magnetic Information Systems** (Box 806, 415 Howe Avenue, Shelton, CT 06484; 203-735-6477). C-10-C90 available; $1.42-$2.58.

☐ A new line of diskettes marketed by **Computer Resources** (15801 Rockfield, Suite J, Irvine, CA 92714; 800-854-8607) under their *Opus* label, feature exclusive protective suede jackets. The *Opus Pak,* a diskette storage and filing case, holds up to ten diskettes. $54.95.

☐ **Morris Electronics** (5108 Pettyjohn Road, Kingsport, TN 37664; 615-323-5827) is offering the *CompuSat Model RF-101* RF modulator, designed to interface an Apple or satellite TV receiver to any standard color or black and white television receiver. The unit comes with a built-in power supply with LED power indicator and selectable channel 3 or 4 output. $54.95.

☐ Also from Morris is the *CompuSat Model RF-102* RF modulator. Power, video, and audio are taken directly from factory-provided connectors in the computer. $44.95.

☐ A new instrument capable of logic analysis on sixteen channels of TTL-compatible signals, the *Owl PI 1160* operates to ten MHz with time-domain display through a standard dual-channel oscilloscope and both time-domain and data-domain displays on a microcomputer. From **Sage Enterprises** (1080 Linda Vista Avenue, Mountain View, CA 94043; 415-969-5111). $950.

☐ **NewsNet** (Bryn Mawr, PA; 703-790-5500), the electronic publishing company, is readying more than one hundred newsletters from thirty publishing groups for electronic transmission to personal and business terminals nationwide. Subscribers pay $24 per hour for system use, with a $15 minimum

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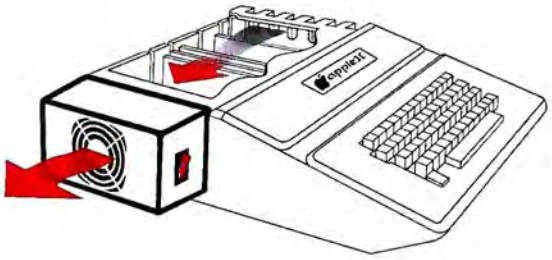


For Cooling

As soon as you move to 64K RAM or 80 columns you need SYSTEM SAVER.

Today's advanced peripheral cards generate more heat. In addition, the cards block any natural air flow through the Apple II creating high temperature conditions that substantially reduce the life of the cards and the computer itself.

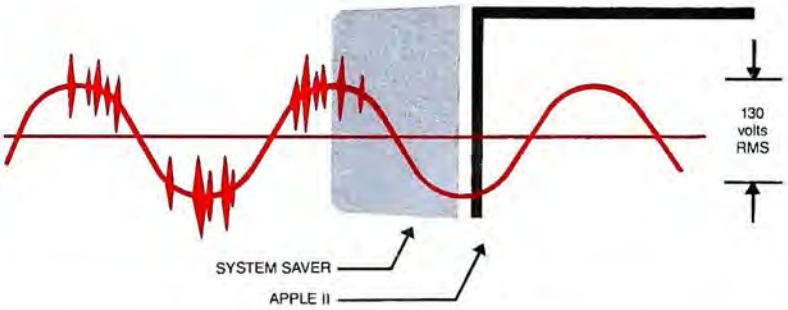
SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.



For Line Surge Suppression

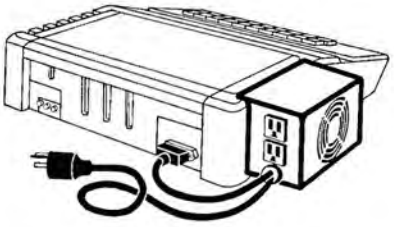
The SYSTEM SAVER provides essential protection to hardware and data from dangerous, power surges and spikes.

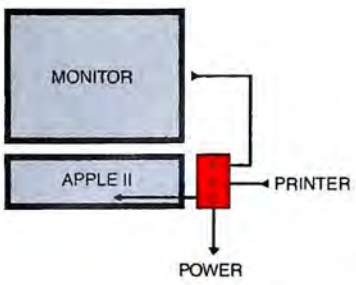
By connecting the Apple II power input through the SYSTEM SAVER, power is controlled in two ways: 1) Dangerous voltage spikes are clipped off at a safe 130 volt RMS level. 2) High frequency noise is smoothed out before reaching the Apple II.



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SYSTEM SAVER contains two switched power outlets. As shown in the diagram, the SYSTEM SAVER efficiently organizes your system so that one convenient, front mounted power switch controls SYSTEM SAVER, Apple II, monitor and printer. The heavy duty switch has a pilot light to alert when system is on. You'll never use the Apple power switch again!





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monthly charge for such on-line services as Satellite News, Telephone News, and Communications Daily.

☐ **Technical Electronic Distributors** (18 West Forest Avenue, Englewood, NJ 07631; 201-894-0800) offers a general purpose computer cleaning kit, *Vari-Clean*; with cleaning disk, CRT screen cleaning solution, more. $39.95. ☐ They also have *Disk Banks*, a modular interlocking disk storage and filing system. $11.

☐ Forty-four different models in the new *International Series* of dc power supplies are available from **Power One** (Power One Drive, Camarillo, CA 93010; 805-484-2806). Features of the series are multi-range input capability, ac input ranges for worldwide operation, and single output as well as dual, triple, and disk drive models. Prices start at $32.95.

☐ Keep intruders out with *Datalock I* from **Terminal Brokers** (4265 Marina City Drive, Suite 411, Marina Del Rey, CA 90291; 213-822-3900). The database security system comes with an encoding technique programmable by the data center manager, data rate switch selectable to 9600 BPS, switch selectable word length, parity, and stop bits. Standard RS232-C connections. $399.

☐ *Microkart* is a mobile computer cabinet for the consolidation of all major microcomputer systems and related equipment. Features pull-out computer platform at standard typing height, storage space, pop-up side tables, four-outlet electrical power strip, more. From **Future Solutions** (3198-H Airport Loop Drive, Costa Mesa, CA 92626; 714-963-7860). $439.95.

☐ A five-megabyte Winchester disk system package is being marketed factory direct in kit form to end users and OEMs by **Xebec** (432 Lakeside Drive, Sunnyvale, CA 94086; 408-735-1340). The system consists of the *Intelligent Disk Assembly* and *Apple II Host Adapter Personality Card*, which currently supports DOS and CP/M. Features up to twenty-two-bit error detection and up to eleven-bit error correction, a full sector data buffer, and single command disk initialization. The company will hold nationwide monthly technical seminars to deal with technical support questions. $1,299.

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☐ *Wine Cellar* from **WE Software** (800 Greenwich Drive, Chico, CA 95926) is a self-contained expandable wine inventory program for individual and business uses. Cellar searches can be based on winery, varietal, vintage, and region parameters. Graphics used to display availability, quality, and ability; 372 types storable on a single disk system. Language card required. $49.95.

☐ *The Programmer* is a program generator that offers a series of menus with which the user can define the desired functions of his program, then writes lines of Basic code to execute the specific functions. Can write to any RAM address; chains programs; branching by single menu selection. Requires Z-80 card and eighty-column card. From **Advanced Operating Systems** (450 St. John Road, Michigan City, IN 46360; 219-879-4693). $495.

☐ *Algebra 2*, the second system in the *Algebra Series* from **Edu-Ware** (Box 22222, Agoura, CA 91301; 213-706-0661) elaborates on concepts introduced in *Algebra 1* and introduces rules for addition and multiplication, solving equations, and solving inequalities. Hi-res graphics, custom-designed upper/lower case font, and flow-charted information maps. $39.95.

☐ *The Mimic Speech Processor* from **Mimic Electronics** (Box 921, Acton, MA 01720; 617-263-2101) converts an audio signal to digital bit stream at 9,600 bits per second, producing speech quality acceptable for applications in games, aids for the handicapped, tuning or practice aids for musicians, and voice alarms. Bare circuit board, $19.95; fully assembled system, $89. ☐ The *Mimtalk* software package utilizes a Basic language program on disk allowing the user to prepare vocabularies consisting of phonemes, words, or phrases for speech output. $34.95.

☐ **Multitech Electronics** (195 West El Camino Real, Sunnyvale, CA 94086; 408-773-8400) has introduced the *Apple Speech Computer Board*, a plug-in speech synthesizer based on TI's *TMS 5200*. For language instruction, vocational speech therapy, experiments in synthetic speech, or other computer speech applications. On-board amplifier; 400-word English vocabulary provided on disk. $129.

☐ *Voter 30*, an audience or student response system connecting up to thirty six-button keypads to the Apple, has been announced by **Reactive Systems** (40 North Van Brunt Street, Englewood, NJ 07631; 201-568-0481). Permits all participants to react to material presented by the computer or group leader; software routines assist in the development of educational lessons and storage retrieval of student responses. Interface card $595, polling stations $125 each.

☐ **H&H Scientific** (13507 Pendleton Street, Ft. Washington, MD 20744; 301-292-3100) announces the release of their *Stock Option Analysis Program*, featuring a full Dow Jones interface, user-specified commission schedules, option to print output including hi-res graphics, and machine language sections for enhanced speed. The Black-Scholes model is used to calculate fair prices of options; expected profit/loss on transactions involving up to three classes of Put or Call options can be calculated until options expire. Requires modem, autostart ROM, Applesoft in ROM. $250.

☐ A bowling league secretary database from **Rainbow Computing** (19517 Business Center Drive, Northridge, CA 91324; 213-349-0300), *Bowling System 2.0* is designed to store and compute data for multiple and mixed leagues of up to forty teams each with six bowlers per team, not including substitutes. Cumulative records of total pins, games won and lost, total points, high series, plus similar information on each bowler. Generates weekly recap, score sheet, season average, and team listing reports. Applesoft in ROM; two drives recommended. $149.95.

☐ **C&H Video** (110 West Caracas Avenue, Hershey, PA 17033; 717-533-8480) has released *The Menu II*, an updated version of the original menu planning program, now with up to twenty-four ingredients per recipe, longer comments and recipe names, and quantites in standard .cookbook fractions. Six user defined categories; menu planning up to two weeks or forty-two meals. $39.95. ◨

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Hi-Res adventures are used in schools across the country to teach problem solving skills and promote student involvement with the computer. The problems and puzzles in an adventure game teach students of any age level to think analytically.


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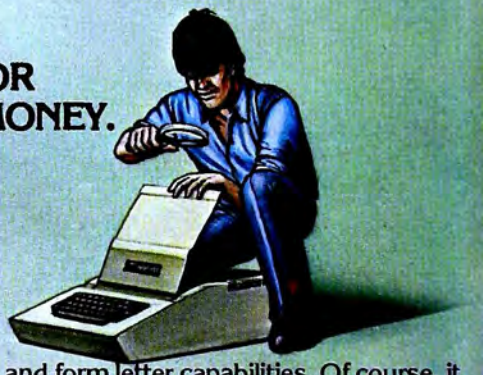
and put seventy columns of text on the screen
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AND WE'RE ALWAYS LOOKING FOR NEW WAYS TO SAVE YOU TIME AND MONEY.



SCREEN WRITER II is, frankly, the kind of word processor **you** would have developed for yourself if you were a programmer: strictly professional in its features, yet simple enough for even a beginner. And that's where we started.

Sure, SCREEN WRITER gives you boldface, underline, global search/replace and form letter capabilities. Of course, it lets you eliminate the boredom of retyping redundant text. Certainly, it lets you generate up to four indices, has complete formatting capability as well as full editing of any DOS 3.3 text or binary (including APPLESOFT programs) . . . and many other wanted features.

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*Printer spooling feature only available for the following printer interface cards: APPLE parallel, SSM AIO parallel or serial, EPSON APL, Centronics parallel and the Grappler. SCREEN WRITER II runs on any 48K APPLE II/II Plus with DOS 3.3, and is available now at your local computer store, or directly from . . .

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Dić~tio~nāry

Saves you from creative speling

No matter how good your Apple's word processor, the user is human. So, the odds are that spelling mistakes will occur in almost every letter, document, or proposal. Many errors will be caused by those who never won a spelling-bee and are addicted to 'creative' spelling...while others will be due to keystroke 'typos'. Either way, spelling errors can be embarrassing to you — to your image — to your business.

DIC-TIO-NARY **solves** the spelling problem for you, and does it at computer speed, easily and almost effortlessly. How easily, how effortlessly? Well, with DIC-TIO-NARY you have the option to correct a word immediately . . . right at the time you're doing the spelling check. No waiting necessary. And if, by chance, you don't know the correct spelling of the word, you can go into the wordbook right then and there and have it displayed for you! (Ask for these features on competitive programs, no matter their price, and see how fast they change the subject.) We think you'll find that for helpfulness our DIC-TIO-NARY is on par with having your favorite English teacher or even Mr. Webster at your elbow!

words, words, words

The DIC-TIO-NARY starts you off with more words than you'll probably ever need: 25,000 of the words used most often. **Plus** it lets you add 3000 words of your own choosing, so you can customize it to your specific needs. (By making back-up "wordbooks" you could have many additional lists of 3000 words!)

how it works

In simplest form, the DIC-TIO-NARY races through your document at a 2+ page-per-minute speed. It looks at **every** word in your text. At the same time it compares each word with those in its 28,000 wordbook...checking for any misspelling. When it catches a goof, you get to see the word as it was used in your text, **on the screen**. The DIC-TIO-NARY then asks how you want that particular word handled.

choices, choices

The DIC-TIO-NARY will display for you any word not listed in its wordbook and any misspelled word. It then offers you a choice of word-editing options. For example: You may decide to ignore the word. You may have it marked in your text and/or on the printout, for later identification, correction or replacement. You may have the word automatically added to your wordbook. Or, you may immediately correct the spelling (using the wordbook for verification, if desired) . . . and all occurrences of that word will automatically be corrected throughout your text, keeping the **original** capitalizations or lower case letters!

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.

All in all our DIC-TIO-NARY may well be the most valuable and useful program since the little red schoolhouse disappeared. Yet, you can enjoy all its benefits for only $99.95. If you buy our special Screen Writer Professional, you get the $129.95 SCREEN WRITER II word processor described on the left, plus The DIC-TIO-NARY, at the package price of $199.95. Be creative! Save $29.95!

DIC-TIO-NARY works with ScreenWriter II, SuperScribe II, Apple Pie and Apple Writer. Requires 48K Apple II or II+ with DOS 3.3. Available at your local computer store or directly from...

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CannonBALL
By Olaf Lubeck
Cannonball Castle, fortress of the enemy redcoats, sits high atop Nutcracker Hill. It is your mission, as a rebel soldier, to climb Nutcracker Hill and destroy the castle. Not so fast though—there are many traps and obstacles designed solely for your elimination. Rough terrain and enemy troops are bent on your destruction, and a constant rain of cannonballs could cause a fatally large headache. Many men before you have tried and failed, so it's all up to you. . .
Cannonball Blitz is a "revolutionary" new arcade game by Olaf Lubeck, author of Gobbler and Pegasus II.
Cannonball Blitz is available on disk for $34.95 and runs on any 48K Apple II/II+ DOS 3.2 or 3.3
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Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

VersaForm. By Joseph Landau. A tight, bug-free program is a thing of beauty and a joy forever. On the other hand, when the program is one as complex and multifaceted as *VersaForm*, it's a bane to a reviewer's existence.

The complexity of *VersaForm* presents only one set of problems. How to describe it raises yet another. Michael Moon, the PR tub thumper for *VersaForm*, heralds it as a new genre of software and he may be right. He's a veteran—if anyone in this young industry can be called that—of the electronics industry and should be in a position to recognize new genres when he trips over them.

But saying that *VersaForm* is a new genre leaves volumes unsaid. If we can't fall back on comfortable labels like "word processor" or "database" to describe a program, how do we communicate what we've seen?

First of all, *VersaForm* is a business program, pure and simple. If your computer is in your home, you need *VersaForm* about as badly as a Bedouin needs a fishing license. However, if your computer is in your office, you'll have *VersaForm* or an entirely new and expensive computer system before the end of the decade to do the work that *VersaForm* does.

Applied Software Technology labels the program a business forms processor, and that will do as a launching pad for lack of a better place to start.

VersaForm computerizes all your business forms. No matter what they are. No matter how varied. No matter what size. No matter what complexity. No matter what purpose. Any form that you now fill out regularly in the course of the business day can be done by *VersaForm.*

Sales order forms? *VersaForm* them. Inventory lists? *VersaForm* them. Purchasing orders? *VersaForm.* Literally any business form can now be stored and printed out on your Apple. Rumor has it that the next generation of business micros will be oriented computers to automate clerical work. Apple owners don't need to wait; they can do it now.

You might best understand *VersaForm* by imagining *DB Master, Apple Writer, MatheMagic,* and a good print-using program all thrown in a jumble. What would come out would be remarkably like *VersaForm.*

Certainly there are elements of databases in the program. After all, it must store the data that it puts on the forms and report on that data in myriad ways. Likewise keying in the data requires a word processor of at least minimal sophistication. *VersaForm* also includes a calculator and some of the most sophisticated print-formatting routines around.

VersaForm will allow you to electronically duplicate your paper forms, fill in the data, and print it out line for line to your paper form. The resulting file can be used to generate other reports, such as tracking customers over their credit limits, back-ordered line items, or to make any other investigation into your business that might be useful.

The form development module provides the user with powerful controls over the input of data. The user may require entry for given fields and may even establish check sums to ensure accuracy of data.

VersaForm has the capacity to provide ninety-nine look-up tables, each holding ninety-nine variables, for automatic entry into your forms. Define a field as requiring a look-up table and the computer will provide the data according to the mnemonics you design.

Full arithmetic extension and columnar totals can be user defined.

Applied Software Technology merits several lashes with something slightly more painful than a wet noodle for its backup policies. Backups must be purchased. This antiquated policy deserves the scorn and derision of all serious users. No serious application should be entrusted to one floppy disk. Magnetic media is fragile and floppy magnetic even more so. Enlightened publishers are either providing the backup with the initial package or sending it free upon receipt of a warranty card. For business use, backups are not a privilege, they are a right and a necessity.

One note of warning: *VersaForm*, after it's been set up, is as user friendly as the next program. But no software this powerful is trivial to use, and that's true of *VersaForm*. Don't expect to boot it and be running in five minutes. This is a complicated program that requires your full attention to use it properly.

But once you've come to grips with the complexities of the setup, you'll have one of the most useful tools your business could desire.

VersaForm, by Joseph Landau, Applied Software Technology (15985 Greenwood Road, Monte Sereno, CA 95030; 408-370-2662), hard or floppy disk versions, requires language card. Apple II floppy disk version $389; Apple II hard disk version, $495; Apple III version for both hard and floppy disks, $495.

Labyrinth. By Scott Schram with Doug Carlston. A new game similar to *Crossfire?* Only more difficult? That was just enough to spark the high-score gleam in the eyes of the *Softalk* staff when *Labyrinth* arrived in the game review room.

The moniker, *Labyrinth,* suggests a myriad of confusing, complicated passageways, which is exactly true, but at first glance the maze seems quite harmless. Ah, but wait till you see what happens when the game is activated. . . .

What seemed innocent now begins to unfurl. Walls start to move, while nondescript, alien protectors appear one by one in the square abyss in the middle of the screen, plotting their strategy and checking their ammunition supply before moving into the network of cryptic arteries.

And you are the crusading expeditioner, on a mission to rescue as many long-lost adventurers as you can, who are imprisoned in the dark, cavernous mines of historic Prince Julian. (Remember him from the ancient backward city of Euqubud, on the ol' Mississippi?)

Again, as in *Crossfire,* keyboard letters J and L direct movement horizontally, I and K control vertical travel. The left-hand keys ESDF are delegated to shooting "zappers" at the guardian attackers. At times, this is relatively easy. Shooting downward, though, seems to take more coordination and skill, but that can be mastered—through the appetite of accomplishment—the more you play.

The real challenge lies in being aware of your surroundings—places to dart in and out of—keeping your eye on the alien attackers and especially on the constantly shifting walls. Even though they provide a temporary hideout, that doesn't mean those aliens aren't going to be hot on your trail, because their superior sense of perception tells them which wall is going to move first. So tactically speaking, you should build a small reserve of your own shots to blast 'em away once you're ex-

posed.

The keyboard response is not quite as fast as the programmed antagonists', which can leave a feeling of displeasure if you get zapped unexpectedly. But conversely, *Labyrinth* displays a well thought-out game plan that is absolutely deserving of merit to designers Scott Schram and Doug Carlston. The animation is smooth and each level progresses with variation in both speed and pattern that provides endless hours of competition, stimulation, and enjoyment. SMP

Labyrinth, by Scott Schram with Doug Carlston, Broderbund Software (1938 Fourth Street, San Rafael, CA 94901; 415-456-6424). $29.95.

Bag of Tricks. By Don Worth and Pieter Lechner. It is becoming apparent that whenever these gentlemen collaborate, the results will have a real significance for the computer community. *Bag of Tricks* is no exception. This bag contains a disk with four binary programs that are massive expansions of listings printed in their previous brain child, *Beneath Apple DOS*. Each program is intended to assist the user in some aspect of disk manipulation, error detection, and recovery. Each of the programs is introduced with step-by-step tutorials that make the operation easy to understand.

One of the programs is called *Trax*. It is able to read the raw data as it is actually written on the disk. In itself, this is of academic interest to all but the very experienced user. The prime function of *Trax* is to locate damaged sectors and to establish whether the damage is in the sector formatting or data.

Trax will read the entire track you specify. It will detect and advise the location of any abnormalities and display the entire address field together with the prologue and epilogue of each sector in that track. With another keystroke, it is possible to review the entire track exactly as it was read from the disk.

The next utility is *Init*. While its operation is similar to the standard DOS *init* command, it differs in several significant ways. It can be directed to operate on one or more specified tracks and, where possible, to leave intact the readable data it finds. *Init* can also change the sector skewing on a track-by-track basis. Skewing is the order in which the sectors are written on a track. In DOS 3.3 this skewing is most efficient for fast booting but not for *bload* or *load* operations. Using *Init* to reskew tracks 3 through 34 (nonDOS tracks), a time reduction of up to 45 percent can be gained. This will introduce no compatibility problems.

Perhaps the most impressive utility of the four is *Zap*. With *Zap*, the contents of any sector on a disk can be read, altered, moved, or erased. Only a few of the more than fifty commands must be learned to start using *Zap*.

After a specified sector is read, the display will show a line of status information, such as track and sector read. The main body of the screen is occupied by a complete hex display of the sector contents and its ASCII equivalent. Any part of this display can be changed, using either hex representation or English. If a specific file is of interest (whether it be binary, data or random access), that file can be opened, sector-by-sector.

Zap will search for a specified string either in an open file or on the entire disk if no file is open. There are sixteen sector-size buffers available; these can be filled as desired. Another feature is a built-in calculator. If a question mark and a hex or decimal number is entered, *Zap* will return both the hex and decimal values.

Zap will accept and save user-defined macro commands. These are strings of commands invoked by a single assigned name. There are several useful macros already saved on the disk. Additionally, *Zap* will accept up to ten labels.

Some of the handy capabilities you get with *Zap* are finding and changing the address and length values of a binary file, making changes in DOS directly on the disk, examining or changing random text files, and copying Pascal files to DOS. Practically anything that appears on the screen can be printed and there is also a command that enables the user to print notes on the output.

While *Zap* is clearly the most powerful of the four programs, *Fixcat* seems to be the most nearly magical. It will check the catalog and file pointers for integrity, produce a detailed report of the disk contents, detect and correct errors in the VTOC and catalog, delete DOS tracks for other uses, and search the disk for lost files and recover them.

One of the measures of a top quality product is its flexibility. *Bag of Tricks* will boot in any slot and operate on a floppy disk in either drive of any slot. If you are interested in what's on your disks, or how to change it, or what to do when the dreaded *I/O error* appears while you are reading your most valuable database disk, you'll appreciate having *Bag of Tricks*. Since this package would be a bargain at anything under $100, it is difficult to understand why it is retailing for $39.95. Better not to ask questions, just take advantage. You can't go wrong. JH

Bag of Tricks, by Don Worth and Pieter Lechner, Quality Software, (6660 Reseda Boulevard, Reseda, CA 91335; 213-344-6599). $39.95.

Time Zone. By Roberta Williams. *Time Zone* is so different in depth and scope from any other computer game, it prompts the coining of a new term: the *microepic*. Written by Roberta Williams over a fourteen month period, this gigantic program contains more than twelve hundred hi-res pictures. When first done, it actually filled twenty-two disks, but through the development of innovative new algorithms, the entire microepic has been crammed into six disks, double-sided. The thirty-nine separate scenarios span historic events and locations from fighting dinosaurs in 400 million B.C. to battling on an alien planet in 4082 A.D.

Billed by On-Line as the "ultimate adventure," *Time Zone* is definitely not for the novice or intermediate level adventurer. Even a veteran expert will be constantly challenged by the complexity and interweaving of the different strands of the game. Only with great skill, and some luck, will the deeper secrets of the game be revealed. Deadly, impassable, traps abound. Each scenario (time zone) is a puzzle in itself. Some scenarios are diabolically deceptive dead-ends, while most scenarios, when solved, yield treasures or tools. These treasures and tools are used, or traded for even more useful items, in other zones.

Finally, when all the other time zones are completely solved and all the right items gathered, the assault on the alien planet of Neburon can begin. This last scenario is so intricate that it resides on two disk sides by itself. On-Line is estimating that *Time Zone* will require from six months to a year for most people to solve, making its $99.95 price one of the best bargains of 1982.

Take heart, though: the game is difficult, not impossible. Well-seasoned logic and accurate mapping skills will enable the intrepid time traveler to advance through the game. Because of the large number of scenarios, anytime you get stumped at one place, there are a myriad number of alternate puzzles to try. You can never get bored! Roberta Williams has checked for historical inaccuracies and designed the game so that, unlike many other adventure games, the solution to each puzzle is not dependent on exact phrasing. This is certainly very refreshing after the latest wave of games that use the obscurer sections of a thesaurus as a crutch to provide difficulty.

Time Zone is not for everyone, but, for the people who do seek the "ultimate" in adventure games, it will stand as a symbol, like the winning of an Olympic gold medal, for many years to come. RRA

Time Zone, by Roberta Williams, On-Line Systems (36575 Mudge Ranch Road, Coarsegold, CA 93614; 209-683-6858). $99.95.

Gold Rush. By Michael Berlyn with Harry Wilker. The Old West is the setting for *Gold Rush*, a lively, new video game that gives you a chance to outwit an assortment of desperadoes who're aiming to kill you and to steal your gold.

As the game starts, a train drops a gold prospector on the edge of a western frontier. Your mission: To guide the prospector to caches of gold in the badlands and to take each one to

mining cars waiting on the other side. You pick up the gold by running over it.

To get the gold, you'll find yourself maneuvering through Indian territory, racing around a fort, and dodging between trees and mountains. You must evade an Indian on the lookout for interlopers, a treacherous soldier, a killer grizzly, and a bothersome, but innocuous, gold bug—officially known as a claim jumper.

When the gold bug collides with you, it will merely steal your gold; the others will take one of your three lives without thinking twice about it. Although you can travel up, down, left, and right, the pursuers have an edge: They can also move diagonally, cutting you off.

Each time you safely transport eight caches of gold, you get a bonus round in which you have sixty seconds to deliver four more gold caches to the mining cars, with a gang of thieving gold bugs hot on your trail. If you're successful, you receive an extra life.

You can get extra points by picking up shovels, picks, and balance scales that appear on the screen. As the game progresses, more attackers will join in the chase, reducing your chances of getting out alive.

After playing maze games that confine you to running inside narrow corridors, it's refreshing to play a game like *Gold Rush,* which lets you roam more freely around the screen.

Tricky maneuvering is required to keep you moving smoothly, especially as you try to circumvent some of the mountains and trees. The program's authors have created a fun and challenging game, giving you freedom of movement beyond that of maze games.

Gold Rush, By Michael Berlyn with Harry Wilker, Sentient Software (Box 4929, Aspen, CO 81612; 303-925-9293). $34.95.

Lemmings. By Dan Thompson. Your town is being overrun by lemmings, those hapless rodents whose fate it is to be inexorably drawn to suicidal leaps over the cliffs and into the sea.

Why, then, should you be concerned with their proliferation, knowing that they themselves are bound to take care of the problem? To be sure, they need only reach a density of sixteen in this town to be overcome by that fatal yearning; at that point all activity stops and the lemmings do their thing. When they do, you lose.

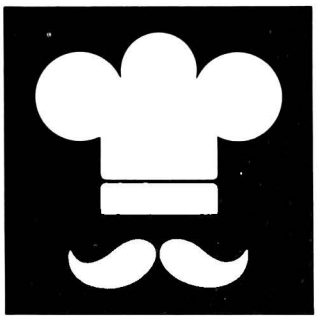
Not so well-known about lemmings—possibly because it may not be so—is their propensity for swift and frequent procreation. Sirius's lemmings (and isn't it appropriate that this game about output should be from the most prolific of game publishers?) have only to pass a lemming of the opposite sex on the street to find themselves in the family way (it can happen to either partner, in a new high in liberation), gestation lasts the merest fraction of a second, and maturity besets the infant equally rapidly.

Your job is to prevent this lascivious activity and thus save your town from the lemmings. The town is made up of rectangular buildings laid out on a crosshatch. Each has doors on all sides. You must lock a pair of lemmings into each house and, of course, the pair must match—girl with girl, boy with boy (assuming those are the varieties lemmings use)—so that no new lemmings will arrive.

When you have filled every house with fruitless lemmings, you have succeeded on that level and can move on to try a more persistent, more prolific invasion. There are eight levels in all; once you've cleared eight, you move on to eight all over again.

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ganization devotes itself to neutering the lemmings you deliver to its truck and practicing euthanasia on lemmings who've become senile. In this strange world, lemmings may become senile at any age; this is an immediately obvious trait; and an encounter with a senile lemming is lethal.

The danger of running into senile lemmings becomes more acute as you reach higher levels. Baby lemmings can turn senile as they mature, or one of two lemmings traveling together can turn, thus masked by the healthy creature.

Lemmings requires more than simple coordination; strategy becomes important on the higher levels. There is no way to stem the onslaught on levels 6 and above by filling each house in a merely methodical manner. Closing all four doors takes time, and up there, there is no time. You'll have to be inventive and fast.

Hi-res animation and color in *Lemmings* is excellent and smooth; sound is weird and doubly adjustable—either lower volume or off. Enjoyable cartoons reward your achievement every few levels.

Lemmings is playable with keyboard, paddles, or joystick. The keyboard works excellently for this game, which uses AZ and the arrow keys for the four directions. Catching and dropping lemmings takes only a tap on the space bar.

To go back to the original point, what's the point? Is your job to save the town from an overpopulation of lemmings? But if the lemmings overpopulate, they run and jump in the sea, taking care of the problem much more efficiently than you can. Is your job to save the lemmings? You're a heck of a savior if salvation means segregation, sterilization, and premature senility.

Oh, well, it sure beats becoming an eyeball and chasing snakes.

Senseless as it is, *Lemmings* is an enjoyable, challenging game that holds up through much play time. Along with *Bandits*, it is the best of Sirius's recent home-arcade offerings.

MCT

Lemmings, by Dan Thompson, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $29.95.

First 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 *First 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.

First 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 the Apple III as well, awaiting the development of a rapid binary sort subroutine.

First Class Mail is a first-rate program for specialized database applications.

ART

First Class Mail, by Bob Schoenburg and Steve Pollack, Continental Software (11223 South Hindry Avenue, Los Angeles, CA 90045; 213-417-8031). $74.95.

Apventure to Atlantis. By Robert Clardy. Ah, the neat, trim lines of another Bob Clardy adventure. No calculation of the odds of fist connecting with chin based on the actuarial numbers for wisdom, charisma, good looks, ad nauseum. Here you don't get constant percentage readouts on how soon you are going to be killed or the rate at which you are dying. Just world-spanning, monster-stomping, fate-of-all-mankind-in-the-balance, meat-and-potatoes adventure fantasy.

In truth, the classical adventure elements are present in *Atlantis* to a greater degree than in *Odyssey: The Compleat Apventure*, its direct ancestor. But Clardy has incorporated those elements into the basic charm of his unique and unmistakable programming style.

At first look, the game is very similar to *Odyssey*. This is, in fact, a sequel. Having completed your quest to gain the Orb of Power, you have now ascended to the throne of Lapour (if you didn't complete the quest, just pretend). Atlantis, stronghold of science gone mad, is busy putting down a lot of bad techno-karma on the pastoral spirituality of Lapour, causing disruptions in the magical fabric of your domain (with a tip of the hat to Ursula Le Guin's *Earthsea Trilogy*). Your mission, should you choose to accept it, is to make the Lost Continent get lost. Permanently.

Emphasis here, far more than in *Odyssey*, is on the magical. Gone are those simple pleasures of bartering for supplies, having to feed a barbarian horde, getting kicked out of a hermit's hovel due to lack of funds, and starving to death in the swamp. There are, however, consolations. You get to select an entourage of sorcerer's apprentices, based on their alignment, wisdom, spell capacity, and other personal qualities, all discernible in advance. This done, the game expands to embrace room exploring, maze wandering, and some fair arcade action, as well.

This is a gamer-friendly adventure-fantasy. It is not possible to get killed unless you are sincerely bent upon your own destruction. Inveterate gamers may consider this unfair: an impurity in the stern adventurer's code. It must be said, however, that when you're veering about with a damaged direction controller after an encounter with an Atlantean ship, praying for an island, then sighting one but being unable to land, then slipping gently beneath the waves with your full complement of wizards and hard-won spells, you are suddenly able to see much that is good in an option to take a fifty-point penalty in lieu of death.

This is not to say that you can step through the scenario in one sitting, completely at ease. Even with a selection of zero reaction time, Atlantean patrols will do unkind things to you unless you do unto them first. On Atlantis, a sort of Etch-a-Sketch function maps out the terrain behind you, but your surroundings become more confusing as they become clearer, Atlantis being in reality a giant invisible maze. (Of the "hazards" on Atlantis referred to in the documentation, this one is to your blood pressure.)

A game this big, varied, and downright agreeable must have its limitations. Much of the artistry of *Atlantis* is in the concealment of the wires and mirrors that make the game seem larger than it really is and facilitate the flow from wizard-recruiting mode to ocean voyage/arcade mode to room-exploration mode. Saving on an island will save the wizards, their spells, and your own character, but you will return to find your inventory empty. Likewise, objects will not travel with you from island to island. Thus, you couldn't "take

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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.

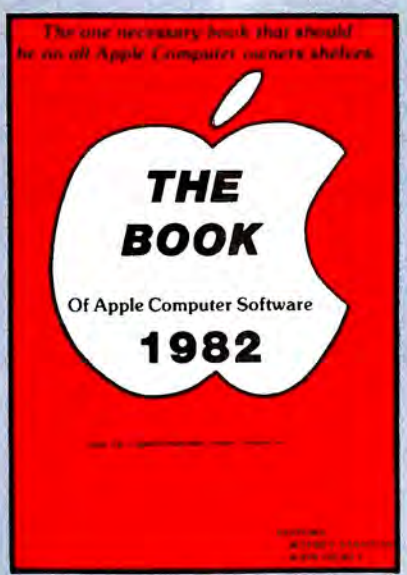
Other pitfalls await the uninformed buyer. For instance, in too many cases you cannot by the appearance of the package whether the program requires Integer Basic or Applesoft Basic or whether it needs 16, 32 or 48K of RAM. It is also often difficult to tell when you purchase a program on tape whether 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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shovel," go elsewhere, then come back later to dig one of your guys out of the avalanche you left him under. It's now or never. You are limited to five wizards and warriors, and your warriors mostly stand around with nothing to do (it's a wizard's world).

What the game does do is as impressive as what it seems to do. The search of the island castles is a complete program in itself, as are the other major modes, each with a significant reward upon completion. On Atlantis, you cut away from the full map to a scene of what you have actually encountered at a given point of interest—a quantum leap over *Odyssey*. The initial ingenuity required to get off Lapour is ingenious, indeed; probably too much so for most. In these efforts, and many subsequent ones, the official hint sheet is a nice courtesy.

If the earthy delights of *Odyssey* have here receded into the background, such is the nature of an evolving culture. We must go forward, concerning ourselves with higher things. *Atlantis* is a worthy successor to its progenitor; preserving many of the original's noblest achievements and adding refinements that in turn promise even greater things in future Apventures. AC

Apventure to Atlantis by Robert Clardy, Synergistic Software, (5221 120th Avenue S.E., Bellevue, WA 98006; 206-226-3216). $40.

Apple Machine Language. By Don Inman and Kurt Inman. True or false: 1) Of the two or three hundred thousand Apple owners, only two have mastered machine language and they're both named Steve. 2) Since there's so much canned software available, the only command you need to know is *PR#6* (and maybe a little Basic), and certainly you don't need any machine language.

Answers: 1) False. 2) False. Try this little experiment. Type *call 65385*. The cursor should change to an asterisk to show that you're in the monitor, that your Apple is not thinking in Basic at the moment but rather will accept orders only in hexadecimal numbers. Now type 300: (that's the number 300 followed by a colon). Then type 20 (space) 58 (space) FC (space) 60. What you have done is to tell the computer to store in memory location number 300 (hex) the number 20 (hex), the number 58 in location 301, the number FC in 302 and the number 60 in 303.

These are the numerical codes that clear the screen. They are the same as the command *home* in Applesoft. Now return to Basic by typing 0G (zero G). Type *call 768* (this is the decimal equivalent of 300 hex, which is necessary because Basic can handle only decimal notation directly). The screen should clear. What you've actually done is to *goto* (code 20) the subroutine located in memory location FC58 (yes, it's backward), which is the *home* subroutine, and then return (code 60).

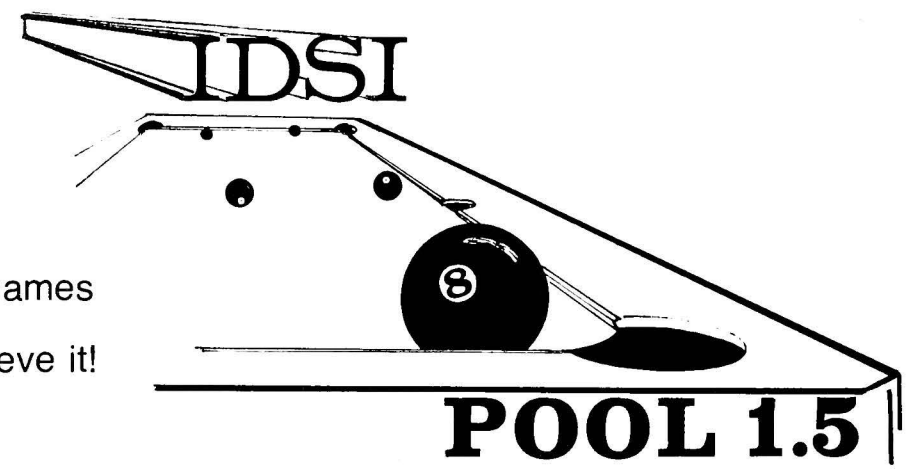
Now purposely make a mistake. Type *call 65385* to return to the monitor. Now type 300:02 which transposes the first two digits in location 300. Now type 0G and then *call 768*, your system should hang and require a reset. No matter what words you type in Basic, all commands must be translated into numbers, and each different number has a different meaning. That's why, when you accidentally type HIME instead of HOME, the Apple won't try to figure out what you meant but instead gives you an error message and forces you to correct the mistake. Precision is paramount. That lesson alone probably makes it worthwhile to learn a little machine language even though you never intend to become a programmer.

While it is difficult to remember each of the numbers that contains an Apple instruction, machine language is conceptually quite easy. Learning it is made much easier by a bridge between Basic and machine language the authors have developed that they call a Basic Operating System (BOS). In the first two chapters, the book develops a Basic program that lets you poke hex numerical commands into decimal memory locations so that you can concentrate on learning machine language commands without worrying about the conversion from decimal to hex. For example, as mentioned above, 20 hex (32 decimal) means the same as *goto*. The machine language command A9 (which happens to be the hex number whose decimal equivalent is 25) tells the computer to store the number that follows it into a storage register called the accumula-

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tor. Using BOS, the newcomer to machine language quickly learns to treat 20 and A9 as commands meaning *goto* and store in accumulator, and can forget the fact that they also happen to be hex numbers that he would count on his fingers and toes as 32 and 25.

Having created this aid, Inman and Inman, very slowly and with lots of repetition in the early chapters, show the reader how to draw lo-res pictures in machine language using only a few two-character commands. Next they turn the Apple into an electric organ that will play up to 255 different tones through the built-in speaker. This one requires only 26 bytes of memory.

After combining the graphics and music programs, the authors abandon BOS, which has served its purpose, and show the reader how to enter machine language codes directly from the monitor (as we did above). They then cover more difficult exercises including machine language arithmetic.

It's a very useful little book. Because its organization is well thought out, it works well as a self-teaching text. You won't become a polished machine language programmer from it—only lots of practice can do that—but you will be able to write small programs in machine language. Perhaps even more important, you will have a much better understanding of how your Apple really works. It requires Applesoft either in ROM (as in an Apple II Plus) or on a plug-in card; this will be sufficient for the first ten chapters. The last two chapters cover the mini-assembler, which is not available for the plus versions, and thus require an Apple II with Integer Basic in ROM and Applesoft on the plug-in card. (UL

Apple Machine Language, by Don Inman and Kurt Inman, Reston Publishing Company, Inc. (Reston, VA 22090; 703-437-8900), 1981, 296 pp., $12.95.

