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Apples of the Sun

Bob Bishop's Hi-Lo Split

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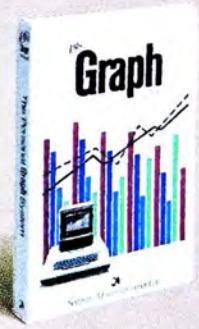
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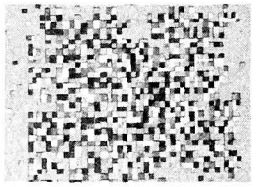
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Exec Infocom: Adventures in Excellence

If Infocom's games bring out the best in us, they've got the answer that acknowledges it—and so do Infocom's people.

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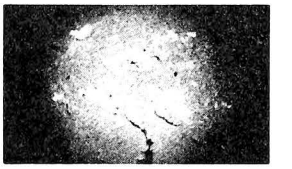
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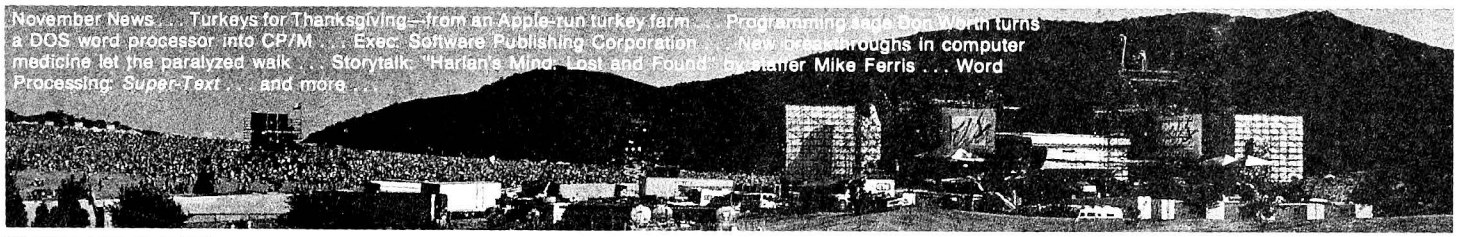
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Contest: The Significant Figure

First there was *Rocky III*. Then came *Friday the 13th, Part 3*. *Star Wars* fans already have their eyes set on summer 1983 for *Revenge of the Jedi*. From the looks of things, sequels to sequels are doing pretty darn well, so the *Softalk* contest staff is trying their hand at it.

As deadline approached we found the contest staff still patting themselves on the back for last month's Shapes contest when they realized it was time to think up another. So we hosed them down; shut them inside their cage with a few pads of paper, some pencils, and an abacus; and they came up with this month's contest, the third Unknown A.

(The cage, in fact, was not to keep in the puzzle staff but to keep out the furious art director who actually invented September's contest.)

It seems rather appropriate, since the last few contests have been focused toward our more literary-minded readers, that we address ourselves to another group, the mathematically inclined. The Significant Figure will be a delight for some, a nightmare for others. One staffer tried for two hours to solve the puzzle and went into shock. Recovery is slow; he can now recognize his shadow and eat solid foods.

How to play:

1. First, determine the values of the letters by figuring out the clues.

2. Next, plug the values into that hideous looking formula to find out what the mysterious A is. (Don't forget your Apple's built-in math functions.)

3. Those who correctly solve the Unknown A III will be stuffed into the random number generator (yes, it's back again), which will yank out a winner. That lucky person wins $100 worth of goods made by *Softalk* advertisers.

4. For go-getters, there's more. Once you get the A, explain its significance. Explanations must be more than two words, but not more than A words. Again, if there are ties, the beloved RNG will work overtime. The winner of this round will also win $100 worth of goods made by *Softalk* advertisers.

5. Getting the significance without knowing the numerical value of A won't win you a blooming thing.

6. Tips. The only real tips we can give you are:

a) The answer A is significant in the microcomputer industry in general.

b) Were it not for A, you probably wouldn't be doing this contest.

If you really get stuck, open your window and give us a call. We probably won't be able to help that much, but you may recognize your shadow. Or we could crack some jokes, have a good time, and take your mind off the contest for a while. Good luck, and above all, have fun!

$$\frac{x^b + zm\,(G + v)}{(e - n)\sqrt[z]{p}} + \left(b^n - \left(\frac{b}{z}\right)\right)^n \times T + \left(\frac{b}{x - \frac{e}{b - n}} + C\right) \times ne^n$$

Clues.

- m = keys on a piano; football players needed for four games.
- x = inches the Two is tall.
- p = Two slots; Beatles's days a week.
- G = kittens coming from Saint Ives; $961.
- z = bathing men; a crowd.
- v = vertical paddle; *Chorus Line* sensations.
- e = defensive housing; Abe's bill.
- b = balls for a 300 game; baker's dozen shy one.
- n = drives per card; Bactrian humps; cents' worth.
- C = true love's gifts after b days.
- T = price for InvisiTabs; prize for losing this contest.

Send in your entry by November 15, 1982, to Softalk Significance, Box 60, North Hollywood, CA 91603. ◨

The Significant Figure is: _____

The significance of the Significant Figure is:

_____

I am: _____

_____

I live at: _____

_____

In city and state of: _____

_____

My phone number is: _____

My dealer is: _____

_____

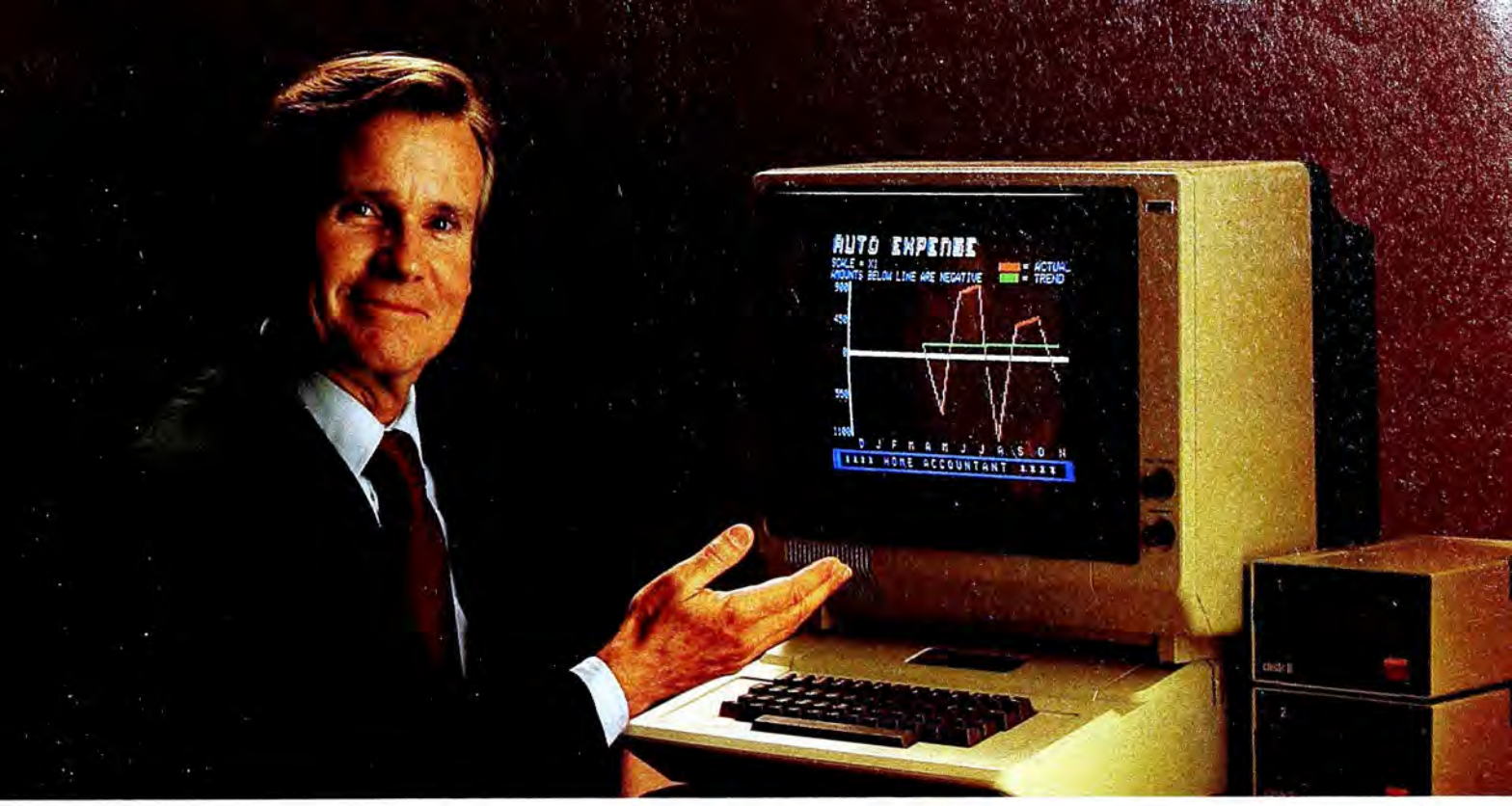
His phone number is: _____

If I win, it'd be nice to have: _____

_____

Yours respectfully: _____

There are three *other contests in this issue. Find them!*



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Contest Winners

Words—What Do They All Mean? We were going to give away the American Heritage Dictionary of the English Language as a bonus prize to the winner of the Apple Etymology contest, but from the looks of things, the winner already has one—and used it well!

Congratulations, Charles S. Lewis (Richmond, Virginia); you are October's etymologist, according to the *Softalk* contest staff. Lewis got off to a fast start solving the first twelve in a row and held on for a strong finish, winding up with a sizzling forty-six out of fifty-one possible points.

Lewis, who doesn't spend a lot of time playing games and therefore isn't too familiar with them, found only "one or two puzzles to be really challenging." Oddly enough, almost half the answers involved Apple games and Lewis got them all.

Softalk contests, it seems, are old hat around the Lewis household. Lewis is the current leader in the Oracle '82 contest, and his wife Elizabeth was the winner of part 1 of the Oracle '82.

Let's hear it for Jeff Moyers (McGaheysville, Virginia), who wins second prize for the most clever and reasonable alternate answer. Moyers did fairly well in his overall contest entry, scoring forty-three points. "Deciding what I want if I win is harder than solving the contest!" he wrote. But he will be most remembered in the annals of *Softalk* contests for his answer to "A pattern of horizontal lines that form on a television screen when no signal is received. Especially visible when one tilts slightly.":

"The word *horizontal* can be defined as 'parallel to the horizon,' and *parallel* in this case means 'having analogous qualities.' Therefore, *horizontal* actually means 'horizon.' The horizon is also known as the 'visible' horizon or 'apparent' horizon. The word *visible* is contained in the clue and *apparent* can be anagrammed from 'a pattern.' If the numeral 1 (one) is tilted slightly both to the right and to the left, since neither side is specified, it forms the Roman numeral V. *Horizon V* is a hi-res game from Gebelli Software."

It wasn't really that complicated, Jeff, but your prize is on its way.

Missed It by That Much. John Fratus (Hiram, Ohio) was the only person to figure out what five shillings in "Five shillings for a hard day's work" amounted to. "Five shillings is a crown," says Fratus, "and a hard day's work is a job. The name Stephen comes from crown, so we get Steve Jobs, the founder of Apple Computer." Actually, the name Stephen does come from the Greek *stephanos*, meaning crown, but we doubt that's what Mr. and Mrs. Jobs had in mind when they named their child.

Moyers also had an answer for "five shillings" that tells a little about where he goes when he has the munchies. "Five shillings is one quarter of a British monetary pound. A Quarter Pounder is a sandwich at McDonald's, as is the Big Mac. Big Mac is a program for the Apple that received at least one first-place vote in *Softalk*'s Most Popular Program of 1981." Now we know whose vote *that* was.

Pity Cary Hara (Hollywood, California), who might have squared off with winner Lewis in the random number generator arena. Hara supplied correct answers to all but two puzzles. Unfortunately, that's all he gave us, having left out answers to all the clues. Well, that wasn't all. Hara also included a sketch of praying hands with his entry. Better pray he reads the directions next time. All together now, one, two, three: awww. . . .

David L. Kutzler's (Welch, West Virginia) answer to "Hi, I'm Peggy. Fly me to Coarsegold" had us all on the double take: "Many of Sierra On-Line's games were inspired by Peggy, the daughter of the company's president"; which prompted Ken Williams to comment, "Did I miss something, Roberta?"

Chris Wysocki (Brookfield Center, Connecticut) thought fifteen shillings sounded like a line from a Charles Dickens book. "Dickens lived in the Kensington section of London," he told us, and that was the inspiration for Kensington Microware. Sorry, mate.

And finally, gusto guzzler Samuel Swersky (Rockville, Maryland) reported for "Imagine flying in your spacecraft through some saw-toothed mountains" that, after a few glasses of Milwaukee brews, "the white lines (in *Beer Run*) sure look like saw-toothed mountains." Good for a few yucks, but not good enough to win, Samuel.

If this were Olympic competition, Fratus, Hara, Kutzler, Wysocki, and Swersky would all win bronze medals. But it's not, so they don't. Instead, they will each receive a set of official *Softalk* Write-Protection InvisiTabs.

Here are the official answers, with two exceptions. For number eleven, *Birth of the Phoenix* was also counted as correct, and for number seventeen, Quark Engineering was acceptable.

1. sierras; Sierra Software (2 points).
2. Aurora, Roman goddess of the dawn; Aurora Systems (2 points).
3. advanced guards; avant-garde; Avant-Garde Creations (3 points).
4. raster scan; pinball; *Raster Blaster* (3 points).
5. Prometheus; Prometheus Products (2 points).
6. calliope (aMUSEment parks); Calliope, the Greek muse of epic poetry; Muse Software (3 points).
7. Pegasus, the Greek flying steed; Coarsegold, California, is where Sierra On-Line lives; *Pegasus II* (3 points).
8. Brazzaville, capital of the Republic of Congo; *Congo*, by Sentient Software (2 points).
9. dog stars; the Dog Star; Sirius; Sirius Software (3 points).
10. North America Radar Air Defense (neither takes, NOR ADds to) is NORAD; *Norad*, by Southwestern Data Systems (2 points).
11. Phoenix; Phoenix Software (2 points).
12. wurst; hunting; one ton; *Wurst of Huntington Computing* (4 points).
13. synergy or synergism; Synergistic Software (2 points).
14. N=nitrogen; atomic weight=14, twice weight is 28, the weight of silicon; Silicon Valley (3 points).
15. five shillings = a crown; from Latin corona; Corona Data Systems (3 points).
16. epoch (scrambled up Pharaoh Cheops); *Epoch*, from Sirius (2 points).
17. quarks; computer game's author, television series star; *Space Quarks* (3 points).
18. sentient; Sentient Software (2 points).
19. Ulysses; (Odysseus in) *The Odyssey; Odyssey, the Compleat Apventure* (3 points).
20. Medusa; *Gorgon* (2 points). ■

The Miracle of InvisiTab

This is the write-protection tab that won't let you save anything to disk accidentally as long as you believe it's there. Should you forget and write over your disk . . . you have learned a valuable lesson.

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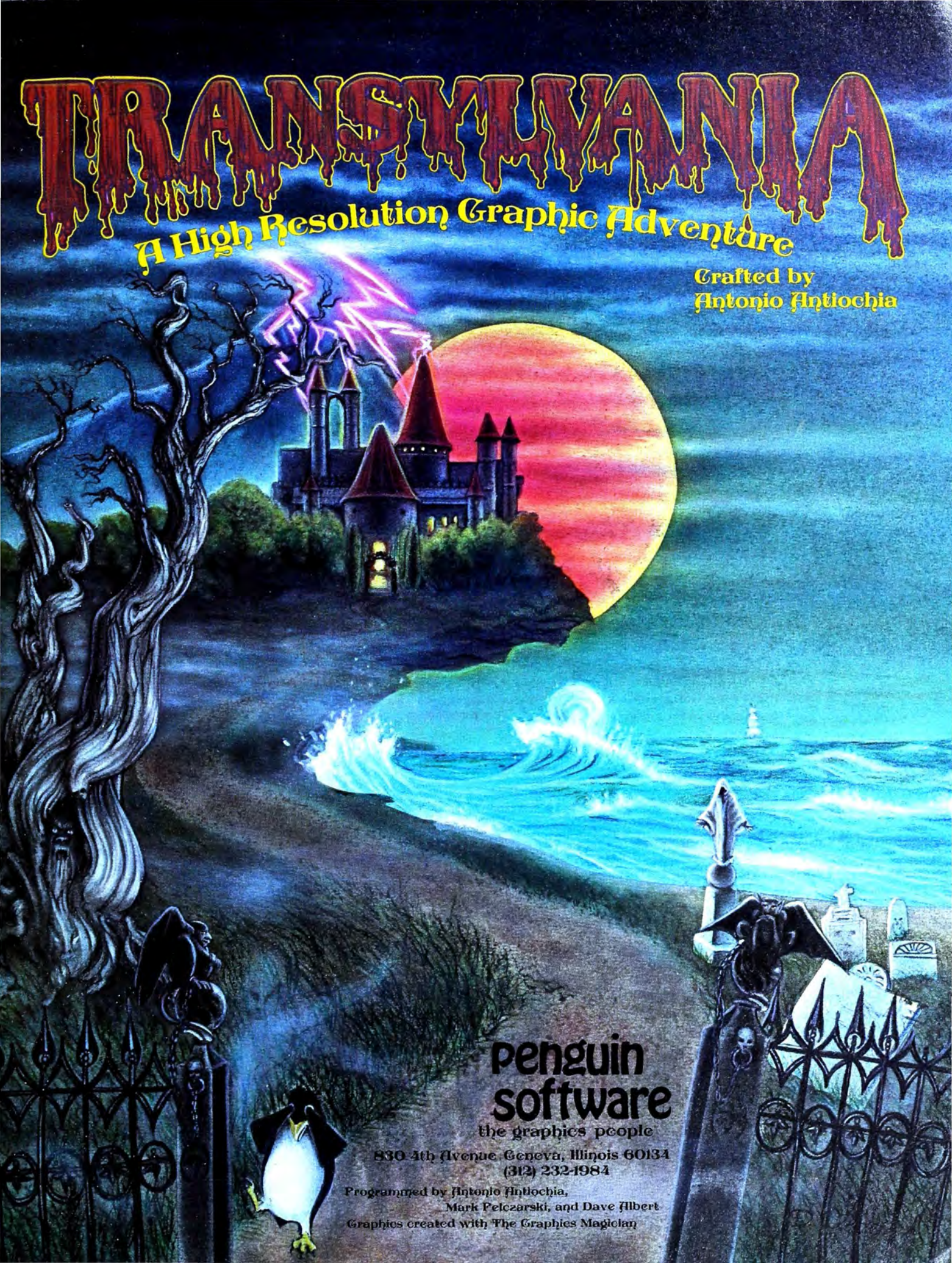
The best thing about this wonder is that, should you later decide to write something to disk, you don't even have to remove it; just pretend the tab isn't there and save away.

The Tab of the Pros

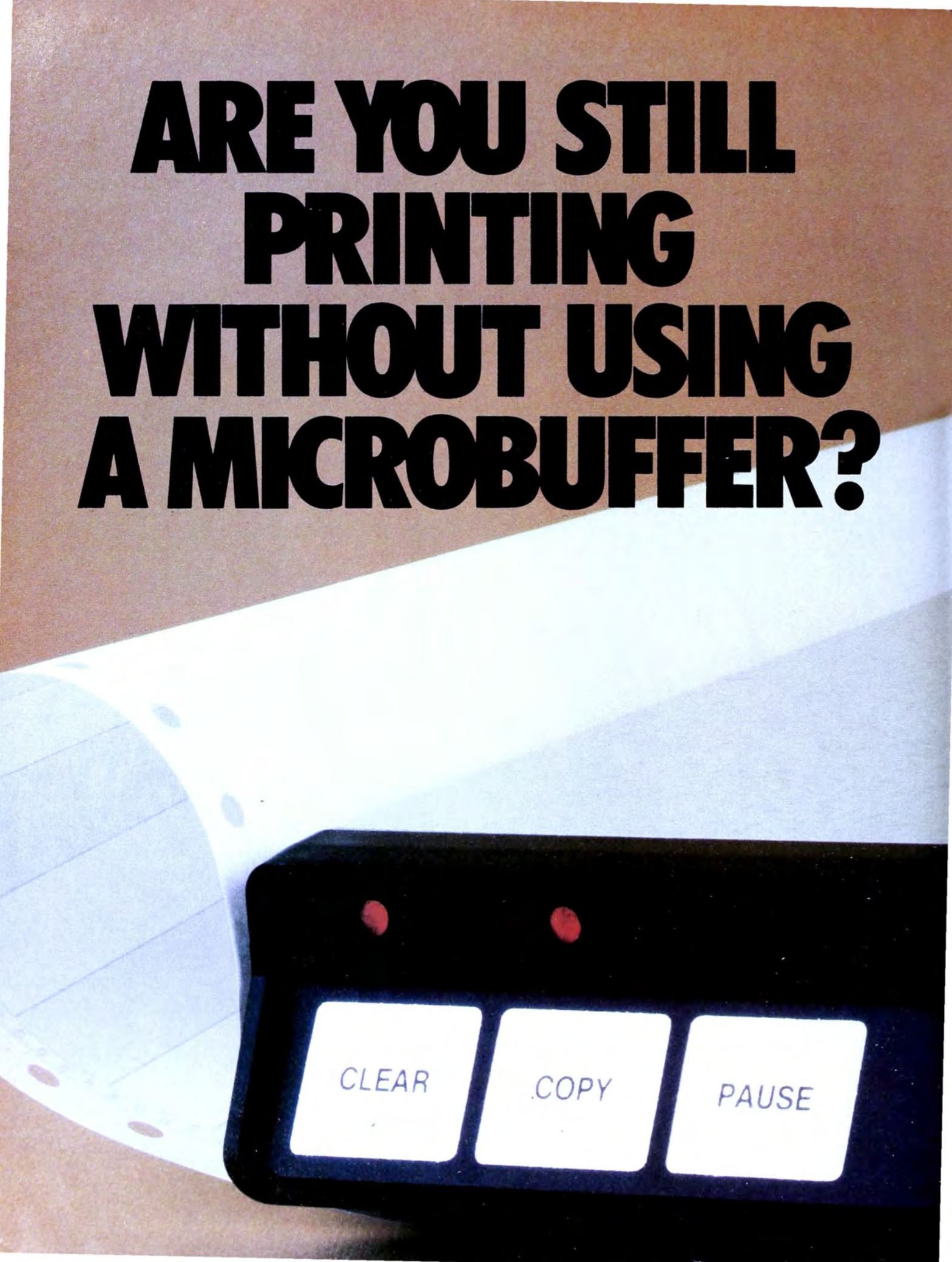
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Both serial and parallel versions are expandable up to 256K. The serial stand-alone will support different input and output baud rates and handshake protocol. The 32K model starts at $299, $349 for 64K, and 64K add-ons (for up to a total of 256K) are just $179.

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Microbuffer II is slot-independent. It will fit directly inside the Apple II in any slot except zero.

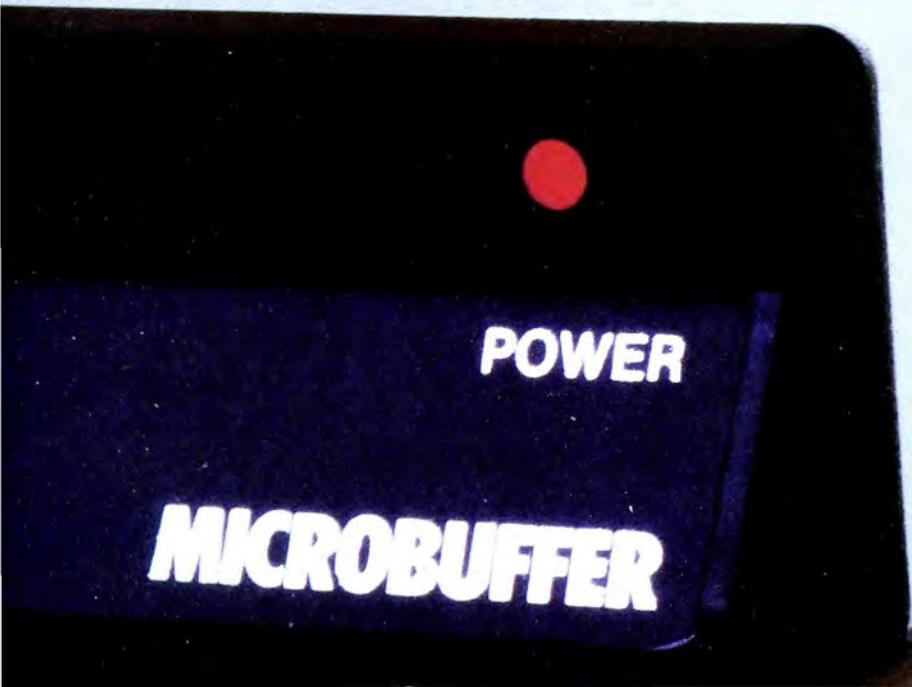
Microbuffer for your Epson mounts easily in the existing auxiliary slot directly inside the Epson printer.

The stand-alone Microbuffer is installed in-line between virtually any printer and any computer.

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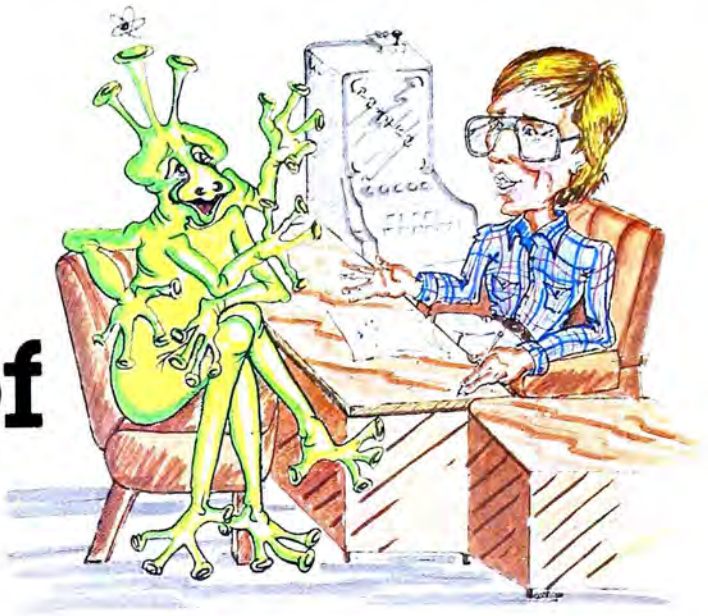
When you think of how much time Microbuffer will save, can you afford to *not* have one?

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A Contest That's Out of This World

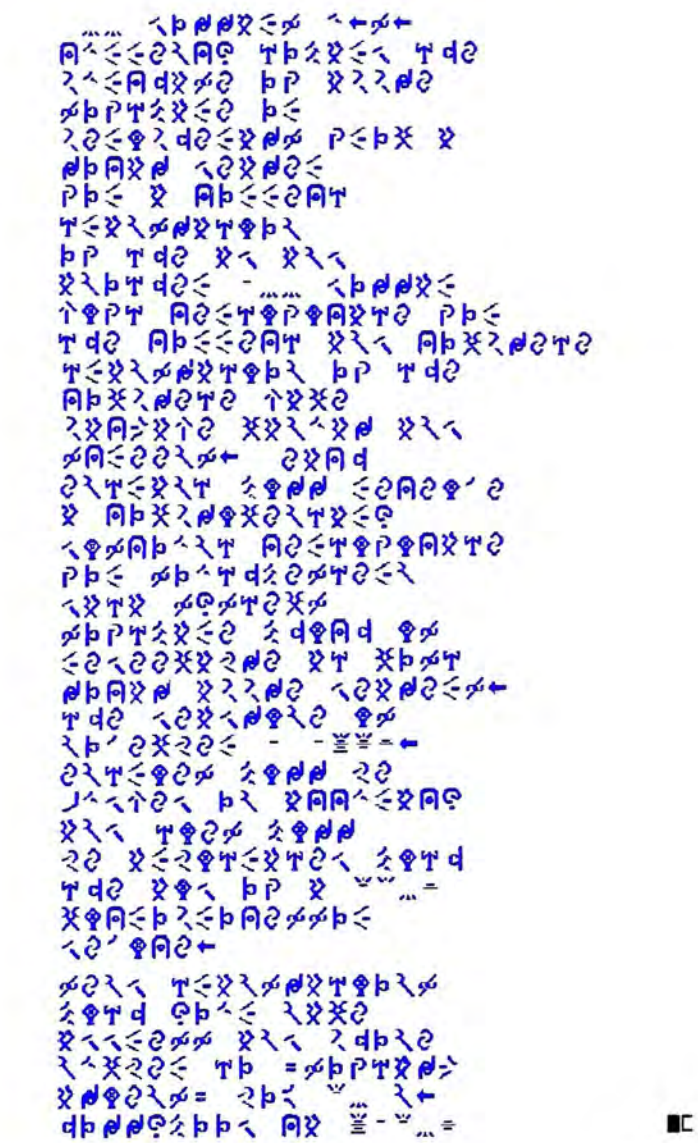


The following message arrived unattended in a slightly charred capsule that narrowly missed some of our more somnolent staff after crashing through the roof late one evening last month.

So far, we've discerned that there's some sort of contest involved and it appears that there's some sort of prize for everyone.

Readers' opinions on the nature of this artifact are requested.





This contest is sponsored by Southwestern Data Systems, Santee, California. All entries will be judged by its staff and all prizes are provided by SDS. Rules must be deciphered. Note: One of two independent parts to the contest requires having an SDS product.

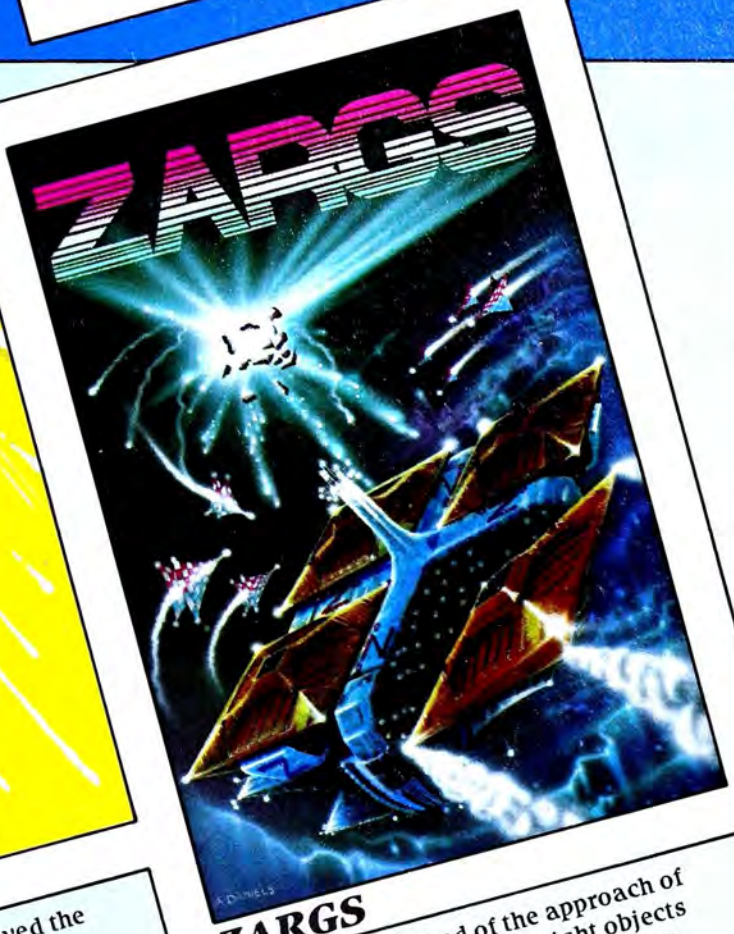
Entertainment Plus



SPIDER RAID

The great war of 2017 nearly destroyed the Earth. The radioactivity and chemical poisons were integrated into the harmless Minimus Problemus beetle. Now equipped with a poison spray, the mutant Spraybius Toxicus beetle is your fiercest enemy.

You are Hero Maximus, leader of one of the few remaining spider packs. You and your two loyal warriors must seek out the only food supply left, the common fly. But beware of the acid rain which can knock you down and leave you far from your prey or in the proximity of the deadly orange spray beetles. Good luck! Only your speed and cunning can save you from certain death!

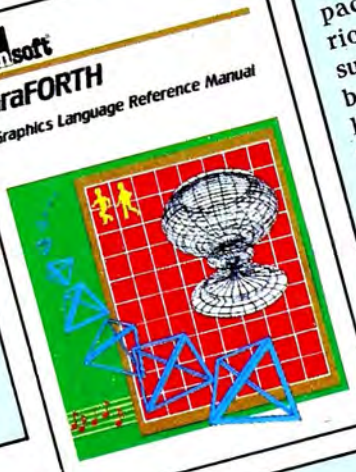


ZARGS

Intelligence has learned of the approach of several thousand mysterious bright objects from the region of the Crab Nebula. It has been concluded that the Earth will soon be under full attack from alien spacecraft.

The only hope is to complete and arm the top secret ZARG spaceships. As captain, you pilot each weaponship enroute to The ZARG. To avoid deadly X-rays, you must work against time to properly rotate and dock your spacecraft into one of the four ports before beaming yourself back to Earth, where you captain yet another craft.

But hurry, Commander, battle with the aliens begins soon!



GraFORTH

GraFORTH is the ideal programming language for entertainment, educational, and other graphics software creation. GraFORTH features fast 3-D Color Animation graphics, Character Set graphics, Turtlegraphics, and a music synthesizer for adding sound effects to your programs. A 220 page tutorial manual provides complete descriptions of the program's operation for the first-time user and is an excellent reference tool for the more experienced programmer. **$75.00**

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

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

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

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

Adventure

- **Adventure.** Crowther, Woods. The original text adventure, created on mainframe, contributed to by many over a long time. Very logical within fantasy framework, excellent puzzles, maps; complex, convoluted, and great. Several publishers: Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $28.95. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $35. Frontier Computing, Box 402, 666 N. Main, Logan, UT 84321. $10.

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

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

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

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

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

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

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

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

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

- **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.*

Prisoner II. Mullich. Totally relandscaped version of original game: hi-res graphics added, puzzles reworked, obstacles expanded. Sophisticated and difficult exercise in intimidation with elements of satire. Edu-Ware, Box 22222, Agoura, CA 91301. $32.95.

Queen of Phobos. Hi-res treasure hunt. Outwit four opponents on derelict ship in space. Looters after your cookies, too. Phoenix, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $34.95.

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

Starcross. Science fiction prose adventure that comes wrapped in a flying saucer. In the year 2186, your mission to harness a black hole takes some unexpected turns. Likeable, engaging. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95.

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

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

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

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

Zork III. Lebling, Blank. Text lives! A masterpiece of logic and a grand adventure to revel in. Hard, logical puzzle with unique point system. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *8/82.*

Business

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

Accounts Payable. Comprehensive, easy to use; handles one year's worth of accounts. Organize, add and subtract vendors, prepare checks, and break down payments. Masterworks, 25834 Narbonne Ave., Lomita, CA 90717. $275.

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

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

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

BPI General Ledger. Accounting system for small businesses automates posting of ledgers, finacial 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, 10260 Bandley Dr., Cupertino, CA 95014. $395.