Gin Rummy. By Art Carpet. It's not clear that the Apple market has much room in it for such sedentary entertainment activities as card playing. Instead, the emphasis seems to be on fast-moving, colorful arcade-style games.

But any gin rummy player with a nickel or so left after his purchases of *Labyrinth* and *Bandits* will find nothing but pure pleasure in this latest offering from Art Carpet—his first under the DataMost imprimatur.

Rummy actually offers the player a choice of three games—gin rummy, knock rummy, or an obscure version called one-meld in which most gin strategy is reversed.

Apple as a rummy opponent is clever enough to cast out bait for a card he's looking for, but has a tendency to speculate a little too much to be a topnotch opponent. Nevertheless, he's a formidable opponent in that he'll knock early and catch a human unawares with tons of unmatched tens remaining if the human doesn't pay attention.

As interesting and fun a pastime as *Rummy* certainly is, this is a package equally as interesting for its lessons about the marketplace. *Rummy* is illustrative of the virtue of perseverance on the part of Carpet and of forbearance on the part of the marketplace.

Gin Rummy is actually Carpet's third program. His first, *Cribbage,* was published by Rainbow. While a creditable entry, it was overwhelmed by the flashier *Hi-Res Cribbage* of Warren Schwader. But the experience gave Carpet a taste for the market and he next delivered *Solitaire,* a four-game package under his own Computek label. *Solitaire* was leagues ahead of *Cribbage* in graphics and programming technique, but proved that one-man companies these days have a much tougher row to hoe than those of a couple of years ago.

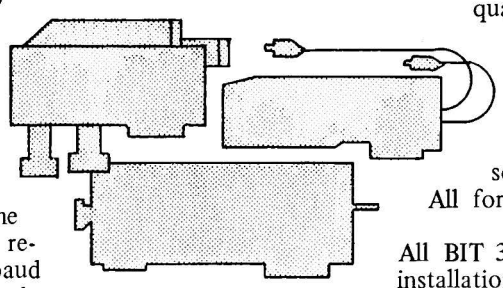
This time all the elements seem to be as favorable as they can get. Carpet has delivered his best effort to date and linked

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it with DataMost, one of the hottest software publishers in recent months. The combination should reward Carpet suitably for his perseverance and ensure that card-playing Apple owners throughout the nation have access to a quality offering.

ART

Gin Rummy, by Art Carpet, DataMost (9748 Cozycroft Avenue, Chatsworth, CA 91311; 213-709-1202). $29.95.

Assembler Teacher. By John Fairfield. This program would seem to offer to do something wonderful: Turn your Apple into a teaching machine, and teach you assembly language the easy way! That's a lovely idea, and quite practical—somebody ought to write such a program, but this program isn't it.

That's unfortunate, because the author knows what he's talking about and explains it clearly and pleasantly. He could probably have written an excellent textbook on the subject, but instead has created a very weak teaching machine. And that's not the worst of it.

The main problem with this program if you're trying to learn assembly language is that it doesn't go far enough. It introduces a few concepts—binary and hex numbers, memory addresses, and a memory map—but it doesn't tell you much about them. Then you're referred to the teacher's manual, where a subroutine from the program is analyzed in detail, just as it would be in a textbook. Then you're sent back to the Apple, where the program tells you something about the five addressing modes of the 6502 (immediate, indirect, indexed, and so on), and demonstrates the *compare* instruction and some of the *branch* instructions.

Then you come to Lesson K, which begins: "There is a whole lot left to learn. Your next step is to get a good assembly language text . . . The texts have many good example programs. Type them in and step them through so you understand exactly what they're doing." It offers a few more remarks like that, and then it ends.

If you take a moment to reread the introduction to the teacher's manual you'll come upon the following statement: "When *Assembler Teacher* is finished with you, you will *not* be a good assembly language programmer, but you will be over the learning barrier and fully equipped to fend for yourself from that point on." (Italics ours.)

Well then, let's consider the program as a machine-assisted *introduction* to assembly language. Is it useful in that form?

Not really. The program does modify your Apple into a kind of teaching device—but instead of an interactive teaching machine, what you get is more like an obsolete filmstrip projector. All the program does is present the text material of the course, one page (screenful) at a time. The so-called teaching program is no more than a textbook on disk. In fact, it's rather less. It turns out to be harder to read, and *much* harder to learn from, than a regular paper textbook.

When you read a textbook, your eye tends to skip around. You reread the paragraph you just finished to make sure it's clear; you check the previous paragraph to see how it ties in; maybe you skip ahead to see where the author is going next. All of this involves *rehearsing* the information you've just acquired, as a psychologist would call it, and it's often a necessary step if you're going to understand what you're reading—let alone to learn from it.

You can't do any of that with *Assembler Teacher*.

And forget about going back for another look at the last screenful you read: the only control options you get, in text mode, are "Hit C to continue, Q to quit." To review the previous page, you have to type Q; then call the lesson back, which will restart it at the beginning; then use C to page through it, until you reach the place you want to review.

Rather than assisting learning, this program *interferes* with learning!

The utility routines that come with the system are convenient and do what they're supposed to, but you don't really need them.

The Apple *Mini-Assembler*, for example—standard on Integer Basic Apples, but omitted from Applesoft II units (you may have it in your system already)—does little more than look up the machine codes for the mnemonics you enter (such as LDA, STA, JMP, and so on), and store them in successive memory locations. That's nice, but if you write your programs out on paper first—and you'd better, or Murphy'll get you!—you can look up those numbers yourself easily enough. Then you can enter them, just as easily, through the Monitor (standard on both Applesoft and Integer systems). This is a bit more work than with the *Mini-Assembler*—but the practice you get will teach you the language faster: and that's why you're here, isn't it?

There's also a routine to display an input byte in five formats (binary, hex, positive integer, signed integer, and ASCII character), which is clever but actually no easier than looking them up on a chart—and you already have such charts in your Apple books.

A memory map routine, that displays what kind of information is stored in each page of your Apple's memory, could have been very useful if only the author had told us how it makes its decisions so we would know how far to trust it; but no such information is included.

And finally, there's the teacher's manual. It's excellent, as far as it goes; but the only part that really teaches you anything is the analysis of a subroutine from the program, which is only five pages long.

Will this program help you learn assembly language? Well, in order to follow it faithfully, you must get a good book and teach yourself from that. So think of it this way: if you are motivated to learn from a book, get one and do so! It's more fun than you might think. If you are not highly motivated, this program probably will not help you.

JR

Assembler Teacher, by John Fairfield Jr., Computer Works, Inc. (Box 1111, Harrisonburg, VA 22801; 703-434-1120). $44.95.]■



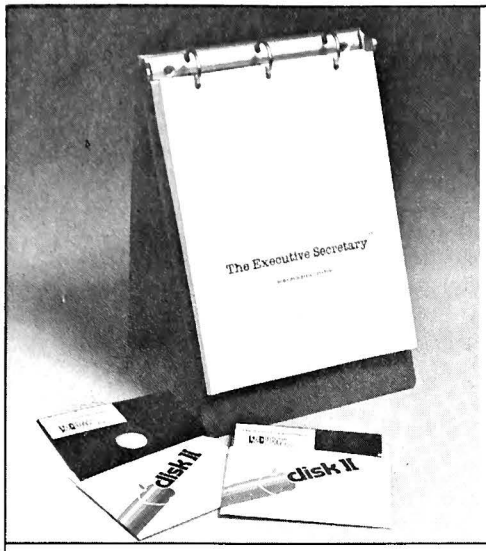
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Richard Bach

from page 82

ger on it precisely—that is what keeps people from doing what they really want to do. And at the same time there's somebody in that little town in Wyoming thinking, 'Gee, I'd like to go to New York City, there would be so many things for me to learn in New York City, but I guess I'll stay right here.' "

Bach spent several summers barnstorming in the Midwest—flying from town to town in his antique biplane and selling rides to the farmers and their kids for three dollars. His adventures were chronicled in *Nothing by Chance*, and in part, in *Illusions: Adventures of a Reluctant Messiah.*

Flight Plan. Looking back now, Bach recalled, the "practical" part of himself rang out loud and clear that his barnstorming adventure would be impossible to carry out. He told himself: "You're going to get yourself sued. You're going to land on somebody's cow. The farmer's going to come out with a shotgun, and your airplane's going to be impounded, and you're just going to be stopped cold. You can't do that. You can't bring 1929 into the middle of 1982.

"I know now that that fear is nonsense," said Bach. "I know that the same fields that were being cultivated for hay in 1879 are cultivated for hay today. Next year they'll be cultivated for corn, but the year after that they'll be cultivated for hay.

"And hay—after they cut it—they don't mind if you land in the hay before it's greened-up again.

"So use your airplane and your common sense and courtesy. Don't land in a money crop. Don't land in the hay where it's starting to grow young again. But if you see the mower and the baler go through, and they've got bales and they've left a little row, then come down.

"Right next to a little town—the town can't be more than fifteen hundred people, two thousand people is getting too big—you circle overhead. You might even go outside the town, do a little loop, a roll, spiral down, and land. People'll come out and they say, 'What's wrong? This airplane's gone crazy and it's in trouble.'

"Soon as they show up you say, 'How would you like to see your town from the air?' And they look at you crazy, and suddenly dim little sparkles come to their eyes, and they say, 'Nobody's landed in that field for forty years, did you know that?'

"And they bring out their scrapbooks, and sure enough, there's an old dusty photograph of an old airplane, landed in that same field. You're aware of the sense of continuity—that you, as a barnstormer, have been part of a tradition.

"This is what I know now. And I filled in my yearnings with things I didn't imagine. I didn't imagine people would bring out chicken salad sandwiches. In wicker baskets. With gingham cloths over them! People saying: 'You've been working hard all day and we just thought you might want some lunch and some lemonade. Stop for a while and sit under the tree with us.'

"I never would have imagined that, but it happens! It happens for anyone who says 'I will try this thing'—whatever crazy thing that we most love to do."

From that learning, according to Bach, our whole view of what this world is can change. "Instead of seeing steely-eyed farmers with shotguns in their hands, I now see, as I look across the Midwest, people with their roots in the same earth I know. They welcome you, if you show courtesy, to land in their fields with the gift you have to give them."

Every once in a while, on those barnstorming tours, some wistful soul would approach Bach, the pilot, with, "Gee, I wish I could go with you. What a life you must have! Up over the horizon! All that excitement!"

And Bach, the free spirit, would answer, "Then come along. I can always use someone to sell tickets. Come on. Let's go. Right now!"

The replies were always the same: If it weren't for my job . . . If it weren't for my mother. If it weren't for this. If it weren't for that.

"I know as we sit here talking, those fields are waving with young hay," he said. "They are available to us if you want.

"You don't have to have a job at a desk in an office. You can if you want to, but, just as easily, you can wake up in the morning and not know where you'll end up by the afternoon. You can base your decision on which direction the wind is blowing."

Bach has abandoned the hay, wicker baskets, and lemonade for the pilots who come after him. There are other things he wants to do now.

"I want to explore this mystical network of the microcomputer and what it has to offer. It's vastly challenging.

"Boot a program. If somebody had said 'Boot a program' to me three years ago, I wouldn't have understood what it meant. 'The disk crashed'—what do you mean—a flying saucer landed in a field?"

In the same way, Bach knows that three years from now, he and Leslie will have new vocabularies, new experiences, new delights, and some new despairs. And from this learning, the author said, comes the power to affect the world in the ways best suited to our individual talents.

Bach makes his contribution through his writing, but he wasn't always a writer. He's the veteran of a number of jobs—none of which he was ever able to hold more than eleven months: mail carrier, motion picture stunt pilot, aircraft riveter, telescope mirror maker, jewelry designer, telephone book deliverer, charter pilot, magazine editor, museum designer, aircraft mechanic, flight instructor, draftsman, and barnstormer.

After all this job-storming, it occurred to Bach one day that he had actually been paid money once for a story he had written while still in high school. An English teacher had bribed the students with an "A" for anyone who would be able to publish a story and get paid for it that semester.

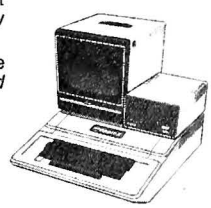
Bach sold a story he had written about telescopes to the Sunday supplement of a local newspaper for $25, minus $7 the newspaper took out of his paycheck to cover the cost of the pic-



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tures they had to take themselves. So with the memory of that success still strong, Bach added "writer" to his long list of careers. It's turned out to be the job he's been able to hold the longest.

Bach said he owes a lot to author Ray Bradbury, who took him under his wing and told him to write lots. Bach did and got lots of rejection slips, including those for *Jonathan Livingston Seagull.*

Not Bad for a College Drop-out. *Jonathan Livingston Seagull* sold more than a million copies in 1972 alone, breaking all records since *Gone With the Wind.* Approximately 24 million copies have been sold to date. *Illusions* (published in 1977) and *There's No Such Place As Far Away* (1979) were also bestsellers; *Illusions* stayed on the *New York Times* bestseller list for almost two years, longer than any book in history.

"A professional writer," said Bach, "is an amateur who doesn't give up."

Author Bach has several other credits to his name: He once beat the MIT chess computer and was told by the staff never to come back again; he challenged Chou En Lai to a Ping-Pong match "to settle the issue" when *Jonathan Livingston Seagull* was banned from the People's Republic of China; He was offered an honorary doctorate at Embry Riddle Aeronautical University, but turned it down in favor of an honorary mechanic's license; and he can also make a mean batch of pan bread.

Bach has just started working on a new book, expected to be his longest one yet. Before he started writing on a computer, Bach said blizzards of notes and tiny scraps of paper were always being lost. He and Leslie now own two Apple IIIs and a II; they needed the expanded memory of the III for the new book and also for the culmination of the forestry battle.

The Bachs praise the Apple III, but in context—and by no means will they endorse the Apple III without reservations—especially for a person who plans to use it for book writing or for converting files from an Apple II. They bought it so they could run the *Apple Writer III* word processing program and, in the process of trying to fashion a working system out of it, just about threw the entire machine out the window along with their frustrations.

They bought a Corvus Systems five-megabyte drive to simulate a huge memory, and then they had worse problems.

"How can Corvus advertise their drive for the Apple III, show photographs of it plugged into an Apple III word processor, and sell it—without any way for the average user to connect it to her or his Apple III—how can Corvus do that?"

Paul Lutus, who wrote the *Apple Writer* word processing programs and is a friend of the Bachs, was able to get the system running. Lutus managed, said Bach, "thanks to some exotic expert's knowledge of both the Corvus and the SOS."

Since then, the Bachs were surprised one evening by a visit from Apple Computer's regional director for their area—surprised especially because their island is difficult to get to.

Apple's representative went over their system carefully. Indeed, the Corvus problems would have to wait for Corvus; but the Apple problems were traced to a minor adjustment needed in one disk drive. The Apple rep made that fix, then discovered an as yet unencountered problem in Leslie Bach's Apple III. Solution? Out of his little black bag, a shiny new III to replace the offending one.

Now, except for the Corvus hookup, temporarily abandoned, the Bach's Apple III systems are running as so earnestly desired.

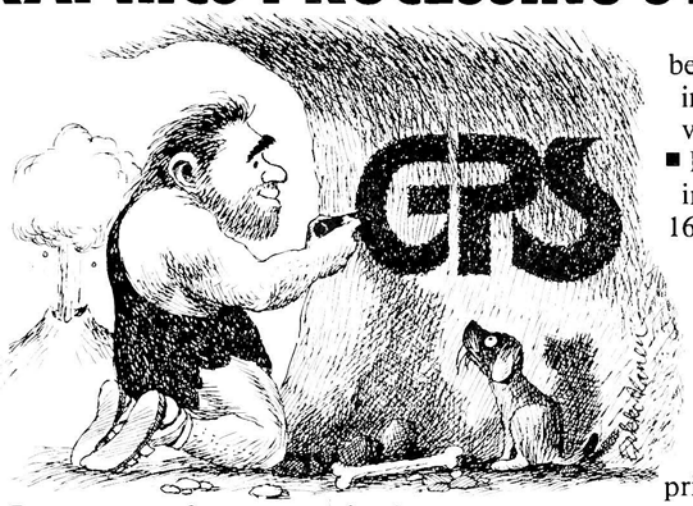
"Our love affair with Apple?" Bach quoted. "It's on, definitely on. They couldn't have gone to more trouble or given us more consideration. We're thrilled."

Lest you're saying to yourself that Apple might do that for Richard Bach, but what if the problems were Joe Blow's? Be reminded that *all* Apple IIIs sold before that machine's problems were solved have been replaced by Apple with new IIIs.

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Bach said it takes much more strength to be an individual who happens to be a woman than it does to be an individual who happens to be a man.

"Women must know themselves so well, that they'll say when they see one of those stupid ads, 'I know those clods are men, and I know they've written this to appeal to men, but I don't care. I need this information. I'm going to walk in this direction and I'm going to accomplish what I need to accomplish for my own learning and for my own development as a human being.' "

And, added Leslie, "We've introduced a number of husband-wife couples to the Apple, and it's always been the woman who uses it more intensely.

"I had somebody put a computer under my nose just once. That's what I'd like to tell all women: Just go put it under your nose just once."

The Bachs realize they have done their share of gnashing and fuming at the problems as well as the advertising problems with Apple and Corvus. But at the same time they realize and unabashedly admit they want so badly to reach out and grasp the world of computing. It's been a stormy love affair, but it's still a love affair.

"We have the capacity within us now, the basic ability to do anything. We are unlimited creatures," Bach said. He believes people are capable now of teleporting themselves from place to place without using our normal modes of transportation and communicating psychically with each other over vast distances and time. Though we may not be doing this as a common practice for a few years yet, he adds, until we unlearn our limits.

"If we are in fact unlimited creatures, we do not have to limit ourselves and our bodies to space and time at all. However, the computer is a mechanical step that makes it so much easier now, making it possible for us to be in touch with those people from whom we have much to learn and to whom I have something to give."

Computers and modems can overcome a great many barriers to communication, he explained. It is communication that can bypass physical appearance and background; instead, everything can be referenced to spirit and intellect: What do you think? Why do you think it? What are your suggestions? How do you approach this problem? Bach even thinks nuclear war would be a simple problem to overcome once enough people with computers were in touch with each other.

"We've always held the ancient idea that a country is defined by physical borders. This petty nationality. There are new boundaries now being drawn through the networks of the computers—what startling nations they are—electronic countries in which citizens are citizens of shared ideals and actions.

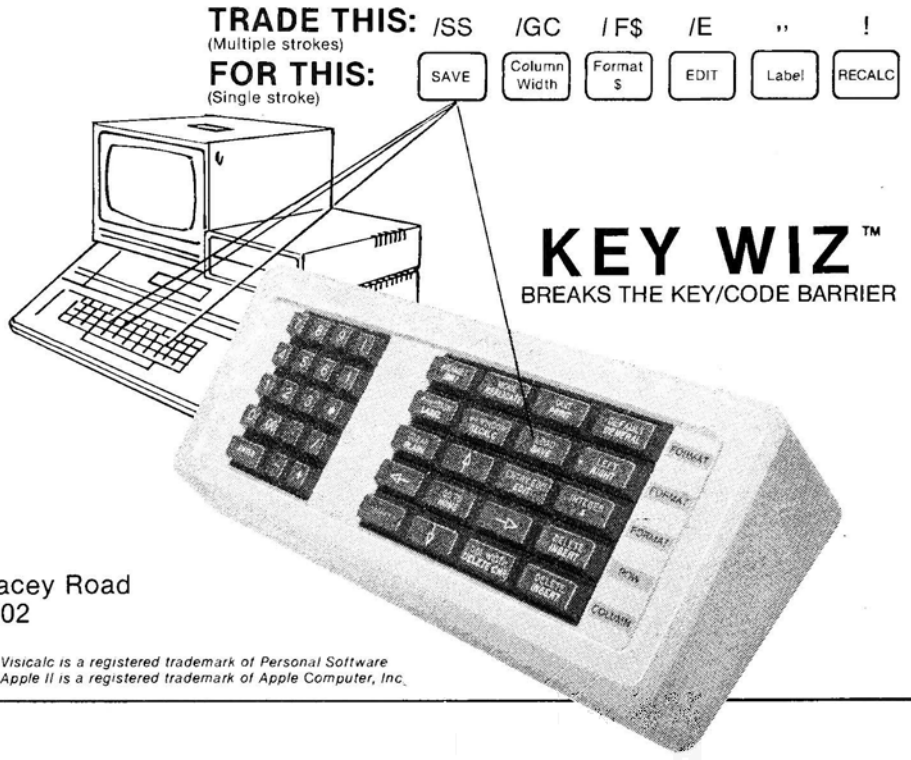
"The only way you can enslave a population is to cut off its communication or to control it. But just the opposite is happening today. And so I breathe a little easier for the future of this country, knowing networks are growing and mushrooming as they are right now."

The only other thing left for us to do then, by the word of Bach, is to seek out our most impractical dreams and grab at those crazy little chances that will spring up unexpectedly in our day-to-day lives. Find a gift to give, dare the adventure, and the wicker baskets and lemonade will be set before us on our way. ◼

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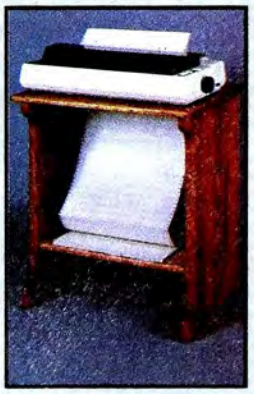
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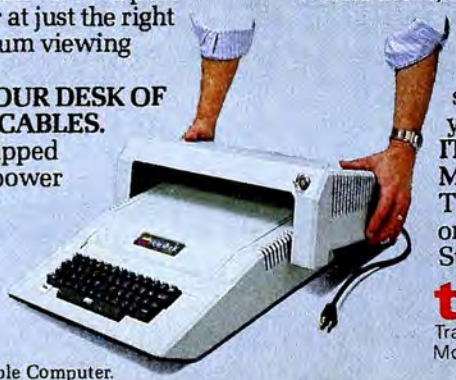


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thing like that."

Such a development appeals to Smith for the simple reason that he is a satisfied *ScreenWriter* customer. He likes the service, the relatively modest asking price, the compatibility of its command format with the IBM 370 and, of course, that soft-set character feature that has allowed him to process manuscripts, text books, presentations and course work in a number of languages.

But that, as the midway barker says, is not all. "*ScreenWriter* is one of the only word processors that will allow you to have a file larger than memory," says Smith. "The only other one that has that feature is *WordStar,* which costs more. Then, too, there's the fact you don't have to invest in an eighty-column board, since *ScreenWriter* provides both upper case and lower case without one."

Smith considers the latter a particular blessing, since it has been his experience 80-column boards give more pain than relief. "They sometimes cause problems with other programs, and you actually have to rewrite some of them when you go into the 80-column mode." As it is, the reinventor of the Chinese typewriter says he prefers to work in 40-column anyway, toggling over to the system's 70-column option whenever he wants to check print formats.

A Combination of Factors. Many who listen to Smith's word processing saga eventually ask the inevitable question: If Chinese is so complicated, why not substitute a simpler, Romanized alphabet? Advocates of Pinyin, as this streamlining approach is called, claim it would modernize the language, making it easier to teach, update, and, of course, computerize. Chinese science students often complain that they spend more time deciphering new characters than they do learning their disciplines. To accommodate such twentieth-century marvels as the computer and the robot, the Chinese don't so much invent a new word as recombine existing characters. The Mandarin term for computer, for example, is "electric calculator."

"The official dialect of Mandarin only has 418 different sounds," Smith explains. "If you go to a Romanized system, it creates a problem, because you have no way of telling what one particular sound might mean. It could have many meanings, like the Romanized sound of 'shr.' It can have forty of fifty different meanings and then when you add the four different tones on top of that, it creates a great many problems."

As Smith and other language specialists point out, the modernization of Chinese is as much a political and cultural issue as a linguistic one. Chinese thought is so bound up with the characters, says Smith, he doubts they will ever be abandoned, as Pinyin advocates within the ruling Chinese Communist Party have learned. It is customary in the West to



think of China as a cultural monolith, but closer examination reveals it is anything but that.

"There are five major dialect groups and they have more spoken differences than French, Spanish, and Italian," says Smith. What holds this nation together, what certifies their Chinese identity, is the written language. It is both their link with each other and the past, a past rich in literary classics that would be lost to future generations if the written language was debased.

The Price of Relevance. The major task as Smith sees it, is raising America's language-consciousness. Foreign language instruction was one of the prime educational casualties of the turbulent sixties. This was a time when people were getting it together, getting relevant, and dropping language requirements in high schools and colleges. The economy had yet to be savaged by the Vietnam war, Ford had its Mustang, and short-sighted accountants everywhere had their bottom lines.

"And then, within a decade, the bottom started falling out. The world was becoming increasingly interdependent, communication satellites were rewiring the globe, and our leader, former president Jimmy Carter, was putting his foot in his mouth in Poland. During a state visit, an attempt to tell the Poles of his eagerness 'to learn your opinions and understand your desires' was rendered historical by a translation that came out, 'I desire the Poles carnally.' "

Such stories might be funnier if they weren't so sad, betraying, as they do, what Smith regards as a serious educational shortcoming. "We're facing the same problem the English faced when they were a world power, the 'I speak English, you speak English' sort of thing. If



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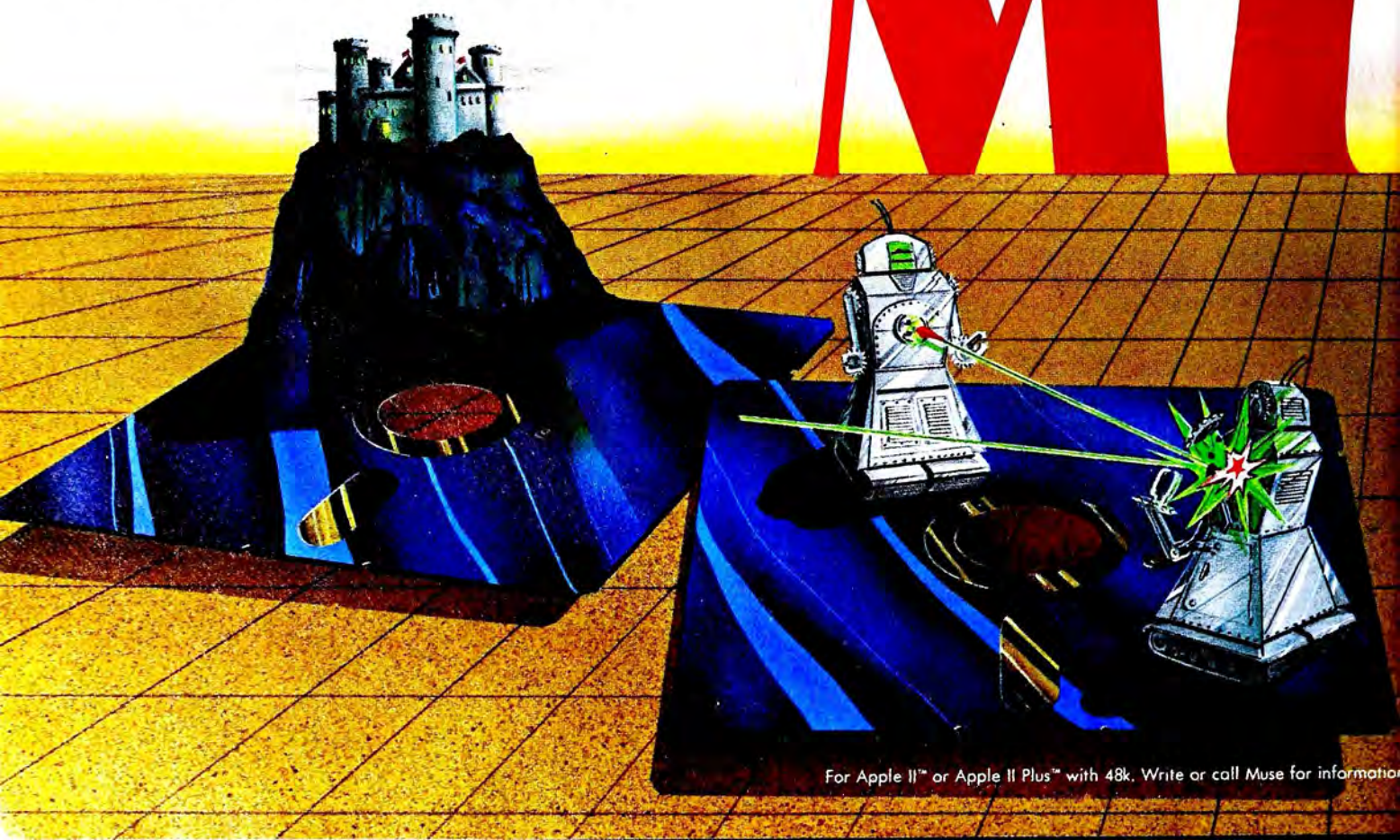
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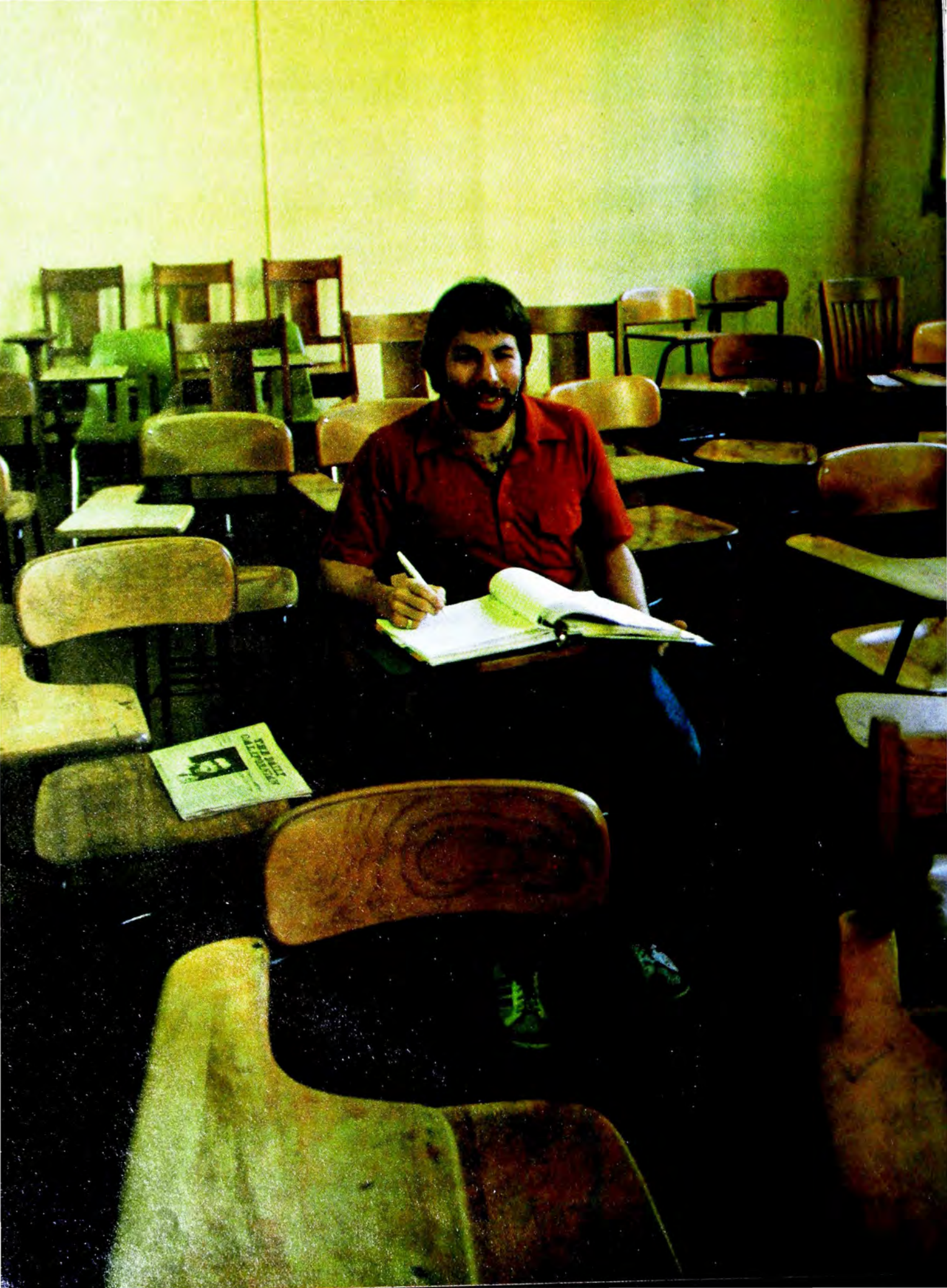
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The Life and Times of Rocky Clark

BY JONATHAN MILLER

Call it fate or opportunity seized, but Apple inventor Stephen Wozniak has a plane crash and a brainstorm to thank for his latest milestones—graduation from the University of California at Berkeley and a second career as a promoter of rock and computer fairs.

As Wozniak tells it, he was at the controls of a private plane about a year ago, flying from San Jose to San Diego to collect the wedding rings for his then upcoming marriage. For reasons still unexplained, the craft decided to merge with Mother Earth just after takeoff, leaving pilot Wozniak with a busted tooth and a busted memory. Five weeks after the fact, the whiz with ROMs and RAMs realized he'd been suffering from amnesia. Even more surprising, it seemed to be just what the doctor of destiny ordered.

Amnesia to Apple to Alias. "Things were pretty intense at Apple back then," the bearded Wozniak explained while dining at a Berkeley pizzeria not far from his off-campus apartment. "They had certain expectations of me and of what and who I am. Also, I had to read memos and go to meetings, and do all this stuff that was fairly easy but time consuming. I wasn't getting down to the problem solving I loved.

"And then I had the plane crash. I'd been off work for five weeks and I said, 'Perfect! There's no way I'm going back. I'm taking a year off and combining it with school.' "

Assuming the alias of Rocky Clark (he has a Siberian husky named Rocky and a wife with the maiden name of Clark), thirtyish Steve Wozniak, merry prankster of blue-box fame, returned to the school he'd dropped out of ten years earlier to pursue his computer passion. He didn't need a degree in computer science and electrical engineering for itself, and certainly not for career advancement, he conceded. But it would be nice, and certainly neat, to be able to tell your kids—he and his wife are expecting a child in September—that you'd graduated from college.

Returning to school after a ten-year absence has been an education for Wozniak in more ways than one. He's found it a lot harder than he figured; he's routinely up until two a.m. and sometimes all night. He's determined that academic computer instruction inhibits creative problem solving and, heresy of heresies, has concluded that computers are not a student's godsend, at least not yet.

"The computer cost me a ton of time in school. I felt that since I have a computer, I have to use it, so I used the word processor for my homework. It was much slower using the computer and that's the truth, and I don't care what anyone says. Computers have to get a lot simpler to use."

Computer Illiterate? According to Wozniak, the culprit is word processing. While his fellow classmates were finishing assignments by hand in a couple of hours, Wozniak was fiddling around with margins, reading proofs, and making corrections, because some words had to be in bold face and some in red ink.

"I went through so much using it that I would spend eight hours where everyone else would spend two. I get every word processor that comes out and no one has written one for the Apple that's any good at all. *SuperScribe*"—*ScreenWriter*—"comes closest. *Format II* isn't close and *Executive Secretary* isn't close and *Easy Writer* is the worst and *Apple Pie* is unusable. Nothing has been any good. *Apple Writer II* is not good even. It doesn't do what *WordStar* does. There are none. You have to go CP/M and I'm mad. Everyone of them claims to be so great. They're all complicated, they're hard, they don't do very much, and they don't work with many printers."

If Wozniak has reservations—to put it mildly—about word processing, he's decidedly more upbeat in his evaluation of his alma mater. Ten years ago, circa the Cambodian incursion when Wozniak was striking snapshot poses beside smoking tear gas canisters, students had only one thing on their minds—the war. Looking back, says Wozniak, it's obvious the war did more than tear the country apart; it distorted college educations as well. Today, swelling ranks of conservative business and engineering majors are positively directed toward, as Wozniak puts it, "earning money for life." The inspirational symbol of Berkeley in the eighties is that of paraplegics and quadraplegics tooling around the hilly East Bay campus in their Jennings motorized wheelchairs—of people, in short, getting on with the business of living.

Changing Subject. Cory Hall, the engineering building where Wozniak took most of his classes this past year, looks very much as it did in 1970, but the instruction in computer science doesn't. The computers were new; now, they've become a part of the bureaucratic problem.

"Back then," Wozniak explains, "they were teaching by saying, 'Here are some problems, find a solution.' They were teaching techniques that would lead you to find a solution. Now they're teaching the complete solution. It's not as creative as it used to be. A lot of good or alternative solutions get passed over."

But Wozniak isn't down on education; far from it. He's an optimist with seemingly boundless faith in the young and in the self-teachability of computer technology.

"The kids are getting so far ahead of people like me," marvels Wozniak. "When you're young, you can learn as many languages as you're brought up with, and computer just happens to be one of them. It's incredible to see so many people get down to the instruction-set level, bit by bit, and understand it so thoroughly. They've learned, they've educated themselves, just by studying what they could and playing tricks with it."

Computers are ideal learning machines, according to Wozniak, because they give you feedback. It's the constant repetition, the over and over, the backtracking on your own, the recovering from errors. "And," he says, extrapolating universally, "repetition seems to be the biggest factor in anything, whether it's winning the Olympics or designing a computer."

An Apple for the Student. For youngsters, the problem isn't designing computers, it's getting their curious little hands on them. Which brings us to Apple's offer to give every primary and secondary school in the country a bright, shiny Apple, provided Congress goes along with a modest tax bill to offset the giveaway partially.

"It's more important for children to get a good education in elementary school, and yet that's where the least money goes," Wozniak stumps. "Universities get tons of donations, fancy computers, and all sorts of tax write-offs that don't apply to lower grades. And that's wrong."

Giving computers away could pay off for Apple one day. To Wozniak, it's merely something he likes doing. An unpretentious multimillionaire if ever there was one, Wozniak is generous with his time and often with his money. His generosity and openness are evident in his development of Apples I and II. He built them for the problem-solving fun of it, to be shared with fellow hobbyists in the Silicon Valley's Home Brew Computer Club. It took the marketing insight of Steve Jobs, Wozniak's partner in pranks and computers, to see the commercial potential.

"I wanted an instruction set I could play with and that's all I wanted," Wozniak recalls of the inception of the first Apple. "That meant a printed circuit board on the floor, some wires connected to a keyboard, and a monitor." When it came to the Apple II, which Wozniak also designed, he still wasn't thinking product, but trying to solve another problem—putting some color on the machine.

Open Roads Go Two Ways. The genesis of the I and II as noncommercial designs proved, ultimately, to be a commercial blessing, since it led to the opening of the Monitor program to would-be software peripheral designers. "We didn't have enough software to write a complicated operating system at this stage," Wozniak says. "Since there wasn't anything in existence, we had to give access to the Monitor." Given his hobbyist disposition, Wozniak would have liked to have seen the III opened through to the Monitor and all the listings given out, but several factors conspired against it—among them, the numerous inquiries concerning weird calls to the Monitor, expected by experience with the II, and a lack of interest in the system's openness on the part of potential business users. Having to concede compromises like this added much to the impetus Wozniak felt to lay back about business and return to school. With the degree as good as gotten, it came time to look ahead again.

The Biggest Bash of All. It was last summer when Wozniak was tidying up academic accounts, taking time to get in touch



with himself and his ideals, that an idea occurred to him and wouldn't rest. Why not combine a computer fair and a musical festival on the order of a Woodstock—sans the drugs, of course, and the ripoffs and the lack of planning? Throw it on a three-day weekend and add activities for participation and you've got just the kind of wild and crazy notion that would excite the public imagination and dyed-in-the-wool computer hobbyists like himself.

The idea soon evolved, with input from promoters and educators, into UNUSON Corporation, founded by Wozniak last August to produce educational computer materials, develop a national data computer network, and run the fair. UNUSON preaches the upbeat technological gospel of the eighties that home and school computers can bring people together by revolutionizing the nation's information and education systems. Its fair in Devore, California, this Labor Day weekend, dubbed the Us Festival, is meant to usher in a new decade of dedication in which computer-literate people, recalling the cadences of John F. Kennedy, will ask, "What's in it for us?" before asking, "What's in it for me?"

"I want to make it big and I'm one of the few people who can do it." Wozniak's excited voice rises above the pizzeria din. "I really don't care about the bottom line. Sure, I hope to break even, but it's got to be done right and it's got to be done well."

By doing it right, Wozniak means having thirty top-name musical groups (rock, country western, and folk—no anti-social punk); attracting upward of a half-million visitors; providing comprehensive facilities for accommodations, including ample power sources and camping facilities; and topping it all off with the biggest computer fair ever. The fair would feature problem-solving competitions between individuals, groups, and brands of personal computers; hardware and software exhibits; and demonstrations of exciting new applications of computer technology in communications, education, small business, music, and ecology.

For hobbyist Wozniak, the paramount concern of the moment—short of finishing his school work—is getting word of the festival out to computer club soulmates and other users. To that end, he is offering *Softalk* readers and other Apple owners the opportunity to make reservations beginning June 1, a month before tickets go on sale to the general public. (See the accompanying announcement for details.)

Simplicity of Things To Come. A lot of calls to the Monitor have hummed along circuit boards since Apple's inception, but Stephen Wozniak remains virtually unchanged. Wiser, of course, but no less committed to the technological gospel that denies the zero sum paradigm that one man's gain is another man's loss.