Business Plus. Interactive package for service-type companies. With full-reporting general ledger (takes up to 250 items), accounts receivable, and accounts payable. Does two-year bar graphs. Advanced Operating Systems, 450 St. John Rd., Ste. 792, Michigan City, IN 46360. $399.

Client Management System. Kalmick. Comprehensive law office manager. Features billing, docket scheduling, client data, critical date calendar, management reports. Hard disk compatible. CompuLaw, 5500 Lindley Ave., Ste. 223, Encino, CA 91316. $2,500.

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

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

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

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

Data Perfect. Assembly language database companion to *Letter Perfect*; compatible with lower case in 40-column, most 80-column boards. Lay out, revise own screen, record design. Excellent built-in editor; ability to be edited by word processor.

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Introducing Spinnaker. We make learning fun.









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At Spinnaker Software, we make educational games that are actually fun.

Because they're fun, your children will use them. Instead of letting them collect dust in the basement.

And because your children use them, they'll be learning. And after all, isn't that what educational games are all about?

Our games are educational, because you can't kid parents.

As a parent, you're probably very concerned with how much time your kids spend playing mindless video games.

Sure, they're fun. But they don't do much more than develop reflexes and hand-eye coordination. Spinnaker games are different.

All our games have true educational value. They help develop a child's learning skills. And that's something your kids can take with them wherever they go.



Our games are fun, because you can't kid kids.

Kids like Spinnaker games for the same reasons they like roller coasters, going to the beach and ice cream sundaes.

They're fun. Lots of fun. So much fun your kids will probably forget they're learning.

Our games make the computer screen come to life. With colorful graphics, animation and sound.

And they're easy to use. In fact, a lot of our games are easy enough for kids who've never even used a computer before.

How do we make our games both educational and fun?

We're glad you asked.

Educators and game programmers write our software.

Educators, because they've been in the classroom and know how children learn. And what it takes to keep their interest.

Game programmers, because they know how to have fun with computers. These programmers give our games the high resolution graphics, animation and sound that make them so entertaining.

And right now, we're introducing four new games that can be played on the most popular computers, Apple,® Atari,® and IBM.®

First, there's FACEMAKER. It's for young computer users, kids ages 4-8. FACEMAKER helps children improve memory and concentration and provides familiarity with the computer.

Another game for young users is STORY MACHINE. This game lets children ages 5-9 write their own stories and see them acted out on the screen. STORY MACHINE helps children learn to write correctly and acquaints them with the keyboard.

Our SNOOPER TROOPS™ detective series gives your child mysteries to solve. As a Snooper Trooper, your child will have to do some daring detective work, including crawling through dark houses and talking to mysterious agents.

Designed for kids ages 10 and older, SNOOPER TROOPS helps children learn to take notes, draw maps, classify information, and develops vocabulary and reasoning skills.

All four games are available in stores today.

With Spinnaker products, you can rest easy knowing your children are spending their time wisely.

So ask your retailer about the growing line of Spinnaker games.

Because one of the smartest things parents can do is help their children learn.

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Versatile. With PrintMate's extensive graphics capabilities, you'll enhance sales reports with charts and graphs. Create characters for bulletin board announcements, or clarify technical information with illustrations. Mix graphics with words in any combination. No other printer can match PrintMate's graphic capabilities. The applications are as unlimited as your imagination.

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Searches, sorts, generates reports. LJK, Box 10827, St. Louis, MO 63129. $99.95.

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

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

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

DB Master Utility Pak I. Compatible with version III. Translates *DB* files to Apple text, restructures existing files, replicates and merges, and recovers crashed files. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $99.

DB Master Utility Pak II. Accessory disk with label printer, global editor, file merge, reblocker, and forms printer. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $99.

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

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 data bank. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $95. *2/82.*

Executive Briefing System. Nifty business graphics package for preparing color slides, graphs, and charts. Lotus, 55 Wheeler St., Cambridge, MA 02138. $199.

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

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

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

Graphmagic. Creates pie charts, bar and line graphs, and scatter charts from different spreadsheet programs. ISM, 120 E. Washington, Syracuse, NY 13202. $89.95.

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

Infotory. Complete purchase order and inventory system for under 9,999 items of one type. Prints receiving, sales, purchase orders; audit trails available. SSR, 320 South Ave., Rochester, NY 14620. $295.

List Handler. List-lover's delight. Prints lists, labels, and letters. Handles up to 3,000 records per disk and eight disk drives. Takes requests. Silicon Valley Systems, 1625 El Camino Real, Ste. 4, Belmont, CA 94002. $79.95.

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

Paymaster. Payroll package that handles up to 100 employees. Accesses any data elements, keeps checks on file; variable deductions, fill-in-the-blanks tax tables. Masterworks, 1823 W. Lomita Blvd., Lomita, CA 90717. $275.

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

PFS:Graph. Chin, Hill. Works alone or interfaces with *PFS* databases and *VisiCalc* files. Produces bar, line, and pie charts merging data from several sources. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125.

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

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

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

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

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

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

VisiCrop. Stukk. Business simulation expansion module to Slipshod's *Crop Duster*. Save your spreadsheet from the bean moths; spare the hi-res cows. Requires joystick or hammer. Slipshod, General Delivery, Bad Nation, SD. $4.95.

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

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

VisiTran. Use to create Basic exec files to transfer variables to *VisiCalc*. Requires some Applesoft programming. ADC Associates, 960 San Antonio Rd., Palo Alto, CA 94303. $99. *8/82.*

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

Communications

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

ASCII Express: The Professional. Greatly improved version of the original. Supports multiplicity of hardware and prints simultaneously. Southwestern Data, Box 582, Santee, CA 92071. $149.95.

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.

Hello Central. Menu-driven modem software. Upload-download, send-capture, save, retrieve, edit and manipulate files and programs. Advanced Operating Systems, 450 St. John Rd., Ste. 792, Michigan City, IN 46360. $99.

Micro-Courier. Electronic mail program. Sends 4,000

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character messages, up to 100 at a time. Create-edit, review-address, send-receive. Can accept and answer simultaneously. Requires clock card. Microcom, 89 State St., Boston, MA 02109. $250.

Micro/Terminal. Access any in-house or remote database, set up and log only once. Built-in editor or edit off-line. Microcom, 1400A Providence Hwy., Norwood, MA 02062. $84.95.

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

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

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

Fantasy

Ali Baba and the Forty Thieves. Smith. Fanciful Arabian Nights role-playing game with a sense of humor. Fresh, fast action, challenging options, and secrets that are a joy to discover. Quality, 6660 Reseda Blvd., Ste. 105, Reseda, CA 91335. $32.95 *7/81.*

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., Ste. 201, Renton, WA 98055. $40. *6/82.*

● **Beneath Apple Manor.** Worth. The original dungeon game for the Apple, created in 1978. Even in lo-res, it still stands up. Quality, 6660 Reseda Blvd., Ste. 105, Reseda, CA 91335. $19.95.

Curse of Ra. Expansion module to (and requires) *Temple of Apshai.* Find the magic treasure guarded by the demons of Ra; overcome the curse. Epyx/Automated Simulations, 1043 Kiel Ct., Sunnyvale, CA 94086. $19.95.

Danger in Drindisti. Expansion module to (and requires) *Hellfire Warrior.* Find the pattern to the glass wizard's maze; steal his magical staff. Epyx/Automated Simulations, 1043 Kiel Ct., Sunnyvale, CA 94086. $19.95.

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

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

Taipan! Canfil. Roam the China Seas as an opium smuggler in this exotic fantasy with a challenging hi-res pirate sequence. Avalanche, 2460 Embarcadero Way, Palo Alto, CA 94303. $39.95.

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

Ultima. British. Hi-res color adventure, progressing from Middle Ages to beyond the space age. A masterpiece. California Pacific, 1615 5th St., Davis, CA 95616. $39.95. *6/81.*

Ultima II. British. Faster play in a bigger universe with a time-travel option. Typically British look and feel. Events are much more interdependent; larger realm of fantasy with more transactions available. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $59.95.

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

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

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

Graphics

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

The Animator. Creates elaborate animated titles that you can add to your own programs. Machine language run. BalbeSoftware Systems, #6 White Plains, St. Louis, MO 63017. $49.95.

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

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

The Complete Graphics System II. Pelczarski. A wealth of graphics tools at a reasonable price. Make 2-D drawings with game paddles, add text in destructive, nondestructive, or reverse modes, create 3-D figures with a panel module, and shape tables with a shape module. Manual features complete outline of command structure. Penguin, 830 4th Ave., Geneva, IL 60134. $69.95; Apple graphics tablet version, $119.95. *7/81.*

Game Animation Package. Bredon, Kampschafer, Clardy, Conley. Arcade game utility with two programs: one creates pictures for hi-res color adventure games; the other uses bit-map graphics to create title pages. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $49.95.

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

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

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

The Graphics Magician. Jochumson, Lubar, Pelczarski. Outstanding animation package consisting of a picture editor and shape table extender designed to allow programmers to design and store graphics files. Comes with utility program to transfer binary files. Penguin, 830 4th Ave., Geneva, IL 60134. $59.95; Apple graphics tablet version, $69.95. *5/82.*

LPS II. Superb hi-res graphics drawing system with light pen. Draw freehand or use circles and lines to create geometric shapes. Fill routine with colors and patterns; fun animation demo; programmable Pentrak driver. Gibson, 406 Orange Blossom, Irvine, CA 92714. $349.

The Poor Man's Graphics Tablet. Easy graphics utility that traces transparencies from the screen, drafts, edits shapes, and assembles scenes. Over fifty-nine textures and even more colors; single-key commands. Rainbow, 19517 Business Center Dr., Northridge, CA 91324. $49.95.

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

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

Home-Arcade

ABM. Atomic war high jinks. Defend the East Coast from Russian nuke attack. Incoming warheads can do splits. Muse, 330 N. Charles St., Baltimore, MD 21201. $25.

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

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

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

Beer Run. Turmell. Artesian's delight. Catch falling cans on your way up one building, hop the blimp, and work your way down another. Sirius, 10362 Rockingham Dr., Sacramento, CA 95827. $29.95. *1/82.*

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

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

Choplifter. Gorlin. Fly your chopper into the Bungeling Empire to rescue the sixty-four hostages,



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

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

Crossfire. Sullivan. Aliens come at you from three directions on a grid laid out like city blocks. Each alien has four lives and metamorphoses into its next one when shot. Strategy and intense concentration required. Superb, smooth animation of a dozen pieces simultaneously. One of the great ones. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $29.95. *1/82.*

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

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

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

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

Firebird. Nasir. Put out the fires while the building burns; catch leaping victims at the same time. Gebelli, 1771 Tribute Rd., Ste. A, Sacramento, CA 95815. $29.95. *2/81.*

Firebug. Warner. Sizzling action as you race through mazes eating gas cans, your fuse tail igniting the walls. Crackling good fun. Muse, 347 Charles St., Baltimore, MD 21201. $24.95. *8/82.*

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

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

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

High Orbit. Merret. Use lasers to lift modules into place to construct floating space station. Watch out—it's a crowded cosmos. Gebelli, 1771 Tribute Rd., Ste. A, Sacramento, CA 95815. $29.95.

Human Fly. Bagley. Good crude fun. Climb the C.P.U. building, avoiding apes, nasty birds, and slamming windows. Promises many excruciating falls. C.P.U., 9710 24th Ave. S.E., Everett, WA 98204. $29.95.

Hungry Boy. Nakan. Eat-the-dots, big ones and little ones. Four ghosts chase you through a maze—when their colors change, you can chase them. Astar Intl., 5675 Francis Ave., Chino, CA 91710. $24.95.

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

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

Laf Pak by Chuckles. Beuche. Four-game variety disk; a real bargain. *Creepy Corridors* (the best), *Apple Zap*, *Space Race*, and *Mine Sweep*. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $34.95. *10/82.*

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

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

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

Microwave. Zimmermann, Nitchals. Brightly colored, highly addictive maze game featuring continuous Looney Tunes musical accompaniment. Cava-



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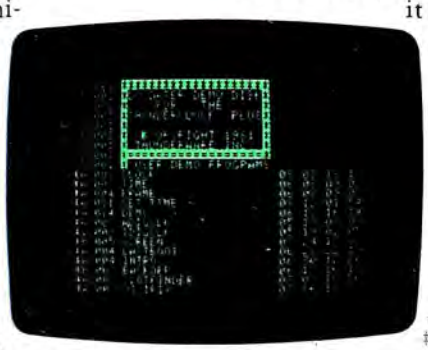


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lier, Box 2032, Del Mar, CA 92014. $34.95. *5/82.*

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

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

Nightmare Gallery. Aldrich, Clardy. High-moon shoot-'em-up. Fast action with ghosts, mummies, and menacing rows of tombstones. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $34.95.

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

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

Phaser Fire. Salt City. Space shoot-'em-up. Defend vortex from swooping rockets and space junk. Gebelli, 1771 Tribute Rd., Ste. A, Sacramento, CA 95815. $29.95.

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

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

Quadrant 6112. Hold your space alone against a fleet of rebel invaders popping through two blue squares. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $34.95.

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

Rear Guard. Five-level rocket run over scrolling terrain. The twist: you dog the aliens, they don't dog you. Adventure Intl., Box 3435, Longwood, FL 32750. $29.95. *8/82.*

Russki Duck. Knopp, Merrell. Recover stolen missile plans hidden in fake duck while dispatching enemy agents. Fairly easy. Gebelli, 1771 Tribute Rd., Ste. A, Sacramento, CA 95815. $34.95.

Sheila. Fitzgerald. Highly adventure-flavored, five-level, real time maze game with weapons, commands, and spells—acquired with increasing point totals. H.A.L. Labs, 4074 Midland Rd., Ste. 23, Riverside, CA 92505. $23. *7/82.*

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

Snake Byte. Arcade action featuring fruit and serpents. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

The Snapper. Different. Eat the *blots* while the whirlers slowly consume the maze. Takes strategy and quick thinking on slippery speedways, avoiding the ever-tossing gamma sticks. Silicon Valley Systems, 1625 El Camino Real, Ste. 4, Belmont, CA 94002. $32.95.

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

Star Blaster. Mines, fireballs, space tunnels, general obstructions and unfriendlies waylay your starship. Piccadilly, 89 Summit Ave., Summit, NJ 07901. $29.95. *8/82.*

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

Succession. Eisnaugle. Real-time maze game. Get the creatures in numbered order as the chaser nips at your heels. Piccadilly, 89 Summit Ave., Summit, NJ 07901. $29.95.

● **Super Invader.** Hata. The daddy of home-arcades. Still good hi-res, still a challenge. *Softalk* readers' Popular Program of 1978–80. Astar Intl., through California Pacific, 1615 5th St., Davis, CA 95616, and Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950. $19.95.

Swashbuckler. Stephenson. Hi-res swordfighting with realistic pirates, snakes, rats, and other scum. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $34.95. *8/82.*

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

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

Threshold. Schwader, Williams. Another shoot-'em-up. Hi-res graphics, animation, and accurate collisions. Targets include everything from flying maple trees to Volkswagen Bugs. Frustratingly small fuel supply. Sierra 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 4th St., San Rafael, CA 94901. $29.95. *4/82.*

Tunnel Terror. Popejoy. Noisy arcade fun. Shoot down tunnel at escaping aliens, get them before they get you. Adventure Intl., Box 3435, Longwood, FL 32750. $29.95.

Twerps. Thompson. Plot, elaborate animation, and sound link aspects of several different game styles together. Sirius, 10362 Rockingham Dr., Sacramento, CA 95827. $29.95.

Zenith. Nasir. Similar to *Horizon V*; 3-D scrolling over planetoid. Build city while fighting off aliens. Gebelli, 1771 Tribute Rd., Ste. A, Sacramento, CA 95815. $34.95. *8/82.*

Home/Hobby

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

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

Apple Aide. Programmer's utility for Basic or machine language that has disk editor, disk mapping, and how-tos on writing and editing. Advanced Operating Systems, 450 St. John Rd., Michigan City, IN 46360. $49.95.

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

Apple Logo. Papert. Custom version (by its inventor) of MIT-developed turtle graphics language. First-rate educational tool with graphics, mathematical, even games use. Hefty documentation. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $175.

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

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

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

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

Busywork. Basic programs and routines for developing new business programs. Used as a start up, add your own program codes as you go. Datum Consultants, 1641 State St., Box 238, DeKalb, IL 60115. $39.95.

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

C.O.R.P. Program generator. Answer questions in English to design Basic programs that run without *C.O.R.P.* Dynatech, 7847 Caldwell Ave., Niles, IL 60648. $250.

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

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

Disk Recovery. Utility to recover disk files. Deletes files and rewrites sectors if you can't patch by hand. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $30.

Disk Scanner. Looks for and fixes bad tracks, checks for bad sectors, and rebuilds your catalog. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $30.

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 tool kit. Edit, assemble machine language programs; write, edit Basic programs. Simplifies graphics, includes character generator. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $75. *10/81.*

Double Check. Hill. Checkbook balancer that handles dozens of accounts. Lists, sorts, prints; has 100 categories; shows seventeen checks per screen. Computer Tax Service, Box 7915, Incline Village, NV 89450. $39.95.

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

Expediter II. Einstein, Goodrow. Applesoft compiler

FASTALK

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

Fast DOS. Triples access speed; compatible with all DOS-Applesoft programs that access DOS through standard hooks. Wytand P/L, 60 Gollan Ave., Dundas, 2117, Australia. $29.

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 use and users. SoftHouse, Box 6383, Rochester, MN 55903. $79. *12/81.*

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

GPLE. Enhanced version of the *Program Line Editor.* Edit everything on a line, line by line, or on a range of lines; plus search for strings. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $60.

Home Accountant. Schoenburg. Thorough and powerful home finance program. Monitors five checking accounts against a common budget, plus credit cards and cash; one-step record of transfer of funds. Continental, 16724 Hawthorne Blvd., Lawndale, CA 90260. $74.95. *4/82.*

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

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

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

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

Memory Management System. Relocates DOS to RAM board in slot 4; frees memory location space for programming. Computer Data Systems, 50 N. Main St., Logan, UT 84321. $40.

Merlin. Does assembly language programming with a dozen editing commands and twenty-eight pseudo-ops. Southwestern Data, 1076-E Woodside Ave., Santee, CA 92071. $28.

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

Personal Finance Manager. Gold, Software Dimensions. Handles up to 200 entries a month from maximum of 14 separate accounts. Search-sort-edit routine. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $75. *11/81.*

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

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

Program Writer/Reporter. Database code generator that does standalone program writing. Interactive between files and fields within programs. Vital Information, 7899 Mastin Dr., Overland Park, KS 66204. $200.

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

Soft-Step. Applesoft Basic interactive debugger. Steps through programs, breaks at any point; trace and list functions are improvements over originals. Accent, 3750 Wright Pl., Palo Alto, CA 94306. $49.95. *8/82.*

Statistics with Daisy. Statistics analyzer for business, science, and social use. Hypothesis testing, correlations, multiple regression, and variance analysis. Rainbow, 19517 Business Center Dr., Northridge, CA 91324. $79.95.

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

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

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

The Tool. Code generator. Programs generated will address up to 80 megabytes (four hard disks). Has customizing features; good productivity tool for programmers. High Technology, Box 14665, Oklahoma City, OK 73113. $395.

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

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

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

Watson. Dutiful disk utility, requires *The Inspector.* Recovers blown disks, repairs bad data files, searches and scans. Omega, 222 S. Riverside Plaza, Chicago, IL 60606. $49.95.

Strategy

Air Navigation Trainer. Winograd. Flight simulator with four games and VOR training aid. Can be played for fun or used to learn basic navigation. Space-Time Associates, 20-39 Country Club Dr., Manchester, NH 03102. $40.

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

Bull Run. Finelli. Stock market simulation game. Trade twelve stocks, purchase options, earn T-bill interest. First Flight, Box 555, Kitty Hawk, NC 27949. $29.95.

Casino. Five hi-res games, Vegas-style: blackjack, baccarat, keno, poker, and roulette. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $39.95.

Castle Wolfenstein. Warner. First game to fuse successfully best elements of home-arcade and adventure. Escape from Nazi stronghold, finding and taking secret plans. 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.** Merro, 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, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $39.95. *9/81.*

Cytron Masters. Bunten. Fast-paced strategy in real time; plays much like football. Rates high in excitement and intelligence. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $39.95. *10/82.*

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

Galactic Gladiators. Reamy. Easy and enjoyable tactical simulation. Suit up and arm your fighters for ten different scenarios. High speed for a strategy game. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $39.95.

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, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *6/82.*

Guadalcanal Campaign. Grigsby. Massive land, sea, and air re-creation of the dramatic battle. Fast and exciting; good balance of conflict. Includes 300-turn campaign game. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $59.95.

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

Hi-Res Cribbage. Schwader. One-peg type; discarding to crib and playing to peg. Spiral board, skunking, automatic counting. Solid, challenging game. Sierra 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. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $39.95.

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

Millionaire. Executive stock market simulation game played via reports, graphs, options, and volume indicators. Blue Chip, 19537 Wells Dr., Tarzana, CA 91356. $79.95.

Pursuit of the Graf Spee. The 1939 engagements of the German pocket battleship off South America. Visibility and sighting system; separate ranges for each gun turret. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $59.95.

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

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

LOBO DROPS PRICES

Bigger volume and lower production costs now make Lobo high performance disk systems and accessories even more affordable.

There's probably nothing that would add more power and usefulness to your Apple than a bigger, faster disk.

Now Lobo Drives offers a whole family of disk upgrade options—direct from the manufacturer, at substantial savings.

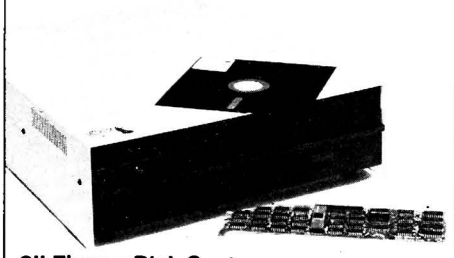
We cut out the middleman—not the quality.

Make no mistake—Lobo's low prices are for highest quality, ultra-reliable systems. We take no shortcuts in design, manufacturing, testing, and burn-in. That's why Lobo systems are probably the only ones you'll find anywhere with a *1-year parts and labor guarantee*.

Lobo uses only Shugart or Seagate drives—the standards of the industry. We put them in rugged metal cabinets, with heavy-duty fan-cooled power supplies and our own proven controllers and interfaces.

So whether you want 8" floppies, a Winchester system, or just a less expensive Apple-equivalent disk, Lobo delivers top quality for less.

You'll find our disk price breakthrough can mean a real performance breakthrough for your Apple II!



8" Floppy Disk Systems

Up to 2.2 megabytes of on-line storage with two double-sided, double-density 8" floppies (1.1 megabytes with single-sided drives). DOS 3.3 capabilities are supported. Interface plugs into any Apple I/O slot (except 0).

Lobo's optional CP/M includes a special DENSITY command to permit reading and writing standard single-density disks.

Optional Pascal software lets you store the entire Apple Pascal system on one side of one 8" disk—with lots of room left for program files.

TWO SINGLE-SIDED DRIVES
Model 8202CA **$1625.00**
TWO DOUBLE-SIDED DRIVES
Model 5202CA **$1925.00**

Winchester Disk Systems

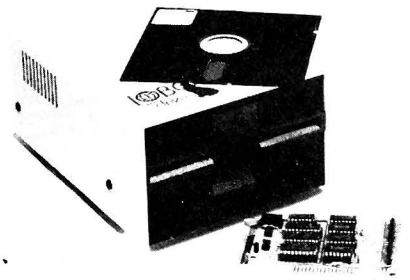
Programs that make heavy use of disk files will get a spectacular performance boost when you plug in up to 8 megabytes of ultra-fast hard disk storage. And imagine the convenience of having all your program and data files immediately available whenever you boot the sytem.

IMPORTANT: many hard disk systems now being sold have no provision for backing up the disk (using standard Apple minifloppies, you'd need about three dozen diskettes to completely back up a 5 MB drive!). *Lobo hard disk systems come with a built-in double-sided, quad-density floppy drive that can store the complete contents of the hard disk on six or seven floppies.* This floppy drive also adds the equivalent of at least 5 more Apple disk drives to your total on-line storage!



5¼" SYSTEM: ONE 5MB HARD DISK PLUS ONE 737 kB FLOPPY
Model 950A **$2675.00**
8" SYSTEM: ONE 8 MB HARD DISK PLUS ONE 1.2 MB FLOPPY
Model 1850A **$3459.00**

Both include Lobo DMA interface usable in Apple slot 1-7 and DOS 3.3 patches. CP/M optional (see below).



Apple-Compatible Minifloppy Systems

Both the disk drive and the interface card are functionally identical and plug-compatible with Apple Disk II equipment. Lobo and Apple drives may be freely mixed on a Lobo or Apple interface card, *and the Lobo interface features a switch to select 13 or 16 sector boot.* The only other difference is the price *and Lobo's unique 1-year guarantee!*

DISK DRIVE WITH INTERFACE CARD
Model 3101-I **$455.00**
DISK DRIVE ONLY
Model 3101 **$385.00**

Software and Accessories

All Lobo disk systems come complete with interface card and any necessary patches to DOS 3.3. Use of Apple Pascal with Lobo 8" floppy drives requires the Lobo Pascal Creator disk and documentation.

Running CP/M with Lobo Winchester or 8" floppy systems requires a Microsoft SoftCard, an Apple Language card (or Microsoft RAM Card or equivalent), and the Lobo CP/M disk. Pascal is not currently supported on Lobo Winchester systems.

PASCAL CREATOR DISK AND DOCUMENTATION **$54.00**
CP/M DISK AND DOCUMENTATION **$54.00**
CP/M DISK WITH MICROSOFT SOFTCARD **$355.00**
MICROSOFT 16K RAMCARD **$175.00**
APPLE FAN (RECOMMENDED FOR HEAVILY LOADED SYSTEMS) CLIPS ON LEFT SIDE OF COMPUTER **$72.00**

Ordering Information

All prices include shipping and handling. California residents add 6% sales tax. Credit card orders shipped within 24 hours. Personal checks require 2-3 weeks for clearance before shipment. Please allow up to 6 weeks for delivery.

The Lobo Warranty

All Lobo hardware products carry a limited 1-year parts and labor warranty. Call or write for complete warranty statement.

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CP/M is a trademark of Digital Research Corp.
SoftCard is a trademark of Microsoft.
Apple II is a trademark of Apple Computer, Inc.

MasterCard VISA

TOLL-FREE ORDER NUMBERS:
U.S. (except California):
800-235-1245
In California: **800-322-6103 or 800-322-6104**
Hours: 7AM—5PM Pacific Time

Write for free catalog:

LOBO drives INTERNATIONAL

LOBO DRIVES INTERNATIONAL
358 S. Fairview Ave. Dept. ST 10
Goleta, CA 93117

Prices subject to change without notice.

FASTALK

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

The Shattered Alliance. Suit up and arm unicorns, dwarfs, zorks, and centaurs to do battle in seven scenarios, both fantasy and historical. Also called *Chronicles of Osgoth.* Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $59.95. *7/81.*

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

Word Processing

Apple 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; continuing features and functions menu; continuous readout of character count and length. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $150.

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

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

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

Format II. Word processor with logic-sorting mailing list. Justifies type, wraps text; has one-key editing, menu prompting. Kensington Microware, 300 E. 54th St., Ste. 3L, New York, NY 10022. $375.

Goodspell. Dictionary companion disk to *Apple Writer* with 14,000 words. Flags words not listed when printing out. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $60.

Graphtrix. Matrix graphics system designed to add graphics, footnotes, and chapter capabilities to *Apple Writer* text editing system. Data Transforms, 906 E. 5th Ave., Denver, CO 80218. $65.

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

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

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

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

MailMerge. Overlay companion to *WordStar.* Add files at print time, sort items, specify variables. Command-driven. MicroPro, 33 San Pablo Ave., San Rafael, CA 94903. $150.

Perfect Speller. In-context spelling checker that integrates with *Perfect Writer.* Processes 4,000 wpm; has 50,000-word dictionary. Perfect Software, 1400 Shattuck Ave., Berkeley, CA 94709. $189.

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

Personal Secretary. At-home version of *Executive Secretary* minus electronic mail and alphabetical indexing. SofSys, 4306 Upton Ave. S., Minneapolis, MN 55410. $75.

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

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

ScreenWriter II. Kidwell, Schmoyer. Formerly *SuperScribe II.* No extra hardware for lower case, 70-column display, printer spooling. Edits Basic, text, and binary files; complete search and replace. Sierra On-Line, 36575 Mudge Ranch Rd., Coarsegold, CA 93614. $129.95.

Sensible Speller. Spell-checking program sports listable 85,000 words, extensible up to 110,000 words. Recognizes contractions, gives file word counts, incidence of a single word, and number of unique words. High marks for clear, logically organized documentation and simplicity of operation. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $75. *1/82.*

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

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

Word Handler. Elekman. Wonderfully simple program with straightforward documentation. Allows folded paper printout for two-sided printing. Silicon Valley Systems, 1625 El Camino Real, Ste. 4, Belmont, CA 94002. $199. *10/81.*

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

Zardax. Philips. Highly recommended. Single program includes all standard word processing features with considerable extras including communication by modem. Computer Solutions, Box 397, Mount Gravatt, Queensland, Australia. In the U.S.: Action-Research Northwest, 11442 Marine View Dr. S.W., Seattle, WA 98146. $295. *5/82.*

Apple III

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

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

Apple III Business Graphics. Converts numerical information into charts and graphs; only graphics program to take advantage of the III's capabilities. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $175.

Apple Writer III. Lutus. Uses WPL (word processing language) to automate the process of text manipulation and document creation. Adjusts print format during printing, translates from typewriter shorthand to English or other language and back again. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $225.

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

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

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

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

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

Pascal. Program preparer with editor, compiler, disassembler, linker, filer, and system library. Features cursor control, text modeling, and formatting. Apple, 10260 Bandley Dr., Cupertino, CA 95014. $250.

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

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

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

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

VersaForm. Landau. State-of-the-art business forms processor. Does invoicing, purchasing orders, mailing lists, client billing. Powerful, complex, worth getting to know. Hard disk compatible. Applied Software Technology, 15985 Greenwood Rd., Monte Sereno, CA 95030. $495.

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

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

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

MING CHALLENGES YOU TO SURVIVE!



MING'S challenge

Ming...Evil incarnate, a hellish entity who by comparison makes Hitler, Stalin, Tiberius, Torquemada, Ivan the Terrible, and the Devil himself look like candystripers...challenges YOU to survive! Think it's easy? Consider:

- You sit, fingering the *kill* button, in your small spaceship at the bottom of the screen.
- Suddenly Ming directs Deathships straight at your fragile craft.
- Next the Claymen, at a signal from Ming, hurtle bombs at you.
- You can neutralize Ming's Deathships by shooting them and placing them in suspended animation.
- Cyclops drop bombs on you and freeze the Deathships, making them disappear into hyperspace (making you lose points).
- If you do not place Deathships into suspended animation they will vanish into the Black Hole and you will lose points.
- Greater perils and varying challenges await you and only the truly TOP game players will survive MING'S CHALLENGE.

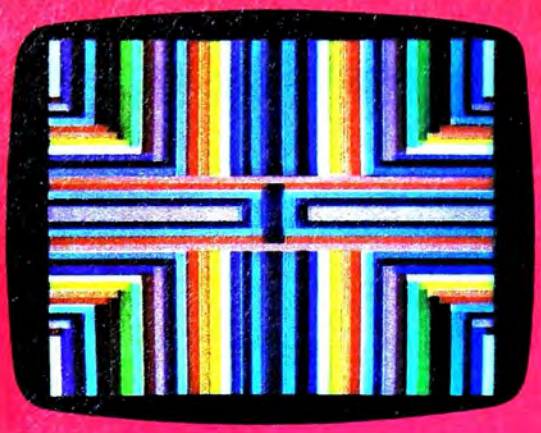
As a player, you enjoy the option of altering the parameters endlessly...changing speed of the game, number of enemies, width and depth of the Black Hole. Also, if you are the first to survive MING'S CHALLENGE, you will receive either the next 10 games produced by MICROFUN, free of charge, or any single business product presently available from MICROLAB.

This Program was Written by Mike Livesay.
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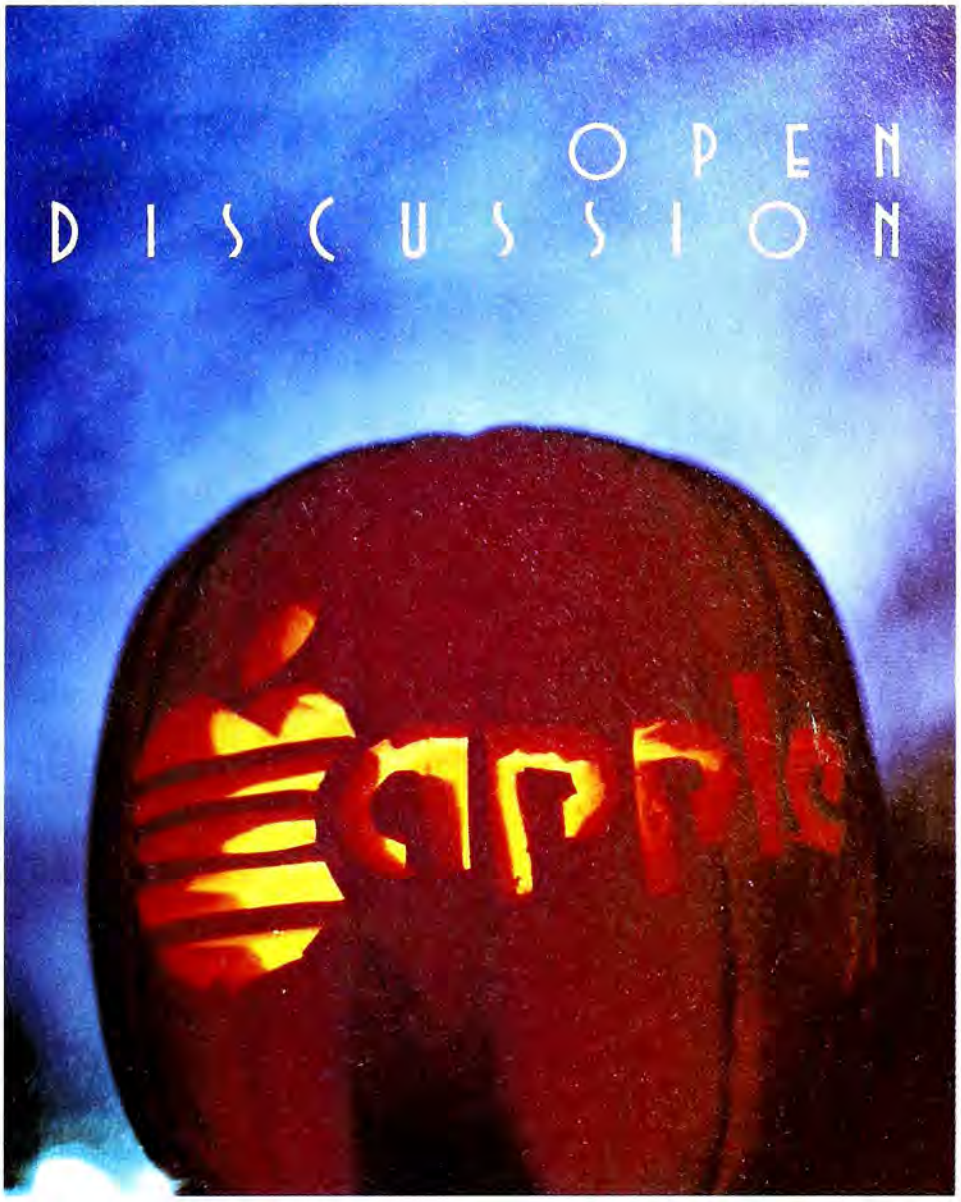
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Why Not Pumpkin?
Sixteen-year-old William Cho of Saginaw, Michigan, sent Open Discussion this Apple jack-o'-lantern he carved to say Happy Halloween to fellow readers of Softalk.