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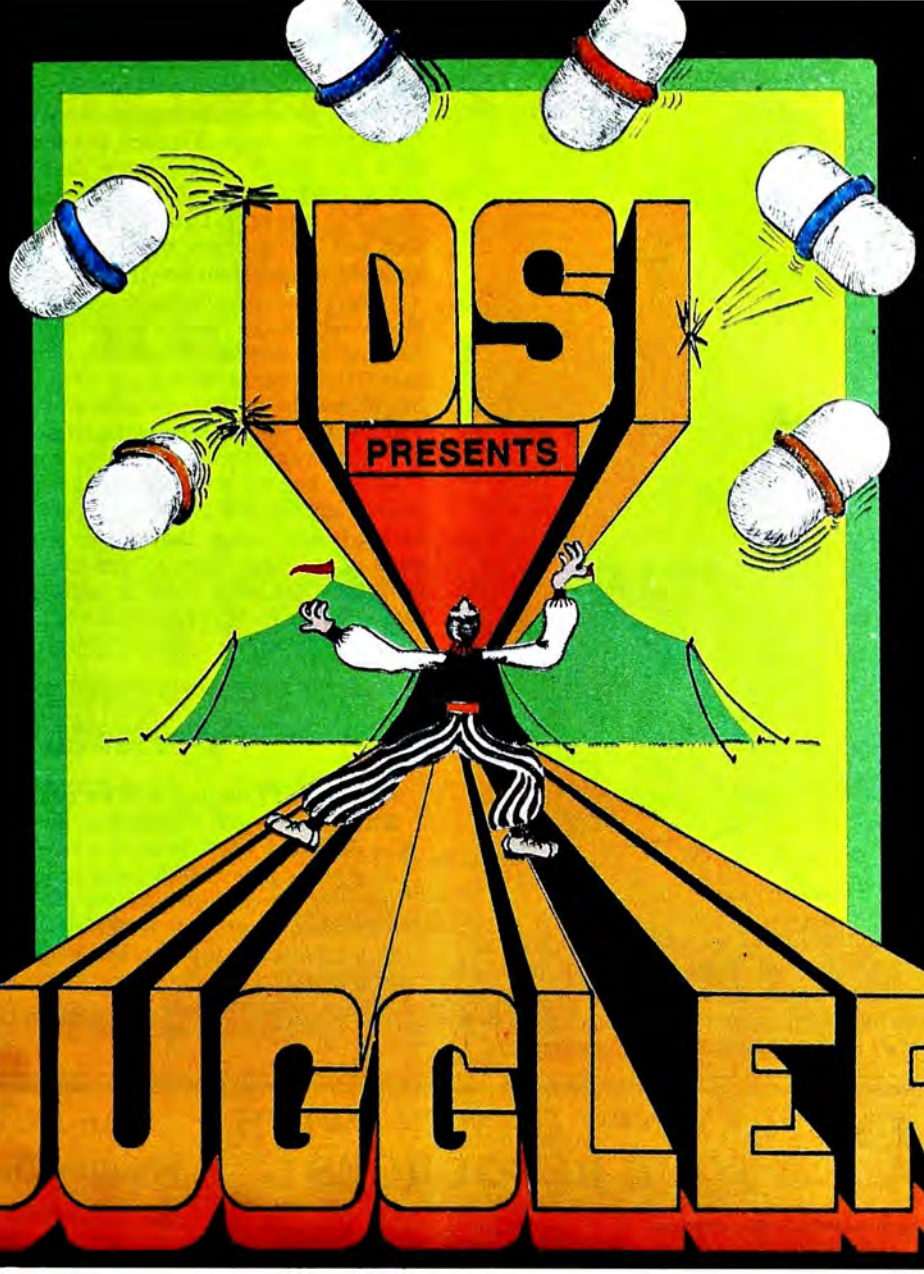
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"A lot of people tend to think that way about everything," says Wozniak, "but I relate to that from a different point of view, that there are a lot of cases of somebody doing something really well, where everyone wins out. I'd say Apple is a good example of that, that technology is benefiting everyone. I think people get rich because they make poorer people richer."

As to the glorious future, inventor Wozniak is playing mum. He's got ideas on software, hardware, and even cpus, but many are off-the-wall type things. "Whatever I do," he confides, "it has to feel good." What will make him feel good, and also sell, he strongly believes, is a product that's a whole lot simpler to use than anything available today.

"Computers have to be easier. Computers aren't easy, Apples aren't easy. They're very hard to use. It's hard to pick up a manual for any major word processor—command this, command that—and that's got to change. I believe Apple's going to be the leader in that revolution. It's going to become so easy, you'll know what to do without reading the manual."

Such breakthroughs may or may not be unveiled at the Us Festival, but for Steve Wozniak 1982 is looking like a very good year. He's turned 1981's plane crash into wide-ranging opportunities, and come the end of September he'll celebrate the birth of his first child. "I get to name the baby if it's a boy," says the man who's toying with Karp, Rocky, and leaning to Clark, as in Kent. "Like I said, I like simple solutions." ◨

Us Festival Tickets

The Us Festival will be held in Glen Helen Regional Park in Devore, California, in San Bernardino County.

Readers of Softalk can reserve choice fair locations beginning this month—one month prior to public sales—by ordering advance tickets from Us Festival, Box 95108-1157, San Jose, CA 95108. Price is $35 for one to three days. Tickets may also be purchased by using the Source #TCW 314.

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THE PASCAL PATH

By Jim Merritt

Tools of the Craft, Part 12

Old Business: Last Month's Challenges. Here's hoping you spent at least part of this past month working on the exercises that were provided for your amusement. Before moving on to anything else, here are solutions to those problems:

1. You were asked to rewrite the function Yes, which we developed last time, to eliminate its dependency on Capital, another function that already dwells within your Pascal tool kit if you've been keeping up with the Path. This was an easy problem (we think); here is one solution, which involves replacing the call to Capital with actual Pascal code that performs capitalization:

```
FUNCTION
  Yes
    :Baalean;
(* Waits for case-independent
  'Y' or 'N' respanse from
  cansale keybaard, and returns
  True as functian value far
  'Y', False far 'N.' <RETURN>
  is taken as equivalent ta 'N.'
  THIS VERSION IS INDEPENDENT OF
  ANY OTHER PROCEDURE OR FUNCTION.
  *)
  VAR
    Ch
      :Char;
BEGIN (* Yes *)
  REPEAT
    Read(Ch);
    (* AT THIS POINT, OLD VERSION INCLUDED
       THIS LINE:
         Ch := Capital(Ch);
    *)
    (* THE FOLLOWING CODE REPLACES THE ABOVE: *)
    IF ((Ch >= 'a') OR (Ch <= 'z'))
      THEN
        Ch := Chr(Ord(Ch) - Ord('o') + Ord('A'));
    IF EOLn (* <RETURN> pressed *)
      THEN
        BEGIN
          Ch := 'N'; (* Was blank *)
          Write('N');(* Blank was echaed by Pascal *)
        END;
  UNTIL ((Ch = 'Y') OR (Ch = 'N'));
  (* Gat respanse, naw repart it! *)
   CASE Ch OF
    'Y':
      BEGIN
        Write('es'); (* Finish "Yes" *)
        Yes := True;
      END;
    'N':
      BEGIN
        Write('o'); (* Finish "Na" *)
        Yes := False;
      END;
  END (* CASE Ch *);
  WriteLn;
END (* Yes *);
```

2. Next, you were challenged to rewrite last month's Echo-ASCII program so that it would cease execution *not* on receipt of an at sign (@), as in the original version, but whenever the user pressed control-C. As you'll remember, the average Pascal program has only one way to determine whether or not the user presses control-C, and that is to read a character and then, if the character read is blank, to examine the value of the built-in function EOF. An EOF value of True at this point implies that the "blank" received by the program actually corresponds to a control-C, the "end of file" character for Apple Pascal's console device. Here's the new version of Echo-ASCII, which uses EOF to satisfy the new specification:

```
PROGRAM
  EchaASCIIVersion2;
(* Reparts the ASCII Integer volue af
   each character typed at the keybaard,
   until user presses cantrol-C
*)
  CONST
    Blank=     ' ';
  VAR
    Ch
      :Char;
BEGIN (* EchaASCIIVersion2 *)
  REPEAT
    Reod(Ch);
    WriteLn(Blank, Ord(Ch));
  UNTIL ( (Ch = Blank) AND EOF (* Cantrol-C *) );
END (* EchaASCIIVersian2 *).
```

3. Finally, we asked the hardy reader to write a program that guesses, using the function Yes in an interactive dialogue, an integer number between 0 and 20 which the user has in

mind. The Guess program, shown below, uses a simple strategy: It starts out by assuming that the user's number can be taken from the entire specified range of numbers. It then asks a series of carefully formulated questions. With each answer, the program is able to whittle the range of possible numbers down to about half its previous size, until the range shrinks to exactly one. That one remaining number should be the one chosen by the user, provided that the user is always honest in answering the program's yes or no questions. (As you'll see, this program recognizes, but tolerates, inconsistent or dishonest users!)

```
PROGRAM
  Guess;
(* Plays a guessing game with the user;
   to see haw ta play, read the WriteLn
   statements in "PROCEDURE Instructians."
*)
  CONST
    LawerLimit= 0; (* Arbitrary restrictian: User's
                      number may nat be negative.
                         *)
  VAR
    UpperLimit, (* User can define initial range. *)
    LawBaund, (* At any time, number cannat be less. *)
    HighBaund, (* At any time, number cannat be mare. *)
    MidPaint (* Of the range LawBaund . . HighBaund. *)
      :Integer;
  FUNCTION
    Capital(Ch
              :Char)
      :Char;
  (* Return Ch, canverted ta upper case
     (capital) if Ch is lower case.
  *)
  BEGIN (* Capital *)
    Capital := Ch; (* Na change unless lawer case *)
    IF ((Ch >= 'a') AND (Ch <= 'z'))
      THEN (* It's a lower-case letter—transfarm it! *)
        Capital := Chr(Ord(Ch) - Ord('a') + Ord('A'));
        (* Otherwise, it's not a lower-case letter,
           sa leave it alane.
        *)
  END (* Capital *);
  FUNCTION
    Yes
      :Baalean;
  (* Waits far case-independent
     'Y' ar 'N' respanse fram
     cansale keyboord, and returns
     True as functian value far
     'Y', False far 'N.' <RETURN>
     is taken as equivalent to 'N.'

     USES FUNCTION Capital, which
     must be declored priar ta
     this functian!
  *)
    VAR
      Ch
        :Char;
  BEGIN (* Yes *)
    REPEAT
      Reod(Ch);
      Ch := Capital(Ch);
      IF EOLn (* <RETURN> pressed *)
        THEN
          BEGIN
            Ch := 'N'; (* Was blank *)
            Write('N'); (* Blank was echaed by Pascal *)
          END;
    UNTIL ((Ch = 'Y') OR (Ch = 'N'));
    (* Gat respanse, naw repart it! *)
    CASE Ch OF
      'Y':
        BEGIN
          Write('es'); (* Finish "Yes" *)
          Yes := True;
        END;
      'N':
```


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```
      BEGIN
        Write('o'); (* Finish "No" *)
        Yes := Folse;
      END;
  END (* CASE Ch *);
  WriteLn;
END (*Yes *);

FUNCTION
  PloyAgoin
    :Booleon;
(* Returns True if user responds in the affirmative
   to invitotion to ploy agoin; False atherwise.
*)
BEGIN (* PlayAgoin *)
  WriteLn;
  Write('Do yau wont to ploy ogoin? ');
  PloyAgoin := Yes;
END (* PloyAgoin *);

PROCEDURE
    Instructions;
  (* Disploy gome's ploying instructians an
     consale screen
  *)
  BEGIN (* Instructions *)
    WriteLn('Yau pick o number, fram 0');
    WriteLn('ta some upper limit that');
    WriteLn('you define, then onswer');
    WriteLn('my "yes-ar-na" questions.');
    WriteLn('If you onswer honestly, I');
    WriteLn('will eventually guess your');
    WriteLn('number.');
  END; (* Instructions *)

BEGIN (* Guess *)
  WriteLn('THE GAME OF GUESS');
  WriteLn;

  Instructions;

  REPEAT (* Ploy one game *)
    WriteLn;
    REPEAT (* Get on upper limit *)
      Write('Your number ronges fram 0 ta what? ');
      Reod(UpperLimit);
      IF EOLn
        THEN (* Skip to next input line *)
          ReodLn
        ELSE (* Keep the screen neot *)
          WriteLn;
      IF (UpperLimit <= LowerLimit)
        THEN
          WriteLn('The high limit must be larger than ',
                  LowerLimit:1);
      WriteLn;
    UNTIL (UpperLimit > LawerLimit);
    (* Initiol ronge, LowerLimit .. UpperLimit is naw
       defined.
    *)
    (* Current ronge is LowBaund .. HighBound,
       first current ronge is initiol range
    *)
    LowBound := LawerLimit;
    HighBound := UpperLimit;

    REPEAT (* Ask question, restrict range by approx. half. *)
      MidPaint := (HighBaund - LowBaund + 1) DIV 2 + LawBaund;
      Write('Is the number less than ', MidPoint:1, '? ');
      IF Yes
        THEN (* Number is in lower holf af current range *)
          HighBound := MidPaint - 1
        ELSE (* it's in the upper holf *)
          LawBound := MidPaint;
    UNTIL (HighBound = LowBaund) (* Only one number passible *);

    (* Commit to o guess. *)
      Write('Is ',LowBound ' yaur number? ');
      IF Yes
        THEN
          WriteLn('I knew it!')
        ELSE
          BEGIN (* User onswers were incansistent, ar
                   even dishanest; still, be palite,
                   or yau might suffer damages *)
            WriteLn('I must hove misunderstood you, then.');
            WriteLn('I lose.');
          END;
    UNTIL (NOT PloyAgoin);
  END (* Guess *).
```

Notice that this program did more than the assignment required, letting the human player specify the upper limit, instead of fixing it at 20. Also, if you enter, compile, and run this program, you'll note that its guessing strategy is somewhat different than that implied by the "sample program output" that was presented as a model for you last time. The program that mirrors that output is less efficient and slightly more difficult to explain than the one shown here. If you took the time to develop a program according to last month's model, and would like it verified, feel free to send a listing. Remember that your program need not conform to the example, a variety of correct solutions were possible. Anyone whose Guess program differs substantially from this one is invited to send a listing for verification and critique. Send all listings to Jim Merritt, in care of *Softalk* magazine.

Advanced Input and Output: Files

If you've succeeded in completing the last batch of exercises, then you've followed the Pascal Path to a mastery of the simplest input and output mechanisms offered by Apple Pascal. To be specific, you can now write programs that use the built-in procedures Read and ReadLn to acquire numeric and character data from the console keyboard, while employing Write and WriteLn to display such data on the console screen. Now, it's time to move ahead and learn to store data on, and retrieve it from, floppy disk, as well as how to move information between your Apple and your printer, modem, or other peripheral devices.

What Is a File? In all but the most exceptional cases, Apple Pascal programs collect input data from (and can also deposit *output data* into) objects called files. According to the classical Pascal definition, a *file* is an indefinitely (but not infinitely) long sequence of data items, all of which share the same data type. For instance, a Pascal file might consist of a sequence of characters, or a sequence of Integers, or a sequence of Booleans, but not a random intermingling of characters, Integers, and Booleans.

Files resemble pipelines insofar as your programs are concerned. You may consider the program as sitting at one end of the pipe, accepting input data as it plops out, one item at a time; or shoving output data into (and down) the pipe, datum by datum. Output data that is sent down the pipeline by a program eventually emerges, in the exact order of transmission, at its final destination. This might be a floppy disk, a hard disk, or the display of a CRT terminal, for example.

The console is treated by Pascal as a file, as is any other interactive input/output device that is hooked into the system. Information on disk is also organized in the form of files. The console device and a disk file certainly have many differences between them, but they have at least one characteristic in common: you can acquire input data from either of them, one unit at a time, *in sequence,* and you can transmit output data to either of them in the same fashion.

To a Pascal program, a file is a variable, albeit one with special properties. Here are declarations for three files, CFile, BFile, and IFile. The type of data each can hold should be obvious from its declaration:

```
VAR
  CFile
    :FILE OF Chor;

  BFile
    :FILE OF Booleon;

  IFile
    :FILE OF Integer;
```

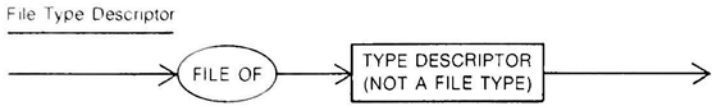


Figure 1.

Pascal syntax to declare file variables is remarkably like plain English. To indicate that a variable is a file containing items of type T, you simply declare it as being a "FILE OF T." The examples given earlier fit this pattern, which is rendered as a railroad diagram in figure 1. Note that a declaration such as "FILE OF T" is a type descriptor, just like the identifiers Boolean and Char, or the enumeration (Red, Yellow, Blue). This means that not only can you declare variables to be files, but you can also declare your own file types. To illustrate this principle, let's declare CFile, BFile, and IFile again. Note that CFile remains a FILE OF Char, BFile remains a FILE OF Boolean, and IFile remains a FILE OF Integer.

```
TYPE
  ChorFile=
    FILE OF Chor;

  BoolFile=
    FILE OF Booleon;

  IntFile=
    FILE OF Integer;

VAR
  CFile
    :ChorFile;

  BFile
    :BoolFile;

  IFile
    :IntFile;
```

Apple Pascal predeclares to file types for you, Text and Interactive. A Text file is exactly the same as a FILE OF Char, and the two type descriptions are synonymous in Apple Pascal. So, whenever you see the identifier Text used as a type descriptor, you may mentally translate it into FILE OF Char, and vice versa. An Interactive file is also considered to be a sequence of characters, but it isn't quite the same as a FILE OF Char. This month we'll study regular Text files, leaving Interactive files and non-Text files until our next excursion down the Path.

Opening Files: Reset and ReWrite. A *file variable* is the mechanism—the "window"—through which you gain access to the data in a physical file. A physical file corresponds to a magnetized area on disk or to an entire peripheral device, such as a printer or modem. Before attempting any access, your program must associate a file variable with a physical file.

The Apple Pascal operating system acts as an intermediary between your program and a physical file. That is, in order to access a given physical file, your program must notify the operating system of its intentions; the operating system—if it can—responds by opening and maintaining the necessary links and communications pathways. All these links and pathways lead into or away from the file variable.

The operating system knows each physical file by its *file name*. You have been using file names ever since we took our first steps along the Pascal Path; these are the names that you give to the Editor in order to recall or store text, to the compiler in order to compile a program, or to the operating system in order to execute a program.

To associate a file variable with a physical file, you issue a call to one of the built-in procedures Reset or ReWrite, whose

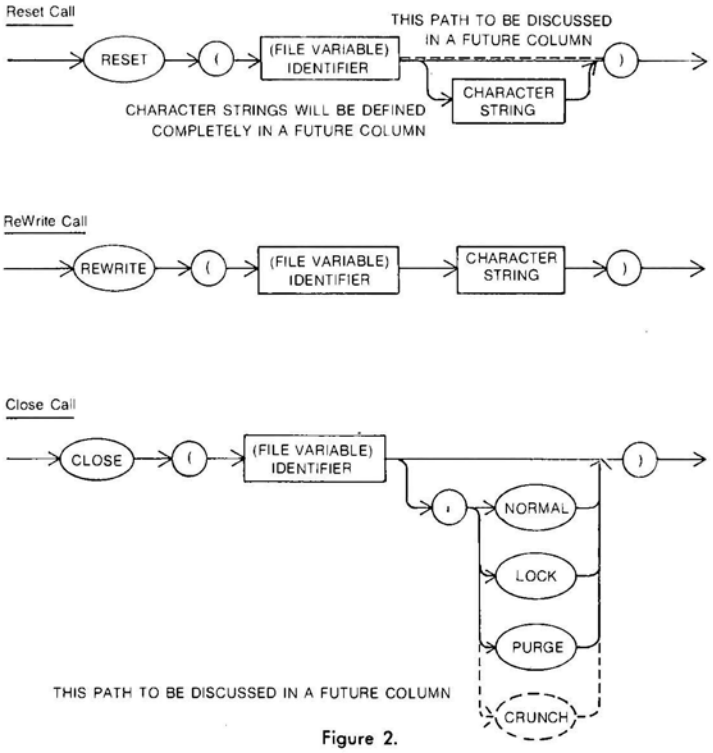


Figure 2.

syntax diagrams are given in figure 2. Either procedure receives two parameters. First is the identifier for the file variable. Second, is a character string. Reset and ReWrite cause the Pascal system to associate the file variable with the physical file whose file name is contained in the character string. This association process is known as *opening* the file. Reset opens an existing physical file, through the specified file variable, for the purpose of input. Once Reset has been called, your program may get data *from* a file. ReWrite opens a physical file, which may or may not already exist, for the purpose of output. If the physical file does not already exist, ReWrite creates it for you. If the physical file does exist when ReWrite is called, it is *erased completely, if possible* (so, be careful when using ReWrite!). After a call to ReWrite, your program may put data *into* a file.

Except in special, highly controlled situations, you should not try to get input data from any file into which you are also writing data, and vice versa. Apple Pascal enforces this philosophy by prohibiting you from reopening a file that is already open. The following code, for example, is illegal in Apple Pascal (though the compiler *will permit it*):

```
(* ILLEGAL PASCAL — RESULTS IN RUN-TIME ERROR *)
  (* Open file for reading *)
    Reset(CFile, 'INDY500.TEXT');
  (* Now, open it for writing, too *)
    ReWrite(CFile, 'INDY500.TEXT');
```

Apple Pascal recognizes this error condition not at compile-time, but at run-time (execution time), and informs you of "I/O Error #12," ("File not closed"). The call to Reset opens CFile. The subsequent call to ReWrite is, to Pascal, another attempt to open CFile. Because CFile is already open (not closed), the second open operation must—and does—fail.

Don't make the common mistake of assuming that there is any relationship between the name of a file variable and the name of the physical file to which it may be associated at a given instant. For example, you may declare Source as a Text variable, but you need not associate it with a physical file named SOURCE.TEXT. On the other hand, you're free to do so, if you wish. The name of the variable and the name of the physical file are entirely independent, in much the same way that the name of an Integer variable remains separate and dis-

tinct from the contents of that variable.

Closing Files. Suppose a program declares a file variable, opens the file, and proceeds to access it. What happens to the physical file when the program ends? We might also ask the same question about the physical file that is associated with a file variable which is local to a certain procedure or function. What happens when the procedure or function ends?

If the file was opened for reading—in other words, if Reset was used to open the file—nothing happens on exit from a procedure, function, or program. The physical file and its contents remain unchanged. However, if the file was opened for writing (with ReWrite), one of two things may happen. If the file was newly created by the ReWrite, it disappears at the end of the procedure, function, or program that uses it. If the file existed prior to the ReWrite, any changes made to it are forgotten; the physical file reverts to the state it was in prior to the ReWrite.

A newly created file, or changes to an existing one, can become permanent only if you use the built-in procedure Close. Close takes as its first (and perhaps only) argument a file variable identifier. An optional second argument determines the fate of the physical file. To illustrate, let's assume you have opened a file variable named FVar. Then, Close(FVar), Close (FVar, NORMAL), Close (FVar, LOCK), and Close(FVar, PURGE) all mark FVar as being closed. This means that FVar is free to be opened again, later during program execution, and may even be associated with an entirely different physical file the next time around. Beyond this, the only difference between these several calls to Close is in the way each handles the disposal of the physical file linked to FVar. As far as the physical file is concerned, Close(FVar) and Close(FVar, LOCK) are identical to no Close at all, as described in the last paragraph. Close (FVar, LOCK) makes a new file—or recent changes in an existing file—permanent. Close(FVar, PURGE) results in the destruction of the physical file that is linked with FVar.

Note that the option names NORMAL, LOCK, and PURGE need not be completely capitalized, as they are shown here. Feel free to use lower case, or a mixture of the two, in specifying Close options.

Old Dogs Learn New Tricks. In a previous jaunt down the Path, we used the built-in function EOF to test for the (logical) end of the standard input character stream, which occurs when someone presses control-C on the keyboard. EOF also works for other files, but to use EOF to check the status of any file, other than the standard input, you must supply the function with an argument: a file variable identifier. For example, EOF(CFile) will be True as soon as the last datum has been read from the physical file that is associated with the file variable CFile.

The built-in function EOLn, and the procedures Read, ReadLn, Write, and WriteLn, also accept a file variable identifier (declared as Text, Interactive, or FILE OF Char) as their optional first—or only—argument. Without it, they deal with the standard input or output; with it, they apply to the physical file that is associated with the specified file variable. They will not, however, work with files that store other types of data (Integer or Boolean, for example). Of the built-in file-oriented procedures and functions we have studied so far, only Reset, ReWrite, Close, and EOF work for *all* files.

Let's look at some examples that illustrate the concepts just presented. Suppose CFile has been declared as type Text. Then, EOLn(CFile) will be True at the end of any text lines within CFile. If IntNum is an Integer variable, then Read(CFile, IntNum) acquires the value of IntNum from the file associated with CFile, while Read(IntNum) acquires IntNum's value from the console. WriteLn(OutFile) sends a blank line to the physical file associated with OutFile. ReadLn(MyFile) forces Pascal to skip to the end of the current line in the file associated with the variable MyFile, then to prepare to acquire subsequent input from the following text line (assuming, of course, that both OutFile and MyFile are declared as Text, Interactive, or FILE OF Char).

A File Lister. Here is a program that lists its own source file:

```
PROGRAM
  Lister1;
(* Disploy the contents of file LISTER1.TEXT
   on the console screen
*)

  VAR
    Source
      :FILE OF Chor;
    Ch
      :Chor;
BEGIN (* Lister1 *)
  Reset(Source, 'LISTER1.TEXT');
  WHILE (NOT EOF(Source)) DO
    BEGIN (* Get and disploy next line *)
      WHILE (NOT EOLn(Source)) DO
        BEGIN (* Get ond disploy next chor *)
          Reod(Source, Ch);
          Write(Ch); (* To console *)
        END (* WHILE NOT EOLN *);
      (* Finish reoding current line *)
        ReodLn(Source);
      (* Show end of line on console *)
        WriteLn;
    END (* WHILE NOT EOF *);
  (* No Close necessory, we were only reoding. *)
END (* Lister1 *).
```

Let's look closely, to see how Lister1 works. First, it calls Reset, to associate the file variable Source with the physical (disk) file "LISTER1.TEXT." Reset assumes that "LISTER1.TEXT" exists; if you give the source program file a different name and do not change the Reset call accordingly, Lister1 may fail in its attempt to open Source, and you will receive an error message. Once Source has been opened, Lister1 can get at the text that is stored in the physical file by going through Source. From this point on, Lister1 simply scans the file, line by line (and character by character within a line), displaying each character on the console screen in turn until the scan reaches the end of the file. This strategy is embodied in two WHILE-loops, nested one inside the other.

The body of the first loop corresponds to the acquisition and display of an entire line of text from Source, and is repeated so long as the end of the Source file has not been reached. The body of the inner loop gets a single character from Source and sends it to the console screen so long as the end of the line has not been reached. When the end of line occurs, the inner loop terminates, a call to ReadLn is issued in order to ready the program to read from Source's next text line, and the console's cursor is positioned at the start of a new display line by virtue of the call to WriteLn.

Exercise

Write a program named CopyText that copies the text in some physical file (for example, LISTER1.TEXT) into a physical file named CLONE.TEXT. After your program is finished, you should be able to access CLONE.TEXT with the screen Editor. Next month's Pascal Path will include a version of CopyText. Before you sit down at the keyboard to write this program, consider the following points:

1. You will need to use file variables to solve this problem; how many are necessary, and what should their type(s) be?
2. How should you open each of the file variables? Should you Close any of them? How?
3. Can you use previously developed programs to solve part or all of your problem? If so, which, and how easy will it be to adapt it (or them) to the task at hand?
4. Do you anticipate ever again using CopyText, or a program like it, perhaps on behalf of a different set of files? Might you ever need to include a file-copying function within a larger program?

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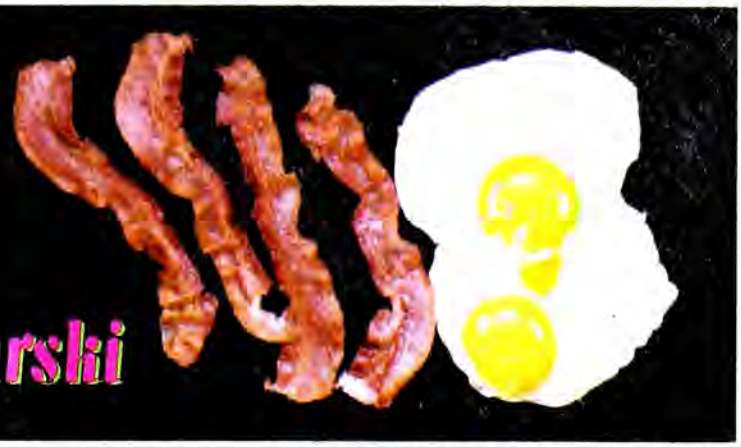
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Graphically Speaking

by Mark Pelczarski



Applesoft Basic has some nice built-in commands for using hi-res graphics. Although they're described in the Applesoft manual, a little repetition doesn't hurt.

Each example used in the manual has a line number, as it would appear in a Basic program. The line numbers used are arbitrary, though. All the commands can also be used without line numbers as direct commands, so you don't even have to write a program to draw on the screen.

The command *hgr* sets the display to show whatever is in the hi-res page 1 memory area (addresses 8192 to 16383). It also clears the screen (sets all values in that address range to zero) and sets a pointer that tells all subsequent hi-res commands to draw on page 1. The syntax is:

```
10 HGR
```

Another command, *hgr2*, sets the display to show what's in hi-res page 2 (16384 to 24575), clears the screen, and sets the draw pointer to page 2. You'd type it:

```
10 HGR2
```

Hcolor sets the color of subsequent *draws* and *plots* to the hi-res screen. Colors are:

0—black	4—black
1—green	5—orange
2—violet	6—blue
3—white	7—white

Remember that white and black have twice the resolution of the other colors (280 dots across, as opposed to 140), and that colors from the left column may affect colors in the right column (and vice versa) when positioned close together horizontally (within the same byte). Here's how you set color:

```
20 HCOLOR = 5
```

Hplot x,y sets the point x,y to the current *hcolor* (the last one specified with an *hcolor* command). Since *hcolor* sets only a single point, though, either white will appear as a different color. White3 will appear green if x is odd, and violet if x is even, and white7 will be orange if x is odd, and blue if x is even. X can be from 0 to 279, with 0 being the left edge of the screen and 279 the right edge, and y can be from 0 to 191, with 0 the top and 191 the bottom of the screen. Any arithmetic expression can also be used for x and y, as long as the resulting values are in the ranges given. If not, you'll get an error in the program.

```
30 HPLOT 30,120
40 HPLOT R*2, (T-5)/3
```

Hplot x1, y1 to x2, y2 draws a line from point x1,y1 to point x2,y2 in the current *hcolor*. The same restrictions apply to the range of the x and y values as in the *hplot x, y* command. The color restrictions of the Apple show when lines are vertical or near vertical. If both x values are the same and the *hcolor* is white, you'll get the same color results as explained with *hploting* a single point. If you try to draw a vertical orange or green line with the x value even, nothing will happen (since orange and green only appear in odd columns). Likewise, if you try to draw a vertical blue or violet line in an odd column, it won't work. Lines that are near vertical will often appear broken or in multiple colors for the same reasons.

```
35 HPLOT 5,10 TO 260,180
40 HPLOT 2*D,5+F TO 3-N,L/2
```

Hplot to x, y draws a line from the last point specified in a previous *hplot* command to x,y. All the above comments about *hplot* commands apply.

```
45 HPLOT TO 45,50
50 HPLOT TO A+19,B-8
```

The above Applesoft commands just outlined take care of setting the individual bytes in the hi-res screen area appropriately. Considering the examples in last month's column, in which we were *poking* values into various bytes of the hi-res screen, this is a real nice convenience. There are several hi-res commands dealing with Applesoft shape tables, too, but we'll talk about those later. In the meantime, here are a few program examples that use the *hplot* commands.

The programs in figure 1 all draw a rectangle on hi-res



```
10 HGR
20 HCOLOR = 7
30 HPLOT 10,10 TO 250,10
40 HPLOT 250,10 TO 250,150
50 HPLOT 250,150 TO 10,150
60 HPLOT 10,150 TO 10,10

10 HGR
20 HCOLOR = 7
30 HPLOT 10,10
40 HPLOT TO 250,10
50 HPLOT TO 250,150
60 HPLOT TO 10,150
70 HPLOT TO 10,10

10 HGR
20 HCOLOR = 7
30 HPLOT 10,10 TO 250,10 TO 250,150 TO 10,150 TO 10,10.
```

Figure 1.

screen 1 in white. If you try them, note that the vertical lines will not appear in white. Try changing white7 to white3 to see the results. Each program uses a slight variation on the *hplot* command to achieve the same result. Note that the usage in the third of the examples is legal and works just fine.

Use of the *hplot* command also lends itself well to use of *read* and *data* in Applesoft. Figure 2 shows first a program for obtaining the same results in figure 1, then shows a program for a more complex figure. Notice that the variable *I* is a counter for the number of line segments used, and that the coordinates and the endpoints of the lines are put sequentially in the *data* statements.

If you're into mathematics and want to play around a little with the coordinates, you can even read them into an array and perform some functions on them before plotting. For a few examples, see figure 3. A GOSUB was used for plotting the figure so that it wouldn't have to be repeated for each example. In lines 100 and 140, you may want to try some other mathematical functions, even things line *sin* and *cos*. The only restrictions are that the results must be in the range 0 to 279 for x, and 0 to 191 for y.

```
10 HGR
20 HCOLOR = 7
29 REM Reod ond Set Starting Point
30 READ X,Y
40 HPLOT X,Y
49 REM Reod Endpoints ond Draw Lines
50 FOR I = 1 TO 4
60 READ X,Y
70 HPLOT TO X,Y
80 NEXT I
90 DATA 10,10, 250,10, 250,150, 10,150, 10,10

10 HGR
20 HCOLOR = 7
30 READ X,Y
40 HPLOT X,Y
50 FOR I = 1 TO 37
60 READ X,Y
70 HPLOT TO X,Y
80 NEXT I
90 DATA
   12, 5, 11, 4, 8, 4, 6, 6, 6, 7, 7,
   8, 4, 11, 3, 13, 3, 16, 4, 18, 6,
   20, 8, 21, 7, 21, 5, 22, 7,
   23, 9, 23, 9, 21, 10,
   23, 12, 23, 13, 22, 12, 21, 10,
   21, 12, 19, 14, 16, 14, 13,
   13, 10, 8, 11, 15, 7, 12, 5,
   8, 11, 7, 8, 6, 12, 6, 17, 8,
   21, 10, 21, 12, 17, 12, 12, 8, 11
```

Figure 2.

There are other handy-dandy commands you can use from Basic to affect what's happening on the graphics screen. The most common is *poke −16302,0* (example: 20 POKE −16302,0), which clears the text from the bottom of the screen after you use *hgr*. To get the text back, use *poke −16301,0*. This is virtually irrelevant when you use *hgr2*, since the four lines of text at the bottom of the screen are associated with page 1 of hi-res graphics. To try it out, use *poke −16302,0* as line 15 of any of the sample programs above.

Another command that you may find useful is *call 62454* (example: *30 call 62454*). This clears the screen to the most

```
10  HGR
20  HCOLOR = 7
30  DIM X(5), Y(5)

39  REM Reod the Endpoints
40  FOR I = 1 TO 5
50  READ X(I), Y(I)
60  NEXT
70  DATA 10,10,25,10,25,15,10,15,10,10

79  REM Draw it Normol
80  GOSUB 500

89  REM Ploy with the Endpoints ond Draw it Agoin
90  FOR I = 1 TO 5
100 X(I)=X(I)+30 : Y(I)=Y(I)+5
110 NEXT
120 GOSUB 500

129 REM Ploy some more...
130 FOR I = 1 TO 5
140 X(I)=X(I)/2+50 : Y(I)=Y(I)*2
150 NEXT I
160 GOSUB 500
170 END
499 REM This Subroutine Drows the Four Lines Specified
    by the Current Endpoints in the Arroys
500 HPLOT X(1), Y(1)
510 FOR I = 2 TO 5
520 HPLOT TO X(I), Y(I)
530 NEXT I
540 RETURN
```

Figure 3.

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recently *hploted hcolor*. Since the *hgr* commands clear the screen to black only, this is a way to choose a different background color. To try it, use the following in any of the examples:

```
18 HCOLOR = 6 : HPLOT 0,0 : CALL 62454
```

A couple of other *pokes* affect the hi-res screen, and may be useful at one time or another. They are listed here only for reference—if they don't sound useful to you now, just ignore them.

You can use *pokes* to switch between hi-res graphics and text without clearing either screen (the hi-res graphics screens and the text screen are independent and are always updated in memory, even though they may not be displayed at the time). *Poke −16303,0* switches from graphics to text mode, and *poke −16304,0* switches from text to graphics mode. Neither clears the screen memory. Examples of using these are the hi-res adventures from On-Line Systems and Adventure International that let you switch between viewing the text descriptions of a location and the hi-res picture of a location without erasing either screen.

You can also switch between the two pages of graphics without erasing; *poke −16299,0* switches from page 1 to page 2, and *poke −16300* switches from page 2 to page 1.

Some good reference material to keep on hand for the various graphics *pokes* and *calls* are the *Applesoft Reference Manual,* pages 131-134, and the *Apple II Reference Manual,* pages 12 and 13. You'd have to be crazy to memorize all the various numbers to *peek* and *poke,* so it's nice to keep these within arm's reach.

Machine Language Entry Points for Applesoft Graphics Routines. This is a bonus for bit-flippers who want some information that's not in the manuals:

For those of you who tinker in machine language and who are getting itchy to try out some machine-language graphics, here are the access points for the Applesoft graphics routines. The hi-res line routine comes in handy when you don't want to write your own . . . or when you don't have the space for one.

Command	Equivalent JSR
HGR	JSR $F3E2
HGR2	JSR $F3D8
HPLOT	JSR $F457

needs Y value in accumulator, X-low in X register, X-hi in Y register.

HPOSITION	JSR $F411

sets the starting point for a line, as does *hplot*, without actually plotting a point. *Hplot* or *hposition* must be used to start drawing with a new *hcolor,* and should be used before the first *hplot to*. Y-value goes in the accumulator, X-low goes in the X register, and X-hi goes in the Y register.

HPLOT TO	JSR $F53A

takes Y value in Y register, X-low in accumulator, X-hi in X register.

H-res Clear	JSR $F3F2

clears the hi-res screen to black.

Background Set	JSR $F3F4

clears the hi-res screen to the color in the accumulator. Instead of 0-7, use 00, 2A, 55, 7F, 80, AA, D5, and FF. These are the hex values that correspond to the various bit masks used for the colors. You can actually use any value, but you'll get different color results.

A couple of locations that are of interest are E4, which holds the current *hcolor* value, as above, and E6, which tells which hi-res page to draw on. The latter is useful for changing the page on which drawing is done without actually displaying it. Changes can be made on the hi-res screen that's not displayed, then you can use the switch to show that page while drawing on the other (the hex values for those switches, given in decimal as −16300 and −16299 in the main article, are C054 and C055). E6 contains $20 if hi-res page 1 is being drawn on, or $40 if hi-res page 2 is in use. In Basic, you can use *poke 230,32* and *poke 230,64* for the same results. ∎

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A12:	Activity	E:12	Booleon
A13:	Poths	E:13	Logic
B12:	Total	F:12	Criticol
B13:	Doys	F:13	Poth
C12:	Booleon	A:17	" 1-2-6
C13:	Logic	A:18	" 1-3-4-6
D12:	Boolean	A:19	" 1-3-5-6
D13:	Logic		

Note that you need to include the quotes with the last three labels, so *VisiCalc* won't treat them as values.

In order to fill in the total days column, we must add the activity days and trans time for the activities in each path. Here are the formulas:

B15:	+B5+C6+B6+C10+B10
B16:	+B5+C7+B7+C8+B8+C10+B10
B17:	+B5+C7+B7+C9+B9+C10+B10

There should be forty-three days for each path. (Now you understand the need for twenty-one activity days for activity two; to ensure there is no single critical path yet.

The Boolean logic columns are the place where we will set up the information we will need to determine the critical paths. It may seem as though you could simply use the path with the largest number in the total days column to determine the critical path (and you could, more about this later!). But, because there are three possible paths, we can't do a simple single comparison. In addition, there may be more than one critical path. Look at the model now. The total days column shows there are *three* critical paths.

In columns C and D, we'll do comparisons. In column E we will compare columns C and D. All this sounds a bit complicated, but it isn't; this procedure demonstrates a method of using Boolean functions.

C15:	+B15>=B16

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We entered a logical operator that asks whether the value in B15 is greater than, or equal to, the value in B16. If B15 is greater than, or equal to, B16 the cell will return *true*. If B15 is less than B16 it will return *false*. Do the same for the other paths:

C16:	+B16>=B15
C17:	+B17>=B16

The second Boolean logic column is similar to the first. The first column compared the total days for each path against another path. The second column compares the total days against the third path.

D15:	+B15>=B17
D16:	+B16>=B17
D17:	+B17>=B15

In the two columns, we have compared each path against the other two. Now it is time to compile the information in both columns to help determine which paths are critical. We will use the @AND function to compare the values in the other two columns. If *both* columns are true, the @AND function will also return true, indicating that the path is critical. If one of the cells is false, the function returns false because there is another path that takes more time.

E15:	@AND(C15,D15)
E16:	@AND(C16,D16)
E17:	@AND(C17,D17)

This has been a good way of learning to understand Boolean functions, but it has limitations. If you build a PERT chart with twenty or more activities, you will go to a lot of trouble determining critical paths using this method. There is an easier method that can be used in a PERT chart with any number of activities (limited by *VisiCalc*'s memory of course).

The purpose of using the Boolean functions in columns C, D, and E is to determine if there was more than one critical path. We know that the critical path will be the path or paths with the maximum number of total days (as shown in column B). By using the @MAX function we can determine what the total days for the critical path will be. We then use the logical operator = to compare each path against the @MAX value and thus determine all critical paths. For example, the formula @MAX(B15 . . . B17)=B15 replaces the formulas in C15, D15, and E15. Each formula that returns true denotes a critical path.

With a large number of activities it is better to enter the @MAX in a separate cell and then compare each activity against that cell (for example, B18=B15). If you have to add or delete activities in the future, you will only have to change the @MAX range in one cell.

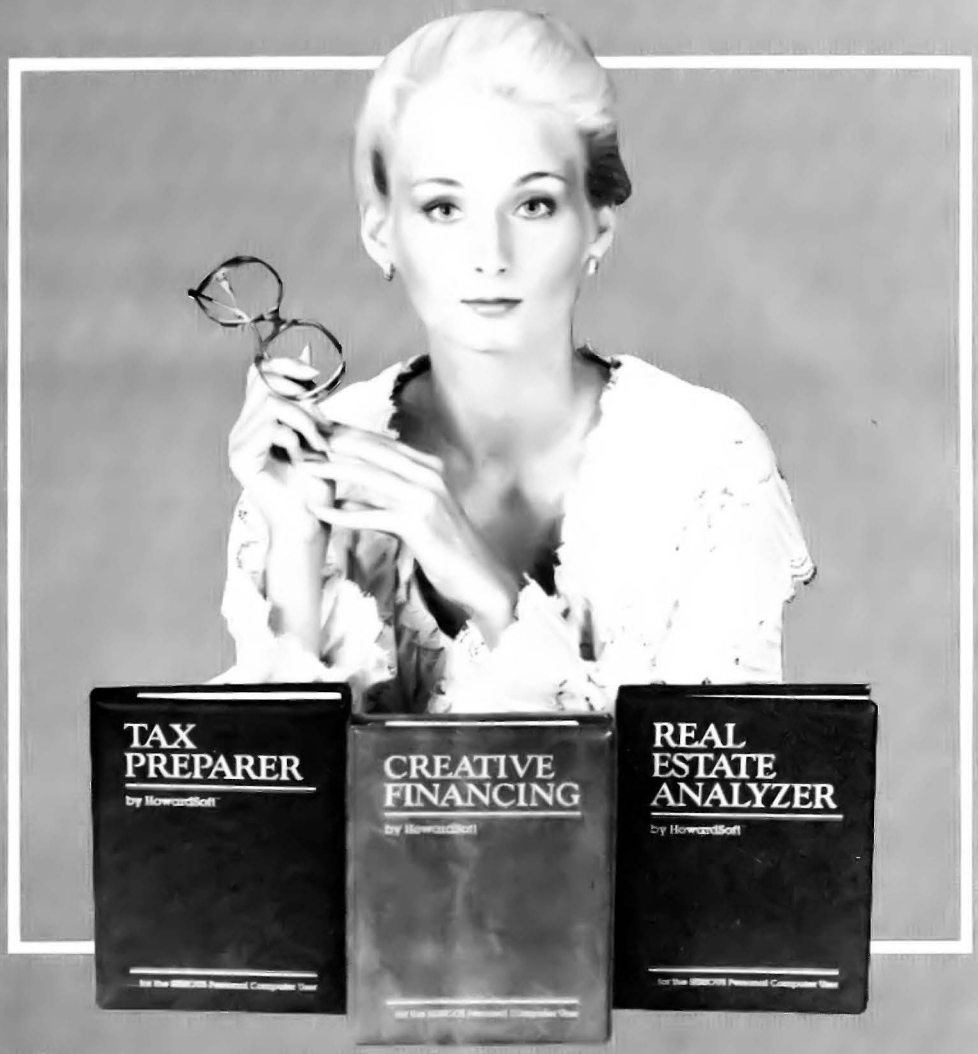
There is also an easy method of determining which of the individual activities are critical. You can determine critical activities by finding those activities with the minimum activity slack days. When we complete the activity slack column later in this article, you will be able to use the @MIN function on that column and then use the logical operator = to again determine critical path.

You can then use the method below to display graphically the critical path and/or each individual critical activity.

Displaying the Critical Path Graphically. It is a simple matter to display the critical path graphically.

F15:	/F*@IF(E15,20,0)
F16:	/F*@IF(E16,20,0)
F17:	/F*@IF(E17,20,0)

All three cells have asterisks indicating that all are critical paths. If you change the values in the activity days column (with the exception of activities one and six) the graphic indicators will change to show the critical path. Changing the activity days for activities one and six won't affect the critical path because they are on all three paths. Changing either of them will affect the early complete date, however. Experi-



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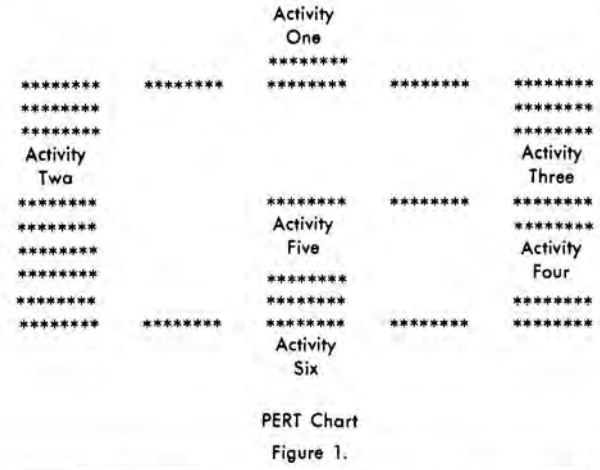
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PERT Chart
Figure 1.

ment with the critical path indicators. After experimenting, ensure that cell B6 has a value of twenty-one and the remaining cells have values of ten.

An interesting note: the formulas in column F could combine the functions in columns C, D, and E. The formula in F17 would be @IF(@AND((B17>=B18), (B17>=B19)),20,0).

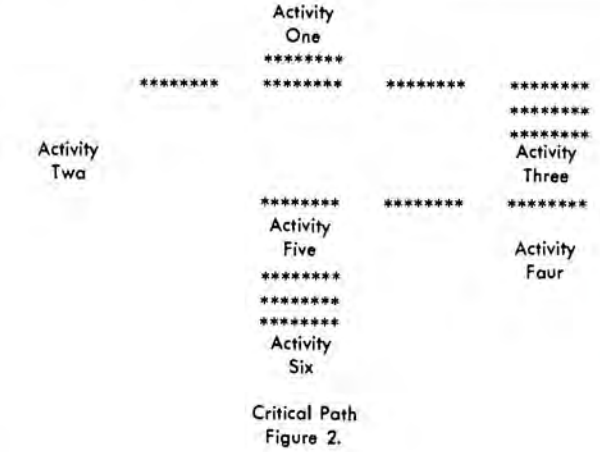
You can probably see how difficult it might be to find any problems in this formula. It is better to complete the problem solving in a number of different cells, as we have done, and later combine the functions into a single cell if you desire.

If you look at last month's article you will see how we completed a graphic representation of the PERT chart (similar to figure 1) with the critical path graphically displayed. If you want to complete another graphic PERT chart, you can use *VisiCalc*'s graphics to draw the activity paths by replicating the formulas (*replicate* with no change) in cells F15, F16, and F17. The only difference will be in those cells that indicate more than one path (for example, the path between activity one and activity three).

The formula used in the common cells for paths 1-3-5-6 and 1-3-4-6 is: @IF(E16,20,0)+@IF(E17,20,0). It is nothing more than the addition of the formulas for the two individual paths. If you had a third path, as you would just prior to activity six, you simply add the formula in F15 also.

If you want to try something interesting with the @IF formulas used to indicate the paths, find a free cell outside the PERT chart and enter 1. Replace the 0 at the end of every @IF statement used to indicate the paths, with the cell coordinate of the value 1. An example would be: @IF(E16,20,K10). Now, whenever you have a critical path displayed, the remaining paths will be indicated by a single asterisk in each cell. If yo' want more or less asterisks simply change the value 1.

Figure 1 shows a graphic representation of the complete PERT chart. Figure 2 shows the same PERT chart with a critical path displayed.



Critical Path
Figure 2.

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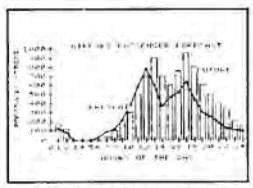


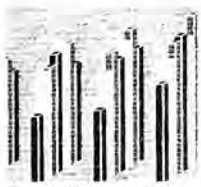
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Project and Activity Slack. Last month we learned that project slack is the difference, in days, between the estimated completion of a project (early complete) and the required completion date (late complete). Activity slack is the excess (or free) time that an activity has before it becomes part of the critical path. It is the difference between the early complete and late complete dates for an activity. To compute the project slack, enter the following:

B19:	PROJECT
C19:	SLACK
D19:	+G10−F10

The project slack is five days. We can check the accuracy by subtracting the early start from the late start. Enter at D20 the formula +E5−D5. The values at D19 and D20 should be equal.

There are many forward references (see last month's article for an explanation) in this template. To ensure that all the values in the template are accurate, press ! four or five times every time you enter a new value. If the values in D19 and D20 are still not equal, recheck the rest of the formulas in the template.

Enter activity in H2 and slack in H3. In the cells in column H enter the late complete cell minus the early complete cell. For example, at H5 enter the formula +G5−F5.

We have now completed the PERT table. It should look like figure 3.

Resource Costs. The man/days required to complete a project and the resource costs are also important indices for managers. Now that we have completed the PERT, we have most of the information necessary to complete these analyses. The simplest method of determining the costs is to develop another table. Rather than giving you specific cell coordinates for necessary information, find a clear section of the worksh (preferably below the tables you have already completed) enter the chart shown in figure 4.

	Activity Doys	Trons Time	Eorly Stort	Lote Stort	Eorly Complete	Lote Complete
One	10	1	1	7	11	17
Two	21	1	12	18	33	39
Three	10	1	12	18	22	28
Four	10	1	23	29	33	39
Five	10	1	23	29	33	39
Six	10	1	34	40	44	50

Activity Poths	Totol Doys	Booleon Logic	Booleon Logic	Booleon Logic	Criti Pot
1-2-6	43	TRUE	TRUE	TRUE	***
1-3-4-6	43	TRUE	TRUE	TRUE	***
1-3-5-6	43	TRUE	TRUE	TRUE	***

Project Slock 6 Doys
Slock Check 6 Doys

PERT Toble
Figure 3.

	People Assigned	Activity Doys	Mon/ Doys	Activity Cost
Activity One	4			
Activity Two	2			
Activity Three	5			
Activity Four	1			
Activity Five	4			
Activity Six	3			
Mon/Doy Cost $240			Totol Cost $	

Activity Costs
Figure 4.

Filling in the activity days is simple. In the first cell o site activity one, enter +B5. *Replicate* that down the rem der of the column (using relative reference) to duplicate al activity days in the PERT table.

Man/days and activity cost columns are equally e Man/days is nothing more than the number of people assig times the activity days. You can replicate it through the maining entries in that column. Activity cost is the numbe man/days times the man/day cost (at the bottom of the a ity column). You can total the costs in the activity cost colu by using the @SUM function.

The completed resource expense table should look like ure 5.

Cost Analysis Bar Charts. Figure 5 shows the costs in t lar form. Bar charts would show the same data in a m more visually understandable manner. This one gets a l tricky, but there are many ways to accomplish it. Find other clear section of the worksheet (again preferably be the resource cost table), and enter the table shown in figu The numbers in the cost row should be placed such that e number defines the end of one cell and the beginning of

	People Assigned	Activity Doys	Mon/ Doys	Activity Cost
Activity One	4	10	40	9600
Activity Two	2	21	42	10080
Activity Three	5	10	50	12000
Activity Four	1	10	10	2400
Activity Five	4	10	40	9600
Activity Six	3	10	30	7200
Mon/Doy Cost $240				Totol Cost $5088

Activity Costs
Figure 5.

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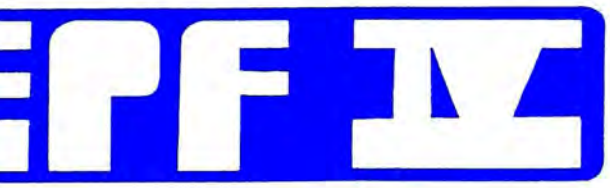
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	Cost $ 0	2000	4000	6000	8000	10000	12000
Activity One							
Activity Two							
Activity Three							
Activity Four							
Activity Five							
Activity Six							

Cost Comparison
Figure 6.

next cell. (for example, the number 4000 should be divided so that 40 is in one cell and 00 is in the next cell.)

Now comes the fun part. We want to take the activity cost for each activity from figure 5 and graphically display it on our graph. First, a little theory. We have divided our graph so that each cell displays $2,000. The 0 to 2000 cell should take the activity cost for the activity and apportion it over the nine available asterisks in the cell. If our activity cost is $1,000, it should show 4.5 asterisks. *VisiCalc* won't display one-half asterisks; it truncates decimals and in this case will display four asterisks. That is sufficient for our purposes, but if you desire greater accuracy, you could change the column width and dollar range for each cell and have a very accurate method of displaying information. If you made the cell width 11 (*VisiCalc* displays one less asterisk than the cell width) and the range $1,000, each asterisk would be worth $100.

The first cell (0-2000) should be formatted for graphics (/F*) and contain the following formula:

```
(Activity Cost CELL COORDINATE/2000)*9
```

Enter that formula in the 0-2000 cell for each activity. We have taken the activity cost and divided it by 2000 to determine the number of cells required and then multiplied that value by nine to determine the total number of asterisks required.

Next, consider the remaining cells. The formulas will be similar. Suppose the cost is $9,600. We can look at the chart and determine that the asterisks will continue from 0 almost to 10000. The second cell should take the value in the first cell (which is the total asterisks that should be displayed), and subtract the number of asterisks displayed (or used) in the first cell. The formulas should read: (PRIOR CELL COORDINATE) − 9. *Replicate* that formula throughout the remainder of the chart (using Relative references) and you have completed the cost comparison bar chart. It should look similar to the chart in figure 7.

	Cost $ 0	2000	4000	6000	8000	10000	12000
Activity One	********	********	********	********	********	********	
Activity Two	********	********	********	********	********	********	
Activity Three	********	********	********	********	********	********	********
Activity Four	********	*					
Activity Five	********	********	********	********	********	********	
Activity Six	********	********	********	*****			

Cost Comparison
Figure 7.

Days versus Dates. There is another capability that you might consider adding to your PERT that would make it even more useful. We have completed a PERT chart that will compute gross days based upon a starting day. Wouldn't it be nice to be able to enter both early start and late complete date and have the dates for the start and completion of each activity computed? This isn't exactly a trivial process, especially since you probably won't want to count weekends as work days. If you are interested in learning something about calendars (there are a number of methods), please write and let us know; we will try to discuss them in a future column. That goes for anything else you want to know about. ◨



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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Sitting down to his new adventure game, the player finds himself on his way back to Earth with an antiplague serum among his other cargo. But his ship is overtaken by an alien race, forced down onto their planet, stripped down to the hull, the pieces are scattered over the alien planet, and he's imprisoned. Can he find the keys to reversing that process?

If that sounds more like the plot of a science fiction novel than an adventure game, that's probably because it's a description of *Oo-Topos,* an adventure game written by Michael Berlyn, a programmer who was a science fiction novelist before discovering micros.

Berlyn's story reverses many of the trends shown by other writers who use small computers for word processors. Always an independent spirit, the thirty-two-year-old novelist, whose credits include *Crystal Phoenix* and *The Integrated Man* with Bantam Books, and *Blight* under the name "Mark Sonders" with Ace Books, actually became a writer because, as he puts it, "I hate working. I don't work well for other people. I need to be doing something creative. I paint, and I'm a musician—I played electric violin and guitar for a rock group called Taylor Mills Road in New York for a while."

But more was involved than creative laziness. Always an avid science fiction reader, Berlyn took a course in science fiction as literature while an undergraduate at Florida Atlantic University. "My professor said that for our final exam we could write a short story," Berlyn recalls. "So I figured, 'Okay, what's so hard about that?' Little did I know."

But when the professor told Berlyn that his story was worth publishing, it gave the young rebel something to ponder. "I thought, if it's possible for me, I'd much rather make my living doing something by myself for myself in which I'm my own boss than work for someone else."

An Apple II proved the catalyst that transformed Berlyn the writer into Berlyn the programmer. "I was going full blast as a science fiction writer when I decided to purchase an Apple to use as a word processor. I figured that it would save me a lot of time and work in not having to retype anything.

"My first word processor was *Dr. Memory*, which was really all that was around then," he recalls. "I struggled along with it as best I could—or as best as it could—and while I was doing that, I was playing games for my own amusement. I found myself enjoying the games more and more and trying to figure out whether or not I could write them myself."

Soon Berlyn found himself splitting his time "about fifty-fifty" between writing on his Apple and writing for it.

"That's how I got started in it in the summer of 1978. I was getting more and more involved in the Apple. Writing a program is very similar to writing a book in that there are problems that must be overcome, and you can see when it's working and when it's not working, and there are levels and layers of complexity," Berlyn says.

Mike Berlyn:

Programming His Way to a Pulitzer



Photos by Tom Martin

BY LAN BARNES

"The amount of satisfaction that I can achieve from writing a good program is—I will not say the equal of writing a good book, but it is similar. The more I got involved with programming, the more I wanted to learn about assembly and Forth and the different languages that were out there."

A "laser learner," Berlyn set his sights on what he wanted to know, and went straight for it. He started absorbing computerese at an incredible rate and, within six months, was an adequate programmer. "Having an Apple at home full time and having nothing else to do was a help," he admits.

But as he eased into programming, Berlyn stayed close to familiar ground—he wrote a science fiction adventure game. "*Oo-Topos* was my first program, and I think I bit off more than I could chew at the time," he says. "I liked the original *Adventure* so much that I wanted to do something like it, a lot larger, a lot more intelligent, a lot larger vocabulary, but basically in the same format.

"I started on it just about the time I got *Dr. Memory*, and worked on it for a year and a half, until I got it into the shape that it is now. It turned out to be 150 rooms and about four hundred-some-odd vocabulary words—it really grew into something huge."

Oo-Topos is still doing very well, Berlyn says. "People seem to like it. It was the first real science fiction adventure with any kind of a plot, any kind of tone, with any kind of science fiction consistency in it."

In 1980 Berlyn and his new wife, Muffy, left West Palm Beach, Florida, and relocated to Aspen, Colorado. "I sold my Apple," he says. "I had no real plans to stay with computers, but when we got here, I just happened to walk into a computer store in town and ask if they needed any programs written."

The store's owners almost leapt upon him, he says. "They really needed a programmer in the area. It's a pretty isolated little town, although very sophisticated, and there wasn't a programmer here, especially for Apples. It was a tailor-made situation."

He began working at the store and within a short time decided to found a software company with some other people in the area. "When we started, we set our sights on outdoing VisiCorp, which was then Personal Software. We're dedicated to high-quality programs and national distribution—that whole trip. We've been working really hard at doing that."

For Berlyn, the key to high-quality programming is interactivity. "Actually, the name of our company is Sentient, and *sentient* means 'aware,' " he says. "In a science fiction sense, when you call an alien creature sentient, you mean that it's an intelligent, feeling, aware creature, almost as if it had human qualities. And that is what our goal is for all of our programs. To make the user feel as if he's interacting with a partner rather than a machine."

Berlyn is in charge of games development at Sentient and still writes games himself. Other games projects are presently jobbed out to freelance programmers, and Sentient boasts a business line coming out with a general ledger, accounts receivable, and accounts payable. "We've also spent a long time developing a job-cost and accounting package for hard disk," Berlyn says.

Today he programs almost entirely in assembly, he says. "*Oo-Topos* is an all-Applesoft program. "*Cyborg*, my second adventure game, is about 75 percent Applesoft and 25 percent assembly, and two graphics games I just finished, *Congo* and *Gold Rush*, are all assembly. The differences between the lan-



guages is really incredible in getting results, and I find assembly easier to work in now than Basic. Besides, I enjoy it a lot more. I'm starting to look at Forth as a real viable language, especially for the kind of interactive adventures I want to write."

Interactive? Yes, Berlyn says, with both his artist's and his businessman's natures showing. "Pure adventure games as extended puzzles have probably had their day—they just can't compete with graphics games," he says. "But the adventure games are evolving into interactive novels, the first all-computer aesthetic development.

"*Oo-Topos* is the start of an interactive novel, but *Cyborg* is an interactive novel. *Cyborg* isn't even an adventure, although we bill it as one, and it's being reviewed and played as an adventure. The program itself is about the same size as *Oo-Topos* is, but there's an excuse, a reason for the computer being there.

"It really creates another persona, a character in the computer, and that is your cyborgan half. As a player, you are only half the player. You have a partner that is the computer, and you can ask opinions of it on locations, on objects, on situations; you can have it scan objects for you using its cyborg powers."

What makes a program an interactive novel? The same thing that makes a book interactive, Berlyn says: total absorption into the characters, the situation, and the plot.

"What takes people away from being absorbed in games is the lack of sophistication of the user interface," he says. "So a program becomes an interactive novel when playing. It's no longer simply a question of walking through situations and solving puzzles. Instead, there's something that unfolds, that illuminates the player.

"So instead of identifying with a hero you read about, you become the hero as you play. And the role that the hero plays is different in an interactive novel than in an adventure game. Both the player and the plot evolve as the game is played."

In that respect, Berlyn has managed to achieve a unique synthesis of the programmer and writer into a new breed of artist. "I'm involved in two projects that are cutting new ground," he says. "I really can't discuss one of them, but the other is going to bring the adventure another step closer to the interactive novel."

So Michael Berlyn is back over the keyboard of one of the two Apple IIs or the Apple III at Sentient, but whether he's a

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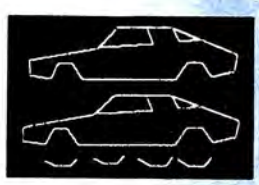
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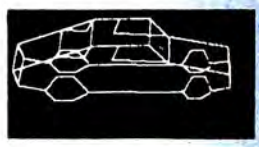
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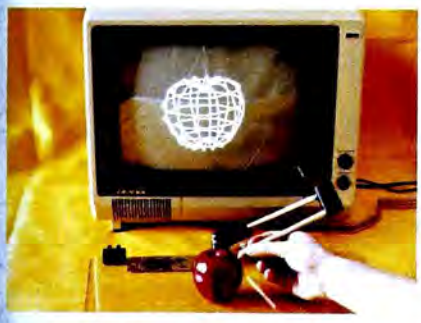


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programmer doing writing or a writer doing programming is hard to tell. Yet despite his achievements, he doesn't consider himself particularly unique.

"The science fiction market was easier to break into than any other," he says, "in that it is one of the only short story markets that is still actively searching out material, and they had absolutely no objections to buying a story from an unpublished writer. Well, that kind of free and easy attitude exists in programming, too. It's getting less and less like that, but it sure was like that last year, and it was even more like that the year before.

"The level of sophistication in the programs that are coming out precludes the home hobbyist from knocking something out over his weekends, and then expecting it to make it in the big time. But opportunity is still wide open. Good programmers can still find a place even if they're self-taught."

At Sentient, he says, they're actively seeking out people who write programs. "There are people out there in college or in high school who don't do anything when they go home but write programs. Every software company is looking for those people, and there's a lot of money there to be made by freelancers, too. It's still wide open in that respect," Berlyn says.

Software companies need new programmers because of the high level of competition, he says. "I just know if you're doing a space graphics game, you really have to compete with people like On-Line and Sirius, because their work is out there and available. Someone would have to be crazy to buy your game if it weren't as good as theirs. The level of sophistication is going up as far as the quality of programs that are available now."

Nor does he find the dominance of arcade games unhealthy—with some exceptions. "They're fine as long as what they're offering is not destructive. *Pac-Man* is what I consider a nonviolent arcade game. Something like *Defender*, where you're shooting down things and the object of the game is to destroy as many things as possible creates a whole different feeling while you're playing it. Implied violence is a negative aspect of arcade games that really isn't being dealt with. I'd like to see it addressed somehow.

"My least favorite game is *Missile Command*. It's really a sick game. And my second least favorite is *Shark Attack*. In that one, the player *is* the shark, and the goal is to rip up and destroy divers who are shooting spears at you, with pools of red blood in color graphics. It doesn't make it for me at all.

"Games like *Pac-Man* I don't see anything wrong with at all, or the amount of quarters being pumped into them. It's a phase, but we lived through the hula hoop. It's going to level out, I'm sure—especially since I'm in the business now."

And for Michael Berlyn's future? "I still love science fiction. I still like working for myself. So underneath it all, I'm still a writer," he says.

"I'm using *SuperText II* now. It's my own personal preference after my experience with all the capitalizing functions in *Dr. Memory*. I find *WordStar* a bit of overkill for what I need, so I never bothered with it. And I've used Paymar's upper/lower case adapter since it came out—of course, his was the only one then, so I don't have anything to compare it to.

"But I can hardly wait for the day I can buy a word processor all my own and sit at home doing nothing but writing. I'm being a programmer now, and I'm doing it with a passion, but I'm still a writer. I'm 100 percent committed to programming, and, when that phase of my life is over, I'll commit myself to whatever's next.

"I was a musician for seven years, and I was totally committed to that. And when that phase of my life was over, I was completely committed to writing. And now it's programming.

"So I don't know what lies ahead, but I sure hope I'll go back to writing. I look forward to it, but I don't begrudge the time I'm spending programming now at all. It's very exciting." ■

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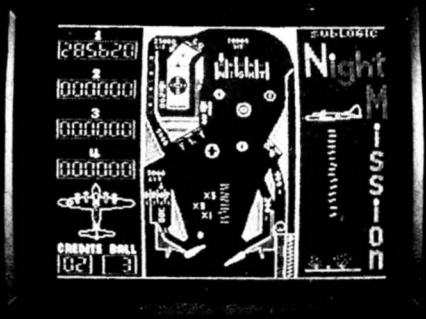
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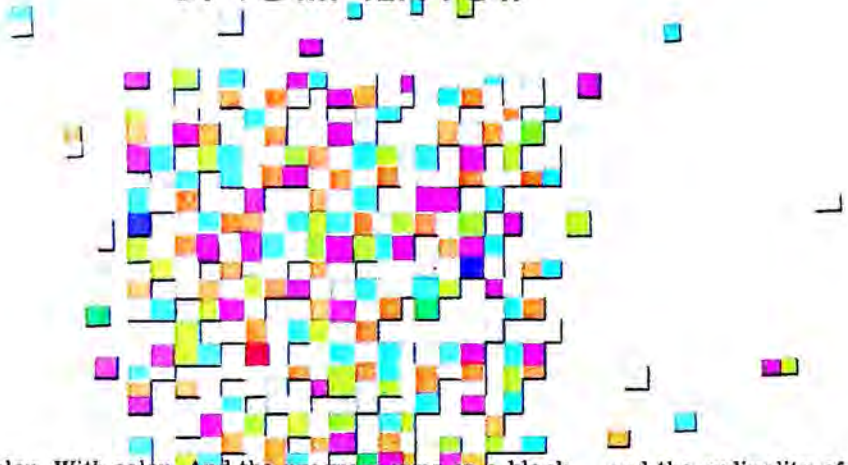
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COUNTING WITH COLORS ON THE APPLE III

BY JOHN JEPPSON



Not in color. *With* color. And the program runs on a black and white screen. Confused? You won't be when you've used the Apple III color table. It operates on colors, and those operations become logic elements to implement Conway's *Game of Life*.

Colors' Numbers Are Values, Too. Apple comes with an elaborate graphics package that is easily accessible from high level languages such as Business Basic and Pascal. In Basic programs one employs the BGRAF.INV invokable module, in Pascal the PGRAF library unit. Each contains the same set of about two dozen graphics utility procedures. These fast machine language routines are called up by simple program commands. They plot lines, dots, and shapes, change colors and viewports, and perform many other complex jobs around the graphics screen. One of these utility procedures sets the Apple III *color table*, a subtle device whose power seeps only gradually into consciousness.

At any given moment, every dot on a graphics screen has some sort of color. In black and white mode each dot is either black (off) or white (on). In color mode each dot is one of the sixteen colors available on Apple III, which range from black to white, with pinks, greens, and other hues between. Of course if you're using a black and white monitor you won't see all those lovely colors, just sixteen different shades of gray. But the computer doesn't really know or, let's be honest, even care what kind of TV you've got.

Table 1 lists the colors available for Apple III graphics. In Business Basic, colors are referred to by number. In Pascal, on the other hand, the PGRAF library unit declares a *screencolor* type containing the color names as an ordered set. So in Pascal you simply use the color names themselves as parameters for graphics procedures. Since these color names do form an ordered set, each has an ordinality within the set, and the ordinality of a screencolor is the same integer as the color number used in Basic. Thus, in Pascal, x:=ord(orange) will assign x the value 9, which is the ordinality of orange in the screencolor set.

0	Black	8	Brown
1	Magenta	9	Orange
2	DarkBlue	10	Grey2
3	Purple	11	Pink
4	DarkGreen	12	Green
5	Grey1	13	Yellow
6	MedBlue	14	Aqua
7	LightBlue	15	White

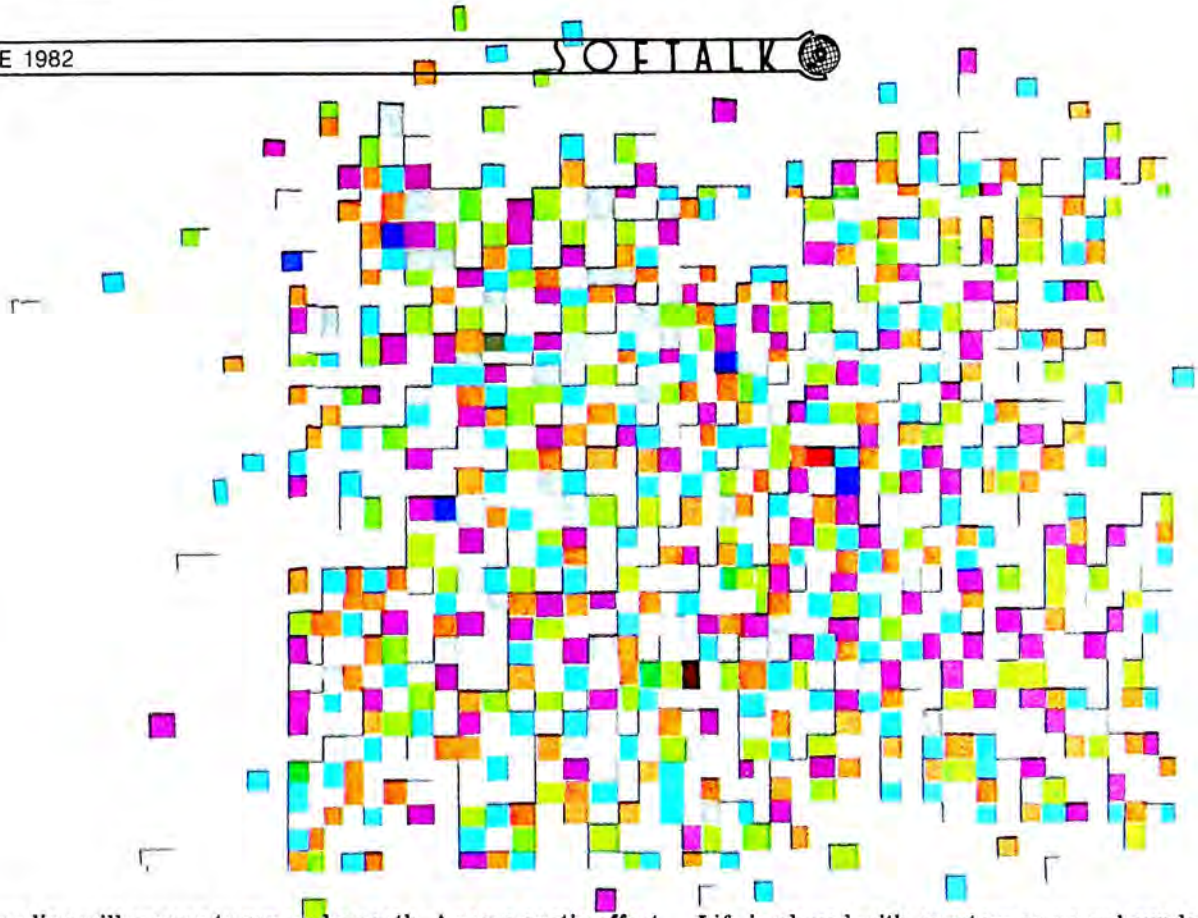
Table 1. Color Numbers for Apple III Graphics

In actual operation, the color table is a simple affair. Suppose you send a new color to a particular spot on the graphics screen. This new color could be the currently specified *pencolor* when plotting a dot or a line, or it could be the current *fillcolor* as background for a shape or as the wash color when clearing a section of the screen. In either case you send a *source* color to a screen dot which is, of course, already occupied by some "old" color.

Normally one would expect the source color simply to replace the old color. But the color table lets you change that. The necessary command has the form *setctab(SOURCE, OLD, RESULT)*, which alters one element of the color table. For example, in Pascal *setctab(pink,green,brown)* directs that, henceforth, any attempt to change a green dot into a pink dot will produce a brown dot. No other color combinations are affected. In Business Basic the same command would appear *PERFORM setctab(%11,%12,%8)*. Note the percent signs. They are essential. They direct Basic to pass the parameter values as integers, each of which has two bytes of binary code, rather than as real numbers, each of which has four bytes.

Changing Values. Each such command sets only one of the 256 elements in the color table. Collectively these elements specify the result color for each of the 256 possible combinations of the sixteen *source* colors and sixteen *old* colors. On power-up, the color table is set to its default condition, which is the simple replacement one normally expects. In other words the *result* color is set in each case to be the *source* color. Thus, in default condition, the color table simply appears not to exist. But interesting things begin to happen when you reset one or more of the 256 *result* colors to a different value.

The color table can be used for a variety of purposes. The Apple manual cites the example of line plotting where the color table is used to protect existing lines from new lines subsequently plotted across them. If you plot a brown line across preexisting orange lines, the new brown line, in default condition, will replace orange dots wherever the lines cross. Thus the new line will appear to overlie the old. But if you protect orange dots with the command *setctab(brown,orange,-orange)*, the intersections will remain orange and the new



brown line will appear to run underneath. A more exotic effect is achieved with *setctab(brown,orange,purple)*. Now the brown line will appear to run under the orange and show through as purple.

Notice in this example that the user need not figure out just where the lines will cross. The new line changes from brown to purple automatically when orange dots are encountered. This is one of the remarkably powerful features of the color table. The user can designate particular dots (or at least dots of a particular color) and selectively protect them or change them to another color without knowing or being able to predict exactly where those dots will be.

Sixteen Motley Registers. This capability may be illustrated by another example slightly modified from one in the Apple manual. Suppose one has a complex graphics "photograph" in several colors. Suppose further that one decides to change all the light blue dots, scattered who knows where all over the screen, from light blue to dark blue, and all the green dots, similarly scattered, from green to dark green. The following Pascal routine will serve:

```
for col := block to white do
  case col of
    lightblue: setctab(brown,lightblue,darkblue);
      green: setctab(brown,green,darkgreen)
    otherwise setctab(brown,col,col) {"old" = "result"}
  end; {case}
fillcolor(brown);
fillport; {washes screen with brown ...
        only lightblue and green dots are changed}
```

This is more graceful, and far quicker, than the brute-force method of examining every dot on the screen.

The accompanying program uses the color table as a logic device by assigning numbers to colors. Then, through suitable settings of the color table, each screen dot is made to serve as a counting register. This makes possible an unusual version of Conway's *Game of Life* in which all calculations occur directly on the graphics screen as manipulations of color.

Give Me the Simple Life. More than a decade ago, John Conway's solitaire game *Life* was explained in a series of Martin Gardner's "Mathematical Games" articles in *Scientific American* (October 1970, November 1970, February 1971). *Life* is played with counters on an unbounded checkerboard of cells. One begins with any desired pattern of counters called the "first generation." The pattern subsequently evolves from generation to generation, often producing long convoluted histories of amazing complexity. The generations succeed each other in accordance with very simple rules. An empty cell adjacent (orthogonally or diagonally) to exactly three counters is a *birth* cell and will contain a counter in the next generation. An existing counter will survive to the next generation only if it has either two or three neighbors. If a counter has one neighbor, or none, it dies of isolation, while with four or more neighbors it dies of overpopulation.

At first glance this game seems readily amenable to the simplest sort of computer program. The obvious approach, which we'll call algorithm 1, is to scan the screen and look at each cell. For each cell, merely count its occupied neighbors and plot the corresponding next generation cell accordingly. This is quite straightforward and can be roughed out very quickly. Early efforts worked very nicely and produced a new generation every few minutes. Unfortunately, the execution speed had a less than dazzling effect on the spectators.

The problems were becoming clear. The scan routine had to look at every screen location. By itself this isn't too bad. A "board" size of 40 x 40 locations contains only 1,600 cells, and Apple III can whack out 1,600 spot checks very quickly. But each such location requires processing. For each location the program must examine at least four and usually all eight of the surrounding cells. Thus each location on the screen must, in effect, be checked up to nine times, equivalent to nine separate full screen scans.

Furthermore, the initial scan may calculate, but may not plot, each cell's status in the next generation. Counters must not be changed during the first scan because, as the scan proceeds, the program will look back from any given row to count neighbors in the preceding row. Those neighbors must still be of the current generation, not the next. So, during the scan, the next generation information must be stored elsewhere. This could, for instance, be in an array in memory. But in that case the array must later be transposed onto the graphics screen, a time-consuming process. A better alternative stores the next generation directly onto the graphics screen, but on page 2. The two graphics screens are then displayed alternately. This scheme works well as long as one has a fast procedure for

clearing each page between generations.

The most serious drawback to the approach just outlined is that every available cell on the screen must be processed whether occupied or not. Because of the rules of the game, many more cells are empty than occupied, even for very large patterns. So it would be nice if somehow one could "process" only occupied cells. That strategy is adopted in algorithm 2.

Friendly Neighbors. In the first algorithm we looked at each square, occupied or not, and determined how many occupied neighbors it possessed. But it is equally correct to focus on occupied cells and say that an occupied cell exerts a "neighborly influence" on each of the eight surrounding cells. To exploit the concept of influence, one needs two capabilities. First, one needs a very quick and recognizable method of stamping this influence on the surrounding cells. Second, one needs some convenient method of counting the number of such influences a cell has received. Apple III graphics' *DrawImage* procedure provides the stamping device and the color table does the counting.

In algorithm 2 the initial scan stops at each occupied cell and stamps a ring of influence on its neighbors. Since all such influences will have been distributed by the end of the initial scan, one may, on the second scan, directly plot the next generation. One merely scans the cells, marks "occupied" those with the right numbers of influences, and marks "empty" all the others. Note that during the initial scan this algorithm does not explicitly calculate the next-generation status of any particular cell. But it has the great advantage of processing only occupied cells instead of every cell on the screen. Furthermore, thanks to the color table, the second scan can be entrusted to a very quick machine language graphics procedure. Thus only one high-level language scan is required, and that scan skips quickly over the empty cells.

Have no fear. You still don't have to cope with excessive speed. The program still scans through extensive blank areas of the screen during which the computer appears to have slipped off into never-never land. In a practical program, you need to create a *search window* that limits the scan to the area of interest.

According to Conway's rules, a counter's influence extends only to contiguous cells. This means that any particular pattern can spread and grow only at the maximum rate of one row or column per generation in each direction. So, if one starts with a small pattern of a few centrally placed counters, there is no point in searching the entire screen. A tremendous increase in speed, for either algorithm, is achieved by confining the search to an appropriate window that grows and shrinks with the pattern.

Like everything else, this has a price. Manipulating the window involves additional subroutines which themselves add execution time. This is well worth it for a small central pattern, but as the pattern grows and approaches full screen, the additional program lines no longer serve a useful purpose and act only as a brake. On the other hand, by the time the pattern fills the screen you'll probably be getting bored anyway.

Through a Cluttered Window. The worst effect of windowing routines is that they clutter up and obscure the program, which is principally designed to illustrate use of the color table. About one-third of the accompanying program is occupied by window routines, placed there solely in the interest of speed. The reader should pay them as little attention as possible.

The program is presented both in Pascal and Business Basic. The two versions are virtually identical since the program was first written in Pascal and then translated into Basic. Close comparison, however, will reveal a number of differences that exploit some of the powerful abilities of Apple III Business Basic that are not duplicated in Pascal. On the other hand, the Pascal version is, as usual, much easier to read, and executes faster—in this case almost twice as fast. But the Basic version is still quite acceptable. Most important, the two versions of the program illustrate the use of machine-language subroutines common to the two languages. The graphics procedures are the same in each, although the two languages require slightly different command formats.

The program uses Apple III graphics' *DrawImage* procedure to mark the influence of a counter on its neighboring cells. *DrawImage* very quickly draws a stored image at any designated spot on the graphic screen. The image must already have been created and stored in memory in the form of a bit map. In Basic, one uses an integer array, although in Pascal a packed array of boolean is more convenient. The *DrawImage* procedure really deserves an article of its own and is merely exploited here, not analyzed.

The stored patterns used by *DrawImage* are plotted in two colors. The shape is drawn in the currently specified *pencolor* upon a rectangular background of the current *fillcolor*. One may plot either the entire image or any rectangular subsection. For this program the image is a three-by-three square of nine complete cells, as shown in figure 1. The outer ring of cells each contains a counter and the center cell is blank. If the center of the image is superimposed on a preexisting counter, then that central cell and the eight surrounding cells are all replotted simultaneously. The tricky part comes with the colors used and their interactions due to the color table.

Figure 1.

Looping through Generations. The program is a loop that accepts a pattern of counters, the current generation, and converts it to the next generation. At the start of each loop the current generation exists as a pattern of counters drawn in white on an empty black background. The counters appear as little squares, although each is actually one dot wide and two dots high. Counters in adjacent cells are separated by a gap of the same dimensions as the counter. Thus each cell is an area two dots wide and four dots high, and the counter itself occupies one-fourth of the cell. At the beginning of a generation-loop, the counter area of each cell is either white (occupied) or black (empty). During "calculation" the counter may appear in other colors, but the rest of the cell always remains blank.

The program scans until it finds an occupied cell, which it recognizes by a counter of white (color number 15) dots (or, as we shall see, by dots of any color of number 10 or greater). *DrawImage* is then centered on the found cell and replots that cell and its neighbors in a three-by-three cell area. The *pencolor* used for *DrawImage* is orange (9) with a black (0) background. *DrawImage* thus plots a ring of eight orange counters in surrounding cells and a black (empty) counter in the center. Normally, one would expect the old counter in the middle (at the scan coordinates) to be turned black and effectively erased. But not so, for we will have rendered black impotent as a source color with:

```
for col := block to white do setctab(black,col,col);
```

This means that when black is a source color, every old color will also be the result color. So black isn't going to change anything. Thus the central counter, the current focus of the scan, will remain unchanged.

What about counters in the surrounding cells? Let's suppose one of them is initially black (0). Normally we would expect this counter to turn orange (9), which is the *pencolor* used by *DrawImage*. But even though the source color is orange, we will have changed the result color:

```
PERFORM setctab (%9,%0,%1):REM 9=oronge, 0=block, 1=mogenta
```

Application of one influence will now change a black counter (0) to magenta (1). We are beginning to count. Similarly, if the color was already magenta (1) we will let the source color (orange) change it to number 2, and so on:

```
FOR col = 0 to 3: PERFORM setctab (%9,%col,%col+1): NEXT col
```

So if a counter starts out black (0), each successive application of influence increments the color number and the screen dots have become counting registers. According to the rules,

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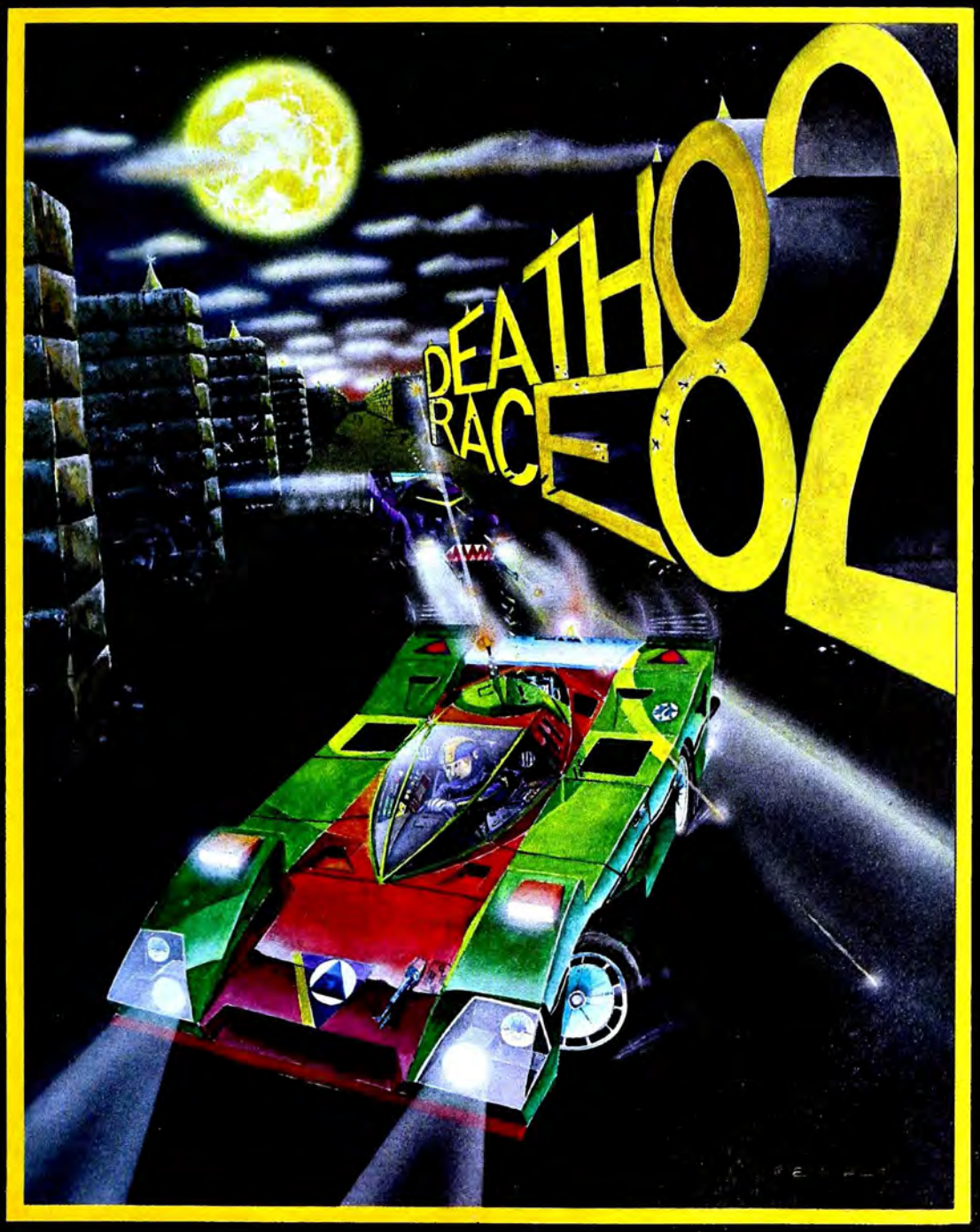
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all cells with four or more neighbors die of overpopulation, so it is pointless to count past four. We stop counting with the command, *PERFORM setctab(%9,%4,%4)*. After reaching dark green (4), the color will change no further no matter how many influences are applied.

Suppose *DrawImage* stamps influence on a cell that already contains a counter. In this case we decrement the color number from 15 to 14 to 13, and so on.

```
FOR col = 12 to 15: PERFORM setctob(%9,%col,%col-1): NEXT col
```

Again we can stop counting after four with *PERFORM setctab(%9,%11,%11)*.

At the end of the scan all influences will have been distributed. Cells that previously were empty (color 0) will have counters in the color range 0 to 4, depending on the number of occupied neighbors. Similarly, cells that previously were occupied will have colors 11 to 15. We are now ready to plot the next generation.

For the second scan we simply change the fillcolor to white and wash the entire screen. If the color table were in default condition this would, of course, turn everything white and erase all trace of the pattern. But we change the color table so that the old colors purple (3), green (12), and yellow (13) are indeed changed to white, but all other old colors are changed to black. Thus all counters with the proper number of influences become white, and all others are erased. In Pascal:

```
for col := block to white do
  if col in [purple,green,yellow]
    then
      setctob(white,col,white)
    else
      setctob(white,col,block);
```

PERFORM fillport washes the screen and there's the next generation.

Setting Up a Civilization or Two. The program must also provide means for placing the initial pattern, the first generation. A visible cursor is presented that may be moved about from cell to cell. Individual counters may be placed in any cell. This is also done with *DrawImage*, which places single counters by plotting only a corner, one cell, of the nine-cell image. There is also a procedure for presenting a few instructions at the beginning. These instructions are really rather sparse, but knowing how you love to type. . . .

The rest of the program is cluttered up with windowing procedures. These should be included and ignored. The program is terminated by any keystroke. In Business Basic the *KBD* interrupt acts instantly, but in Pascal the program will run on to the end of that generation before *keypress* is checked.

As a trial run you might try the *R Pentomino* in figure 2. This pattern has a long complicated history that runs on and on for hundreds of generations, possibly forever.

```
 XX
XX
 X
```

Figure 2.

The program runs very nicely on a black and white monitor. If the brightness knob is turned down to some civilized level, color numbers from 0 to about 10 are too dim to show up, so the "influence" squares are invisible, or nearly so. Thus one actually sees only the "legal" counters that are supposed to be there. On the other hand, with a full-color screen, all those magentas and purples of colors 1 to 4 appear. This is a very interesting effect. The resulting confusion makes it just about impossible to see the pattern of legal counters, so as *Life*, it isn't great. But the colorful influence squares do have a certain hypnotic charm all their own.

Life on the Color Table

```
10  GOSUB 200:REM initiolize
20  GOSUB 400:REM first generotion
30  GOSUB 600:REM fix colors
40  ON KBD TEXT:HOME:END
50  GOSUB 1000:REM colc nextgen
60  GOSUB 1200:REM show nextgen
70  GOTO 50
198  REM ------------
199  REM -- (stort) initiolize --
200  leftedge=2:REM constonts chosen for mox number of whole cells
205  rightedge=136:REM eoch cell is 2x4 dots
210  bottomedge=5:REM y-coord. ore odd becouse they ore "top" of
215  topedge=189:REM 2 dot counter 0,1; 2,3; etc.
220  INVOKE"/bosic/bgrof.inv":REM use oppropriote pothnomell!
225  GOSUB 2000:REM disploy instructions
230  GOSUB 2200:REM moke imoge
235  oldleft=leftedge
240  oldright=rightedge
245  oldbottom=bottomedge
250  oldtop=topedge
255  PERFORM grofixmode(%3,%1):REM color 140x192, buffer 1
260  PERFORM grofixon
265  PERFORM fillport
270  RETURN
398  REM ------------
399  REM -- (stort) first generotion --
400  GOSUB 2400:REM reset window
405  PERFORM moveto(%newleft,%newtop):REM storting position
410  GOSUB 500:REM get pottern
415  GOSUB 2600:REM updote window
420  RETURN
499  REM ------ sub-subroutine getpottern
500  x= EXFN%.xloc:y= EXFN%.yloc
505  PERFORM dotot(%x,%y+1):REM cursor "floots" just obove counter
510  GET g$
515  PERFORM pencolor(%0):REM block
520  PERFORM dotot(%x,%y+1):REM remove cursor
525  PERFORM pencolor(%15):REM white
530  PERFORM moveto(%x,%y)
535  IF ASC(g$)=27 THEN TEXT:END
540  IF ASC(g$)=8 THEN IF x>leftedge THEN PERFORM moverel(%-2,%0)
545  IF ASC(g$)=10 THEN IF y>bottomedge THEN PERFORM moverel(%0,%-4)
550  IF ASC(g$)=11 THEN IF y<topedge THEN PERFORM moverel(%0,%4)
555  IF ASC(g$)=21 THEN IF x<rightedge THEN PERFORM moverel(%2,%0)
560  IF g$=" " THEN PERFORM drowimoge(@pic%(0),%2,%0,%2,%2,%2):REM
     eroses counter by plotting o "blonk" oreo of imoge
565  IF g$="x" OR g$="X" THEN PERFORM
     drowimoge(@pic%(0),%2,%0,%0,%2,%2):GOSUB 288:REM plot one
     counter, expond window
570  IF g$="o" OR g$="A" THEN RETURN:ELSE GOTO 500
598  REM ----------
599  REM -- (stort) fix colors --
600  FOR col=0 TO 15:PERFORM setctob(%0,%col,%col):NEXT col:REM render
     block impotent
605  FOR col=0 TO 3:PERFORM setctob(%9,%col,%(col+1)):NEXT col:REM these
     ore "count up" colors
610  FOR col=12 TO 15:PERFORM setctob(%9,%col,%(col-1)):NEXT col:REM
     these ore "count down" colors
615  PERFORM setctob(%9,%4,%4):REM stop counting up
620  PERFORM setctob(%9,%11,%11):REM stop counting down
625  FOR col=0 TO 15
630  PERFORM setctob(%15,%col,%0):REM white cleors screen -- except
635  IF col=3 OR col=12 OR col=13 THEN PERFORM
     setctob(%15,%col,%15):REM these hove right number of "influences" for
     next generotion
640  NEXT col
645  RETURN
998 REM ------------
999  REM -- (stort) colculote next generotion --
1000  GOSUB 2400:REM reset window
1005  PERFORM pencolor(%9):REM oronge, on influentiol color
1010  FOR x=oldleft TO oldright STEP 2
1015  FOR y=oldbottom TO oldtop STEP 4
1020  PERFORM moveto(%x,%y)
1025  IF EXFN%.xycolor>10 THEN GOSUB 2800:PERFORM
      moverel(%-2,%4):PERFORM
      drowimoge(@pic%(0),%2,%0,%0,%6,%12):REM expond window, plot
      stomp
1030  NEXT y,x
1035  GOSUB 2600:REM updote window
1040  RETURN
1198  REM ------------
1199  REM -- (stort) show next generotion --
1200  PERFORM viewport(%oldleft,%oldright,%oldbottom-1,%oldtop)
1201  REM oldbottom is the "top" dot of two-dot counter
1205  PERFORM fillcolor(%15):REM white
1210  PERFORM fillport
```

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```
1215  PERFORM fillcolor(%0):REM block
1220  PERFORM viewport(%0,%200,%0,%200)
1225  RETURN
1998  REM ------------
1999  REM -- (stort) instructions --
2000  HOME
2005  VPOS=2:PRINT USING"78c";"Conwoy's Life Gome"
2010  VPOS=6:PRINT"Ploce initiol pottern:"
2015  PRINT
2020  PRINT" <cursors> move obout"
2025  PRINT" <X> ploce counter"
2030  PRINT" <spoce> cleor counter"
2035  PRINT" <A> occept pottern, stort run"
2040  PRINT:PRINT
2045  PRINT" -- ony KEY to continue --"
2050  GET g$
2055  RETURN
2198  REM ------------
2199  REM -- (stort) moke imoge --
2200  DIM pic%(12):REM the "%" is essentiol; it indicotes integer orroy
2205  pic%(0)=TEN("A800")
2210  pic%(1)=TEN("A800"):REM see poge 314. Business Bosic Monuol
2215  pic%(2)=TEN("0000"):REM "Creoting ond Storing o Bit Arroy"
2220  pic%(3)=TEN("0000")
2225  pic%(4)=TEN("8800"):REM creotes on open squore "imoge" thus:
2230  pic%(5)=TEN("8800")
2235  pic%(6)=TEN("0000"):REM       * * *
2240  pic%(7)=TEN("0000"):REM       *   *
2245  pic%(8)=TEN("A800"):REM       * * *
2250  pic%(9)=TEN("A800")
2255  pic%(10)=TEN("0000"):REM "corner" of imoge (one counter) olso used
2260  pic%(11)=TEN("0000"):REM when plocing initiol pottern
2265  RETURN
2398  REM ------------
2399  REM -- (sturt) reset window --
2400  newleft=CONV%((oldleft+oldright)/2):REM begin "new window" ot center
      of old window
2404  REM "overoge" position moy foll "between" proper cell positions
2405  IF CONV&(newleft) MOD 2<>0 THEN newleft=newleft-1:REM note "&"
      sign
2410  newright=newleft+2
2415  newbottom=CONV%((oldbottom+oldtop)/2)
2420  IF CONV&(newbottom-1) MOD 4<>0 THEN newbottom=newbottom-2
2425  newtop=newbottom+4
2430  RETURN
2598  REM ------------
2599  REM -- (stort) updote window --
2600  oldleft=newleft-2
2605  IF oldleft<leftedge THEN oldleft=leftedge
2610  oldright=newright+2
2615  IF oldright>rightedge THEN oldright=rightedge
2620  oldbottom=newbottom-4
2625  IF oldbottom<bottomedge THEN oldbottom=bottomedge
2630  oldtop=newtop+4
2635  IF oldtop>topedge THEN oldtop=topedge
2640  RETURN
2798  REM ------------
2799  REM -- (stort) expond window --
2800  IF x<newleft THEN newleft=x
2805  IF x>newright THEN newright=x
2810  IF y<newbottom THEN newbottom=y
2815  IF y>newtop THEN newtop=y
2820  RETURN
```

Life in Pascal Shades

```
progrom life;
uses pgrof,opplestuff; [ollocote 16K for grophics with "option" commond]
const leftedge = 2;
  rightedge = 136;
  bottomedge = 5;
  topedge = 189;
vor pic:pocked orroy [0..11,0..5] of booleon;
  oldleft,oldright,oldbottom,oldtop:integer;
  newleft,newright,newbottom,newtop:integer;
procedure reset window;
  begin
    newleft := (oldleft + oldright) div 2;
      [averoge moy lond holf woy between two counter positions]
    if newleft mod 2 <> 0 then newleft := newleft-1;
    newright := newleft + 2;
    newbottom := (oldbottom + oldtop) div 2;
    if (newbottom-1) mod 4 <> 0 then newbottom := newbottom-2;
    newtop := newbottom + 4;
end; [procedure.reset window]
procedure expond.window;
  vor x,y:integer;
  begin
    x:=xloc;
    y:=yloc;
    if x < newleft then newleft := x;
    if x > newright then newright := x;
    if y < newbottom then newbottom := y;
    if y > newtop then newtop :=y;
  end; [procedure expond.window]
procedure updote.window;
  begin
    oldleft := newleft - 2;
    if oldleft < leftedge then oldleft := leftedge;
    oldright := newright + 2;
    if oldright > rightedge then oldright := rightedge;
    oldbottom := newbottom - 4;
    if oldbottom < bottomedge then oldbottom := bottomedge;
    oldtop := newtop + 4;
    if oldtop > topedge then oldtop := topedge;
  end; [procedure updote.window]
procedure initiolize;
  procedure instructions;
    vor inchor:chor;
    begin
      write(chr(28));
      gotoxy(30,2);
      writeLn('Conwoy's Life Gome');
      gotoxy(0,6);
      writeLn('Ploce initiol pottern:')
      writeln;
      writeln(' <cursors> move obout');
      writeln(' <"X"> ploce counter');
      writeln(' <spoce> cleor counter');
      writeln(' <"A"> occept pottern, stort run');
      writeln;
      writeln;
      writeln(' -- ony KEY to continue -- ');
      reod(keyboord,inchor);
    end; [subprocedure instructions]
procedure mokeimoge;
  vor x,y:integer;
  begin
    fillchor(pic,sizeof(pic),chr(0));
    for y:=0 to 2 do
      for x:=0 to 2 do
        begin
          pic[4*y,2*x] :=true;
          pic[y*4+1,x*2] :=true;
        end;
    pic[4,2] :=folse;
    pic[5,2] :=folse;
end;[subprocedure mokeimoge] begin [moin of initiolize]
  instructions;
  mokeimoge;
  oldleft := leftedge;
  oldright := rightedge;
  oldbottom := bottomedge;
  oldtop := topedge;
  grofixmode(col140,1);
  grofixon;
  fillport;
end; [procedure initiolize]
procedure first.gen;
  procedure getpottern;
    vor x,y:integer;
      inchor:chor;
    begin
      repeot
        x:=xloc;
        y:=yloc;
        dotot(x,y+1); [cursor "floots" just obove counter]
        reod(keyboord,inchor);
        pencolor(block);
        dotot(x,y+1); [remove cursor]
        pencolor(white);
        moveto(x,y);
```

```
        cose ord(inchar) of
          27:exit(pragrom);
           8:if x > leftedge then maverel(-2,0);
          10:if y > bottomedge then moverel(0,-4);
          11:if y < topedge then moverel(0,4);
          21:if x < rightedge then maverel(2,0);
          32:drowimage(pic,2,0,2,2,2); [plat blonk]
        88,120:begin
                 drawimage(pic,2,0,0,2,2); [plat counter]
                 expand.windaw;
               end;
        end; [case ord(inchor)]
      until (inchor='o') ar (inchor='A');
    end;[subprocedure getpattern]
  begin [main af first.gen]
    reset.window;
    maveto(newleft,newtap);
    getpattern;
    update.windaw;
  end;[pracedure first.gen]
pracedure fixcolors;
  vor cal:screencalar;
  begin
      [make black impatent]
    for col:=black ta white do setctab(black,cal,col);
      [caunt up calars]
    far cal:=black to purple do setctob(aronge,cal,succ(cal));
      [caunt down colors]
    for cal:=green ta white do setctob(oronge,col,pred(col));
      [stop counting at 4]
    setctob(oronge,dorkgreen,darkgreen);
    setctab(arange,pink,pink);
      [proper colors became white in next generatian]
    far cal:=black to white do
      if cal in [purple,green,yellow]
        then
          setctab(white,cal,white)
        else
          setctob(white,col,block);
  end;[procedure fixcolors]
pracedure calc.nextgen;
  var x,y:integer;
  begin
    reset.windaw;
    pencolar(aronge);
      [unlike Basic, Poscol can only FOR-NEXT with step=1]
    for x := aldleft div 2 ta oldright div 2 do
      far y := (oldbottom-1) div 4 to (aldtap-1) div 4 da
        begin
          moveto(2*x,4*y+1);
          if xycolar>10
            then begin
                   expond.window;
                   moverel(-2,4);
                   drowimoge(pic,2,0,0,6,12); [plot "square"]
                 end;
        end; [far . . for . . begin]
    update.windaw;
  end;[procedure calc.nextgen]
pracedure shaw.nextgen;
  begin
    viewport(aldleft,aldright,oldbottom-1,aldtap);
      [oldbattam is the "tap" dot of twa-dot counter]
    fillcalar(white);
    fillport;
    fillcolor(block);
    viewport(0,200,0,200);
  end; [pracedure shaw.nextgen]
begin [moin]
  initialize;
  first.gen;
  fixcolors;
  while not keypress da [keypress is not o true interrupt]
    begin [Business Bosic's "KBD" is]
      calc.nextgen
      shaw.nextgen;
    end;
end.
```


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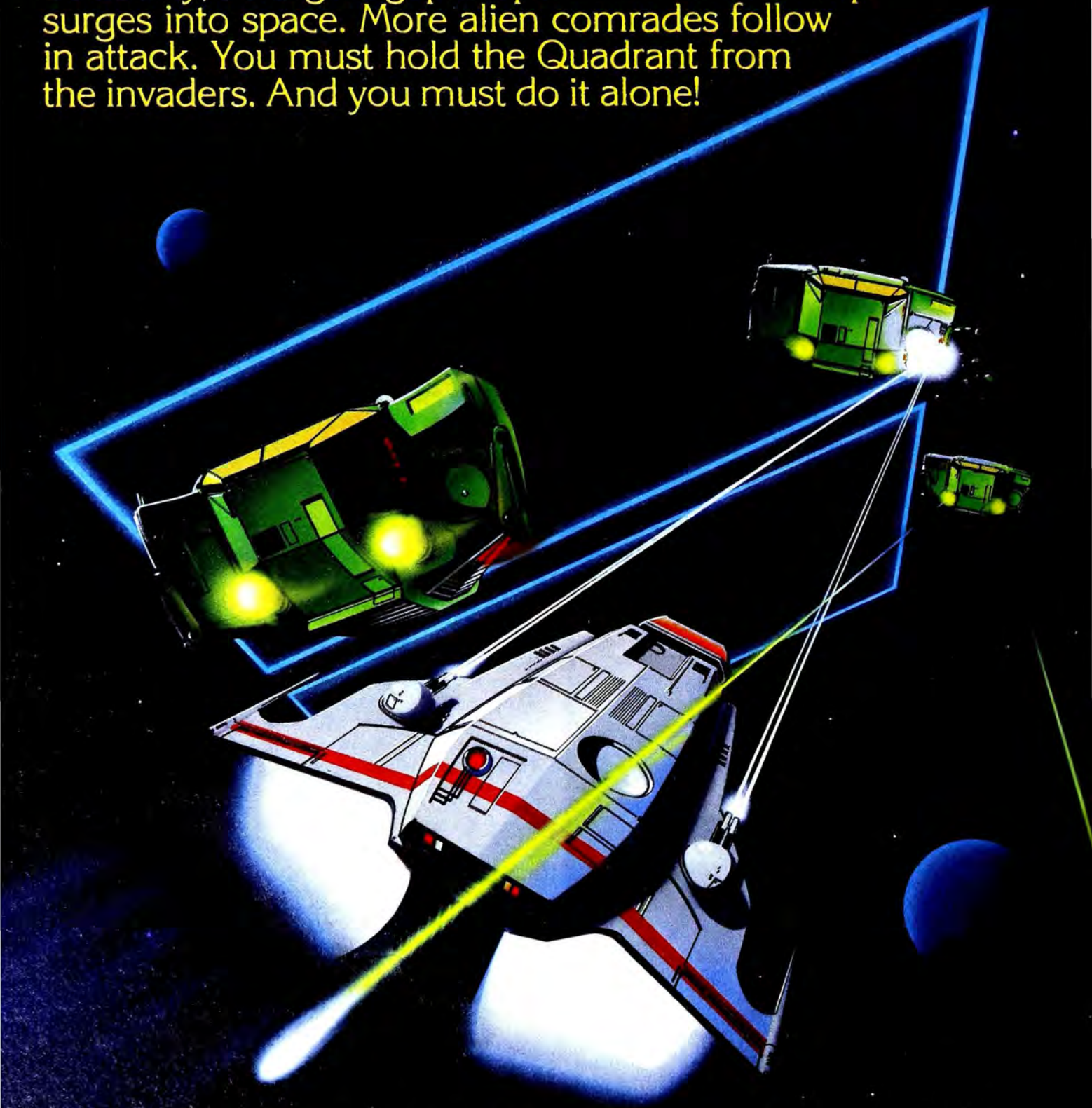
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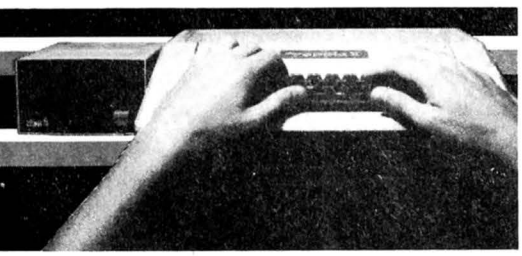
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TRADETALK



☐ **MicroStand** (Tolovana Park, OR), producers of various hardware accessories for microcomputers, welcomes **John Nicholson** to its staff. He brings five years of experience in finance and marketing to his position as marketing director for the company.

☐ **Software Distributors** (Culver City, CA) has expanded its customer service force for its wholesale line of business and entertainment software packages. A special team will be in charge of maintaining the currentness of the company's inventory, monitoring manufacturing developments, and keeping dealers informed of software requiring updating. The company forecasts a 25 percent per month sales growth for the remainder of the year.

☐ In response to dealer suggestions, **Lifeboat Associates** (New York, NY) has announced a new dealer policy that makes a greater number of discountable items available from its library of software programs with no minimum order requirement. Director of business development and marketing **Eddie Currie** notes the advantage in bookkeeping reduction that the program provides, plus "more effective inventory control because it requires less capital to be tied up in specialized programs that have limited market appeal."

☐ **Micro Focus** (Santa Clara, CA), producer of software tools for business programming, won six awards at the eleventh annual ICP Million Dollar Awards ceremony last April in Scottsdale, Arizona. The company won the International Computer Programs "$5 Million Dollar Floppy Award" for CIS Cobol, two $1 million dollar awards for Level II Cobol, and three "Super Sales" awards.

Among those acknowledged were president **Paul O'Grady**, **Paul Adams**, who opened up the Japanese market for the company's Cobol products, and technical director **Stewart Lang**.

☐ **Applied Software Technology** (Monte Sereno, CA), manufacturer of the *VersaForm* business form processor, has entered into distribution agreements for the state of California with **Computer Potentials** of Sunnyvale, **Software Express** of Mountain View, **Software Distributors** of Culver City, and **Softsel** of Inglewood. Computer Potentials has been further designated as exclusive regional distributor for Northern California.

"Due to the diversity of domestic distribution channels for microcomputer products, there is not one model that's right in all or most cases," said Applied Software general manager **Joseph Landau**. "While it is difficult to mix distributors, reps, national account sales by OEMs, and privately licensed OEMs, I am convinced that no one channel can be disregarded."

☐ A $1.75 million venture capital funding agreement has been entered into by **Alphacom** (Campbell, CA) and **Churchill International** (Menlo Park, CA), the funds to be invested in Alphacom's future growth by increasing its work capital.

According to Churchill's managing director **Spencer W. Hoopes**, "Alphacom's thermal and impact matrix printer product line provides an ideal complement to the Churchill computer-family of investments, which include Sanders Technology, Micromation, and ECS Microsystems."

☐ **Computer Station** (St. Louis, MO) has introduced a host of new services for its dealers, installing a toll-free order number (800-325-4019) and a technical assistance line (314-432-7120) for users with technically involved problems. The company has also increased its advertising.

Computer Station's general audience products are available through **Softsel**, **High Technology**, and **Computerland**. Data sheets are enclosed on request with each order.

☐ **Corvus Systems** (San Jose, CA) has completed a 25,000-square-foot expansion of its manufacturing facilities. According to **Pat Elmendorf**, vice president of operations, the additional capacity will be used to meet increasing demand for present Corvus products while allowing dedication of facilities to high-volume production of a major new product line.

The company reported profits of $907,000 on sales of $11.37 million worth of its local networks and Winchester disk mass storage systems for the six months ending November 30, 1982.

☐ **Microcon SoftwareCenters** (Watertown, MA) has opened its second store in the Northeast, located in Woburn, Massachusetts, in the Woburn Mall.

"If this store follows the pattern of our Watertown store," said president **Barry Passen**, "we'll be pulling customers from as far north as Maine and New Hampshire."

The Woburn store is geared to family and business markets; additional business support will be provided by the staff of business computer consultants at the Watertown store. In response to customer demand, Microcon SoftwareCenters has expanded its services to include microcomputer hardware sales. Current plans call for the opening of twenty-five more stores in the next ten months and thirty-five more within two years.

Joanna Tamer has been named executive vice president of Microcon SoftwareCenters International. She will be responsible for all aspects of operations, including staffing, management control systems, planning, and corporate development. As president of Small Office Strategies since 1976, Tamer has provided management consulting services to entrepreneurs, start-up businesses, and companies in stages of rapid expansion, participating in the establishment and development of Computer Pictures Corporation, the Joy of Movement Center, and Elgin International. She developed the Design Log Method, a data management system for architects and developers, in 1977.

☐ **MicroGram Systems Group**, a San Diego software developer, has announced the acquisition of the software division of **Executive Island**, taking over marketing and development of further enchancements of Executive Island's *Real Estate Analysis and Listing System*, a group of CP/M menu-driven interactive programs for the analysis of income properties, including shopping centers, office buildings, apartments, and industrial complexes.

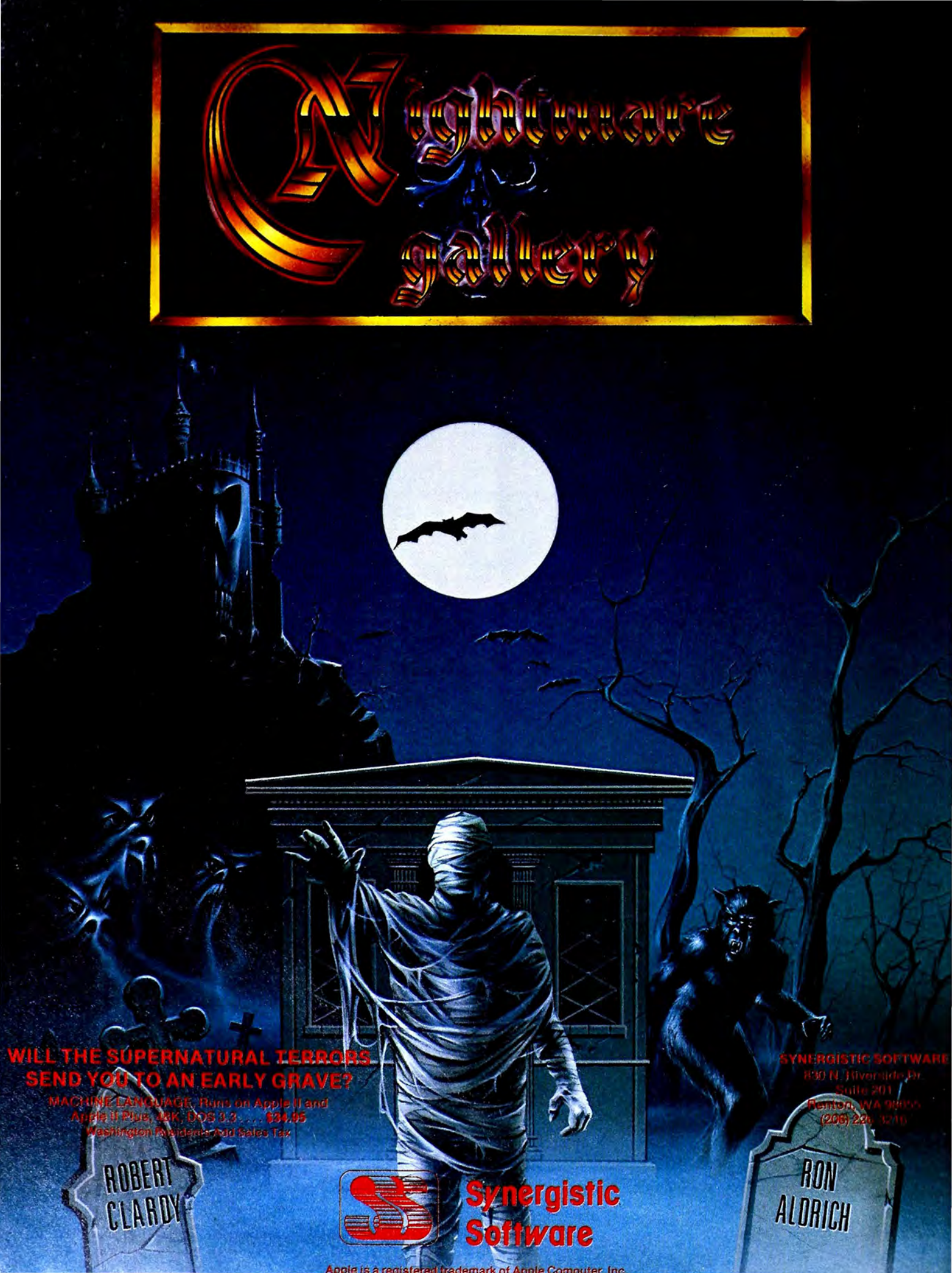
☐ **Southwestern Data Systems** (Santee, CA) is preparing *Demo+Plus*, a dealer support package featuring a software demonstration kit containing every software package SDS has ever produced, including manuals and all necessary hardware, plus publishing information for programmers, monthly press releases, and price list updates.

Dealer comments or suggestions for improvement or expansion of the program prior to production are welcome.

☐ **Digital Research** (Pacific Grove, CA), the developer of CP/M, has announced a general restructuring of its organization.

Two strategic business centers, organizational subunits that function like separate companies, have been formed around language and operating systems. Each will have its own product development and marketing departments. An international SBC has been formed for all company sales and support in Europe, working with Vector International of Belgium.

Finance and administration has assumed responsibility for EDP automation, transferred its shipping and receiving responsibilities to the manufacturing group, and passed its order pro-


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cessing responsibility to the operations group, established to manage inside sales and order processing, customer services, marketing communications, technical support services, documentation, training, and legal services.

The manufacturing group will also handle inventory, assembly, and disk production. This group will supply all company products.

An external sales group, formed to develop the company's domestic OEM and distributor sales organization, will establish a technical support organization throughout the U.S.

According to **Gary Kildall**, company founder and president, "This change is the fourth step in Digital Research's development. The first step was to include the participation of venture capital firms. Next, we acquired a language company and entered into an agreement to acquire a second. Third, we added more management expertise. Now, we are consolidating those steps and formalizing a tighter structure. Our goals are to continue to grow and respond to industry needs."

Digital Research recently announced the elimination of run-time library royalties for their languages, and entered into an agreement with **Micro Focus** to market CP/M-generic-based CIS Cobol and Level II Cobol.

☐ **James Lawson** has been appointed vice president of marketing and sales for **Evotek,** a recently formed designer and manufacturer of 5¼-inch Winchester disk drives. He will be responsible for domestic and international sales and marketing programs, bringing to the company his experience as vice president of sales for the western division of Software International, national sales manager for Honeywell's printer division, and three years with Sperry-Univac in Houston.

☐ A new approach to computer graphics has been developed by the **Conographics Corporation** (Newport Beach, CA). Called Conography, it allows a number of curve parameters to be translated into the x, y, and z grid axes, which then define the curve through a couple of equations. The resulting figure can have any degree of curve and orientation.

The Conographic company is developing a new board containing Conography graphics to replace the graphics board in the IBM personal computer, and is trying to interest Apple in producing a similar board for their computers.

☐ **Greg Staie**, general manager of **Continental Software** (Los Angeles, California), has announced several new appointments. **Ray Watt** has taken the position of account executive, and **Mary Watt** is the company's new accounting manager. **Jim Densmore** and **Richard West** will be complementing the customer support staff, and **Dr. Robert Wells** is handling technical writing and serving as company project coordinator.

☐ **James S. Campbell**, president of Shugart Associates, presented a gold-plated version of his company's minifloppy disk drive recently to **Wes Cantrell**, president of **Lanier Business Products**. It was the one millionth drive made by Shugart, which invented the minifloppy drive in 1976, and has been selling them to Lanier since 1977. Campbell said that Lanier was presented the drive in recognition of a mutually successful customer/vendor relationship.

☐ **The New Century Data Corporation** of Santa Rosa, California, is in the process of establishing a nationwide network of franchises that will provide computer hardware, software, and consulting services. The stores will operate under the name **Supertec**. In addition to retailing most types of microcomputers, they will custom-design computer systems based on the needs of the user and provide custom software. New Century Data is currently evaluating the proposals of forty-seven prospective franchisers from seventeen states and plans to have 137 consulting groups franchised by 1985.

The ideal candidate for a franchise is, not surprisingly, anyone with a strong background in hardware, software, and systems, rather than retailing. A franchise will require an initial $5,000 fee and a 3½ percent monthly fee thereafter. As part of obtaining a franchise, dealers will be provided with training in all aspects of marketing. NCD will provide on-site start-up assistance. ◨■

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This menu driven program combined with **LETTER PERFECT** allows user to generate form letters and print mailing labels. With the Atari, you may **CONVERT ATARI DOS FILES,** or Visicalc files compatible for editing with **LETTER PERFECT.** Utility creates Data Base files for Letter Perfect.

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Lower Case Character Generator for the Rev. 7, Apple II or II+ computers. When installed, this Eprom will generate lower case characters to the video screen. Lower case characters set has two dot true descenders. Installation instruction included. Manual includes listing of software for full support and complete instructions for shift key modification. Compatible with **LETTER PERFECT.**

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Everyone's Guide to Assembly Language, Part 21

Last month we looked at how the Apple hi-res screen is set up and at how each dot on the screen is linked to a bit-position of a byte in memory.

This month we'll present a more detailed explanation of plotting a point, and more specifically, provide routines for some new ways of plotting to the hi-res screen.

Normal Point Plotting. Last month we saw that the hi-res screen colors are mapped out from memory according to the scheme illustrated in figure 1.

You'll remember that we could access either the violet/green or blue/orange dot pairs depending on whether or not the high order bit (bit 7) of the byte in question was set. To plot a color dot on the screen we need to carry out the following steps.

1. Use the Y coordinate to determine which horizontal screen line to plot on. Because the lines are not mapped continuously, a special routine is used to calculate the base address. In this case the term refers to the address associated with the first byte on the line given by Y.

In normal Applesoft, this base address is called GBAS (for Graphics BASe address) and is stored in the byte pair $26,27. Location $E6 (HPAG) is used to indicate whether the plot is to be one on page 1 or page 2 of the hi-res screen.

A few lines were omitted from last month's listing, so here it is again:

```
                        1  * ********************************************
                        2  *            HI-RES 'BASE ADDRESS'           *
                        3  *            CALCULATOR ROUTINE .            *
                        4  * ********************************************
                        5  *
                        6          OBJ   $300
                        7          ORG   $300
                        8  *
                        9  GBAS    EQU   $26
                       10  HPAG    EQU   $E6
                       11  *
                       12  *
0300: 48                13  ENTRY   PHA
0301: 29  C0            14          AND   #$C0     ; CALCULATES BAS
0303: 85  26            15          STA   GBAS     ; ADDRESS FOR Y-COORD
0305: 4A                16          LSR            ; IN ACCUMULATOR.
0306: 4A                17          LSR            ; GBAS = ADDRESS OF
0307: 05  26            18          ORA   GBAS     ; 1ST BYTE OF LINE
0309: 85  26            19          STA   GBAS     ; SPECIFIED.
030B: 68                20          PLA
030C: 85  27            21          STA   GBAS+1
030E: 0A                22          ASL
030F: 0A                23          ASL
0310: 0A                24          ASL
0311: 26  27            25          ROL   GBAS+1
0313: 0A                26          ASL
0314: 26  27            27          ROL   GBAS+1
0316: 0A                28          ASL
0317: 66  26            29          ROR   GBAS
                        30  *
0319: A5  27            31          LDA   GBAS+1
031B: 29  1F            32          AND   #$1F
031D: 05  E6            33          ORA   HPAG
031F: 85  27            34          STA   GBAS+1
                        35  *
0321: 60                36  DONE    RTS
```

As it happens, we can use the HPOSN ($F411) routine in Applesoft to do this calculation for us, but the above listing is provided for your entertainment, and for possible use if you should decide to write an Applesoft-independent routine.