A Home Computerist's Tale

Two nights ago I brought home my new Apple II Plus. I have been feeling kind of confused and elated at the same time. Here I am with 48K, two floppy disk drives, a color monitor, and a printer—veritably all dressed up and looking hard for a place to go.

I have been running a Datapoint ARC system for around four years and in that time have learned a bit about computers, but only in a strictly business environment. A month or so ago, for the hell of it, I visited my local Computer Universe store. I wondered how they sold computers for families. How can a computer improve the quality of life of an average family in 1982? So I decided to play dumb. Although I am quite able to sling RAM, ROM, and kilobytes with the best of them, I asked naive questions such as what is a computer and what can it do for me?

They looked at me like I was a congenital idiot. Immediately they started talking about eight bit machines, 6502 chips, and so forth. I made confused noises, and instead of realizing that I needed further explanation they just got more technical. I then asked what a computer could do for my family. They wanted to know if I was intending to run a business on it. I said no; it would be for my family. This time they looked confused.

I asked if there were educational programs that my child could use. The salesman said that there were, but he really didn't know very much about them. I got the same response when I asked about my household budget and home money management. He did know about *VisiCalc* and he tried to gear the conversation toward that. On the whole, this salesman didn't have the slightest idea of how to sell a computer to people. Computerland was a bit friendlier, but for the most part no one knew how to sell a computer to people for people to use. If you are not computer literate, there is really no way to enter the market unless you have done the research and know the right questions to ask.

The answers to most of my real questions have been found in computer magazines such as *Softalk*. I got hooked but good and knew I would have a computer in my home. I have learned that there is a wealth of application software on the market that ranges in quality from very useful or entertaining to incredibly mindless. There are a myriad of uses which are only limited by the imagination after one becomes fairly proficient in programming. There are programs that my child at eighteen months of age can benefit from. My wife and I can carry on all our correspondence (I was never one for writing letters). We can keep records of valuables for ourselves and for insurance companies.

But there is a darker reason to spend all this money and invest all this time and effort: the computer is probably the most remarkable toy ever invented! I always wanted to get my hands on a microcomputer, not for my business, but just for me. I want to learn to program it and see what kind of things my mind can make it do. I'm sure many other readers feel the same way. I'm very excited about what the concept of home computing has in store for me.

David Winograd, Hillsdale, NJ

He Blew It and It Worked

The morning after our daughter's slumber party my wife called me at work very upset. She had discovered that a glass of water had been spilled into our box of disks. All the disks were okay after being dried except *Jawbreaker*, our family favorite. When I got home, I saw that the disk would not turn in the jacket. In desperation, I used a blow dryer set to the lowest setting to blow warm air around the disk inside the jacket. The water was evaporated in about twenty-five minutes and the disk booted. Some happy kids could then resume their *Jawbreaker* contests. I hope that sharing my experience can help someone else.

Michael Meehan, Jacksonville, FL

Crime Report with a Plea

Computer crime is becoming a common term, but I have recently been a victim of a rather unusual form of it. A remarkably sophisticated and specialized burglar broke into my house. To the great surprise of the police, the only thing he took was the 128K Saturn RAM board which I had recently installed in my Apple II. Nothing else, except one unrelated disk, was taken or disturbed. This is certainly a step beyond piracy of programs, although I suspect that people who try to achieve a reasonable income developing and selling programs might not agree.

I had been thinking of submitting a review

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SAVVY

MARKETING INTERNATIONAL

of the RAM board to *Softalk*; this thief's action seems to be a remarkably favorable review in itself. During the brief time I had it, I was quite impressed by the Saturn card, and I agree with the burglar that it was the single most valuable thing in my Apple. It did a fine job of speeding up the compilation of large Pascal programs, offered lots of programming space and convenience for Basic programs, and the accompanying software performed flawlessly. The documentation was clear, complete, and easy to follow. Apparently, the thief didn't recognize the value of the manual and disks; he failed to take any of them. Unless he is a remarkably sophisticated programmer, the card will be useless to him without these items. I find that fact somewhat consoling.

This leads to the point of this letter. I would be grateful if any readers of *Softalk* who have Saturn cards would regard with great suspicion any requests to copy their disks or manuals, and let me have the name and address of anyone making such a request.

James R. Florini, Biology Department,
Syracuse University, Syracuse, NY 13210

Apropos to Oo-Topos

After all the horror stories about unscrupulous vendors giving Apple software a bad name, I'd like to say a word about one that supports its customers: Sentient Software.

My copy of the game *Oo-Topos* blew up and I had to send for a replacement, which was promptly provided at the nominal fee of six dollars. However, problems with their disk supplier and with the software caused great difficulties. My replacement was a bad floppy and I had to send it back; they sent another that I also had to return.

In the midst of my anger and frustration, Sentient sent me a free copy of their game *Cyborg* by way of apology for the trouble I was having, along with another, as it turned out, bad copy of *Oo-Topos*. I kept *Cyborg* and sent back *Oo-Topos* again. Sentient finally determined that their copy protection scheme was preventing the disk from booting on a standard Apple with language card.

Sentient's support solution for me was to send me a completely unprotected version of *Oo-Topos*. It works fine, and I am amazed by their generosity and trust. Needless to say, I am very highly impressed by the ethics and dedication of this company, and I'd like to commend them publicly. If game vendors will support their users thusly, we should likewise be willing to support them.

Geoff Puterbaugh, Sunnyvale, CA

A Voice of Encouragement

I bought my Apple used. It came with the Videx eighty-column card, but no Videx manual. So I called Videx and ordered a manual. While I was on the phone, they told me of the Videx Soft Video Switch. This little gadget lets you switch between forty and eighty columns under software control, so I ordered one. Included with it was version 2.3 of the firmware for the eighty-column card. However, since they had just released version 2.4 of the firmware, they offered to send that instead. Unfortunately, 2.3 was in the package I received. I called Videx. They apologized and immediately shipped 2.4. At the same time they sent me a prepaid UPS ticket so that the 2.3 ROM could be returned. I was impressed by their helpful attitude and rapid correction of the problem.

When I decided to upgrade the keyboard on the Apple, I bought the Videx Keyboard Enhancer II. When I started to install it, I was again impressed, this time by the manual. Step by step, and with photographs even, it took me through the process of disassembling the Apple, removing the keyboard encoder and replacing it. Unfortunately, when I put it back together, it didn't work. I called Videx. They immediately and with no hassle said to send them the Enhancer. They fixed it and returned it to me at no charge. There's a chance I may have damaged it while trying to install it. Videx did not ask. They simply took care of it.

There's a problem with the Enhancer not being compatible with some games. I ended up removing it since the main thing I do on the Apple is play games. At the National Computer Conference in Houston, I stopped by the Videx booth and explained my problem. The Videx representative said to call customer service at Videx and ask for the new release of firmware (version 1.1) for the Enhancer. With this new version, you can defeat all the features of the Enhancer and make it act like the original keyboard encoder (by pressing the space bar when you power up the Apple). They immediately shipped me the new ROM at no charge, asking only that I return the old one.

Videx has repeatedly demonstrated their intention and ability to provide extraordinary service and I congratulate them on their achievement. The products I have used are excellent; with the high level of service provided by Videx, they are in fact a remarkable value.

Harvey P. Morgan, Jr., Houston, TX

Continental Courtesy

I have just been overwhelmed by a prompt, courteous letter and a full no-questions-asked refund from Continental Software. I had problems with one of their early releases, and rather than complain about it, I let it sit and gather dust for months. I finally decided I didn't have the heart to tackle it again and I sent it back. Wow! What a surprise to find a company so willing to stand behind their products. They sure made a Continental Software fan of me.

Louis E. Alfeld, Clayton, MO

An Unaccustomed Customer

I am a very satisfied owner of an Apple III and I am always interested in seeing articles on the Apple III in *Softalk*. I do, however, have some concerns with respect to Apple Computer and the Apple III. First, with the exception of *Mini-Micro Systems*, I have not seen any advertising for the Apple III. It seems to me that Apple is missing the boat by not advertising in industry journals, let alone magazines such as *Softalk*, that are oriented toward the personal computer market. Second, although I have owned my Ap-



ple III since January, I have yet to hear anything from Apple Computer regarding new products for it. Whatever happened to the much rumored Fortran; when is the SOS reference manual going to be published; is Apple going to manufacture a real-time clock for the III?

Please do not let the foregoing influence you into thinking that I am dissatisfied with my Apple III. I am extremely happy with it. I am, however, accustomed to somewhat better user support. I have been involved with computers for nearly fifteen years. During that period, I have used and programmed a wide variety of machines. With the exception of the Apples I've used, I have always received excellent support from the manufacturer. Since I bought the Apple III to use in my own business, I hoped, perhaps assumed, that I would receive similar support from Apple. Apparently Apple assumes or expects local computer retailers to handle this, but it has been my experience that a dealer's staff is so busy trying to run the business and make sales to new customers that they simply cannot keep up with industrywide developments, let alone Apple developments. Because my credibility with my customers is dependent on current knowledge of the industry, I need all the help I can get. It would really be great if some of this help came directly from Apple.
M. Keith Williams, vice president, Sunflower Micro Systems, Kansas City, KS

Addressing the Mail Decision
In response to Mr. Graham's (Northwestern Apple User's Group) letter concerning Apple's decision to restrict mail-order sales, I offer the following comments:

1. For rural populations not close to an Apple dealer, this policy does present a problem. Apple should consider direct sales or some other means of servicing that market.
2. Local dealer organizations have more than enough competition from IBM, NEC, PET, and Radio Shack. I hardly think Apple has a monopoly on the market, and dealers I know are clearly aware of this, with or without mail order sales.
3. With regard to restraint of trade, each company still (thank heaven) has the right to decide what distribution channels it will employ. The "ethical" aspect is indeed plain; that is, that Apple has the right to market their products by any legitimate means they deem appropriate.
4. Apple will clearly have to contend with competitive equipment, including peripheral equipment. I suspect they believe that customer support will be critical to selling microcomputers to the general public and business and, as a relative neophyte to microcomputers, I think they are correct. The majority of noncomputer buffs will want more than a post office to help them get maximum use out of their purchase.

Apple has clearly decided that the future for microcomputers will require a strong dealer network and this action is evidently intended to ensure this network. Let us hope they are correct.
Ronald L. Sladky, Perrysburg, OH

Reaction from Abroad
I am a charter member of the Rota Computer Club aboard the United States Naval Station in Rota, Spain. This club was organized last October and has been a valuable source of information and support for interested owners and potential owners of various computers. Those of us in the club who are Apple owners were very disturbed to discover Apple Computer's arbitrary decision to end mail-order sales of Apple products. A lot of Americans who are in the military or civilians who work overseas for our government were effectively stopped from adding to a system that was already started. I have invested not only a substantial amount of money in this product, but my faith as well. I feel betrayed! The people who bought these products when Apple was a small company and helped turn it into a large company are the people most hurt by Apple's decision. I have not written to Apple regarding this decision. I doubt if my letter would be read. I have read many complaint letters in your magazine and in others, but I have read no satisfactory reply from Apple. If Apple thinks that all those dealers are supporting the buyers, I wish they could have followed in my footsteps. My computer came in a box, and I wasn't even invited to see how it would go together. Today, I know where to find answers to my questions: I read *Softalk* every month. I find a lot of answers there because you directly address the problems we run into rather than pretending that problems don't exist. I will certainly buy a piece of software on your recommendation, as well as learning from other people in my computer club.

I am a teacher, and I hope that the government changes the rules so that Apple can put a computer in every classroom. It makes sense. I also hope that Apple Computer changes the rules and remembers us forgotten people overseas. That makes sense too.
Karen Obrock, Rota, Spain

Behind Life's Simple Things
I want to congratulate Barney Stone for his fine discussion of copy protection tradeoffs in the August Open Discussion. So many users seem unaware of the complexity of "simple" things that they ask for; and too many want to have their cake, decide what plate it's served on, what flavor of ice cream it's served with, and then eat it too.

Small Business Computer Systems warrants all of its software to perform as specified, provides a free program back-up with each package, free program updates, and free replacement of damaged disks. Modifications are available, as is prompt, friendly customer assistance by phone or mail. Demos with full documentation are available, and questionnaires are sent to users and dealers for suggestions on improving present programs or developing future ones.

That kind of service can't be offered if we let our users modify our programs whenever they want. As Mr. Stone pointed out, when a user makes a modification that results in a problem with the program, how do you determine if it's your code or their modification that's the source of the problem? When do such modifications void a warranty?

I speak from experience. Our software used to be modifiable, but that policy was abused. Dealers were particularly adept at mangling the code and passing on mutant programs to users. When problems subsequently developed, the dealers passed the buck, and users turned to us for assistance. After all, it was "our" code, right? I invested a lot of time straightening programs out, and since most users expected me to do it free of charge, it became quite expensive and time consuming.

Users are expecting extreme flexibility and capability and also lower prices. They need to realize that time and effort are involved in producing, marketing, and maintaining software programs. There is time and money involved in customer service, and problems are inherent in modifying someone else's source code. Some sacrifices in flexibility have to be made in return for program performance. Software manufacturers aren't all raking in millions of dollars in profits. Because of things like overhead, development time, advertising costs, and discounts to dealers and distributors, the software manufacturers have to draw the line somewhere.
David McFarling, president, SBCS, Lincoln, NE

Long-time Softalk *readers may recall the character sketch of the remarkable Dave McFarling in "Apples Are Handy for Handicapped People," October 1980. McFarling founded SBCS and does all its programming.*

A Four-Disk Lunch
Permit me to respond to Barney Stone's long letter in August *Softalk*. I like the options and features of your product, Mr. Stone; however, as far as user friendliness goes, *DB Master* ranks near zero. The product is copy-protected, which prevents me from tailoring it to my own needs. This is important because the program simply does not run well in an Apple II with two disk drives.

My first test of *DB Master* continually asked me to swap three disks (programs, utilities, and data, I guess). This was really tiring and unfriendly and was necessary for even a little database. However. when I expanded my testing and it asked for a fourth disk for sorting, I nearly lost my lunch.

Thanks, Mr. Stone, for intelligent software with features. However, because I cannot tailor your product to correct this flaw, I think I'll just go out and buy a copy of *VisiFile*. How did you end your letter? "In a free enterprise economy, the market will tell."
Steven Kauder, Los Altos, CA

Mortal Syndrome
The letters from Barney Stone and Everett Ogden in August Open Discussion provide an excellent point-counterpoint on an important topic. Mr. Ogden, and others, point out the many drawbacks of programs such as *DB Mas-*

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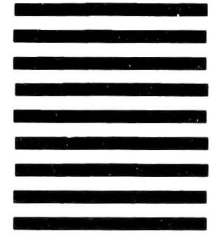


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ter that are not only copy protected but make use of so many nonstandard features that they are essentially incompatible with everything else in the world. The conventional, though perhaps unfair, parlance for such a program is a kluge.

Barney Stone, the coauthor of *DB Master*, rebuts with a good defense of his position. Essentially, he argues that the Apple II is a small shoe and that a big shoehorn is required to extract the kind of performance that he and his customers expect. Unfortunately, using a shoehorn on software inevitably leads to a number of undesirable consequences and compromises. His closing statement is most telling and absolutely correct: "In a free enterprise economy, the market will tell."

Mr. Stone may be right, but my own sympathies lie with Mr. Ogden and others like him. In sixteen years in the computer industry I have watched innumerable endeavors go astray because of a single problem—the "Why can't the computer do just this one more thing?" syndrome. It is only in recent years that more than a handful of software producers and consumers have realized the fallacy of that argument.

In the case of *DB Master*, Mr. Stone could have chosen to write a version completely standard, maintainable, and extensible with a performance of x units of speed and capacity. Instead, he chose to squeeze blood from the stone (no pun intended) to achieve, instead, a performance of y units, where y/x is presumably greater than one. However, a customer is concerned only with satisfying his own performance requirement of z units. Unless z is in the range $x<=z<=y$, little or none of the benefits of a stretched performance design do any good. In a growing business, z better remain less than y forever, or disaster may result. In short, the customer shouldn't be so greedy. In the long run, cutting corners is seldom profitable in any type of business.

Will the microcomputer industry take as long as the maxi and minicomputer industries did to learn this lesson? I hope not, and I think not. For one thing, publications like *Softalk* can help spread the word before inexperienced users get in too deeply. What I would really like to see is the free enterprise economy motivate Barney Stone to use his considerable talents to produce a *DB Master II* that will satisfy the likes of Everett Ogden and me.

R. J. Mills, Schenectady, NY

One Spell That Remains Unbroken

I would like to respond to the letter about copy protection by Gary Griffis in August Open Discussion. I, personally, would love to have all programs unprotected, and I think that it would show that the companies trust us. However, I must disagree with Gary's statement that no copy protection would increase sales. I don't know if the following story applies to all Apple owners, but I know that it does to the ones I know.

I know about six Apple owners, most of whom occasionally copy programs. The program that most of them have bought is *Wizardry*, which has perhaps the best copy protection of any program on the market. First one person bought it, and then everyone saw how excellent it was. Next they tried to copy it. I know one person who spent hours trying to copy it using every copy program you can think of—but he failed. That person, and every other Apple owner I know (including me), bought his own *Wizardry*. Now I am positive that if *Wizardry* had not been protected this well, especially if it had not been protected at all, not a single person besides the first one would have purchased it.