2. Once the base address of the horizontal line has been determined, the position of the byte relative to the left edge needs to be established. Because seven dots are stored on each byte, the byte we need to access can be determined by dividing the X coordinate by 7. This result is stored in location $E5 (HNDX = Horizontal iNDeX). It will be used later by putting the contents of $E5 into the Y register for an LDA ($26),Y operation—but more on that later.

3. The color mask needs to be set up. The color mask is a bit pattern that shows which bits in a byte are acceptable possibilities for a plot. The color mask is stored in location $E4 (COLBYTE). Rather than literally calculating, Applesoft stores all the possible color masks starting at location $F6F6 (see figure 2).

Ones and zeros are used to indicate which dots are on and which are off for the color indicated. Black1 is the simplest; black is achieved by turning any dot off. White1 is its converse, achieved by turning on any dot by a plot. Note that bit 7 does not correspond to a displayed dot and is left a zero (high bit off).

If you compare the color mask for green and violet to the chart in figure 1, you'll note that the ones match the available dots for the given color in a byte. Remember, the order of the

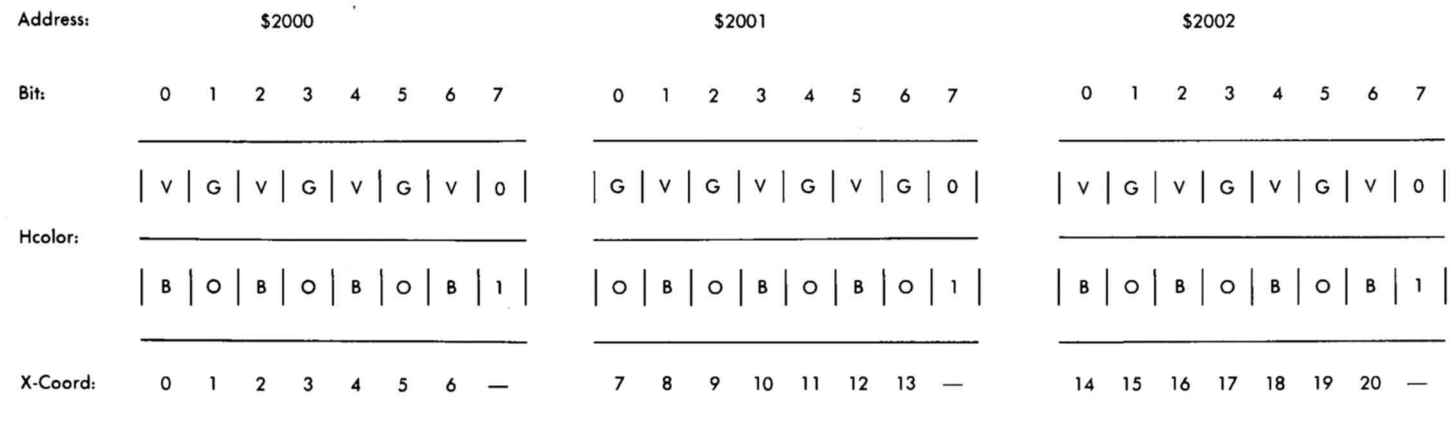


Figure 1.

	For X = EVEN					(shifted for X=ODD)			
$F6F6:	$00	=	0000	0000	(Block1)	$00	=	0000	0000
$F6F7:	$2A	=	0010	1010	(Green)	$55	=	0101	0101
$F6F8:	$55	=	0101	0101	(Violet)	$2A	=	0010	1010
$F6F9:	$7F	=	0111	1111	(White1)	$7F	=	0111	1111
$F6FA:	$80	=	1000	0000	(Block2)	$80	=	1000	0000
$F6FB:	$AA	=	1010	1010	(Orange)	$D5	=	1101	0101
$F6FC:	$D5	=	1101	0101	(Blue)	$AA	=	1010	1010
$F6FD:	$FF	=	1111	1111	(Block2)	$FF	=	1111	1111

Figure 2.

bits is reversed when mapping to the screen, so that bit 0 to bit 7 are mapped left to right on the screen.

The second set of masks on the left are the colors with the high-bit set (bit 7 = 1). The same pattern as before is used, except that the high bit is set for all four colors.

Looking at figure 1 again, you'll note that the masks shown on the left will work for all even-addressed bytes, that is, such bytes as $2000, $2002, and so on. For the odd-addressed bytes ($2001, $2003, and so on), the colors are shifted one bit position. When HPOSN is called, along with determining GBAS, it checks the HNDX calculated, and if that is an odd address, shifts the color byte. The result, whether shifted or not, is always put in location $1C (HCOLOR1). The results of such a possible shift are shown on the right side of figure 2.

(An interesting result of this process is that you cannot clear the entire screen to an actual color [green, violet, blue, or orange] by filling memory with a single value. Try it. Clear the hi-res screen with an *hgr*, then enter the Monitor with *call −151*. Then type in:

```
*2000:2A
*2001<2000.3FFFM
```

The screen should clear to alternate vertical bars of green and violet.)

4. Now the actual bit position of interest needs to be selected. This actually has already been done by HPOSN. The result of the X coordinate divided by seven was put in HNDX and the remainder of that division just happens to correspond to the actual bit position within the byte we want. The only remaining problem then is that the result is a number from 0 to 6, and what we need is a byte with only that particular bit turned on. This is again derived from a table within Applesoft (in this case starting at $F5B2). The result from this table is then put in location $30 (HMASK). For the table at $F5B2 see figure 3.

Now at last we're ready to do the actual plot. The plotting sequence (normally found at $F45A) looks like this:

```
LDY HNDX                LDY $E5
LDA HCOLOR1             LDA $1C
EOR (GBAS),Y            EOR ($26),Y
AND HMASK               AND $30
EOR (GBAS),Y            EOR ($26),Y
STA (GBAS),Y            STA (GBAS),Y
```

This last operation is probably best clarified with an actual example.

Given:

```
HGR
HCOLOR=1
HPLOT 15,0
```

$F5B2:	$81	=	1000	0001
$F5B3:	$82	=	1000	0010
$F5B4:	$84	=	1000	0100
$F5B5:	$88	=	1000	1000
$F5B6:	$90	=	1001	0000
$F5B7:	$A0	=	1010	0000
$F5B8:	$C0	=	1100	0000

(Note: the bits shown here for each byte are broken into four bit sets for clarity.)

Figure 3.

Procedure:

1. JSR $F3E2 (HGR)
   Clears the hi-res screen. Sets HPAG ($E6) to $20.
2. LDX #$01
   JSR $F6F0 (HCOLOR)
   This puts the mask value %00101010 in HCOLOR1 ($E4).
3. LDX X (LOW ORDER BYTE of the X coordinate)
   LDY X+1 (HIGH ORDER BYTE or X)
   LDA Y (Y coordinate)
   JSR HPOSN

Note that the percent sign (%) in the mask value is used to indicate the binary form of a number. This form is used in the remark portions of many of the source listings in this series as an added aid to the explanations. Although some assemblers allow binary numbers in the operand, we have limited their use here to the remark field to reduce compatibility problems.

This will:

a. Calculate the base address using the page index at $E6 (usually $20). In this case the result will be $2000. The result is stored in GBAS, GBAS+1 ($26,27)

b. Divide 15 (the X coordinate) by 7. The result (2) is put in HNDX ($E5). The remainder of the division (1) is used to access the bit mask table. The result of this table lookup (%1000 0010 found at $F5B3,X where X = 1) is put in HMASK ($30).

c. Check HNDX to see if the byte offset is odd. If so, shift the color byte mask. Since in this case $E5 holds a 2, no shift is required. Thus the color mask %0010 1010 is put in HCOLOR1 ($1C) in preparation for the plot.

4. JSR $F45A (HPLOT)

This completes the process with:

```
LDY HNDX          ($E5)    =  '2'
LDA HCOLOR1       ($1C)    =  %0010 1010
EOR (GBAS),Y      ($2002)  =  %0000 0000
                             ----------
                             %0010 1010  (EOR'ed)
AND HMASK         ($30)    =  %1000 0010
                             ----------
                             %0000 0010  (AND'ed)
EOR (GBAS),Y      ($2002)  =  %0000 0000
                             ----------
                             %0000 0010  (EOR'ed)
STA (GBAS),Y      ($2002)  =  %0000 0010
screen looks like:             0100 000-
                               ^
                             Green dot lights!
```

The net effect of step 4 is to say: "Look at the bit mask pattern and compare it to the color mask. If there is a one in the color mask at the given dot position, turn that dot on (set the bit to one). If there's a zero at that position, turn the dot off (clear bit to zero)."

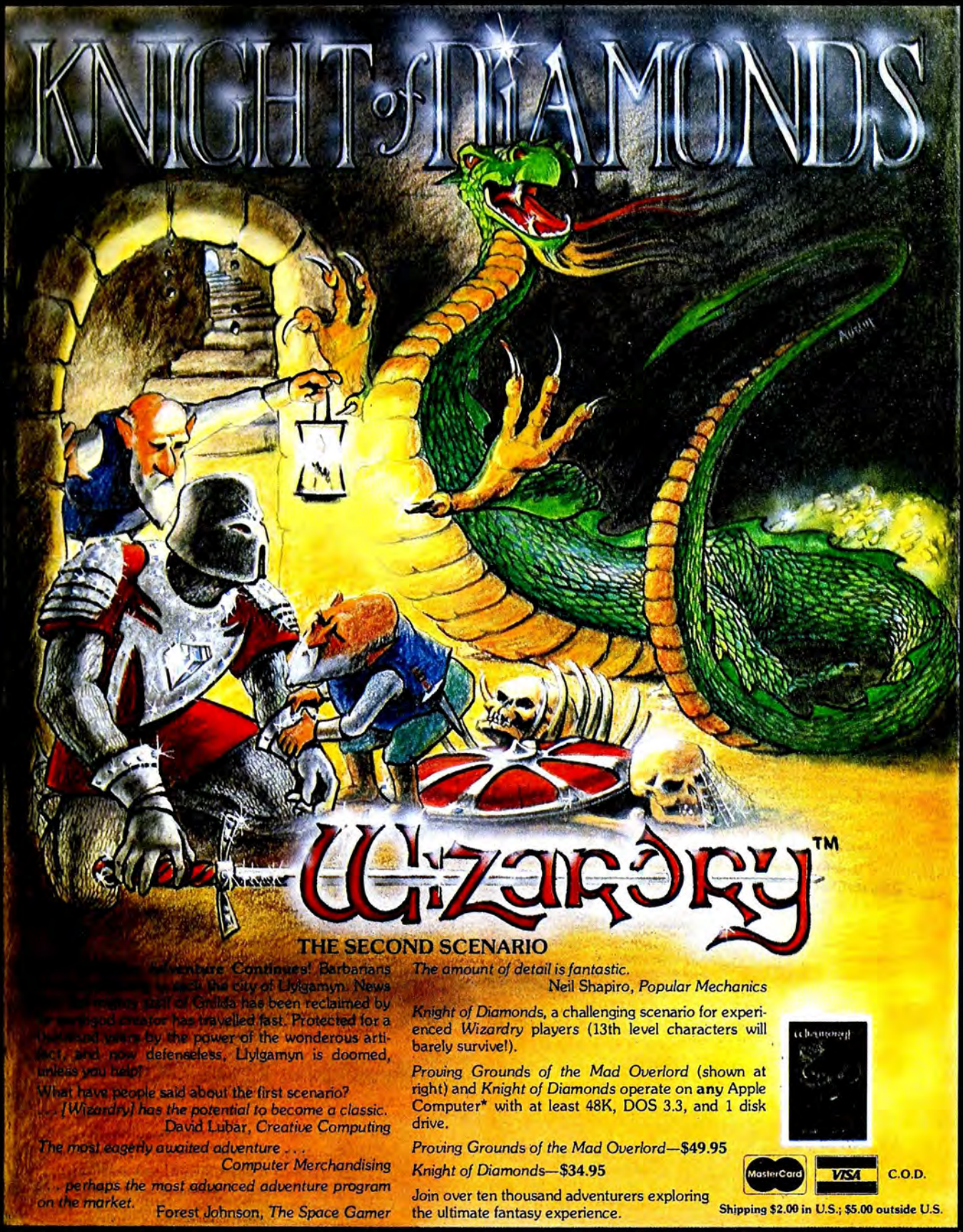
Alternate Plotting Modes. So far, all we have really done is to explain further something we were already using. This new explanation makes possible some alternative ways of plotting to the hi-res screen. In fact, by using the existing Applesoft routines, the new routines are rather short and, best of all, easy to explain. If you are unsettled right now about the finer details of the masking operations, don't worry. The real point of all that is to give you some feel for the general processes involved.

For starters, let's review some basic problems encountered so far with the normal Applesoft *hplot*. The first problem arises when you are trying to plot using just one color. By setting *hcolor* equal to 1,2,5, or 6, we limit the possible dots which can be plotted to every other dot on the normal screen. This can be disconcerting when you have a statement like:

```
HCOLOR=1: HPLOT 100,100
```

and nothing happens. The reasons for this were discussed in earlier issues, but now it should be even more obvious that the color mask specifies only odd-dot positions for *hcolor=1*, making it impossible to plot at X=100.

The second problem occurs when you're plotting with *hcolor=3* or *hcolor=7*. Even though we have specified white, an



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attempt to plot a single point always comes out as a colored dot. It is only when drawing more than one point (such as in a line) that white appears.

Let's examine possible solutions to these problems.

140-Point Resolution Mode. For the first problem of invisible points, one solution is to accept that there are only 140 points available for a given color, and to alter our frame of reference to recognize that reality.

An easy way of doing this is to always work with an **X** coordinate value in the range of 0 to 139, and then to double the value when actually doing the *hplot*. The main drawback to this approach is the speed loss during the multiplications, and the fact that odd color values must also be shifted by one (since odd colors can only plot at odd **X** positions). The situation now would look like this:

```
HCOLOR=2          or      HCOLOR=1
X=15:  Y=30               X=20:  Y=30
HPLOT  X*2,Y              HPLOT  X*2+1,Y
```

Another approach is to create a machine language routine to do this for us automatically. Here's the source listing for such a routine.

```
                        1  ************************ *
                        2  *      HI-RES PLOT.140     *
                        3  *                          *
                        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 *
                       16 X       EQU $E0
                       17 Y       EQU $E2
                       18 *
                       19 HCOLOR  EQU $F6F0
                       20 HGR     EQU $F6F0
                       21 HPLOT   EQU $F457
                       22 HPLOT2  EQU $F45A
                       23 COLBYTE EQU $E4
                       24 *
0300: 20 BE DE         25 ENTRY   JSR  CHKCOM
0303: 20 67 DD         26         JSR  FRMNUM
0306: 20 52 E7         27         JSR  GETADR
                       28 *
0309: 06 50            29 CALC    ASL  LINNUM
030B: 26 51            30         ROL  LINNUM+1    ; X*2
                       31 *
030D: A9 02            32         LDA  #$02        ; %0000 0010
030F: 24 E4            33         BIT  COLBYTE
0311: F0 06            34         BEQ  C1          ; NO MATCH (COLOR=EVEN)
0313: E6 50            35         INC  LINNUM
0315: D0 02            36         BNE  C1
0317: E6 51            37         INC  LINNUM+1
                       38 *
0319: A5 50            39 C1      LDA  LINNUM
031B: B5 E0            40         STA  X
031D: A5 51            41         LDA  LINNUM+1
031F: 85 E1            42         STA  X+1
                       43 *
0321: 20 4C E7         44 GETY    JSR  COMBYTE
0324: 8A               45         TXA              ; PUT Y-COORD IN ACC
0325: A6 E0            46 PLOT    LDX  X
0327: A4 E1            47         LDY  X+1
0329: 20 57 F4         48         JSR  HPLOT
                       49 *
032C: 60               50 DONE    RTS
```

This program is designed to be called from Applesoft, serving as a subroutine for an undefined overall program. The advantage of the routine is that *hcolor* may be set to any value, although white will still only plot one color. Values for the **X** coordinate may range from 0 to 139.

Assuming that the routine is loaded starting at location **$300** (768 decimal), the syntax for calling it would be:

```
CALL 768, X, Y
```

where **X** and **Y** are the coordinates for the desired plot.

Examining the listing, you will see that the first step is to use the calls to Applesoft on lines 25 through 27 to retrieve the **X** coordinate from Applesoft. The resulting two-byte representation for the value will end up in LINNUM (**$50,51**).

Once we have the value for **X**, the remaining process is very straightforward. The **X** coordinate is doubled by the pair of left shifts on lines 29,30. Next, the color byte is checked to see if the *hcolor* previously selected was an odd or even color value. A brief look at the color mask chart in figure 2 shows that bit 1 (rather than bit 0) is the key to whether a color is odd or even. If the color is odd, LINNUM is incremented by one to select the next odd **X**-coordinate position.

The **Y** coordinate is then retrieved using **COMBYTE**. Since **Y** cannot be larger than 191, the one-byte retrieval routine can be used.

At that point, the usual call to *hplot* is done with the new **X** coordinate.

A little rumination on this routine should convince you that it is functionally identical to this Basic algorithm:

```
0  HGR: HOME: VTAB 22
10 INPUT "HCOLOR";C : HCOLOR = C
20 INPUT "COORDINATES:";X,Y
30 X = X * 2
40 IF C/2 < > INT (C/2) THEN X = X + 1
50 HPLOT X,Y
```

The machine language routine given can always be used directly from other machine language programs by deleting lines 25 through 27 and changing 44 and 45 to read LDY Y. The routine would then be called by putting the **X** coordinate desired in LINNUM (**$50,51**), and the **Y** coordinate in **Y** (**$E2**).

560-Point Resolution Mode. The disadvantage of the 140-point method just shown is that the resolution of the graphics is obviously limited. This is particularly apparent in attempts to draw near-vertical ines; it's easy to observe the degree of stairstepping that occurs. Low-resolution plotting modes produce very broken vertical lines.

If color is not a concern (such as when using a black and white monitor), then why not just plot using white? Because we won't know that the colors are actually varying depending on the **X** coordinate specified, a black and white display will look fine.

Well, if that's the case, then you might as well go for all you can get and use the 560-point mode. The theory to this mode is that the high-order bit of each screen byte can be used to choose between dots shifted one half position with respect to the usual 280-point mode. The argument against this method is that the plotting of dots within the same byte can distort the first byte plotted.

For example, if the first dot plotted is on the farthest left possible position (high bit off), then a successive plot of any *hcolor* with the high bit set (*hcolor*=4 through 7) will change the color of the dot and shift it to the right. As it happens, this is not much of an argument since the same holds true for the normal 280-point mode, and even for the 140-point mode. The inescapable fact is that plotting two colors with conflicting high bit conditions within the same byte will always affect the first dot plotted. If the distortion is unavoidable then you might as well enjoy the benefits of the higher resolution, especially if you're going to have to cope with the distortion problem anyway.

Without further introduction, here then is the routine implementing the 560-point plotting mode.

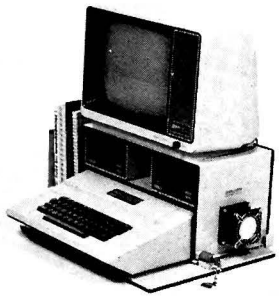
Like the PLOT.140 routine, this is assumed to be loaded at $300 and would be called in a manner identical to that for the previous routine:

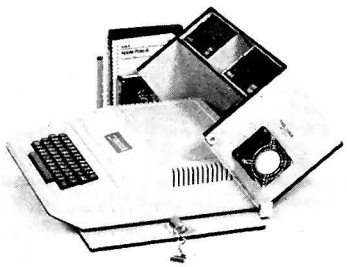
```
call 768, X, Y
```

The main difference here is that **X** can now have a range of 0 to 559, and that *hcolor* is always set to white. As with normal

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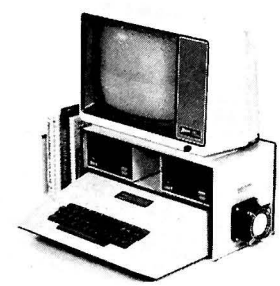
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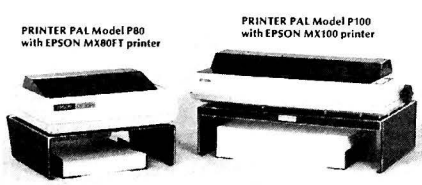
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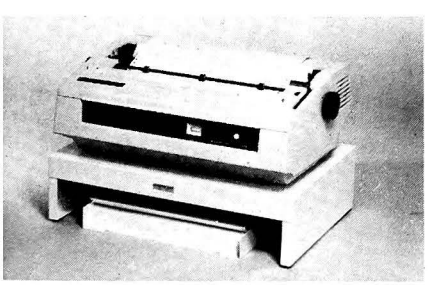


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Applesoft, what this really means is that we'll take any color we can get for a given plot, and that true white will only result when dots are plotted adjacent to each other.

Here's the listing for this routine:

```
                        1  ************************ *
                        2  *       HI-RES PLOT.560      *
                        3  *                            *
                        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 *
                       16 X       EQU  $E0
                       17 Y       EQU  $E2
                       18 *
                       19 HPLOT   EQU  $F457
                       20 COLBYTE EQU  $E4
                       21 *
0300: 20 BE DE         22 ENTRY   JSR  CHKCOM
0303: 20 67 DD         23         JSR  FRMNUM
0306: 20 52 E7         24         JSR  GETADR
                       25 *
0309: 46 51            26 CALC    LSR  LINNUM+1
030B: 66 50            27         ROR  LINNUM      ; X/2
030D: A9 7F            28 CHK     LDA  #$7F        ; %0111 1111
030F: 85 E4            29         STA  COLBYTE
0311: 90 04            30         BCC  C1          ; X=EVEN
0313: A9 FF            31         LDA  #$FF        ; %1111 1111
0315: 85 E4            32         STA  COLBYTE
                       33 *
0317: A5 50            34 C1      LDA  LINNUM
0319: 85 E0            35         STA  X
031B: A5 51            36         LDA  LINNUM+1
031D: 85 E1            37         STA  X+1
                       38 *
031F: 20 4C E7         39 GETY    JSR  COMBYTE
0322: 8A               40         TXA              ; PUT Y-COORD IN ACC
0323: A6 E0            41 PLOT    LDX  X
0325: A4 E1            42         LDY  X+1
0327: 20 57 F4         43         JSR  HPLOT
032A: 60               44 DONE    RTS
```

The operation of this routine is also fairly simple. As with the PLOT.140 program, the value for **X** is retrieved from the calling program. In this case though, **CALC** divides the passed value by two. Note that a left-shift operation is used, not the right shifts (for a multiply) that were used in the 140-mode.

You'll recall that **LSR LINNUM+1** (**LSR = Left Shift Right**) will shift all bits in LINNUM+1 (the high order byte) to

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the right one position, forcing a zero at the right-most position, and putting the old bit zero in the carry.

This is immediately followed by the ROR (for ROtate Right) instruction which again shifts all the bits in LINNUM (the low-order byte), puts the carry into bit 7, and drops the last bit 0 into the carry, thus replacing the old value.

```
Example:     X COORD = 289 = $121 = %0000 0001   0010  0001
                                                 LINNUM+1     LINNUM
LSR LINNUM+1:     %0000 0001 -> %0000 0000 (Carry=1)
                                  !
                                (C) <--!
ROR LINNUM:       %0010 0001 -> %1001 0000 (Carry=1)
                                  ^       !
                                !-(C) <--!
```

The rather coincidental beauty of this is that the carry flag will end up being set or cleared depending on whether the original value for **X** was odd or even. This is needed because in the 560-point mode, we'll use the odd or even nature of **X** to determine whether to set the high bit or not.

X(560)	X (280)	Calar Mask ta Use
0	0	White 1 (bit 7 = 0)
10	5	White 1 (bit 7 = 0)
201	100	White 2 (bit 7 = 1)
501	250	White 2 (bit 7 = 1)

Basically what we do is to divide the **X** coordinate by two to get a value acceptable to normal Applesoft, and then force the color to be either white1 or white2 depending on how we want the high bit set in the final plot.

Lines 28 through 32 set the color mask to the appropriate value by checking the carry flag to see if the original value of **X** was odd or even. Then LINNUM is transferred to our actual X-coordinate bytes. The routine is then completed with the usual call to *hplot,* as was done in the PLOT.140 routine.

This process could be simulated from Applesoft with the following routine:

```
0  HGR: HOME: VTAB 22
10  INPUT "COORDINATES?",X,Y
20  HCOLOR = 3 : REM WHITE1
30  IF X/2 < > INT(X/2) THEN HCOLOR = 7:
    REM WHITE2 FOR X=ODD
40  X = X/2
50  HPLOT X,Y
```

It's likely, however, that you'll find the machine language routine considerably faster, and certainly much easier to implement.

A Demonstration Program. To give you something to show off these routines, here's a program in Applesoft that will call both routines and show the differences in their appearances.

```
10  D$ = CHR$ (4)
100  REM NORMAL TEST
110  HGR : HCOLOR= 3
120  FOR I = 0 TO 100
130  HPLOT I,I
140  NEXT I
200  REM PLOT.140 TEST
205  PRINT D$;"BLOAD PLOT.140,A$300"
210  FOR I = 0 TO 100
220  CALL 768,I,I
230  NEXT I
300  REM PLOT.560 TEST
305  PRINT D$;"BLOAD PLOT.560,A$300"
310  FOR I = 0 TO 100
320  CALL 768,I,I
330  NEXT I
```

Notice that this program loads each routine from a disk file as it's needed. Basically this illustrates the steepest vertical angle at which a line can be drawn without any noticeable stairstepping, or breaking, in the line. It also conveniently shows a perhaps unexpected change in the actual visual result of the plot, even though all three lines were done with similar *for-next* loops.

Normally, the 280-point mode is conveniently proportional. That is to say, a move of five points horizontally on the screen is about the same actual distance on the screen as a move of five points vertically. This ensures that a square will in fact look "square" when drawn on the screen. Thus the first plot is at the "proper" 45 degrees when drawn using *hplot I,I.*

When the number of screen points is halved, as in the case of the PLOT.140 routine, the result will be to "stretch" the screen horizontally by a factor of two. Similarly, packing twice as many points (namely 560 versus 240) across has the effect of compressing the screen. These effects must be considered when doing geometric designs on the screen.

We'll leave it as an exercise for you to draw three parallel lines using each of the three modes.

By now, you've probably also noticed some minor flaws in the clarity of the 560-point line.

Next month we'll explore the matter further, discovering why the faint spots occur, and how to fix them.

Have fun!

Please note the following correction to the February 1982 Assembly Lines. The listing for the Real Variable Sender routine had an error on lines 19 and 20 of the source listing. The listing for those lines should have read:

```
0303:  AD  81  03    19        LDA  DATA+1
0306:  AC  80  03    20        LDY  DATA
```

The listing given had the DATA and DATA+1 bytes reversed, which would have accordingly reversed the low and high order bytes in calculating the final result. ◨■

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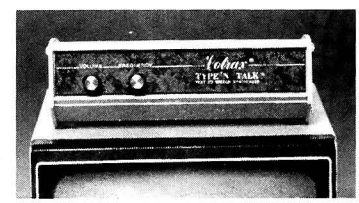
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BY BERT KERSEY



After memorizing the location of the on-off switch on my 16K cassette Apple, my main frustration as a beginning programmer became my inability to save keyboard input from within a program. I would write a program that asked questions, but then the only way to save the typed-in answers was on a printout (very difficult without a printer). Then along came a little black and white box called Disk II, *and my problems were solved. The instruction book said I could create* Text Files. *Oh boy! But then a question arose . . .*

What Is a Text File? A text file is simply a series of words separated by carriage returns and stored on disk. The words may range in length from 0 to 255 characters. All characters except carriage returns (control-Ms) are legal. You will recognize a text file in your catalog by the T that appears to the left of the sector number.

You can't *run* or *load* text files (you'll get a "file type mismatch" message if you try), but you can *read* them or *write* to them from within a program. You can also *exec* some text files, as we'll discuss later on. Text files are stored or *saved* onto disk with DOS's *write* command and retrieved or *loaded* with the *read* command. Both *read* and *write* need the help of the *open* and *close* commands.

Some Words about Control-D. We're about to write and use a few programs that perform some DOS commands. To do this, we'll need to use DOS's control-D or CHR$(4) command character in front of our commands. We'll assume you've read your DOS Manual (only the interesting parts, of course), and know how to perform simple DOS commands from your programs, like:

```
10  D$=CHR$(4): REM (control-D)
20  PRINT D$; "CATALOG"
```

We'll assume you've run into the problem of this method *not* working in situations like this:

```
10  D$=CHR$(4): REM (control-D)
15  PRINT "POPSCICLE";: REM (with semi-colon)
20  PRINT D$; "CATALOG"
```

For whatever reason, control-D has to be "printed" (invisibly) at the *left margin* of your screen for the command that follows to be executed. So if your cursor is stranded out at *htab* 10, as in the example, *print D$; "catalog"* will do just that, print the word catalog, nothing more, and *not* catalog your disk.

Well, let's fix that problem forever. From now on, use:

```
D$=CHR$(13)+CHR$(4)
```

Now there will be a carriage return (CHR$13) or control-M) printed before every control-D, always placing the control-D on the left side of your screen.

A Read-Any-Text-File Utility! As you know, you can *load* and *list* Applesoft and Integer Basic programs and even *bload* and *peek* at binary files, but what if you have a text file that you or some other key-banger wrote, and you want to check it out? Well, you came to the right place 'cause here's a way to do it. Read along; maybe we'll both learn something.

First, let's write an Applesoft program that asks questions of (gets input from) the Human At the Computer Keyboard (H.A.C.K.?):

```
100  INPUT "WHAT? "; A$
110  GOTO 100
```

Not bad! Do you realize you could learn everything a person ever knew with that program!? What happens in line 100 is that the human at the keyboard sees the question "What?" on the screen, types his answer, and then hits a carriage return. The carriage return, in a way, is the last "character" of his answer.

Now, we're going to expand the program and pretend that your *disk drive* is the human at the keyboard. When we *read* a text file, that's exactly what we're doing; we're getting *input from the disk.* So, let's precede our input routine with *open* and *read* statements and follow it by a *close* command. Here's the program. Type it in, *save* it and then *run*:

```
10  TEXT : HOME : PRINT "THIS PROGRAM WILL READ ANY TEXT FILE."
20  FOR I = 1 TO 40: PRINT "-";: NEXT
30  INPUT "NAME OF FILE:";F$
40  D$ = CHR$ (13) + CHR$ (4)
50  PRINT D$;"MONICO"
60  PRINT D$;"VERIFY ";F$
70  PRINT D$;"OPEN ";F$
80  PRINT D$;"READ ";F$
90  ONERR GOTO 120
100  INPUT "";A$
110  GOTO 100
120  PRINT D$;"CLOSE ";F$
```

This program should read any standard-DOS text file. Dig around; you should be able to find one someplace (there's one on the System Master Disk). The text file you read may be a list of words of names, a series of commands, or a combination of the two. You may get a few confounded "?extra ignored" messages, because of encounters with commas and colons (we'll get to this later), but no problem; the commas, colons, and words that follow *will print.*

Let's see what makes this program do its thing.

Lines 10-30 print a title and get the name of the text file we want to read. Line 40's D$ was discussed earlier.

Line 50's *monico* sort of tells the Apple to print what it's "thinking about." A better command here might have been *mon I* (*MON*itor *I*nput) but for now, let's not be choosy. See Apple's DOS Manual for more. They'll tell you, by the way, to use *mon i,c,o*, but who has time to type all of those unnecessary commas?

Line 60's *verify* is a trick that checks to see if the text file we are looking for is actually on our disk. *Verify* is a DOS command of questionable value (until now). If the file you asked

for in line 30 doesn't exist (maybe you spelled it wrong), the program will stop with a "file not found" message; it tried to verify the program but couldn't find it. Had we not used *verify*, the next command, line 70's *open*, wouldn't have found the file either, but it would have *created* a file for you, a useless one-sector empty file (spelled wrong and everything) in your catalog. Just what you don't need.

By line 70, the Apple knows the file exists, so it *opens* it. Text files have to be *opened* before you can write to them or read them.

Line 80 tells the program to read the text file. After opening a text file, we have to say whether we want to *read from* or *write to* the disk.

Line 90, *onerr goto 120* is going to watch for the end of our text file; more on this later.

Lines 100-110 are where the real action takes place. The *input* statement asks the question and the disk drive answers by reading data from the disk, storing it in memory and (optionally) printing it to the screen or printer. Every time a carriage return is encountered in the text file, the Apple considers the question or *input* answered, so the program continues to the next (in this case, the *same*) question. Incidentally, if you use *input ""; A$* instead of *input A$,* you don't get a column of question marks printed to the left of the data coming in from the disk. You could also use *input "data:"; A$* or something similar. This would also prevent ?s.

Sooner or later, the program will encounter the end of the text file. Line 100 will ask for more input and the file will have nothing left in it. Normally, if you ask too many questions of a text file, you will get an "end of data" error message (not "?out of data"; that's another story). Instead of a crash, good old *onerr goto* takes over and does a jump to line 120.

Line 120 closes the file for us. Just as you have to *open* text files when you read or write, you have to *close* them. You actually don't need to use the file name after *close,* but it doesn't hurt. By the way, *close* is one of the DOS commands you can use in *immediate-execution* mode. *Open, read,* and *write,* however, may only be used in a program (*deferred* execution).

Sequential Text Files. Now we're going to write the simplest kind of text file. *Sequential text files* best fit our definition—"a series of words separated by carriage returns." Apple's other type of text file, *random access files,* are just a bit more complex. The objective of the two programs below is first to get some names from the human at the keyboard and then to save *(write)* the names on disk so we can turn off the Apple and retrieve *(read)* the names next Tuesday after work.

First, here's a program that will get the names we want to store:

```
10  REM "WRITE" PROGRAM
20  TEXT : HOME : NORMAL
30  MAX = 100: DIM NAME$(MAX)
40  N = N + 1
50  PRINT "TYPE NAME #";N;
60  INPUT ":";NAME$(N)
70  IF LEN (NAME$(N)) > 0 and N < MAX THEN 40
80  N= N - 1: PRINT : PRINT
90  INPUT "NAME OF FILE TO BE WRITTEN:";F$
100  D$ = CHR$ (13) + CHR$ (4)
110  PRINT D$;"MONICO"
120  PRINT D$;"OPEN ";F$
130  PRINT D$;"DELETE ";F$
140  PRINT D$;"OPEN ";F$
150  PRINT D$;"WRITE ";F$
160  PRINT N
170  FOR X = 1 TO N
180  PRINT NAME$(X)
190  NEXT X
200  PRINT D$;"CLOSE"
```

Lines 10-70 get our names from the keyboard for us and store them in memory as a *name$* string array. If return is pressed without typing a name, then the length *(len)* of *name$*(N) is zero (line 70) the *input* is discontinued, and N is decreased by one (in line 80; because no name number N was entered). Line 30's *max* and *dim name$(max)* determine the maximum number of names allowed by the program. Unfor-

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tunately, you have to assign this value first; you can't increase it as you go along.

Line 90 lets you name the text file about to be written. Any legal file name is okay (it must start with an upper or lower case A-Z *or* a control character *or* one of twelve other special characters and it must contain no commas).

Lines 100-140 open our name file almost as we did in our "Read Anything" program. Line 130, however, uses a common trick to prevent a common problem. After the file is opened, we *delete* it whether or not it appeared on the disk when we started. Nothing is lost; we're about to *write* (or rewrite) the file anyway.

The thing is that if we are rewriting a text file *shorter* than it was, the *end of the file* we are writing to will *not* be overwritten and will appear at the end of our new file. You don't need to worry about this when you save an Applesoft program under the same name as a longer one, but here you worry. After the file has been *opened* and *deleted,* we must *open* it again (line 140).

Line 150 initiates the *write* process. Everything that is *printed* in quotes or outside quotes will now be written to the disk. If we want the printed or written words to show on the screen, we use the *print D$; "mono"* or *mon ico* command. If we don't, we use *nomono* or *nomon ico.*

Lines 160-190 write the pertinent information—the *number* of names in our file and the *names* themselves. It is important that we write the number of names as the first piece of data because later, when we retrieve the file, we will be asking for a *number* as the first piece of data.

Line 200 closes the file. No more lines; end of program.

After running the above program and entering a couple of short test names, *catalog* your disk. You should see a T (for "Text") file, probably two sectors in length, depending on the number and length of the names you entered. Save the program on disk by typing *save write program.* Now type ***FP*** or *new* and we'll write a program that will *read* our textfile:

```
10  REM "READ" PROGRAM
20  TEXT : HOME : NORMAL
30  MAX = 100: DIM NAME$(MAX)
40  INPUT "NAME OF FILE TO BE READ:";F$
50  D$ = CHR$ (13) + CHR$ (4)
60  PRINT D$;"MONICO"
70  PRINT D$;"VERIFY ";F$
80  PRINT D$;"OPEN ";F$
90  PRINT D$;"READ ";F$
100  INPUT "";N
110  FOR X = 1 TO N
120  INPUT "";NAMES(X)
130  NEXT X
140  PRINT D$;"CLOSE"
```

Notice how *input* statements are used in lines 100 and 120. We are again asking questions of the disk drive. Assuming our *read* program (this one) and our *write* program are compatible, everything should work fine. Of course, you will want to *do* something with your names; this program just *gets* them for you. Maybe you want to be able to add a few names or delete a couple, and write them back into the text file, or alphabetize and. . . . But before you go any farther, you should renumber these two programs and append them, giving you the options of reading and writing from the same program. As you can see, this could be the start of something big.

The #@&?Extra Ignored Problem. There's a Basic conflict here that gets in the way of writing all-purpose textfiles, and that's Applesoft's confounded dislike of any input that contains a comma or a colon. Any answer you give to an *input* statement is chopped off at the first comma or colon, and to make things worse you get an ugly "?extra ignored" printed on top of your previously neat screen layout (at least it doesn't *beep* twelve times). Even if you come up with some words or strings that already contain commas or colons (as in "Smith, John") and *write* them to a textfile, you can't *read* them back into memory with *input* statements (thanks to *mon ico,* you *can* get them printed on the screen).