I would really love to have an unprotected *Wizardry* so I could look at some of the program (I know it's in Pascal). I am sure a lot of other people would like this too, but I just don't think that selling an unprotected *Wizardry* would increase its sales. I think it would decrease sales by maybe up to one-third. Like I said, I don't know if all Apple owners treat the copying of programs this way. I would like to hear someone else's opinion.

On another subject, I used *Word Handler* for this letter. *Word Handler* is an excellent word processor. To those of you who feel that you like *WordStar* better, I just don't have that kind of money to put into a word processor, so *Word Handler* was my choice. I love it! One warning: the letters are a little small, so you need a very good monitor (preferably green phosphorous) to be able to read it.

Matthew Machlis, Temple City, CA

Pass the Word

I purchased an Apple II Plus nearly one year ago for several different functions, including limited word processing. I originally purchased *Apple Writer* and found it to be a handy text handler, but unsuitable as a word processor for a nontechnical writer such as my wife. I wanted a package that provided more capability than *Apple Writer*, but did not require additional hardware.

About that same time I began receiving *Softalk* and Sierra On-Line Systems was promoting their *SuperScribe II* (now *ScreenWriter II*). The advertising copy described a product that appeared to be what I was looking for. Many dealers would have been happy to sell the product to me, but none was willing to demonstrate it. I had not read my reviews of *SuperScribe II* so I did not want to invest in a product of this size without a demonstration. I telephoned On-Line and they only referred me back to the same dealers I had already contacted. I wrote On-Line's president in a last attempt to get steered to a dealer who would demonstrate the product. My letter to On-Line was never acknowledged or answered. I felt happy for them since their business is so good that they can turn away customers.

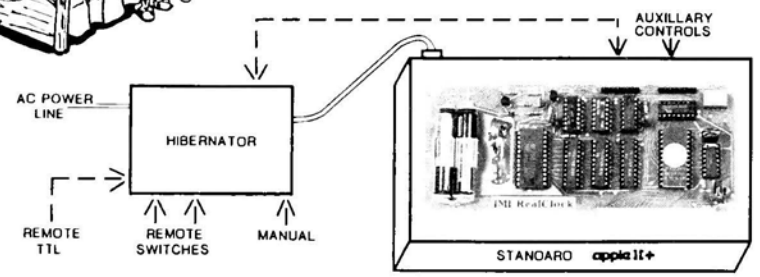
I gave up on Sierra On-Line and resigned myself to the limited functionality of *Apple Writer* until I could invest in additional hardware. Rereading *Softalk*, I came across an ad-

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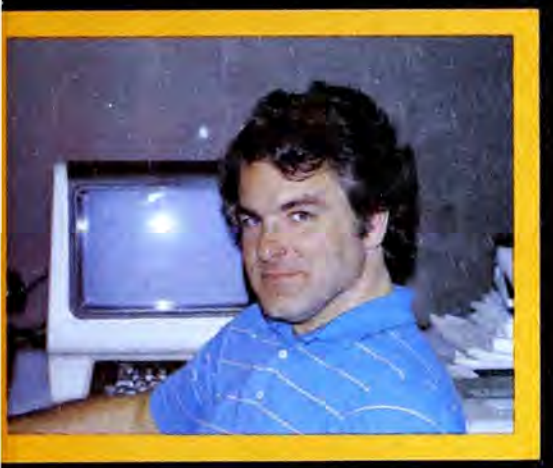






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BY ROE R. ADAMS III

Nestled in a cozy office complex in Cambridge, Massachusetts, due west of Harvard and the Massachusetts Institute of Technology, is the new corporate headquarters of the legendary Underground Empire, Infocom. Perhaps embassy is a more accurate description of the facility, as there is certainly the feeling of stepping onto foreign, even alien, soil. Impressions of Infocom's several stories overlay and intertwine with the threads being woven on the loom of reality. Approaching the entrance, we recall the promise of a special surprise at the end of our visit, and that, in true *Deadline* tradition, if we keep our eyes open, we might discern clues as to what that surprise is. Come along and see if you can anticipate the secret with us.

Upon entering, you find a strangely familiar lamp sitting on the receptionist's desk. As you instinctively take it along, you notice an attractive paperweight: a sword embedded in a crystal rock. A man resembling a prospector sits waiting in the lobby, and the sword glows brightly blue for a moment as we enter the offices. After wending through a series of winding, twisting passages, we arrive at the Wizard's Den. There is the Wizard of Frobozz himself, bent over, gazing intently into a black sphere.

Marc Blank looks up from the Apple and smiles.

Before the Fall. To understand Infocom is to return to the pre-Apple days of the early seventies at MIT. As Joel Berez, president of Infocom, relates:

"We all at one time or another had worked for a research group that's now part of the Laboratory for Computer Science at MIT. This group was strongly result oriented. It was called The Dynamic Modeling System; now it's the Programming Technology Division.

"We believed it was important to develop programming tools before trying to develop applications. Over the years we had assembled an extremely advanced set of tools. Marc Blank lived next door to me when we were undergraduates and we both worked in this group.

"A dream of the leader of the group, Al Vezza, was that someday he would bring together all the people who'd been involved with the group to start a commercial venture using the same techniques that had been so highly successful. Of the ten founders of Infocom, eight came from the group.

"We also have three generations of teacher/students here; Dr. Licklider, in a sense, was Al's teacher, and Al was ours."

Joel Berez sets down the translator, as Marc Blank materializes to introduce us to one of the cocreators of *Zork*, the Great Implementor himself, Dave Lebling.

Moving through a door to the west brings us into a large conference room, where we sit around a shimmering table; everyone avoids touching the table. Water seems to glisten in an African painting on the wall where crocodiles and hippos swim serenely. You notice, though, that the green bubble on the dam upstream is not flashing. The robot in the corner puts down its apple and, while whistling, serves tea. Strange, your cup has a slight discoloration in the bottom.

The Underground Empire existed long before Infocom's founding, so Lebling and Blank relate how they first opened the door to *Zork*; the background music plays an oldie by the Taylor Mills Road group.

As Lebling explains it, "We had so much fun playing *Adventure* that when it was all over, we said, 'Oh dear, there are no more of these; how awful!' "

Blank, officially vice president in charge of product development, adds that there were some areas where they thought they could improve upon the original *Adventure*, which had been written in Fortran.

"It really bothered us that if you said, 'Take bird,' it would put the bird in the cage for you—sort of doing things behind your back. I suppose it's the nature of computer programmers everywhere to want to outdo the other person, to be a little better, especially in games.

"There were primarily three of us who worked on the original *Zork*: Tim Anderson, Dave, and I. In 1976, Tim and I started with an eight-

---

The Infocom party. Back row, left to right: Chris Reeve, J. C. R. Licklider, Gabrielle Accord, president Joel Berez, Scott Cutler, and newest addition, author/programmer Michael Berlyn; front row, Zork authors Dave Lebling and Marc Blank, Stan Meretzky. The leaders. Clockwise from top: Dave Lebling, Marc Blank, Mike Berlyn, Joel Berez, and chairman Al Vezza.

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room dungeon on a PDP-10, written in Muddle, or MDL, which was developed at MIT in the early seventies as a spinoff of Lisp.

"Then we began thinking of problems to overcome for the adventurer. The silliest thing in *Adventure* was that you always had to say, 'Take ax, throw ax; take ax, throw ax.' So we decided that anything you threw at *Zork*'s troll, it would eat! A lot of things in *Zork* pay homage to *Adventure*."

Lebling and Anderson's Inferno. "We were thinking all along about an underground world. Tim and I had each read a lot of fantasy and it struck us as picturesque. We liked the idea that this was going to be like a book, like a story, so the player can say, 'I can see this world.' So we spent a lot of time on developing descriptions and trying to make the world seem more realistic."

That's where Lebling comes in. "I'm in charge of the purple prose; and I did the geographical design of *Zork I*."

Blank explains how *Zork* came to be *Zork*: "We'd generated this game with eighty places and five problems, and we didn't have a name for it. We just put it on the system. We had to have some type of name for it—files need names. *Zork* was a nonsense word used around the lab at the time as an exclamation—like, 'Zork, look at that!' The name stuck.

"We then added direct and indirect objects so we could tell it things like 'Kill troll with knife.' The parser got more and more sophisticated. As things progressed, we understood prepositions, we used adjectives, and we differentiated between objects with adjectives."

By June 1977, the first version of the mainframe *Zork* was finished. Blank had done the bulk of the work with help from Dave, Tim, and Bruce Daniels. Daniels is now working for Apple. He had done the coal mine section in *Zork I* and helped on the puzzle in *Zork III*. During 1977 and 1978, the areas of *Zork II* and part of *Zork III* were added. That is as far as *Zork* was developed on the mainframes.

How had Blank found time in his hectic, pressure-filled schedule at MIT to do all this massive work on *Zork*? Says Blank, "Oh, no. I had graduated from MIT in 1975 with a degree in biology. At the time of *Zork*'s development, I was in medical school at Albert Einstein in the Bronx in New York City." Ah. That explains it. "I graduated from there in 1979. So how did I write *Zork*, in Boston, from New York? Easy. I used to drive up every weekend and work with Tim on it. During the week I would think of ideas to try out. I like biology and was sort of interested in medicine, but I love playing with computers, and I love games and programming." Enter Infocom, stage right.

On Goldfish Pond. Al Vezza is the Prime Mover of Infocom and chairman of the board. He still works at MIT full time, where he holds the impressive title of senior scientist and is currently acting associate director of the lab. Gazing out a rear window at the aspen trees and the goldfish pond, Vezza recalls, "Our main objective when we started this company in 1979 was to use our technology to sell products. At that time we didn't have a specific product in mind, but my firm belief is that the way you create new products, with new ideas, is to get a bunch of bright people, put them in an environment that is stimulating, and let them go at it."

Over the summer of 1979, Berez told Blank about Vezza's exciting new venture. Blank suggested that *Zork* was certainly marketable, and, according to Joel, "Marc and I kicked around the idea of putting *Zork* out commercially; we designed a machine-independent language for games that summer." Berez, at that time, was in the Sloane Management School at MIT earning his business degree. They took the idea to Vezza, who agreed to let *Zork* be Infocom's first venture.

From the summer of 1979 to the spring of 1980, Blank wrote the compiler and Lebling wrote the assembler for the new language. Bruce Daniels wrote the Apple Kernel. During this time, *Zork* for the micro was being developed independent of MIT on rented space on a DEC-20 from Digital Equipment.

In the spring of 1980, the decision to license *Zork* to Personal Software was made. Vezza relates why it was not a hard sale.

"We talked to Dan Fylstra from Personal Software about *Zork*. Turned out that when Dan had been in business school in Boston, he had played *Zork* on my computer while doing a thesis. So he knew what *Zork* was all about."

The Wizard and the Shape Changers. *Zork* did quite well under Personal's umbrella, but in the fall of 1981, Personal underwent a corporate metamorphosis into VisiCorp. The new image involved VisiCorp's dropping all its game lines and concentrating on business programs, so Infocom took back the rights to market the *Zork* line. This created quite a problem for Infocom at first.

During a moment's pause in Blank's narration, you watch a crystal phoenix being reborn in the air above the shimmering table. Blank continues the story.

"We've been in business three and a half years, but only one year has involved marketing under our own name. Last fall we started an incredible scramble. We had *Zork II* ready, but we didn't know anything about packaging or advertising. So we got a terrific agency, Giardini/Russell in Watertown, Massachusetts. In two days they came up with the *Zork* logo and the manuals—really quick; and we had *Zork II* out for Christmas. We took our first office last September in the Faneuil Hall Marketplace in Boston. It was only one room and, in true *Zork* fashion, required a special key for unlocking the elevator to get up to that floor. Joel was the first full-time employee and started last July. I came on at the same time and became full time in January. We now have a staff of four people and we'll be expanding to ten within four months. Others, like Dave, have regular jobs elsewhere, working here evenings and weekends. We moved into these new offices in January."

As Blank shows us around the offices, we notice all of Infocom's package fronts framed on a wall, including the two new ones, *Zork III* and *Starcross*. Next to *Starcross* is an empty frame filled with ivy. Perhaps the ad agency is from nearby Harvard.

Great Caesar's Muddle! As we walk, Blank and Berez explain the Muddle language and why it's so central to Infocom's success.

"Muddle, like us, is a result-oriented, function application language," says Berez. "A program is formatted, debugged, and compiled on a DEC-20 in Muddle, then translated into machine language, which is interpreted on the Apple. Thus programs are easily transportable between different machines. Currently, all our programs are available for eight machines, including the IBM and the new NEC."

Blank adds, "What we've done is design a machine independent lan-

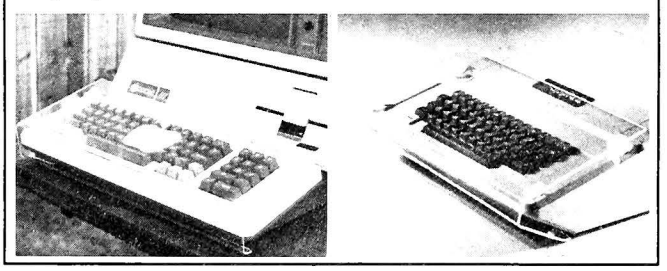
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guage, which is emulated like Pascal on all the different machines, and optimized it for doing what we do. It's very compact. For example, on the mainframe, *Zork I* was about six hundred thousand bytes. That same game in its entirety is seventy-five thousand bytes on micros. So we get a factor of eight compression."

Berez then points out, as we step aside for the bear, that "this gives us a tremendous marketing edge. If you can show us any machine that will sell a reasonable number of copies, we'll adapt our games to run on it."

The Infocom parser is also a unique and somewhat mystifying tool. Blank defines a parser as "a module of a program that takes English input and distills it into smaller pieces of information. The parser has three outputs. It understands a verb, a direct object, and an indirect object. If I say, 'Put the brown bag into that trophy case' " (pointing to the one behind us), "the parser looks at that and basically comes out with three things: *put* is the verb, *brown bag* is the direct object, and *trophy case* is the indirect object. Thus, where most adventures are limited to a parser that can only handle two words, our parser takes full sentences."

Old Pictures in New Frames. Blank also explains that *Zork* on the Apple was quite different in spots from the original mainframe version. *Zork I* is two-thirds from the original and one-third brand-new, *Zork II* is half and half, and the just-released *Zork III* is one-third old and two-thirds new. A black and white checkerboard figure looks over your shoulder as Blank discusses the depths of subtlety that *Zork* plumbed.

"If you're really in a place that's very foreign, very mysterious, nothing should be taken at face value. Everything should be explored," Blank advises. "For example, in *Zork II*, the Oddly-Angled Room was sort of a joke, like the way Beethoven would write a scherzo. The minuet movement was a very formal thing, the third movement in symphonies. Beethoven turned it into a scherzo, which means joke, and did funny things to a movement that is normally a very rigorously stylized thing.

"We decided, in the same way, that this maze was going to be different. You," Blank says, meaning us, "think you know how to do mazes. Here's a maze that you can't map. It's basically to tell people, 'Don't always think that a maze is a maze.' "

One of the big breakthroughs with *Zork* was the development of multisolutions to the same problem. The cyclops in *Zork I* could be put to sleep by feeding him the right food, or, if you ever happen to chance upon saying *Ulysses*, he would flee from the room. Blank offers a rare piece of *Zork* trivia. "Do you know that there is actually a clue to saying *Ulysses* or *Odysseus*? The commandment in the prayer book in the temple starts off with saying: 'Commandment 29,160—Oh ye who go about saying unto each other, "Hello Sailor." ' If you look at the first letter of each line going down the side, it reads 'Odysseus'!"

Beware the Fork. Hearing a mind-curdling scream from behind an unmarked door, you open the door onto a view of a demonic black temple. "What's that?" you yell. Blank swiftly closes the door, saying, "It is not time for you to know."

Somewhat shaken by this vision of blighted evil, we turn for comfort to a more familiar subject: Infocom's revolutionary breakthrough in the blossoming field of computer novels, *Deadline*.

"*Deadline* was our hardest project yet to implement," Blank comments. "People moving around—the idea that characters can walk a path by themselves. You can interrupt them and sometimes change their future moves completely, like switching train tracks. If you ask them about something, their answers depend on what you know. If you've shown them this, but not that, you'll get one answer. If you've shown them that, but not this, you'll get a different answer. And, if you've shown both things to the person, you'll get a third, entirely different answer. If you ask someone about something before it happens, they'll claim to have no knowledge of it.

"In *Deadline*, things are waiting for you to do something. You are an active force. It's possible that if you don't do anything in the game, nothing will really happen. There are thirty different endings possible. The newspaper headlines at the end convey how close to the best possible solution you were. When you finally satisfy this very finicky jury, you get, on the screen, the author's summary of what actually occurred.

"We pride ourselves on anticipating the things people will try to do, so that there'll be meaningful responses in the game and not just the old standard 'nothing happens.' *Deadline* is our best effort to date in that regard. It adds a sense that there is more going on in the game than what you see."

This Way to Debriefing. Lebling rejoins us, the natives having dropped him off from canoeing on the Charles River. He's excited about Infocom's first science fiction adventure, *Starcross*.

"Just as Mark is almost entirely responsible for *Deadline*, *Starcross* is mostly mine," Lebling smiles. "I have always been a science fiction fan and have wanted to do an adventure in the genre. That's one of the things I really like about Infocom. We figure out what we really want to do, rather than design games by market demand. I'm in this to have fun. It would be nice also for Infocom to make lots of money and be very successful, but I couldn't work if I wasn't having fun doing it. I love writing these games—much more than I enjoy playing them.

"*Starcross* was a real joy to write and should be a lot of fun for people to play. The puzzles are science fiction puzzles, not adventure puzzles. We did not want to do a 'Zork in Space' game. *Starcross* is intended as an entry level game for people who like science fiction but who haven't played many adventure games before."

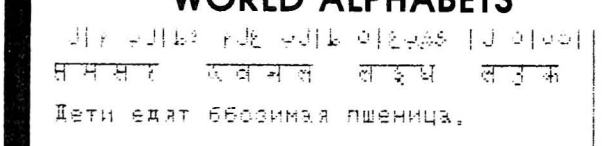
The airlock puzzle that begins *Starcross* is worth the price of the whole game for its cleverness of design. Even the packaging of the game is extraordinary: the disk comes in a large flying saucer that's reusable for storage—and it really flies. Enclosed is a special color space map and a detailed manual. The map figures prominently in getting the game started.

Let 'Em Eat Disks. Referring to this and the excellent *Deadline* package, Berez puts forth the innovative idea that "merchandising can be a deterrent to piracy. People want all the goodies inside. That's the position Infocom is taking in the marketplace, in the sense that we're discouraging piracy by making the add-ons so attractive that people are willing to pay for them rather than settle for a pirated disk without the paraphernalia."

The outer door of the *Starcross* suddenly clangs shut and you hear the airlock recycling. Then the inner door opens in front of you and out steps the surprise you'd been told to expect: a cyborg. Michael Berlyn lights the room with his elfin grin. Now many of the strange things you've been seeing and experiencing throughout your visit begin to be-

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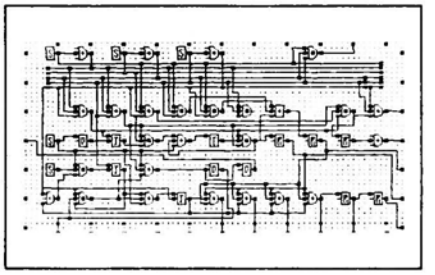
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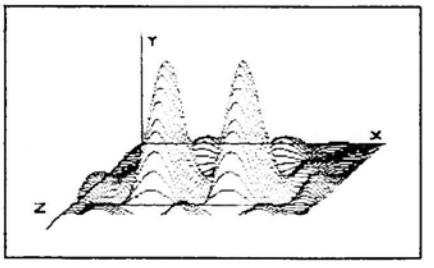
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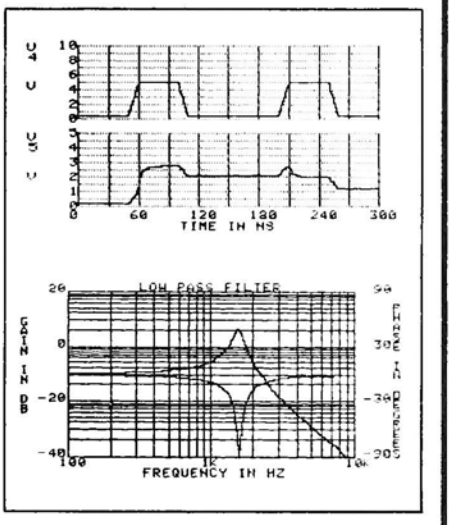


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Sitting in the shade of the two ancient stone guardians of the Underground Empire, sharing a box lunch, Berlyn tells you of his journey to Infocom.

"It all started when Marc and I were introduced at Applefest. We hit it off so well that we decided right there to do a collaboration. Later on it looked like it would be better to go beyond collaboration and actually join up with him. I'm very glad to be here."

The future and its promises excite Berlyn. "I have two science fiction games planned. One is a collaboration with Dave and Marc. We intend to introduce some brand-new elements into the adventure genre with this game. I'm also working on a book called *After the Change*—six hundred pages long, so far.

"Being offered a position in this company is the pinnacle of my career. I'm into squeezing and wringing every ounce of energy, experience, creativity, and application out of myself that I can. I perceive Infocom as giving me the space, the time, and the opportunity to do just that."

Great excitement reigned at Infocom upon Berlyn's decision to join them. This was not just a sudden, unplanned happening. Berez explains: "Since the summer of 1979, we've realized that our whole system lends itself to the talents of a professional writer. We've wanted to bring in people who could put most of their effort into writing good stories. Michael Berlyn—a published science fiction author with computer experience—is ideal. It's possible that what we're producing will become the novels of the future, and you're not going to want to read novels written by programmers. So we're providing new tools for writers to use to get their points across in new ways."

Blank discusses those tools and Berlyn: "Having Mike Berlyn here is one of the biggest pluses we have for the future. He's an excellent writer. He has lots of great ideas for sophisticated games that couldn't be implemented within the restrictions of Basic. With access to our technology, he'll be able to develop them. We're trying to extend the concept of the adventure story to where the player is a character and feels like a character, a part of the story, and not just like some being solving problems."

What Dreams May Come. Your lamp flickers; your remaining time here is short. If we're to learn about the future of Infocom, we must listen now. Berez complies.

"Al and I have just completed a business plan—about two inches thick. It establishes where we are today and where we want to go—the old five-year plan.

"In the future, we'll branch out from entertainment into other areas. For next year, there are five entertainment programs scheduled.

"One reason we're successful is the broad spectrum of computers on which our products run and the large installed user base that entails. Yet our transportability, for all its breadth, reaches only one-third to half of all the personal computers. The marketplace is growing and hungry, and our plans are to provide for it."

Your lamp is very dim and you can hear the baying of the grues in the distance. So, with a last whiff of the Perfect Rose, we bid Infocom adieu. Marc Blank leads us to a cell and waves as he sets a dial and pushes a button outside. As we pass through the Great Door, we hear the Wizard mutter an "F" word, and we leave with a warm glow in our hearts that will never leave. ◨

BONUS!

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The winding halls of Infocom seem to be peopled by the spirits of games. Not only do ghosts from Infocom's own games roam, but so do some from other games by Infocom's people.

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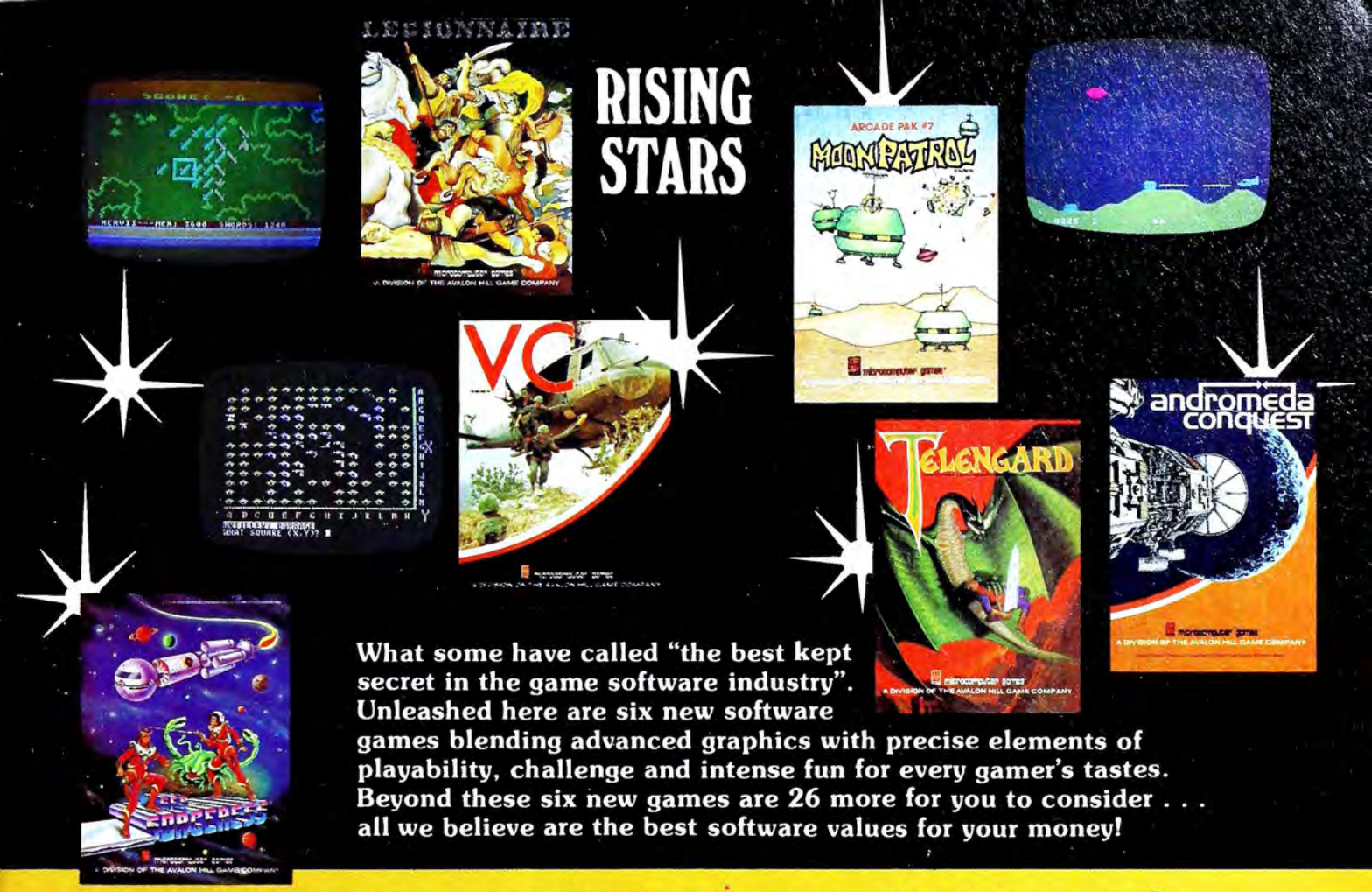
P-LISP:

- 83 Functions
- 15K ELIZA Program
- P-LISP Tutorial

APP-L-ISP:

- 63 Functions
- 3K "Doctor" Program
- Winston & Horn Book

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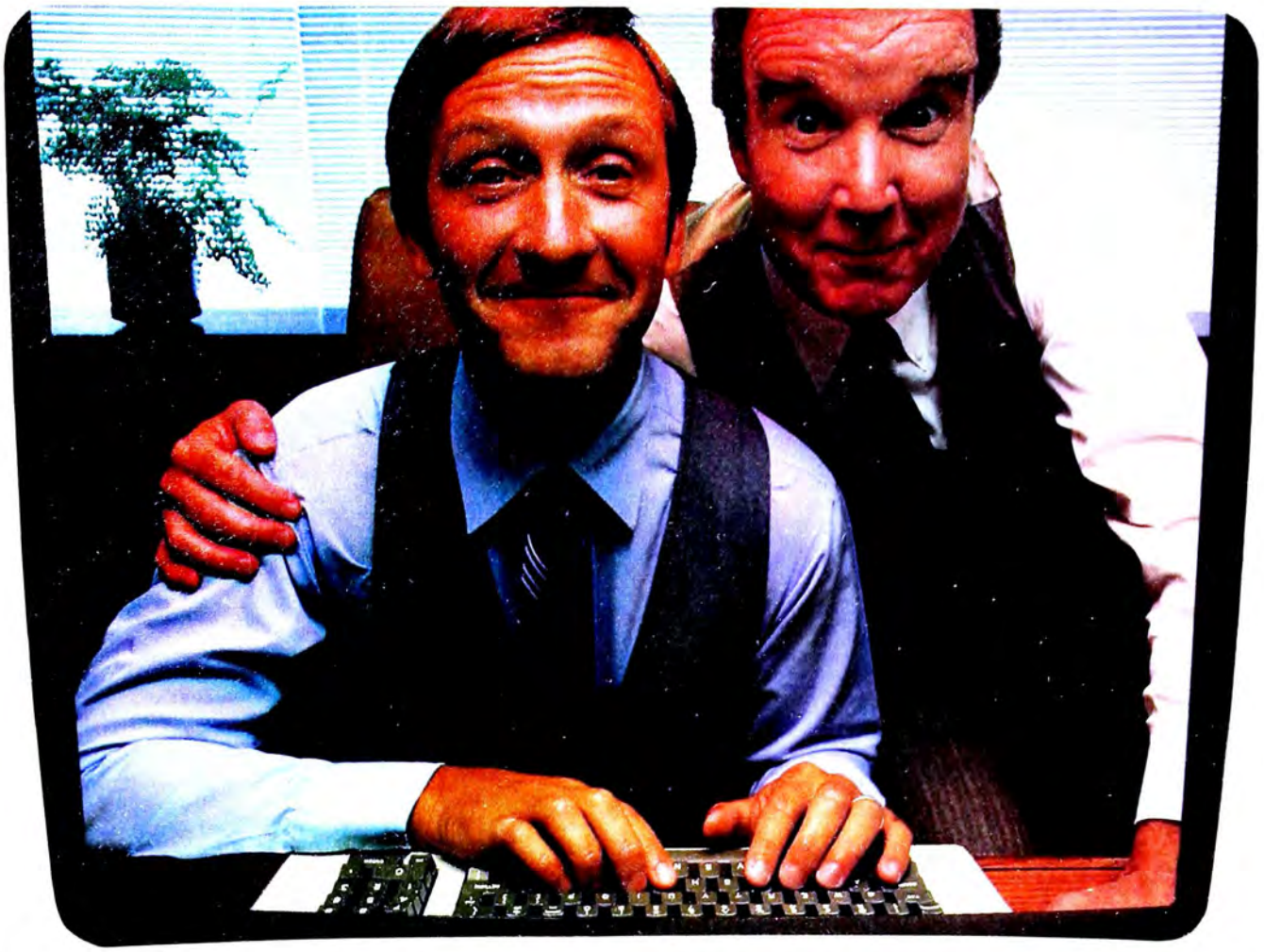
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TRADETALK

☐ **Glenn Sirkus,** co-owner of **Hayes Microproducts** (Norcross, GA) until his departure from the company this past July, reports that he is sailing his boat, working on his tan, and generally "enjoying my first vacation in eight or nine years." He is doing some consulting but has received no long-term offers that he is "ready to jump on." He most recently addressed Sigma Distributors in Bellevue, Washington, and will continue with his occasional speaking engagements.

☐ **Charles Weddington,** president of **High Technology Software** (Oklahoma City, OK), has announced the licensing of exclusive marketing rights for French language versions of the company's *Information Master* and *Data Master* programs to **Logic-Homme,** a division of Sogides Ltee, Canada's third largest book publisher. The company is expected to begin marketing the translations this fall in Canada, France, Switzerland, and Belgium. High Technology is considering complete German and Dutch translations of its software for licensing to qualified firms.

☐ **Richard M. Brenner,** former vice president of the U.S. Rail Services subsidiary of United States Leasing International, has joined **Corvus Systems** (San Jose, CA) as chief financial officer. He will be responsible for the firm's financial management operations and investor relations. **Avery Dee,** director of planning, has been promoted to the position of vice president of corporate planning. He will supervise development of corporate management and business growth plans for the firm as well as handling corporate legal matters and contract negotiations. **Augustus Allen** is Corvus's new director of human resources, with overall responsibility for affirmative action requirements, employee relations, and personnel recruitment. He was previously manager of manpower resources for Diablo Systems. Corvus sales for the fourth quarter of the fiscal year were up 102 percent over 1981, with net income for the year increasing from $10.3 million to $26.8 million.

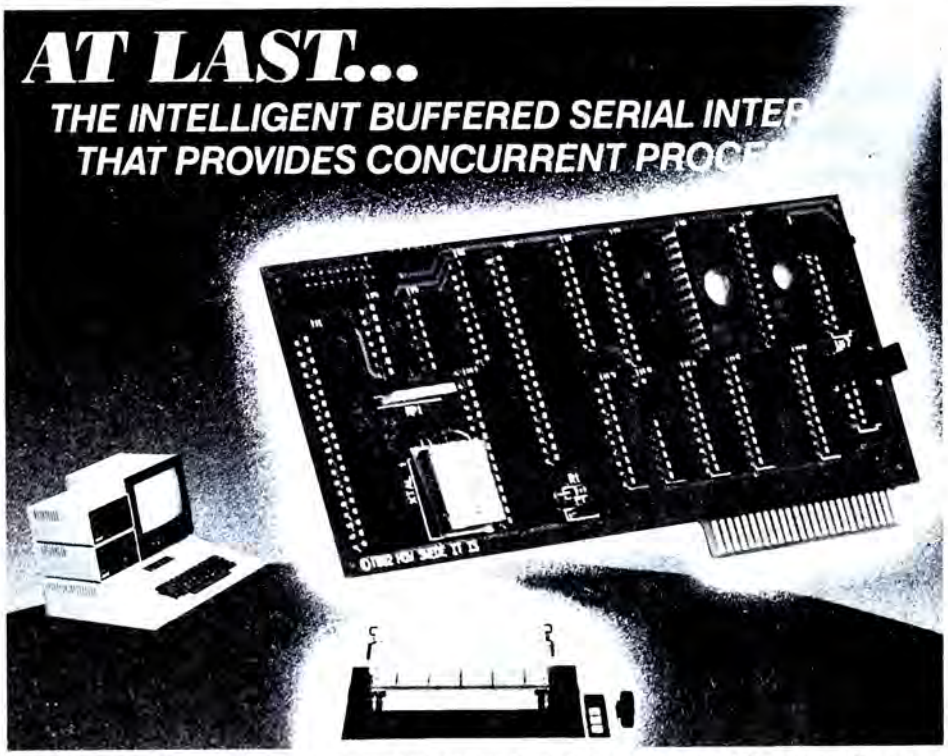
☐ To correct any confusion between the trademarked game *Gold Rush* by **Sentient Software** (Aspen, CO) and a program listing of the same name that appeared in *Compute* magazine, the magazine has agreed to print an explanation and change the name of its game.

☐ Signing its first authors for its maiden launch this fall of home learning and strategy games, **Spinnaker Software** (Cambridge, MA) contracted with **DesignWare** (San Francisco, CA) and **Computer Learning Connection** (Cambridge, MA) to produce four games. DesignWare created *The Story Machine* and *Face Maker* for elementary school age children; Computer Learning Connection has designed the first two installments of the *Snooper Troops* mystery adventure games, which test reasoning and logic. Both software design companies have entered the home market for the first time with Spinnaker, having initially developed institutional school software.