Enough complaining. Let's do something about it.

```
60  INPUT "WHAT'S YOUR NAME? ";A$
70  PRINT "THANKS, ";A$;"!"
```

Run this program, and answer "SMITH, JOHN" (with a comma) to the question. The Apple prints:

```
?EXTRA IGNORED
THANKS SMITH!
(instead of "THANKS SMITH, JOHN!")
```

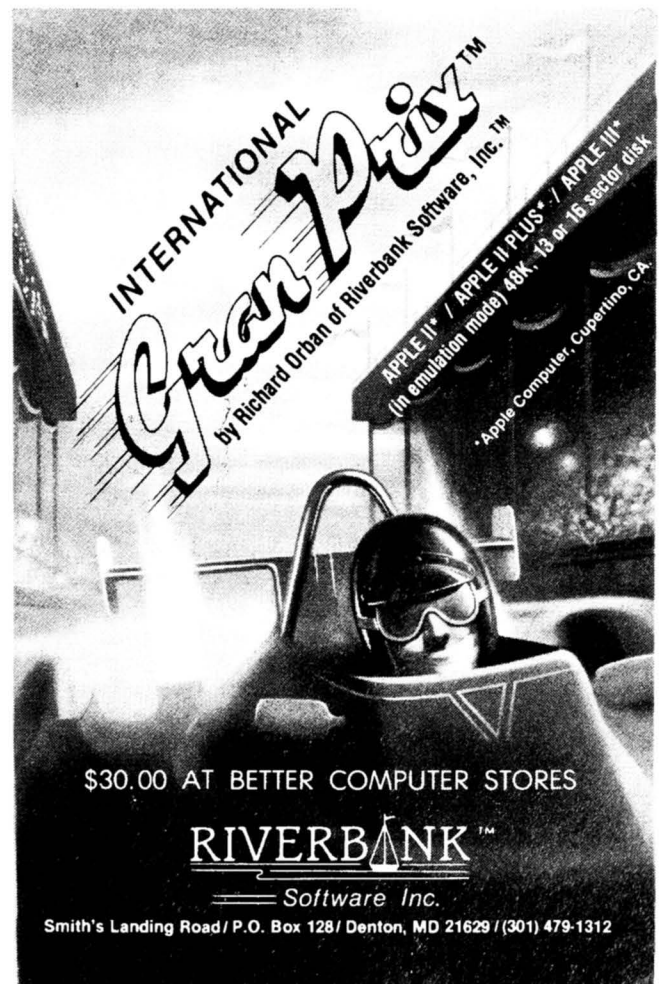
Now the solution: There's a nice subroutine built into your Apple that can be utilized by a *call-657.* The subroutine is really sort of an *input* function that just *loves* commas and colons. The problem is, it sticks your "input" into the input buffer at memory location 512 ($200-$3FF) and you have to dig it out. Here's one way to do it:

```
60  PRINT "WHAT'S YOUR NAME? ";: REM (that's PRINT, not INPUT)
65  CALL -657: A$ = "": FOR X = 512 TO 767: P = PEEK(X):
      IF P <> 141 THEN A$ = A$ + CHR$(P): NEXT X
80  PRINT "THANKS, ";A$;"!"
```

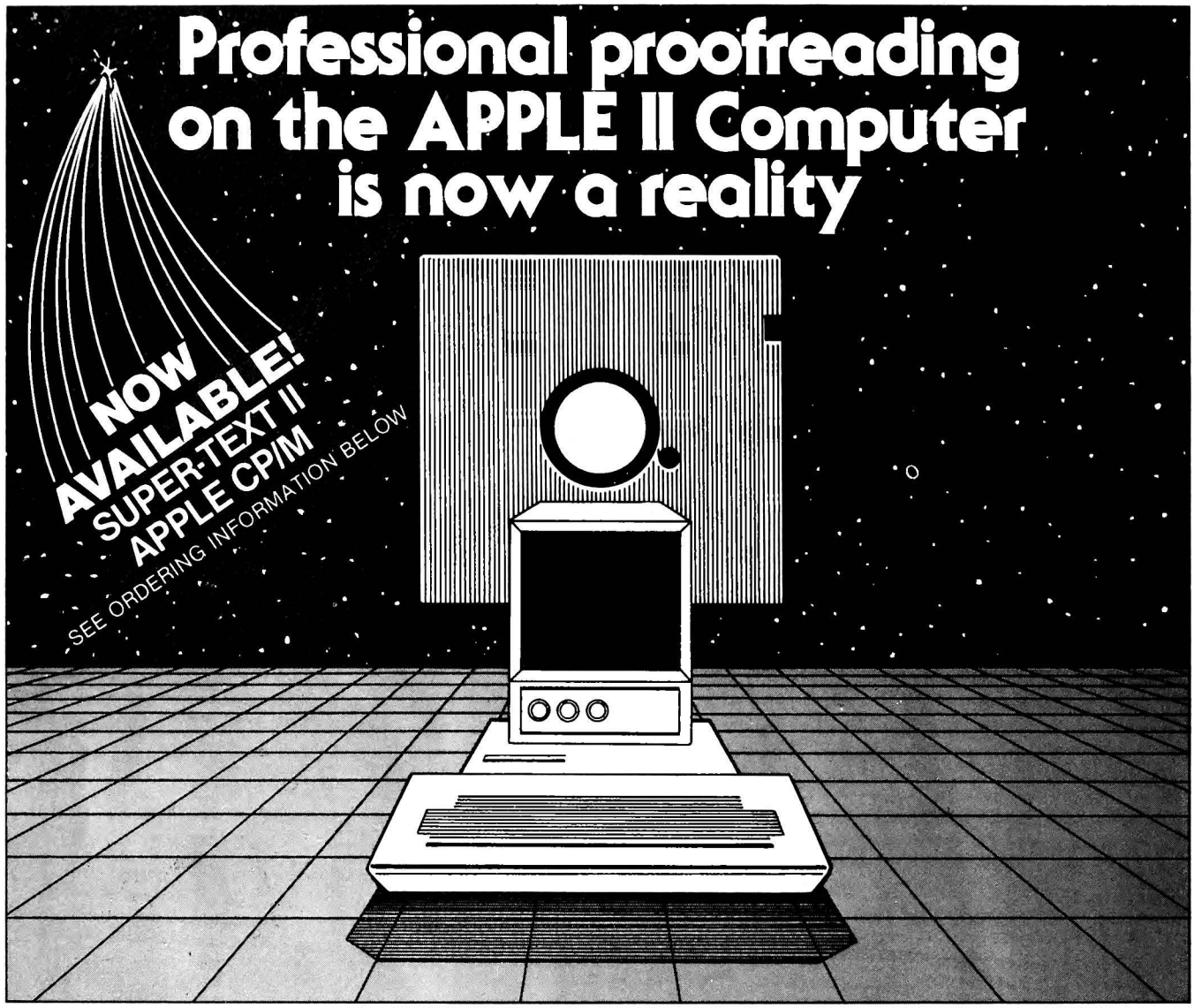
A lot of extra work just to get commas and colons, right? Line 65 scans each character of the input buffer, adding each one to the string A$ until it finds a carriage return (until P=141). Use this method in all of your programs if you want. Besides solving the comma problem, this routine will accept leading spaces as input. You could make line 65 a subroutine (with a return in the *next* line) if you need several inputs in a program.

Mystery of the Month. Another one from Chris Volpe, chief Apple mystery man. There is a *call* called *call 42350* that will catalog a disk, handy for use with disks where the *catalog* command word may have been altered. Try it; it works. Just type *call 42350* (return). Now try it with your drive door open. This should produce an *I/O error* message, but no-oo-oo! You get a *rogram too large* message (that's "rogram," not "program").

Well, we don't explain 'em, we just find 'em. See you next month. ◨



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NEWSPEAK



☐ **East Side Story.** Leon Watkins is a man with a mission in life. For years he has been working with gangs in East Los Angeles, California. By getting them off the street and into a learning environment, Watkins, and many others, believe it's possible to integrate gang members into constructive social behavior.

Watkins's latest effort in this area involve microcomputers. Every Saturday, Watkins tours around in an old church bus and collects gang members for a trip to Data Equipment Supply in Downey. Under supervision, gang members learn about programming and word processing on Commodore computers.

Working with a nucleus of gang members who have made the trip before and know the ropes, Watkins gathers a few new people each weekend. A buddy system is used wherein two or more people work together to learn about the computer.

"I'll try anything once," explains Watkins. "I didn't have any idea that this would last so long. Taking the gangs over to Data Equipment has been very successful. We'll keep doing it as long as we can."

The program originated when Commodore loaned fourteen computers to Larry Bowder of Data Equipment to help start local microcomputer workshops for the general public. One workshop was in East L.A. and that is how Bowder met Watkins.

Now Saturdays are East L.A. day at Data Equipment. Working in conjunction with the Los Angeles Police Academy, Bowder is striving to provide an alternative outlet for gang energy. The idea is to find an activity that is more fun than running with a gang but is also part of the real world.

According to Bowder, "Dissemination is not the answer. We try to keep the camaraderie found in gangs and let it carry over into what they're doing here."

Each Saturday is broken into thirds. The first third is spent on general typing skills. The second third involves learning basic math through CAI. The last third of the day is spent in small workshops learning programming skills, word processing, and even things like *VisiCalc*.

"It's important that they learn something that has to do with the real world," explains Bowder. "Their attitude starts changing when they think they've become involved. The social interaction possible with microcomputers is incredible. I sure didn't see it coming and I've been in this business for fifteen years."

The ultimate goal of Watkins and Bowder is to have computers in the community where the gangs are located. This way an individual can take knowledge and experience gained at Data Equipment back to help others learn on their own machines locally.

☐ **A Fistful of Nickels.** Nineteen eighty-two's first quarter financial reports are in and they show the computer industry as a whole reflecting the economic slump due to the recession.

International Business Machines racked up $7 billion in sales, an increase of 9 percent over the same period in 1981. Reported profits were $768 million, up 5 percent from last year. The profit margin shrank from 11.3 percent to 10.9 percent.

The recession and high interest rates are bad enough, but inflation drastically changes some of the figures released by companies. The inflation scoreboard in *Business Week* (May 3, 1982) reports on 400 companies' profits in 1981 when adjusted for inflation.

According to the scoreboard, IBM's total sales of $29 billion in 1981, with a reported increase of 11 percent, earned a far less impressive 1 percent increase over 1980 sales.

The industry composite for office equipment companies shows an inflation-adjusted 2 percent increase in sales, far from the 13 percent increase garnered before inflation. Figures for the composite totals were calculated using the financial results of ten companies with a total sales of $66 billion.

Inflation has also taken its toll on profits. IBM's little more than $3 billion profit reported for 1981 becomes a little less than $2 billion in 1981 dollars. Further analysis of four year growth rates shows IBM's reported 12 percent increase in sales are actually 1 percent after inflation and profits are down 5 percent instead of up 5 percent.

Business Week came to the conclusion that industries suffer unevenly from inflation. After adjusting costs for the consumer price index and for changes in specific prices, including depreciation and cost of goods sold, the best industry is office equipment. The current-cost profits as percent of historical cost is 93 percent, compared to 83 percent for second-place publishing and television.

The *Wall Street Journal* attributes IBM's slight first quarter profit to demand for the Personal Computer. Without the Personal Computer, the scene would have been even more dismal.

Apple Computer, on the other hand, showed a first quarter profit increase of 51 percent. Take into account inflation and that percentage drops, but Apple is still growing at a phenomenal rate.

With total sales of $335 million in 1981, Apple missed the Fortune 500 by about $120 million. By contrast, IBM placed eighth on the 500, retaining the same position it had in 1980.

IBM's competitors in the office equipment market may be falling on hard times. Control Data showed first quarter profits of 5 percent before inflation. Honeywell showed a profit increase of 8 percent, attributable in large part to $36 million from the sale of its interest in GE Information Service. *Business Week* notes: "Without that income, its (Honeywell's) profits would have fallen nearly 63 percent."

Burroughs reported a first quarter profit increase of 22 percent, but industry analysts attribute this to the acquisi-

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tion and exchange of securities.

The fact remains that the worse the economy gets, the more it affects people and business. Computers are in many different facets of life. When there are fewer new cars, houses, banks, manufacturing plants, research projects, and schools, the demand for computers declines.

The results? A lot of computer companies are riding the whirlwind dream of future sales. Many studies predict a threefold increase in demand for office automation equipment in the next three years. Some companies will truly flounder if the economy stays bad and significantly cuts into those dollars of the future.

☐ **Corporate Bootstraps.** Business and consumers are in trouble if they invest hard-earned money in a computer system that is quickly outdated. Likewise, computer manufacturers are in big trouble if they invest in a technological development that flops or, at best, never catches on.

General Automation (Anaheim, California) was the fourth largest manufacturer of minicomputers in the early seventies. An expensive gamble on an exotic technology called silicon-on-sapphire lost millions of dollars and sent engineers back to the drawing boards. By mid decade, things had gone somewhat askew.

A great deal of money was spent on research and development, but no new products were forthcoming. The company's response? Several members of the executive staff took up religion and tried introducing it to employees.

One day in 1975, a top executive, attempting to fix a malfunctioning General Automation computer, placed his hands on it and prayed. Whether the prayer worked or not is a moot point, but the doubts raised by this incident still cloud the image of the once high-flying minicomputer firm.

The second half of the seventies saw General Automation's stock drop considerably and many investors abandon ship. Keeping up a good service department and customer relations was about the only thing the company did right in these years.

General Automation kept publishing software, but no new computers saw the light of day. A lot of problems can be attributed to the solid but unproductive engineering base of the company. The founders had been engineers; research projects with uncertain market value proliferated.

When it looked like things could get no worse, in September 1979, founder and chairman Lawrence Goshorn was ousted by the board of directors. A consultant was brought in to determine what course should have been taken. The conclusion reached was that the company was worth saving, but that many things had to change; a turnaround would take at least three years.

A crack senior management staff came with the new president. Many development projects were axed and there was a sizable work force reduction. The decision was made to put out a new family of minicomputers to replace the aging 16/200 and 16/400 series. Just released, Series 900 is General Automation's first high-cost performance but cost-effective product line in a long time.

Current plans call for an increased effort in software development, as well as a microcomputer and a thirty-two bit minicomputer due in a year's time.

General Automation has paid dearly for the years of standing still, losing a good share of the market. Now they think they're on the right road to recovery. It's tough playing catchup, but it can be done.

The second year of a three-year turnaround is spent gearing up. The third year you go get 'em.

A General Automation spokesperson lamented the economy: "Now it's even more of a challenge to get the company back on its feet." Regardless, General Automation plans to make some significant waves in 1983. Only time will tell how they fare.

☐ **In Harvard's Way.** One of the top learning institutions in the country has made knowledge of computers mandatory for all undergraduates. Explaining the difference between samarium and zirconium is still optional, but understanding simple programming is now considered part of getting a good education.

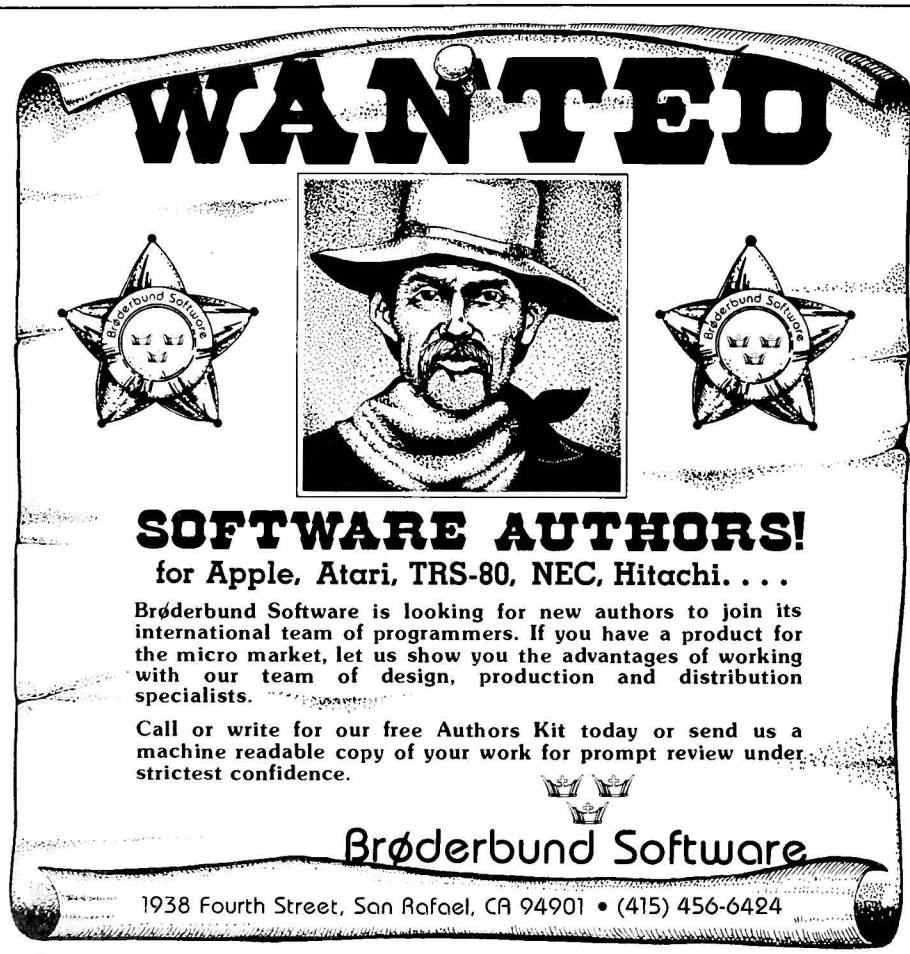
Undergraduates at Harvard University have to display at the end of their freshman year a certain understanding of quantitative reasoning. The requirements call for knowledge of data analysis—probability, means, and standard deviations—basic math through Algebra II, and basic computer science.

Adequate knowledge of computers for a freshman is defined by the ability to write a short program. Ideally, the program should involve a loop, inputting and outputting data, and a simple function. Warren Reed, assistant director of admissions, calls it a "folksy" test, not "particularly onerous."

"We're not trying to scare students away, but we're very serious about making people do it."

If a student can't pass this requirement at first, they attend minicourses for basic but detailed instructions on programming. In cases where the minicourses don't do the trick, an introductory course in computer science is called for.

"We don't exclude people without computer experience, but we keep an eye out for some quantitative sense. We're encouraging the use of computers as part of the academic experience. ■



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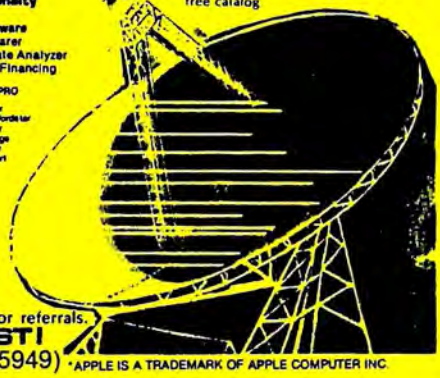
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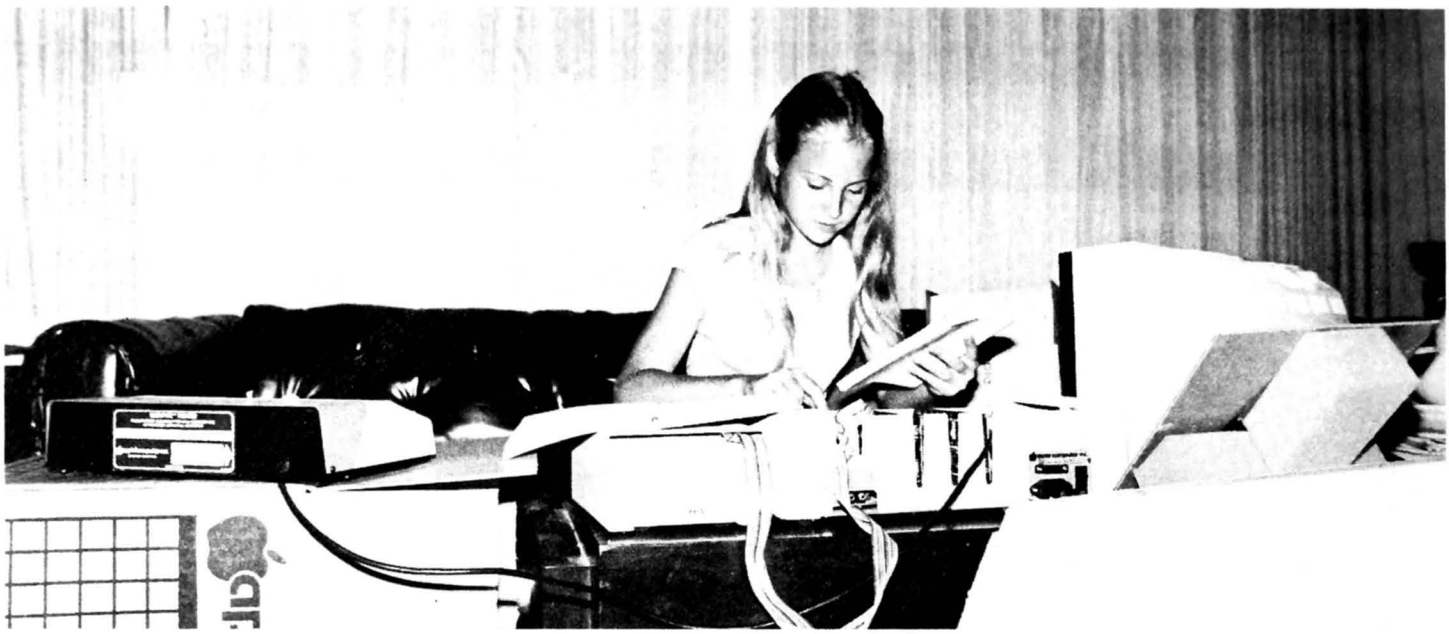


The original Keyboard and Display Enhancer is still available for Revision 0-6 Apples (on which the new Enhancer II will not fit). These Apples have memory select sockets at chip locations D1, E1 & F1. The Keyboard and Display Enhancer allows entry and display of upper & lower case letters with fully functional shift keys. It does NOT have user definable keys nor a type ahead buffer.

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If you had taken an introductory college course in computer programming during the sixties or early seventies, the odds are the first language you'd have learned would have been Fortran. A little later on in the seventies there's a good chance you'd have been introduced instead to Fortran's descendent, Basic. Nowadays the same class might well offer instruction in Pascal instead.

Basic is still the most popular programming language, by far. More people write in Basic than in any other language, and this is especially true of microcomputer enthusiasts. Virtually every microcomputer on the market offers some form of Basic; in most cases the language is built into the machine in ROM.

Nonetheless, Pascal, which was introduced way back in the primordial antemicro days of 1971, has attracted an ever-growing following. Its adherents include academics, who like to use it as a teaching vehicle, programmers of large-scale business applications, and a growing number of ordinary micro hobbyists and end users as well.

A couple of major factors account for Pascal's appeal. First, because of the way the language is usually implemented, programs in Pascal tend to be more easily transferable from one kind of computer to another.

It's Got Steps Appeal. On most computers, including the Apple, Pascal is both a compiled language and an interpreted one. In the customary scheme of things, a program written in Pascal gets compiled into a sort of low-level language called p-code, or pseudo-code. Then, when the program is run, the host computer converts the p-code into native machine language, line by line, just as the Basic interpreter does for a Basic program.

The advantage of this two-step process is that it permits a high degree of standardization of the front end, the part of the system where you write, edit, and debug your programs.

For example, when you write a Pascal program on the Apple, you use a facility called an *editor*. The editor works much like a word processor. Just as you would create a document on a word processor and subsequently edit, rearrange, or otherwise massage it, so can you use the Pascal editor as a development tool for your programming efforts. The editor offers such facilities as automatic indenting—useful for enhancing the visual clarity of your code—and automatic search and replace functions.

When you finish writing a program in the editor, or when you're ready to take a break from it, you summon another part of the system, called the filer, which does some of the same functions in Pascal that DOS performs for the Applesoft programmer. The filer is a utility program for managing your disk files.

Later, when you're ready to run your program, you send the text, or source file, off to the compiler, which converts your Pascalian words of wisdom into p-code and reports back to you on any syntax errors it may have found. The compiler and the editor are in close touch with each other, so that if the compiler does find anything objectionable, it tells the editor where the problem is, and the editor (usually) takes you straight to the offending word in your source code.

It's Shy, But It Has Sass. Part of what's nifty about all this is that these front-end features—the editor, the filer, the compiler, and some others—are virtually identical on other Pascal systems. The part of a Pascal implementation that varies from one computer to another is not the part the programmer sees and works with, but the translation of p-code into native machine language. So a program written in Pascal can be transported relatively easily from one computer to another, and a publisher of commercial software can make programs available on a variety of machines without heavy reinvestment of development time.

Ease of portability is not one of Basic's stronger features. That's because Basic grew somewhat in the manner of a natural language; various groups, using the language on different machines, added new features to the original body of the language, so that eventually there came to be a lot of related dialects, all called Basic, rather than a single standardized tongue.

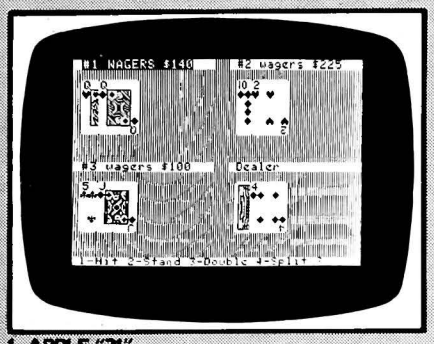
A second major reason for Pascal's success is that programmers who use it believe the nature of the language itself encourages them to write programs that are better organized and easier to maintain.

Pascal, like Basic, is a general-purpose language, as opposed to a specialized one for particular kinds of applications, such as education or engineering. The two languages have similar vocabulary and use comparable command words (*write* in Pascal, for example, does essentially the same thing as *print* in Basic).

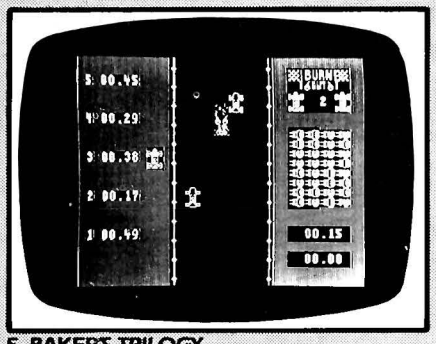
The biggest syntactic difference between Pascal and Basic has to do with the way instructions are organized. Pascal is an example of what's sometimes called a structured language; it might be more correct to say that it's a language that encourages structured programming. Let's compare a short program skeleton formatted both ways.

Here's a miniscule example of what might be part of a Basic program:

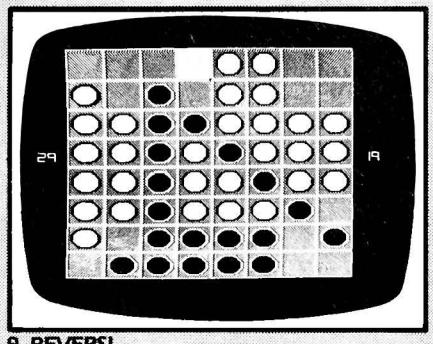
```
300 STATEMENT 1
310 STATEMENT 2
320 STATEMENT 3
330 IF X < Y THEN GOTO 300
340 STATEMENT 4
```



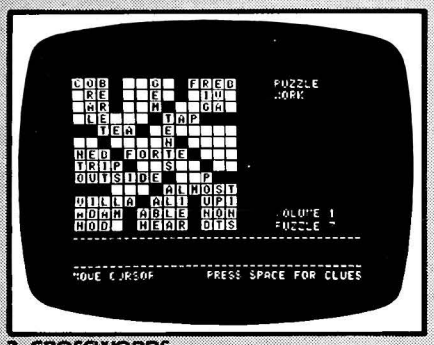
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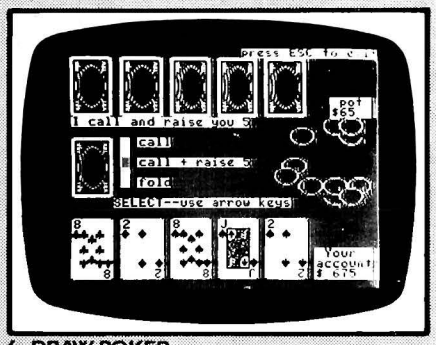
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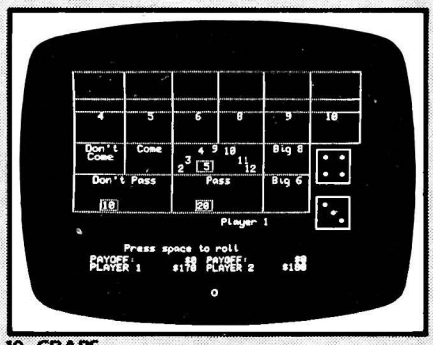
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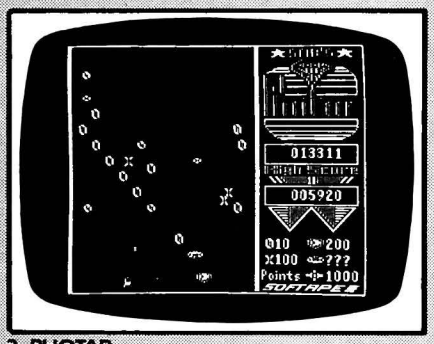
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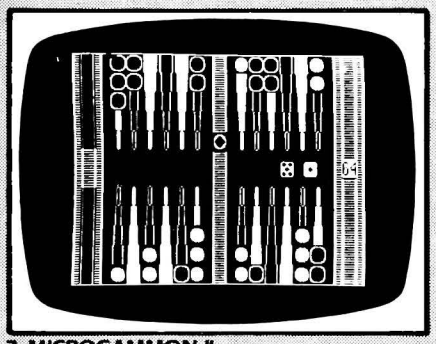
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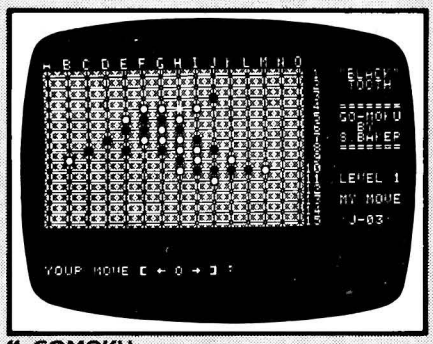
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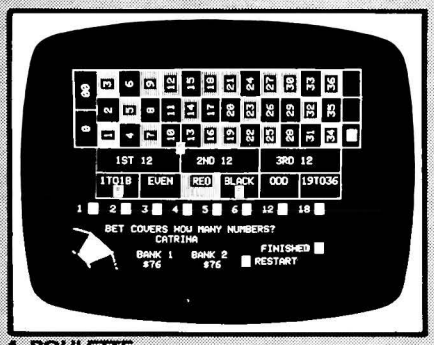
3. PHOTAR



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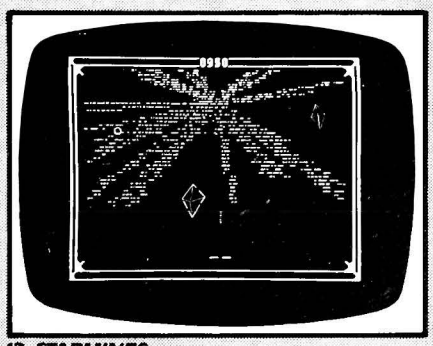
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The computer would begin executing this fragment at line 300. It would execute statements 1 through 3, then, arriving at line 330, it would evaluate two variables, X and Y, which, presumably, would have been defined elsewhere in the program. If it found X to be less than Y, it would return to line 300 and perform these same sequence of events again; if not, it could continue to line 340. This is one way of achieving a loop in Basic.

It Loops to the Future. A Pascal program might do the same business in a manner something like this:

```
REPEAT
  STATEMENT 1;
  STATEMENT 2;
  STATEMENT 3;
UNTIL X >=Y;
STATEMENT 4;
```

The result would be the same in both languages, but the constructs have different appearances. In Pascal the whole sequence from *repeat* to *until X>=Y*; is handled as a single unit, a compound statement built of several simple statements.

Suppose now that we make entrance into the loop conditional upon some other event. Let's say, for example, that if P should be equal to Q we'd like to execute the sequence of statements in lines 300 to 330 and if that's not the case, if P isn't equal to Q, we'll forget the whole thing and go on to line 340. We could accomplish that in Basic by adding a line 290, as follows (the < > symbol means "is not equal to"):

```
290 IF P <> Q THEN GOTO 340
```

If we wanted to the do the same thing in Pascal, that is, if we wanted to make execution of the loop conditional upon the equality of P and Q, we would build a larger compound statement to enclose the compound statement we'd already made. the result would look like this:

```
IF P = Q
THEN REPEAT
        STATEMENT 1;
        STATEMENT 2;
        STATEMENT 3;
      UNTIL X >=Y
ELSE STATEMENT 4;
```

Most programs of any size and complexity have a lot of branch points—places where the program will vary its behavior according to the presence or absence of some condition. It's not at all uncommon to find branching structures nested within other branching structures.

It's Cozy with Logic. Basic handles this kind of complexity by spinning out a switching network of *goto* statements. Pascal does it by building more comprehensive logical units. The result of Pascal's approach is sometimes called block structure, and block structure is one element of what people mean when they speak of structured programming.

Pascal's block-structured approach is at once liberating and constraining. It's constraining because it requires you to know pretty well where you're going before you begin to write code. In Basic it's easier than it is in Pascal to dive right in and begin programming and then alter or refine your code on the fly.

But the people who prefer Pascal say the constraint of having to have a program mapped out before they begin to write is an advantage, not an disadvantage. It encourages, if not forces, them to develop good organizational habits and therefore to produce more efficient programs. It urges them, among other things, to adopt a top-down approach to problem solving, one that starts with large objectives and refines them into successively smaller subobjectives.

A liberating consequence of Pascal's block structure is that a Pascal program is easier to read than one in Basic. The way the code is laid out on paper (or in the editor) clearly reflects the logical organization of the program.

It might not be fair to say that Basic encourages careless programming habits, although it does not do the things that Pascal does to encourage organizational discipline; but it's generally fair to say that Basic programs are hard to read. Even your own program may be tough to figure out a week or so after you've written it.

A Basic program is a little like one of those pictures you draw by connecting numbered dots. Once you sit down with it and trace the connections, the gestalt does begin to emerge. But the organization is not usually apparent at a casual glance.

The readability of a program becomes a significant factor if the program is large and complex, like a database manager or a word processor. It's an especially crucial factor if more than one person is working on developing the program or if the program is likely to require modification at some later time.

It Can Take Action. Pascal programs are always divided into two main sections: a declaration area and the main body of program instructions. Actually all programs, in all languages, consist of two kinds of statements: those that tell the computer to take some overt action and those that provide information that will be used by the computer when it takes action. Pascal separates these two kinds of statements, putting all of the nonexecutable, informing kind into the declaration area and reserving all the action statements for the main body of the program.

Among other things, the declaration area must include a list of all variables to be used in the program, as well as their types. *Variables* are names used to designate data available to the program; P, Q, X, and Y in our examples a few paragraphs ago are variables. As the term variable suggests, the values held under these names may change during the course of a program run.

The variable *type* indicates what kind of data is held under a variable name. The programmer needs to specify, for example, whether a given variable is to be used for numeric information or information that may include letters as well as numbers. If a variable's data is to be strictly numeric, it may be typed as either integer or real; the former category is less consumptive of memory resources but can only be used for whole numbers within a certain range.

Pascal permits programmers to designate nonstandard data types. So a certain variable could be declared to be of type *DayoftheWeek*, for example, and the compiler could be informed that the *DayoftheWeek* type has only seven legal values: 'Mon,' 'Tues,' 'Wed,' and so on. The advantage to this approach is that it establishes automatic error-checking procedures. The programmer doesn't have to write separate code within the program to keep a user from entering unusable data.

Also within the declaration area, the programmer may define procedures and functions.

A *procedure* is a segment of code that the programmer wants to identify by name. The instructions subsumed by the procedure would be spelled out in the declaration area but not executed there. In the main body of the program, the compiler would then encounter the procedure name and execute the instructions specified in the declaration area.

Usually, but not necessarily, procedures are used for recurrent routines within a program. So a person writing a blackjack program might, for example, want to declare a procedure called *shuffle*, another called *deal*, and a third called *takemoney*.

It Has a Streamlined Body. The provision for named procedure serves several useful functions. It streamlines the appearances of the main body of the program, so that a person trying to understand what the program does has fewer logical elements to look at. Second, it makes the main body of the program appear more like English; a well-written program that uses a lot of procedures may consist almost entirely of English or near-English words. And third, it makes it easier for a programmer to create on disk a library of routines that may be summoned for duty in various programs.

A *function* is similar to a procedure, except that it's used within some kind of arithmetic or other expression. For example, one could define a function called *hypotenuse* as the square root of the summed squares of two other bits of data. The other bits of data, within the context of this function, would be called parameters; their values would have to be supplied whenever the hypotenuse function was used.

Functions and procedures are not unique to Pascal. The *def fn* statement in Basic also allows you to define your own functions, and the Basic subroutine has the same effect on the outcome of a program as does the Pascal procedure.

What's distinctive about Pascal is that functions and procedures can be given recognizable names and that they must be declared in a separate section of the program.

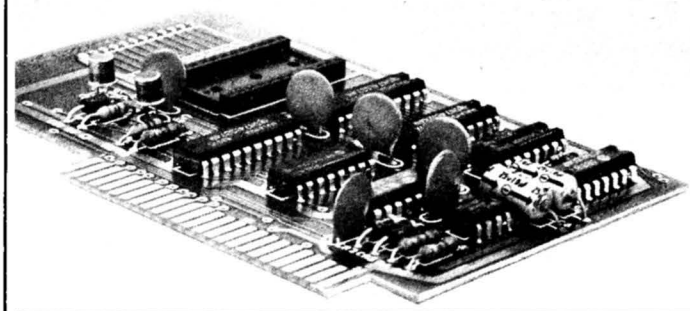
Should you learn Pascal? The answer may depend on your style and your programming goals. If you mostly want to write short programs and want to be able to do them quickly, you'll probably find Pascal a real pain in the neck. On the other hand, if you want to do more complex things or you're interested in developing commercial software to run on other computers as well as on the Apple, you might want to consider Pascal.

It Likes Expansive Tools. If you decide to get into Pascal, you'll need to get two things for your Apple: a 16K RAM card to put in slot 0 and the Pascal language and operating system. That's assuming you already have 48K on your motherboard; if you don't, you'll need to bring your system up to 48K as well.

There are a variety of ways to get this equipment. Apple sells the whole package, hardware and software, as its Language System. You get a RAM card and four disks with the quaint names of Apple0:, Apple1:, Apple2:, and Apple3:. Or you can buy the hardware and the software separately.

There are also a number of other companies that make functionally equivalent RAM cards and still others that make

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Pascal software.

The reason you need all this gear is that you're buying not just a language but a whole operating system—a programming environment, as they say. The RAM card shares the memory space from 49152 to 65535 with the six ROMs on your motherboard. A process called *bank switching* allows the 6502 to decide which set of chips—the ROMs or the chips on your RAM board—it wants to acknowledge as being within its memory domain. When you boot the appropriate member of your Pascal software set, the 6502 bids a temporary goodnight to your motherboard ROMs and loads an item called *System.Apple* into the RAM board.

It Keeps Secrets. Because the Pascal operating system includes its won input/output system, it overrides DOS as well as the Basic Interpreter and the System Monitor. Unfortunately, the filer's methods of storing data on disk are different from those of DOS, so the files you create through Pascal will not be accessible to programs you may write in Basic. There are, however, utilities available that will convert files from one operating system to the other.

There are several side benefits to having that RAM card in slot 0. The first is that you get the equivalent of having the alternate dialect of Basic—Integer on an Apple II Plus or Applesoft on a standard Apple II—in ROM. When you boot your DOS System Master disk, the *Hello* program goes out looking to see if you have a RAM card in slot 0. If it finds one, it loads the card with a software version of whichever Basic interpreter you don't have in firmware. Once the alternate language is there, you can switch back and forth from one Basic to the other by typing *int* for Integer and *fp* for Applesoft.

The second side benefit is that certain commercial programs that don't use either Basic interpreter are able to take advantage of the extra memory space provided by the card. *VisiCalc* is one notable example. On a 48K Apple without a RAM card, *VisiCalc* offers you 18K of memory in which to develop your spreadsheet. With a RAM card you get 34K.

Still another incidental benefit of having the card is that it makes it possible for you to use certain other languages on your Apple, such as Fortran, Pilot, or Logo. Each of these, like Pascal, has its own software component that you must buy separately, but you need the RAM card as well.

It Has an Exotic Past. Pascal was published first in 1971, by Niklaus Wirth of the eidgenossische technische Hochschule in Zurich. Wirth was primarily interested in creating a language, not an entire operating system. He wanted, among other things, to improve a language called Algol and to create a vehicle for teaching programming.

The operating system that was to become standard for Pascal users was developed some time later by a group at the University of California, San Diego, under the leadership of Kenneth Bowles. The system came to be known as UCSD Pascal.

It also became a huge commercial success—so much so that the university found it necessary to divest itself of the property. It sold the rights to the UCSD system to Softech, a large producer of mainframe system software, which spawned a subsidiary, Softech Microsystems, to handle and develop the UCSD system. The name UCSD remained with the product, though Bowles and some other key people originally associated with it at the university went separate ways.

UCSD systems were produced for a variety of different computers, including the Apple. In the meantime, however, before the divestiture, Apple Computer had negotiated an agreement that had allowed them to market the system under their own name. The end result is that there are two nearly identical Pascal systems available to you as an Apple user.

The Very First Beginners' Corner Graduating Class. *One of the hazards of writing a column called Beginners' Corner is that the material, as if of its own volition, presses toward ever-increasing complexity. And, along the way, the readers lose their status as beginners.*

This series has now reached the end of a cycle. Next month, we'll have a new beginning and a new author, Christopher U. Light will begin again at the beginning for a new crop of Apple owners. Stay tuned or pass the word. ■

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The Schoolhouse Apple

by Jean Varven

lit · er · ate *(adj.) 1. Able to read and write. 2. Knowledgeable; educated. 3. Familiar with literature, literary. —n. 1. Someone who can read and write. 2. A well-informed, educated person.*

Ask most literate people to define the word *literate* and they will probably come somewhere close to the dictionary definition. Put the word *computer* in front of it, and people's clarity, certainty, and unanimity about what this modified term means is likely to diminish dramatically.

But even people who aren't sure what computer literacy consists of are becoming convinced of its importance. In fact, more and more educators, parents, and students see computer literacy includes computer awareness and also means some nology that has begun to revolutionize the work world, the home, and the educational process. And they are looking to the schools and to various other public and private sources to provide instruction that will help them achieve computer literacy.

Numerous camps, seminars, classes, workshops, foundations, institutes, clubs, books, pamphlets, and software programs have come into existence in response to the perceived need for computer literacy. And it won't be long now before coin-operated microcomputers in libraries, in community centers, and in pizza parlors become the norm rather than the town curiosity.

At a time when so much is happening, the need for a clear idea of what computer literacy is becomes more apparent. A definition might serve as a sort of road map through this increasingly populated territory, and help individuals to be more focused in their pursuit of computer literacy. After all, as the not-so-old saying goes, "If you don't know where you're going, it doesn't much matter where you start from."

Dueling Dictionaries. The definition of what it means to be computer literate seems to have changed somewhat over the years, or maybe it just depends on who's doing the defining. Some would say that being computer literate basically means having a general understanding of various aspects of information processing technology, an awareness of how computers affect society, and a knowledge of how computers can be used to solve problems.

So far, so good. But as technology moves ever faster and its effects become more powerful and far-reaching, a case can certainly be made for the view that more is needed if one is to call oneself computer literate. In an effort to take this into account, some people (some of the time) make a distinction between computer literacy and a less sophisticated state known as "computer awareness." The "Apple Educator's Information Booklet" from Apple Computer offers concise definitions of both terms, delineating the difference between them in the process:

"Computer awareness usually means becoming aware of the extent to which computers are a part of our lives. Computer literacy includes computer awareness and also means some ability to program or control the computer. Computer literacy can only be achieved by hands-on experience and practice."

Wise Fingers Do the Walking. Dr. Arthur Leuhrmann, an authority on computer literacy and cofounder of Computer Literacy, Inc., wholeheartedly agrees that hands-on experience is essential. When asked for a definition of computer literacy, he makes the connection between this kind of literacy and the other literacies. People who are literate, says Leuhrmann—in math, in language skills—are "in control, in charge." Because they can read and write, they can do things for themselves, "work things out for themselves," without relying on others to tell them what's going on. People who are literate can communicate their own ideas and can read and comprehend the ideas of others.

Then, bringing the whole issue of definition down to an even more basic, no-nonsense level, Leuhrmann asserts, "If you can tell a computer to do what you want it to, you are computer literate. If you can't, you're not."

Although he feels that the perspective gained by knowing about the history of computers is a valuable one, he strongly believes that the primary focus in computer literacy instruction needs to be on improving people's abilities to express their ideas and to understand and make use of other people's. He points out that the schools have been the place in our society where literacy training has gone on in other areas and believes that they are also the best place for computer literacy training to occur.

In Leuhrmann's view, junior high is the ideal time for kids to be offered a "serious course" in computer literacy. At this age, they are developmentally capable of conceptualizing—they have the ability to create a picture in their minds of what memory is, what input is, what output is.

What would students in Leuhrmann's "serious course" be doing? Well, it helps to backtrack a little and say what they would *not* be doing. What they would not be doing is spending all their time sitting in front of the computer learning traditional basic skills. Leuhrmann does not mean to diminish the importance of kids learning the basic skills. Far from it. He stresses especially the importance of basic math skills, math reasoning, and estimation skills; without them, you are just "taking the word" of the calculator—you are not in control at all.

Rather, what Leuhrmann objects to is the prospect of students becoming slaves to the computer for everyday lessons and drill, rather than learning how to tell the computer to do what they want it to.

In a serious computer literacy course, students would meet every day, but would spend only every other day in front of the computer, experimenting and doing projects. In between, they would work with a teacher, whose role would be to provide a frame of reference for the ideas they were learning. Students in such a course would learn a programming language, although it doesn't especially matter to Leuhrmann which one. There are much larger issues to be concerned about, he believes, than promoting the use of one language over another.

One thing that disturbs Leuhrmann at times is the emphasis in teaching on the grammar of a programming language—the properness of a statement—with the result being that there is insufficient stress on the thinking processes involved. Learning programming helps students learn a way to write, a way to think—a way to organize their ideas and to decide how to solve a problem in a logical, step-by-step fashion—and, in many situations, this aspect of programming is not stressed sufficiently.

Programming Your Personal Best. *Precollege Computer Literacy: A Personal Computing Approach,* published by the International Council for Computers in Education (ICCE) and written by David Moursund, editor of *The Computing Teacher* and current president of ICCE, is now available from ICCE (% Department of Computer and Information Science, Univer-

sity of Oregon, Eugene, OR 97403) for a single-copy price of $1.50. You're likely to find this concise, literate booklet a most valuable resource/reference if you are interested in attaining a perspective on computer literacy and in clarifying your own ideas on what it is and how it can be achieved.

Rather than attempting to specify course goals and objectives, the author approaches computer literacy "based upon the idea that a computer can have a personal impact upon the student, and that the student will be self-motivated to acquire a certain level of computer literacy because of the personal value of computers." Moursund stresses the importance of functional knowledge, and feels that students need easy, everyday access to computers if they are to become computer literate.

Moursund has views similar to Leuhrmann's about the connection between programming and problem solving and about the place of programming skills in the definition and development of computer literacy. He suggests that the definition of programming be expanded to include the use of "information retrieval, word processing, statistics, and other applications systems."

He also makes the important points that the definition of computer literacy must vary depending upon the age and other characteristics of the person involved (just as does the definition of traditional literacy). He maintains that the requirements for literacy will change over time as the capabilities of the available hardware and software change and as the technological advancements we achieve are applied to various fields. It would seem that when it comes to computer literacy, whoever coined the phrase *lifelong learning* was right on target, because, in fact, progress and change create new knowledge to be learned, new skills to be mastered.

Vanishing Tunnel Vision. If we are parents, our more immediate concerns about computer literacy education—our own and our children's—sometimes lead us to overlook some very significant aspects of the overall picture. We may be so focused in on our present efforts to meet the demands of the future that we don't recognize the implications that this present may have for the rapidly approaching future.

One vital piece of the computer literacy puzzle must be put into place—who is teaching the teachers? How are teachers keeping up with the pace of technology, and with the pace at which our microkids (as a recent *Time* cover story dubbed them) are learning?

The Apple Education Foundation has named teacher training as one of the areas to which it will give the highest priority and interest when it comes to grant support. Already funded by the foundation is a teacher training project at Iowa State University.

Other organizations and individuals share this awareness of the importance of teacher training. The Microcomputers in Education program, jointly sponsored by the School of Education at Stanford University and Interactive Sciences, a nonprofit corporation, has an especially creative way of addressing this concern.

As Jeff Levinsky, a member of the workshop faculty and vice-president of Interactive Sciences, describes it, this in-depth workshop is designed for teachers, many of whom don't have much computer background, who want to establish and operate microcomputer learning centers in their districts. Teachers who participate in the six-week in-depth workshop come away with experience, knowledge, and a feeling of comfortableness with technology that will help them operate such a center when they return home. In addition, they're likely to become computer resource people for their districts.

Course work in the first three weeks emphasizes computer literacy, Basic programming, and learning and practicing the peer tutoring techniques that will be so essential to the establishment of a learning center. Included in the second three-week session are such advanced techniques and topics as

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One of the first things to which educators become exposed when they start the program is peer tutoring methods. Almost from the outset, they are given plenty of opportunity to try out their new skills—they teach what they have learned to junior high-level kids who are attending a five-week computer summer camp known as Computer Tutors at Stanford. Meanwhile, the teachers—the ones who are learning peer tutoring—are also being tutored.

The teachers' tutors are young people who have been especially selected for their jobs—they are chosen from among the students who have completed the Computer Tutors course program. According to Levinsky, besides having completed six to ten weeks of initial training, the young people chosen to tutor the teachers have experience tutoring other students and have had a certain amount of advanced training as well.

The scheduling and coordination of a program such as this one could well be a nightmare, but the enthusiasm of the people involved suggests that it's all worth it. Sound premises seem to underlie it; namely, that people learn by teaching and teach by learning, and that human resources are our most valuable ones.

Be the First on Your Block. Not all computer literacy efforts are directed at educators or at students in a school setting. Welcome to ComputerTown, USA! This nationwide experience involving people of all ages had its beginnings in Menlo Park, California, in 1979 and has since taken root in Illinois, Texas, Wisconsin, and Washington, D.C., and in Germany and the United Kingdom, as well as in other California towns.

ComputerTown, USA! is actually the name of the nationwide dissemination project funded by the National Science Foundation, and its job is to help new, local ComputerTowns get started by providing them with information that will support and guide them in their progress. A formal implementation package containing information on how to start and manage a successful ComputerTown is also planned but is not yet available.

As the story goes, the first ComputerTown came to be when Ramon Zamora and Bob Albrecht, coauthors of numerous self-teaching books about computers, began taking their own computers with them to public places like bookstores, pizza parlors, and parks to give people who were interested in computers a chance to use them. So many people expressed interest that the two men approached the city librarian and arranged to have weekly computer sessions in the library's community room. This provided a safe place for the computers to reside on a permanent basis.

It was a three-year National Science Foundation grant awarded to Zamora and Albrecht in September of 1980 that allowed them to get ComputerTown going on a larger scale. Since then, classes, workshops, and other events in the community have gotten thousands of people involved with using computers.

According to Fritzi Lareau of the People's Computer Company, a nonprofit educational foundation involved in Menlo Park's ComputerTown, the basic purpose of ComputerTowns across the country is the same as that of the original implementation. ComputerTowns attempt to help people become more comfortable with computers, to help them feel friendly toward computers rather than afraid of them, and to help them move toward integrating and accepting microcomputer technology into their lives in the same way they have accepted and feel at home with telephones.

The original ComputerTown USA! in Menlo Park serves as one model of what a ComputerTown can be, but each time a group of individuals comes together to start a ComputerTown, the results are different. What takes shape depends, of course, on a variety of factors, including the level of interest and expertise of the people who participate, the level of funding available, and the level of involvement of local corporations and businesses.

The main things the different ComputerTowns would seem

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to have in common is the desire on the part of participants to become more aware and literate about computers and technology and an emphasis on informal learning settings in which people share their knowledge, their expertise, and their questions and inexperience with one another.

Looking Ahead—Progress Has Consequences. In his article, "Computer Literacy," which appears in the March 1982 issue of *The Computing Teacher,* Arthur Leuhrmann points some possible consequences of today's computer literacy efforts at the junior high and high school levels.

One basic issue seems to be this—the more successful we are at getting microcomputers in our junior and senior high schools (if the number of computers in secondary schools continues to increase at the current annual rate, there will be approximately one computer for every sixteen students), and the more successful we are in creating environments in which children can gain literacy skills, the greater the need becomes for us to anticipate and set in motion the necessary next steps at the college level. Students who have gotten hands-on experience at the precollege level will not (and should not) be content with less adequate facilities and instruction at the college level.

According to Leuhrmann, such inadequacy is likely to take one or all of three forms: poor access to computing, overcrowded computer science courses, and unprepared general faculty. Dealing with the new problems our advancement creates, including the vast gap between those who have had and taken advantage of computer literacy opportunities and those who have not—will be among the major challenges of the coming years.

Conference Corner. The School of Education at the University of Oregon will hold its third annual summer conference July 21 through 23 at the Eugene Hilton Hotel. The conference, entitled "The Computer: Extension of the Human Mind," will explore and share current developments and future trends in computer-assisted teaching and learning. The three-day conference is expected to draw teachers, parents, and students.

Dr. David G. Moursund, a computer and information science professor at the university and president of the ICCE, will give the opening address. Appropriately, his topic is "The Computer Literate Student." Other scheduled conference speakers include representatives of various educational institutions and of the business community who are recognized for their knowledge of the computer field. Their presentations will explore such topics as preparing teachers to teach with computers and the ethical and social issues associated with computer use. Small group sessions will cover using computers in home instruction, in lab science courses, and as career counseling tools. There will also be a workshop on using computers with gifted students, and one on using computers in the early grades.

There will be an exhibit area in which a variety of computers can be seen and used by participants, a demonstration room, and an on-site theater for computer films.

Enrollment is limited, so preregistration is suggested. Additional information about the conference or about how to register can be obtained by contacting Jude Ridge, College of Education, University of Oregon, Eugene, OR 97403; (503) 686-3405.

Legislation Pending. The Technology Education Act of 1982, otherwise known as H.R. 5573, could have a powerful impact on computer literacy in the United States. This is the bill that would make it financially feasible for Apple Computer and other manufacturers to donate microcomputers to elementary and secondary schools. H.R. 5573 had its hearings in the Senate Finance Committee on May 7th. As of that date, the bill had sixty-seven cosponsors and had the support of both Republicans and Democrats. Next stop is hearings in the House of Representatives. Some decision will have to be made before Congress adjourns in the fall or the bill will die.

Company capsules will resume next month.

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Contest Winners

from page 4





The readers' choice for first place in Softalk's Art Gallery: Chuck Arnold's Lost Horizon won for hand-drawn art and Ben Lanterman's Specter for computer-drawn work.

from *Softalk* for winning the computer graphics portion of Art Gallery; $150 worth of any software advertised in *Softalk* from Penguin, and his second-place prize for the animation portion of Penguin's contest, a copy of Penguin's *Graphics Magician*. He figures he'll put the money toward a new *VisiCalc*—which he can use as a flight engineer. What we have here could be another da Vinci, for Leonardo was designing flight machines as well as his art work back during the Renaissance.

More Art Gallery Winners. Lanterman didn't walk away with all the prizes. *Softalk*'s readers voted for Chuck Arnold (Dalton, GA) as first place winner in the hand-drawn category for *Lost Horizon*, a modernistic eye in an Apple. Arnold will also be awarded $100 worth of software at his local computer store, Compu-shop. He'll probably apply it toward the purchase of *Hi-Res Football*, *Hi-Res Computer Golf*, and *Pool 1.5*. The runners-up in both categories will receive $10 credits: Eddie Moore (Mesquite, TX), for *Master Blaster*; Jeff Coyle (Anaheim, CA), *Rat Race*; Nathan Jensen (Austin, TX), *War*; Mary Ciccolella (Piscataway, NJ), *Pharaohs* and *The Wind*; Bob Martin (Boulder, CO), *Infamy*; Wendel Kirkbride (Idaho Falls, ID), *Climber II*; Mildred Edwards (Waterloo, IA), *Conquest of the Cosmos*; Brian Taylor (Pasadena, CA), *Dragon Slayer*; and Ben Lanterman (haven't you heard that name somewhere before?) for his *Stalker*.

There was one more part to that contest: *Softalk*'s readers, who were asked to judge the contest, had their ballots numbered and our random number generator chose Lonny Zwickle of Hooper, Nevada. For helping *Softalk* judge this tough contest, Zwickle receives a $100 credit at his local computer store.

Guest Contest: The Penguin Computer Art Competition. Mark Pelczarski of Penguin Software also had the opportunity for a little bit of art appreciation with his guest contest, which ran in the January issue of *Softalk*. The contest had three parts: for best computer picture, best computer animation-moving picture, and for best computer calligraphy-character generated font. First prize in each category is $150 toward the purchase of any software advertised in *Softalk*; second prize winners receive copies of Penguin's *Graphics Magician*; third place prizes are copies of Penguin's *Special Effects*.

Softalk readers were able to enter the competition using any graphics program on the market. Pelczarski judged on originality and execution.

And now for the envelope please, Mr. Pelczarski:

Computer Art: first place, *Way Out*, Ben Lanterman (Bridgeton, MO); second place, *Sea*, Elizabeth Riggle (Louisville, KY); and third place, *Edge*, Chuck Bilow and Bob Casey (Electronic Easel, Madison, WI).

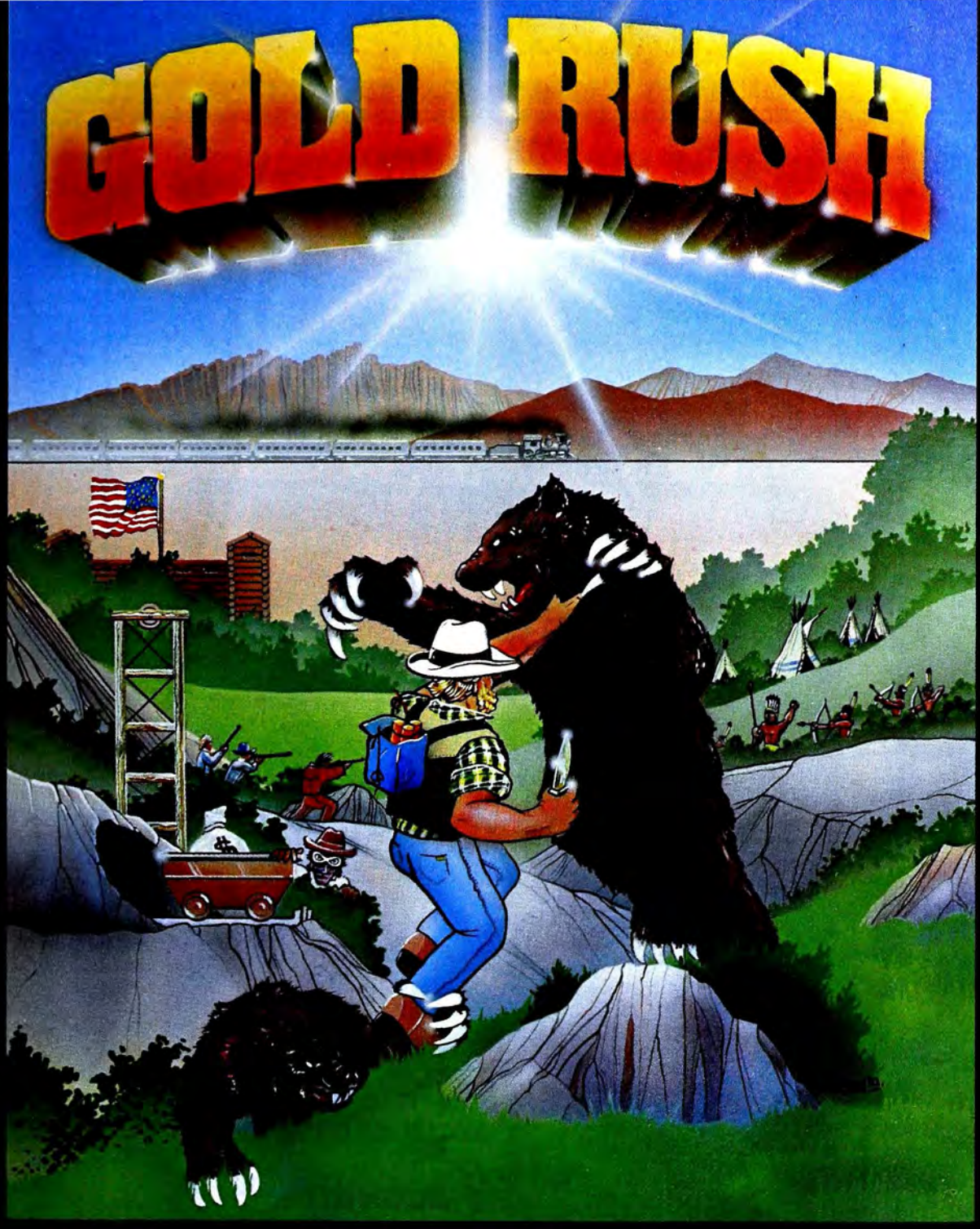
Animation: first place, *Choo Choo*, Margaret Park (Pullman, WA); second place, *The Present*, Lanterman; and third place: *Cristoforo Columbo*, Bilow and Casey.

Fonts: first place, *Laughs*, Riggle; second place, *Creepy*, Doug Smith (Oak Park, IL); and third place, *Elvish*, Wayne Mascarella (Chapel Hill, NC).

Guest Contest: The Great Trick Shot Tournament. *Trick Shot* was a long shot, but Don Hoffman of Innovative Design Software came up with three winners in IDSI's guest contest from last January, The Great Trick Shot Tournament. The object of the contest was to find the consummate shot—the most artistic, the most imaginative, the most innovative, and the most difficult pool shot that could be conceived. The stakes were high: first prize was $1,000 followed by prizes of $500 and $250 for runners-up.

Pool shark Stanley C. Stockdale (Daley City, CA) won first prize; Harold P. Zimmerman (Fairloom, OH) took second place; and Daniel A. Hammond (El Paso, TX) came away with third place.

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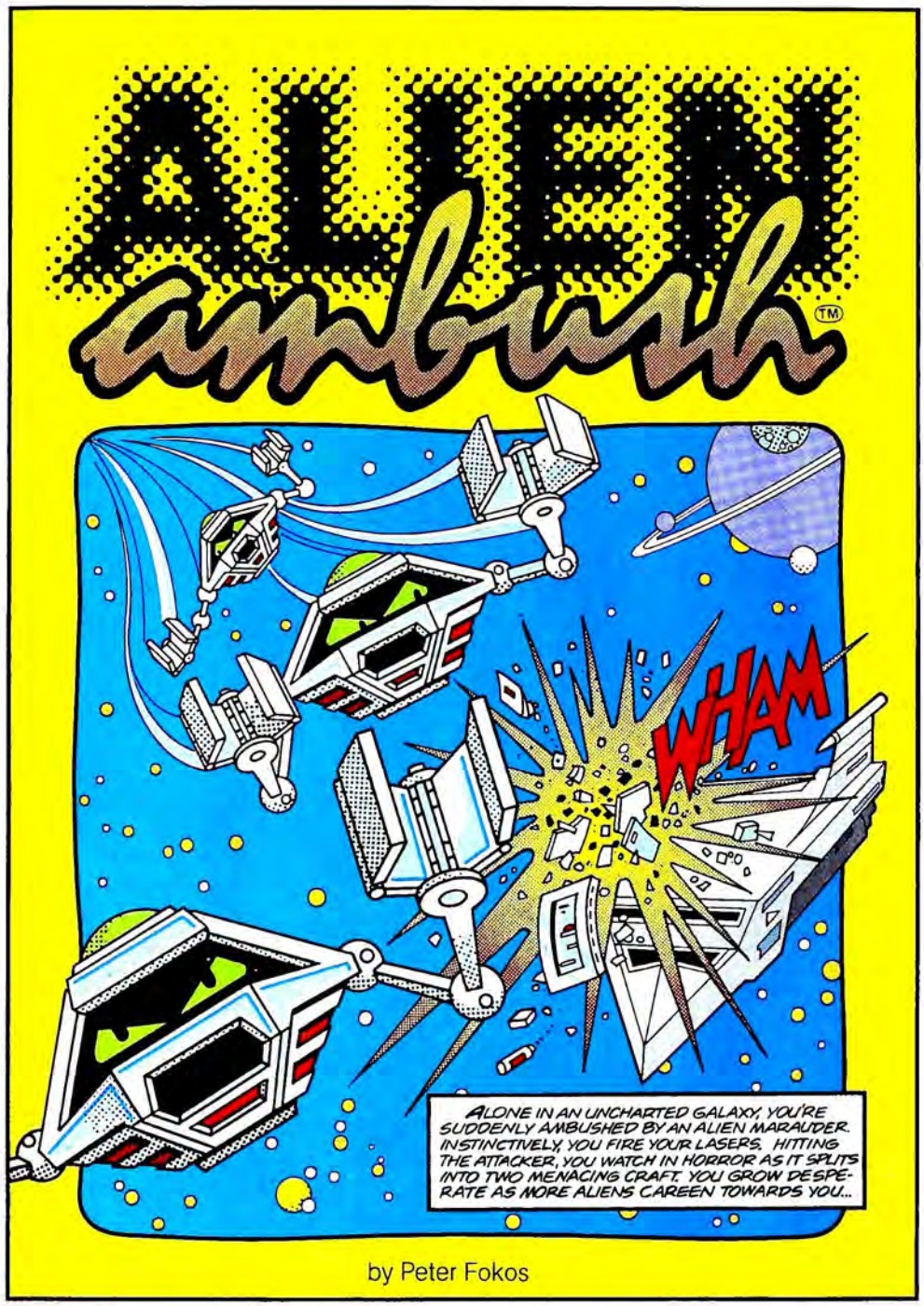
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Softalk Presents The Bestsellers

Dan Bricklin and Robert Frankston have forsaken the lofty heights. The authors of *VisiCalc* have been in the enviable position of watching while the competition tried to catch up with their innovative speadsheet program.

Now they've announced software that will compete with *MatheMagic* (MatheWho?) in the contest to turn your computer into the most sophisticated calculator possible. For the first time, the pair will demonstrate whether the genius that is *VisiCalc* is transportable to other software.

But that program won't be out until late this year—as software schedules usually go, that probably means sometime next year. Until then, Bricklin and Frankston remain the unchallenged champs of microcomputerdom. *VisiCalc* for the Apple II continues nearly to double the sales of its closest competitor. *VisiCalc* for the Apple III took a clear-cut lead over *Apple Writer III* in sales of Apple III software. And indications are that the program is equally as dominant in other personal computer markets.

The rest of the top ten bestsellers received a shakeup in sales in the month of April. *Home Accountant* took over second place, *Snack Attack* moved up to third, *Wizardry* rose to fourth and *Personal Filing System* dropped from second to fifth.

Apple Writer II, the Paul Lutus upgrade to the old standard, jumped from nowhere to sixth; *DB Master* rose to seventh, *Star Blazer* dropped to eighth, *Pinball A2-PB1: Night Mission* made ninth in its first month on the list, and *VisiFile* moved up to tenth.

Other programs new to the Top Thirty were *Bag of Tricks* in seventeenth, *Taxman* in twentieth, *Microwave* twenty-second, and *Kabul Spy* twenty-fifth. *Bag of Tricks* is the superior disk utility from Quality Software. *Taxman* is a home-arcade eat-'em-up, and *Microwave* is a home-arcade pick-'em-up. The May Softalk review of *Microwave* failed to credit Jay Zimmermann as coauthor. *Kabul Spy* is Sirius Software's success-

Apple III

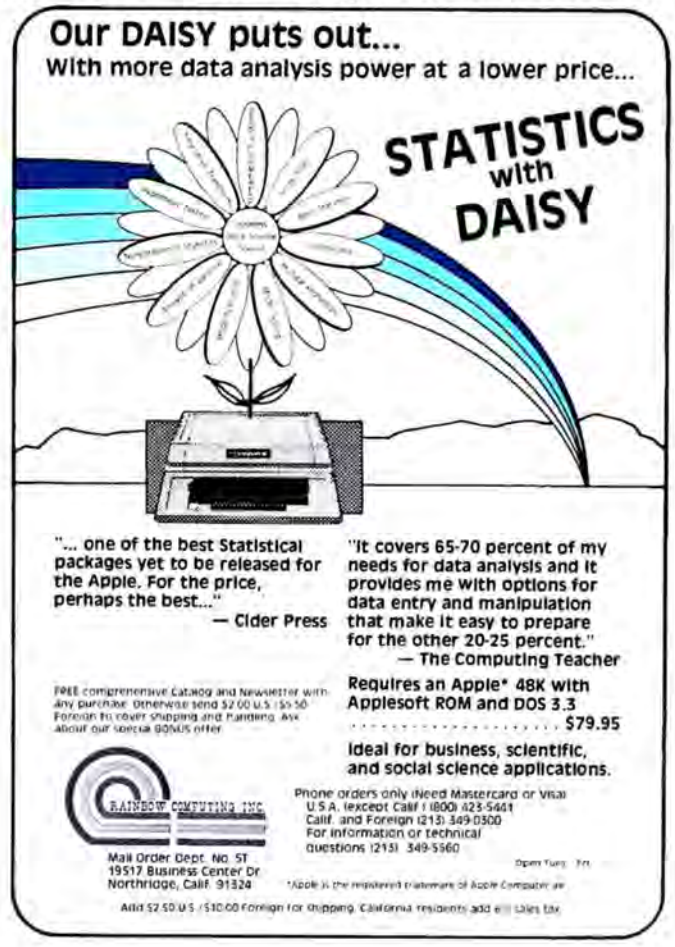
This Month	Last Month	
1.	2.	**VisiCalc III,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp, Apple Computer
2.	1.	**Apple Writer III,** Paul Lutus, Apple Computer
3.	3.	**Personal Filing System,** John Page, Software Publishing Corporation
	4.	**PFS: Report,** John Page, Software Publishing Corporation
5.	5.	**Apple III Business Graphics,** Apple Computer
6.	—	**Word Juggler,** Tim Gill, Quark Engineering
7.	6.	**Access III,** Apple Computer
8.	7.	**Apple Business Basic,** Apple Computer
	10.	**Mail List Manager,** Apple Computer
10.	9.	**Great Plains Accounting Software,** Great Plains 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.	**VisiFile,** Creative Computer Appplications/Colin Jameson and Ben Herman, VisiCorp
5.	5.	**PFS: Report,** John Page, Software Publishing Corporation
6.	6.	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
7.	7.	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
8.	9.	**Accounting Plus II,** Software Dimensions, Systems Plus
9.	—	**DBase II,** Ashton-Tate
10.	9.	**Data Factory,** Bill Passauer, Micro Lab

Word Processors 5

This Month	Last Month	
1.	4.	**Apple Writer II,** Paul Lutus, Apple Computer
2.	2.	**WordStar,** MicroPro
3.	5.	**Super-Text II,** Ed Zaron, Muse Software
4.	3.	**Magic Window,** Gary Shannon and Bill Depew, Artsci
5.	—	**Word Handler,** Silicon Valley Systems



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ful challenge to the dominance of On-Line Systems in the genre of hi-res adventure programs.

Returning to the Top Thirty after various periods of absence were *Zoom Grafix, DOS Tool Kit, Super-Text,* and *Typing Tutor.*

But outside of the continuing dominance of *VisiCalc,* the most notable thing about April's poll was not what programs made the list, but what program would make the list next month. Almost unanimously, retailers reported *Knight of Diamonds,* the next *Wizardry* scenario, as outselling all other

Strategy 5

This Month	Last Month	
1.	1.	**Castle Wolfenstein,** Silas Warner, Muse Software
2.	2.	**Flight Simulator,** Bruce Artwick, SubLogic
3.	5.	**Sargon II,** Dan and Kathe Spracklen, Hayden
4.	4.	**Robot War,** Silas Warner, Muse Software
5.	—	**Warp Factor,** Paul Murray, Strategic Simulations

Adventure 5

This Month	Last Month	
1.	4.	**Kabul Spy,** Tim Wilson, Sirius Software
2.	—	**Deadline,** Infocom
3.	1.	**Time Zone,** Roberta and Ken Williams, On-Line Systems
4.	2.	**Hi-Res Adventure #4: Ulysses and the Golden Fleece,** Bob Davis and Ken Williams, On-Line Systems
5.	—	**Hi-Res Adventure #2: The Wizard and the Princess,** Ken and Roberta Williams, On-Line Systems

Fantasy 5

This Month	Last Month	
1.	1.	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
2.	3.	**Ultima,** Lord British, California Pacific
3.	2.	**Apventure to Atlantis,** Bob Clardy, Synergistic Software
4.	4.	**Upper Reaches of Apshai,** Automated Simulations
5.	—	**Empire Builders,** David Mullich, Interactive Fantasies/Edu-Ware

products early in May. Outlets that seldom report more than ten or fifteen units of a title as being their top seller were reporting sales nearing fifty for the sequel to the popular *Wizardry.*

In Apple III software sales, *VisiCalc III* took over the lead, deposing *Apple Writer III.* The only new program on the list is *Word Juggler* from Quark, which jumped into sixth place.

Sales of both *Apple Writer III* and *Mail List Manager* from Apple are being depressed by a lack of communication within the company. Apple brought out a 256K Apple III, but *Apple Writer III* is incapable of recognizing the additional 128K of memory. Likewise, Apple has been successfully moving Pro-File hard disks; but, alas, *Mail List Manager* looks at the device as simply another single-density floppy.

It can be anticipated that sales of both products will rise when Apple remedies these deficiencies.

The big news in the word processor area was that the last of On-Line's *SuperScribes* were finally sold. The program that for

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Avalon Hill	Denver Software	Micro Pro	Sirius Software
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Beagle Bros.	Hayden Software	Muse	Software Publ.
Brillig Systems	High Technology	Mytopia	SDS
Broderbund	Highlands	Nikrom	Stoneware
Bubblesoft	Howard Software	Omega Microware	Strategic
Budgeco	HSD	On-Line Systems	Sub Logic
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Cavalier	Innovative	Personal Software	Systems Plus
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a time looked like it would take a virtual monopoly position in the Apple market now awaits release as *ScreenWriter II,* but it'll have a long hard pull to regain its once dominant position.

Apple Writer II is a significant enhancement of Apple's beginners' word processing program. *WordStar* continues to make inroads among Apple's forty thousand CP/M users. The enhanced eighty-column version of *Super-Text* is making a strong run. *Word Handler* and *Executive Secretary* are continuing to gain strength, with *Word Handler,* a program similar in concept to *SuperScribe,* gaining the charts. In all, the task facing *ScreenWriter* is formidable.

Apple Speller from Sensible Software is leagues ahead of the other word processing proofreading programs. These programs will be combined with word processors in an expanded listing next month.

The Business 10 stayed exactly the same through the first seven positions in April. The biggest change was the appearance on the list of the powerful but expensive *DBase II* program from Ashton-Tate. As with *WordStar, DBase II* is capitalizing on the large CP/M user base within the Apple market.

Home Accountant continues to lead all other Home 10 products by a three-to-one margin. Interesting, however, is the charge of *MasterType* into second place. Bruce Zweig's program is proving that software with an educational purpose can be both fun and profitable.

Biggest revision to the Home 10 sees the demise of the tax packages. *Tax Manager* and *Tax Beater* dropped off the list, while *Tax Preparer* slumped to eighth. Among the products

Home 10

This Month	Last Month	
1.	1.	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	4.	**MasterType,** Bruce Zweig, Lightning Software
3.	3.	**Personal Finance Manager,** Jeffrey Gold, Special Delivery Software, Apple Computer
4.	5.	**Typing Tutor,** Image Producers, Microsoft
5.	7.	**Data Capture 4.0,** David Hughes and George McClelland, Southeastern Software
6.	—	**The Source,** Source Telecomputing Corporation
7.	—	**Dow Jones Portfolio Evaluator,** Apple Computer
8.	2.	**Tax Preparer,** James Howard, Howard Software
9.	—	**VisiTerm,** Tom Keith, VisiCorp
10.	8.	**ASCII Express,** Bill Blue, Southwestern Data Systems

Hobby 10

This Month	Last Month	
1.	5.	**Zoom Grafix,** Dav Holle, Phoenix Software
2.	8.	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
3.	3.	**DOS Tool Kit,** Apple Computer
4.	1.	**Utility City,** Bert Kersey, Beagle Bros
5.	10.	**LISA 2.5,** Randy Hyde, On-Line Systems
6.	2.	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
	—	**Graphics Package A2-3D1,** Bruce Artwick, SubLogic
8.	4.	**DOS 3.3,** Apple Computer
9.	7.	**Program Line Editor,** Neil Konzen, Synergistic Software
	—	**The Inspector,** Bill Sefton, Omega Microware



taking up the slack was the information utility, *The Source,* which was the sixth largest seller in this category. *Data Capture 4.0* has now taken a commanding lead over its communications counterparts.

The Hobby 10 list reflects the sophistication with which software publishers are now approaching the utility market. *Zoom Grafix,* the universal graphics dump, took over first place. *Bag of Tricks,* a compendium of four programs, any one of which is probably worth the price of the entire disk, grabbed second. *Utility City* continued to fare well in the market and Randy Hyde's revamped *LISA* assembler has surged to fifth.

Outside of *Wizardry* and *Castle Wofenstein,* the specialty entertainment software sales have not kept pace with the growth of the market. For example, On-Line Systems once could be counted on to provide two or more hi-res adventures for the Top Thirty. Now *Kabul Spy* from Sirius leads that genre and sits in the lower echelon of the Top Thirty.

Not only did *Kabul Spy* depose On-Line from the top of the hi-res adventure list, but *Deadline,* the no-res text mystery from Infocom, grabbed off second. *Time Zone,* On-Line's epic, was third.

Trailing *Castle Wolfenstein* in the Strategy 5 list were all old favorites: *Flight Simulator, Sargon, Robot War,* and *Warp Factor.*

There was nothing much new in April in the Fantasy 5 list, although *Ultima* bested *Apventure to Atlantis* for second place. The May sales, which will chart *Knight of Diamonds,* will bring more substantial revisions to this list.

The current economic depression has not yet seemed to affect system sales. Apple sales remain constant while the upstarts, IBM and Osborne, continue to sell well. But software sales are definitely soft. April was a particularly anemic month, reversing the usual trend in which April starts a sales resurgence from the weak winter market.

Some retailers attribute part of the weakness to the spate of me-too, look-alike arcade products. Buyers are having difficulty distinguishong one new product from another and are therefore sitting on the sidelines or buying such products as *Wizardry* and *MasterType* that are clearly distinguishable from the pack.

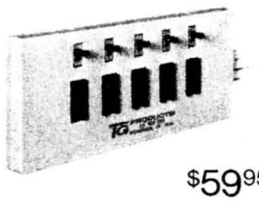
Applications software is not nearly as susceptible to that kind of buyer confusion, which partially accounts for the strength of those products vis-a-vis entertainment software.

Likewise, the addition of strong new entries, such as Software Arts's forthcoming calculator, lend strength to that segment of the marketplace. Unless, of course, Bricklin and Frankston turn out to be mere mortals after all.

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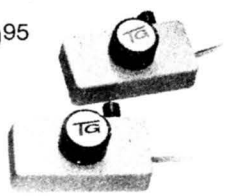


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The Top Thirty

This Month	Last Month	Index	
1.	1.	171.81	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	3.	96.49	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
3.	4.	95.11	**Snack Attack,** Dan Illowsky, DataMost
4.	5.	80.87	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
5.	2.	79.83	**Personal Filing System,** John Page, Software Publishing Corporation
6.	—	59.01	**Apple Writer II,** Paul Lutus, Apple Computer
7.	9.	56.92	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
8.	6.	51.37	**Star Blazer,** Tony Suzuki, Broderbund Software
9.	—	46.86	**Pinball A2-PB1: Night Mission,** Bruce Artwick, SubLogic
10.	11.	44.08	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp
11.	8.	42.00	**Castle Wolfenstein,** Silas Warner, Muse Software
12.	12.	38.88	**PFS: Report,** John Page, Software Publishing Corporation
13.	—	37.83	**Zoom Grafix,** Dav Holle, Phoenix Software
	14.	37.83	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
15.	12.	36.10	**Apple Panic,** Ben Serki, Broderbund Software
16.	17.	32.28	**WordStar,** MicroPro
17.	27.	31.93	**MasterType,** Bruce Zweig, Lightning Software
	—	31.93	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
19.	20.	29.16	**Swashbuckler,** Paul Stephenson, DataMost
20.	—	28.46	**Taxman,** Brian Fitzgerald, H.A.L. Labs
21.	18.	27.07	**Gorgon,** Nasir, Sirius Software
22.	—	25.69	**Microwave,** Jim Nitchals and Jay Zimmermann, Cavalier Computer
23.	—	24.30	**Super-Text,** Ed Zaron, Muse Software
24.	10.	23.26	**David's Midnight Magic,** David Snider, Broderbund
25.	—	21.52	**Kabul Spy,** Tim Wilson, Sirius Software
	16.	21.52	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
27.	20.	20.13	**Raster Blaster,** Bill Budge, BudgeCo
28.	25.	19.78	**Personal Finance Manager,** Jeffrey Gold, Apple Computer
29.	23.	18.74	**Crossfire,** Jay Sullivan, On-Line Systems
30.	—	18.05	**Typing Tutor,** Image Producers, Microsoft

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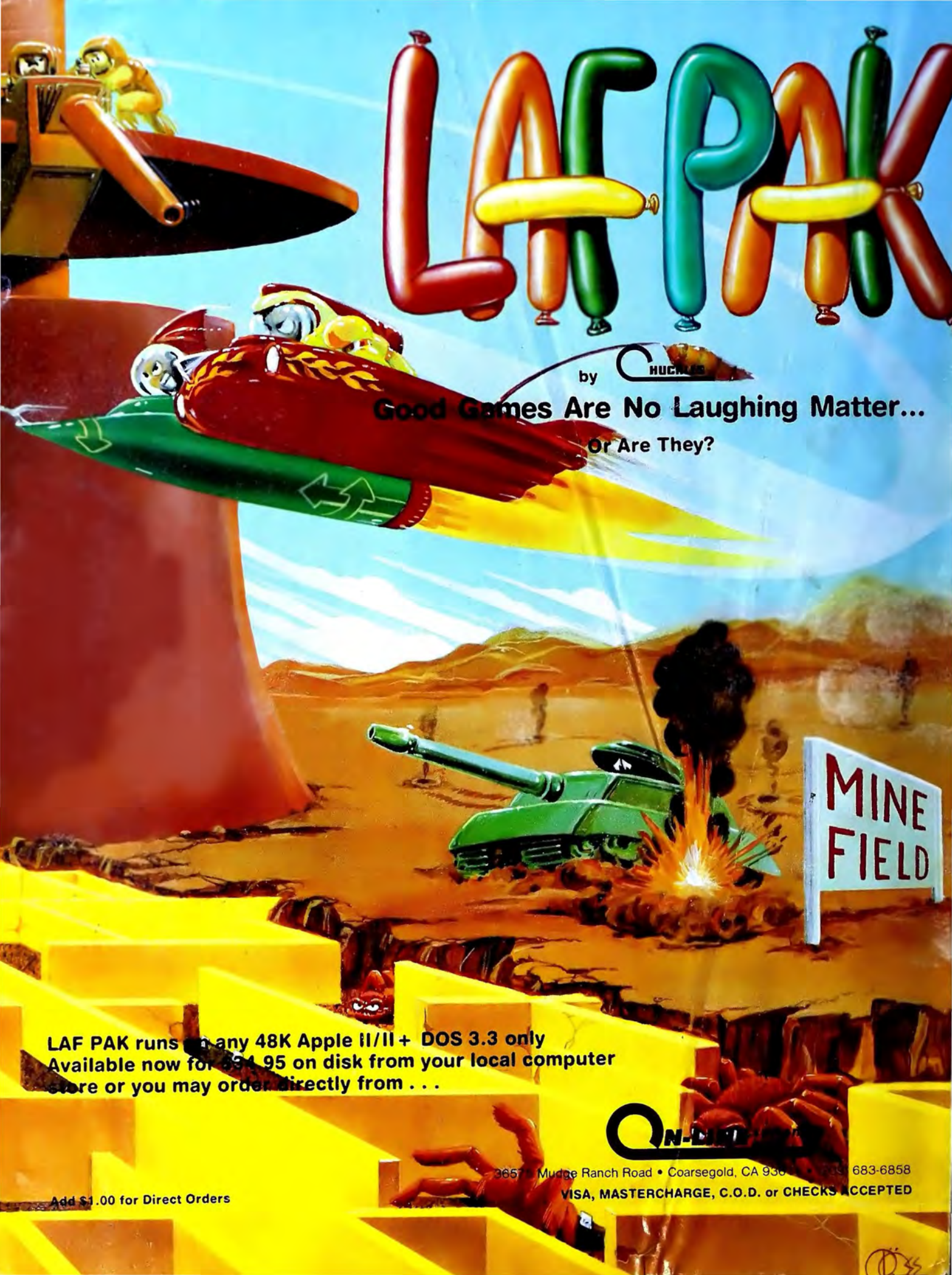
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