☐ **James S. Mulholland,** president of **Hayden Publishing Company** (Rochelle Park, NJ), has announced the formation of the **Hayden Software Company** (Lowell, MA), with **Oscar Ray Rodriguez** as president. Hayden has been involved in the publishing of microcomputer software through a division of its wholly owned subsidiary, the Hayden Book Company, since 1979. Rodriguez says that the objective of the new company is to expand rapidly the Hayden product base through acquisition of software in the areas of business, education, games, the professions, and utility while increasing distribution in retail and Independent Sales Organization distribution channels.

☐ **SoftLink,** publisher of the *SoftLok* encryption process for trial-use business software, has relocated from Los Altos to new corporate headquarters at 3255-2 Scott Boulevard, Santa Clara, CA 95051. **David Levinthal** and **Heidi Wolf** have joined the company as marketing director and director of communications, respectively. Levinthal, previously an independent marketing consultant to Fortune 1000 companies, oversees promotional activities and directs the software documentation department. Wolf, formerly an account executive for Regis McKenna Public Relations, is in charge of the company's public relations, advertising, promotions, and employee communications.

☐ **Avant-Garde** (Eugene, OR) has appointed **Robert M. Tappan** as new sales and marketing director. "We are in the process of developing a more refined and sophisticated approach to our marketing strategy," says Tappan. "We will be breaking an all new advertising campaign this fall and will be working closely with our distributors and dealers beforehand to ensure that the new program is coordinated properly so that we all profit from our efforts." The software company's new national sales manager, **Steven D. Hanson,** will be in telephone contact with dealers and distributors for information on products and support materials.



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☐ **Apex Software Company** has commenced operations in Spring Valley, California. Introductory software will include *Saints and Sinners*, a game program with an extensive musical repertoire; a *Basic Learning Program*; and *Word Alphabets*, featuring a disk with Arabic, Greek, Hebrew, Chinese, Japanese, Russian, Egyptian hieroglyphic, Cherokee Indian, and Sanskrit type fonts.

☐ **Data Resources** (Lexington, MA), a division of McGraw-Hill, has entered into an agreement with **VisiCorp** (San Jose, CA) to allow users of personal computers access to DRI's and McGraw-Hill's business and economic information. VisiCorp will produce software giving the user access to DRI's central data banks. DRI will provide information products containing the data for specific applications, which the user will order on-line from a DRI catalog. "Access to both DRI's information products and *VisiCalc* allows users to combine information and analytical techniques with powerful software to get the most benefit from personal computers," says DRI president **Joseph E. Kasputys**. "We expect these products to be used widely by business and other users."

☐ **Edu-Ware** (Agoura, CA) has appointed **Douglas R. Sietsema** as director of instructional development. Sietsema holds a Ph.D. in educational psychology from UCLA, as well as a California Community College license in psychology.

☐ **HTS Partners Ltd.** (Lincoln, NE) has announced completion of a $1.75 million limited partnership funding to develop sixteen additional *AgDisk* and *BankDisk* software products. The new *BankDisk* programs will be available in November 1982; the line of *AgDisk* programs will be expanded beginning in February 1983. Says **Bob Harris**, president of HTS, "Our market research continues to confirm that agricultural and financial buyers will represent a total software market of more than $1 billion during the next five years. This additional partnership funding helps ensure that both *AgDisk* and *BankDisk* will have a significant share of those markets."

☐ **The American Software Club** (Millwood, NY) has announced the addition of more than five thousand new members to its roster, allowing the club to enlarge its monthly compendium to more than one hundred fifty products. The compendium describes all software offered in a thirty-two page booklet, under categories of entertainment, education, diagnostic, and business. According to marketing director **Lee Konowe**, "Our approach to providing members with a variety of software, and in some instances hardware, allows us to offer a library that will expand a computer's capabilities indefinitely." Complete information is available by writing to the American Software Club, Millwood, NY 10546.

☐ **Eastern Software Distributors** (Baltimore, MD) has appointed **David E. Myers** to the position of sales and marketing manager. Meyers will be responsible for expanding the outcall sales program as well as maintaining and servicing existing dealer accounts. He will also coordinate the company's advertising and public relations efforts.

☐ The Bulletin Board, or BBS, is up and running as a public service of the newly franchised **Softwaire Centres International** (West Los Angeles, CA). It features a catalog of the latest software for CP/M and most of the major systems. Callers are invited to leave messages and ideas; the phone number to call from your modem is (213) 479-3189.

☐ To assist franchisees coming into the computer retailing business with strictly technical backgrounds, **Byte Industries** (Hayward, CA) is holding a series of sales and business management training programs. The course, a feature of Byte's franchising package, offers training in advertising, financial analysis, inventory control, product maintenance, retail law, and personnel management, among other topics. "We stress store management, how to hire employees, how to develop a professional image, and how to identify a target market," says franchise training manager **Diane C. Wood.**

☐ **Software Distributors** (Culver City, CA) has opened an overseas office in Munich, Germany, and regional offices in Dallas and on the East Coast. The company reports an increase in sales of 20 percent per month over last year since the beginning of 1982.

☐ A marketing study prepared for **Lebhar-Friedman** (New York, NY) by special projects editor **Douglas Stinson** predicts total home computer retail outlets will grow from 3,300 stores to more than 32,000 by 1985; total units sold in that period will rise from 400,000 this year to almost eight million; sales of home computers and accessories will increase from $217 million in 1981 to $5.26 billion in 1985; and the average first-year cost of home computers and accessories will rise to $666 in 1985, despite price reductions for the computer itself, as more sophisticated home-oriented accessories become available.

☐ **Open Systems** (Minneapolis, MN) has reached a distribution agreement with **Computerland** of Hayward, California, in which Computerland will distribute Open Systems's seven CP/M Software Fitness Program accounting application packages through its network of 300 stores.

☐ **Bill Cox** has joined **Evotek** as product marketing manager. He will establish pricing policies and develop technical literature for the Fremont, California, based manufacturer of 5¼-inch hard disk drives. **Robert K. Paxton,** a former division manager for Marshall Industries, is the company's new manager of marketing.

☐ **SyQuest Technology** (Fremont, CA), manufacturer of 3.9-inch cartridge Winchester disk drives, has announced the appointment of cofounder **George M. Hennen** as its vice president of finance and chief financial officer. Hennen left his post as corporate controller of KLA Instruments to join SyQuest as a corporate board member. President **Syed Iftikar** stated that the company has been formed to meet the mass storage requirements of the small computer system. SyQuest is staffed with personnel who have started and run other companies or

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have made contributions to disk technology. Iftikar is also the chairman of the board of the new company **MicroDisk** (Fremont, CA), manufacturing thin film metal alloy disk platters and cartridge disk packs for small Winchester disk drives.

☐ **Leading Edge** (Canton, MA) has appointed **John E. Fisher** technical support manager for the company, the first step in building a comprehensive service capability at the Canton facility, and the first of a series of steps to build a field service organization. Fisher was formerly product support and program manager at Honeywell Information Systems's field engineering division

☐ **Jun Wada** has delivered his latest game, *AE*, to **Broderbund** (San Rafael, CA) for U.S. distribution. **Programmers Three** (Tokyo, Japan) has been formed by Wada, **Yoshio Taya**, and **Makoto Hurai** as an independent company programming game and business software. They are designing games for the new Epson 16K hand-held computer (transferable to the Apple) and are developing programs for the NEC, Mitsubishi, and Sony SMC.

☐ **Hughes Aircraft** (Fullerton, CA) has signed a corporate procurement agreement with Apple Computer giving Hughes a discount on all Apple product business purchases. The agreement has been extended to Hughes employees to allow an equal discount on corporate and personal employee purchases of Apples and peripherals. Hughes is providing the service to employees through its employees association.

☐ **Roger Wagner**, president of **Southwestern Data Systems** (Santee, CA), has appointed **Luis Rivera** vice president in charge of operations and expansion. Rivera has owned and operated a data processing firm for the last four years and comes to SDS with fifteen years of mainframe experience. **Joanne Johnson** will be managing the company's new San Francisco office, which will open in November.

☐ **TG Products** (Plano, TX), makers of Apple game controllers, their most recent being a track ball released this month, has doubled its office space and expects to do the same with its staff by the end of the year. They now occupy suites 9 and 10 of their 1104 Summit Avenue address. New production manager **Robin Vanderploeg** will be in charge of scheduling, shipping and receiving, and training.

☐ And finally ... dateline September 24, 1985—*Softalk* has received a United Press Universal release of a most unusual nature. It appears to have been mailed with too little postage to another star system in 1985; having postage due, it was naturally bumped by the post office and returned to sender. In the process, it somehow arrived back before it had left. The present occupant of the sender's address, who has nothing to do with news services, passed it on to us: Corporate insiders have confirmed that **Broderbund Software** (San Rafael, CA) plans to buy controlling interest in **International Business Machines** (Armonk, NY). The takeover deal had been rumored since Broderbund successfully took over Xerox Corporation earlier this year. News of the takeover caused IBM stock to soar to its highest level since 1936.

The takeover of IBM continues the meteoric expansion which Broderbund began with the purchase of Commodore Computer and Tandy Corporation in 1984. Other subsidiaries of the computer software company now include Sierra On-Line, Apple Computer, Digital, Stanford University, and Japan.

Broderbund board chairman **Douglas Carlston** credits much of his company's success to Supreme Court Justice **Warren Berger,** who ruled inadvertently in 1982 that Broderbund holds exclusive rights to the binary numbering system. Although Berger recently claimed that he was "just kidding around," the Court has yet to reverse the decision.

Justice Department lawyers say they are not presently planning to institute anti-trust procedures against Broderbund Software, because they are still working on the break-up of AT&T. Actually most of AT&T's digitally based long-distance equipment was awarded to Broderbund Software by a San Francisco small claims court in 1984, and AT&T is now limited to a few local telephone systems using hollow tubes for voice transmission. "Nonetheless," says Attorney General **Donald Segretti,** "Justice has fifteen years tied up in the AT&T antitrust case, and we intend to see it through to the end."

Knowledgeable sources at Broderbund suggest that the takeover of IBM will result in few major changes in that company's operation. Rumors are that the company may be given to Broderbund heir apparent **Amanda Carlston** as a Christmas present.

Despite the growth of Broderbund into an international conglomerate, company financial analyst **Cathy Carlston** says "this is still basically just a family business." The company has given employment to Professor **Donald E. Carlston** as a consultant on a project to convert carbonated soft drinks into disposable microcomputers using bubble memory technology. "A judge in Texarkana gave us the Coca-Cola Company," says Don, "and we felt we had to do something useful with it." The Texarkana judge ruled that bottling and retailing Coke involved the systematic switching of bottles between two states, empty and full, and thus constituted a "binary process" covered by Broderbund's proprietary rights. Former Coca-Cola president **I.M. Fizzy** protested, "By that kind of logic, sex could be considered a binary process." Replied Broderbund spokesperson **Erin Carlston,** "It is true that it takes two to tango," but she wishes to reassure the public that "Broderbund has no plans to seek patents in that area." Then, after a brief pause, she added, "At the present time."

Meanwhile, at press time, Doug Carlston has been reported en route to England to conduct negotiations of an unspecified nature. In light of the ongoing troubled state of the United Kingdom's economy, it is speculated that it may be looking for a buyer. ◨

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BY DAVID DURKEE



It has been said that any sufficiently advanced technology will be indistinguishable from magic. If you think that this principle applies only to isolated aboriginal tribes, like the ones in New Guinea who thought they were seeing the gods incarnate when airplanes first flew over their lands, think again.

We Apple users like to think of ourselves as too technologically aware to be more than just impressed by something as mundane as a new peripheral. It's a good thing when something comes along to challenge our complacency. If you left your sense of wonder behind you with other childish things, you may be surprised to find out that magic has returned to the world.

Saint Nick Deals a Gibson. Imagine that you're a kid again, and it's Christmas morning. There are presents under the tree, there's a fire in the fireplace, and there's a foot of fresh snow on the ground from the night

before. Now imagine that one of the presents is so neat that for the rest of Christmas vacation you forget about snow forts, snowmen, snowballs, and the Flexible Flyer in the garage and just play with this one present. If you close your eyes and think about that for a second, you'll begin to feel the way that we feel about the *LPS II* from Gibson Laboratories.

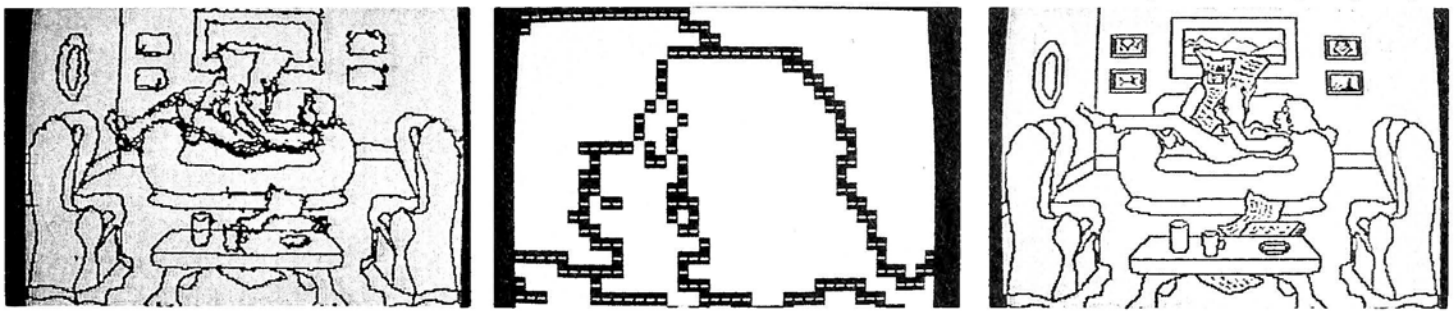
The *LPS II* is a light pen that's turned into a revolutionary graphics system. Originally intended as demonstration software, the disk in this package contains the most exciting hi-res art system since Bill Budge first chose to share the secrets of 3-D. The pen becomes a tool to the software—but a very special tool.

This pen is not to be confused with other instruments called light pens. It's similar in appearance—a penlike object attached to a wire that runs to the back of the Apple—but in execution it is a quantum leap beyond other light pens. It actually gives the Apple a coordinate location on the screen instead of a simple light-intensity reading.

trol functions, such as turning the pen on and off, selecting a color, and loading or saving a picture, are handled with single keypress commands instead of with a pen-based submenu. If you forget the commands, they're as close as the help screen. Just hit H.

Assisted Triple Play. Some of the other programs support and add to the capabilities of *Sketch*. *EasyEdit* allows you to clean up your picture. *Geomed II* lets you put perfect geometric forms in your hi-res drawings. *Penpainter* is an innovation in color-fill programs that makes the most hardened adult yearn for a disk-based coloring book to play with.

Even with the most precision equipment, the human hand is not completely steady, so anything you create with *Sketch* is likely to contain small glitches—lines that don't quite come together or details that don't look quite right. With *EasyEdit*, you point the pen at an area on the hi-res display and you instantly zoom in on the image in that area. That is, a forty by twenty-four pixel section of the hi-res image will be instantly translated to the text screen. Each pixel that's *on* (white) is repre-



Left: This cozy domestic scene was created using *Sketch*. *Sketch, Geomed II*, and the *Penpainter* sketch mode all include a powerful mirroring function that can be set for two-way horizontal, two-way vertical, or four-way mirroring. The symmetry of the furniture was accomplished with two-way vertical mirroring. Center: Using *EasyEdit*, the rough lines of the picture on the left are smoothed out point by point. *EasyEdit* was also used to create the face and other detail work. Individual pixels from the hi-res display are blown up to the size of Apple text characters in *EasyEdit*'s zoom mode. Right: The domestic scene after *EasyEdit*. The line drawing is clean and was relatively easy to create. It is now ready to go on the *Penpainter* to pick up some color.

Steven Gibson, the creator of the *LPS II*, originally intended the device and its machine language driver program, *Pentrak*, as a graphics aid for programmers, but light pens had such a bad reputation that computer retailers wouldn't even look at it. Undaunted, he set out to create demonstration programs. He soon got so caught up in the wonder of his own product that the demos grew to a full graphics system.

No graphics system on the market makes a fair comparison with the *LPS II*. The paddle and keyboard based systems are all somewhat difficult to use. Keyboard input just doesn't lend itself to easy graphics application. Paddles' problem lies in their duality: you need both members of a pair to control horizontal and vertical cursor movement, and paddles aren't designed for one person to operate both dials at the same time. Joysticks aren't much better; although simpler to manipulate than paddles, they don't give as fine a degree of control.

The Apple Graphics Tablet comes the closest to the *LPS II*, but having to point to the tablet and watch the CRT just isn't the same as pointing the pen directly at the screen and seeing the image appear right beneath the pen tip.

"Don't Point That Thing at Me!" The system is operated from a central menu program that comes up when you boot the *Pentrak* master disk or whenever you exit one of the system's programs. The menu is the first inkling an unsuspecting user has of the actual capabilities of the pen. You merely point the pen at the program you want. Many of the programs in the system use similar submenus, making the whole package as friendly as you could ask for.

For each of the programs, there's a help listing accessible from the keyboard. The programs are so interactive and easy to use that the one-page help listings are all it takes to make the programs completely self-explanatory.

After running *Introduction* (which gives an overview of the system) and *Calibrate* (which ensures that the pen is honed in to your individual screen), the logical place to go is *Sketch*. This is a drawing program that's as easy to use as pen and paper but more versatile. The pen has six colors, and the whole image can be erased or switched to a reversed display (black on white instead of white on black) at any time.

Because *Sketch* uses the whole screen as its drawing pad, all the consented by an inverse space (which appears as a white block the same size as the Apple's flashing cursor), and each pixel that's *off* (black) is represented by a normal (white-on-black) dash. You then use the pen to change the image point by point. The result is a picture with clean lines, well defined angles, and fine curves.

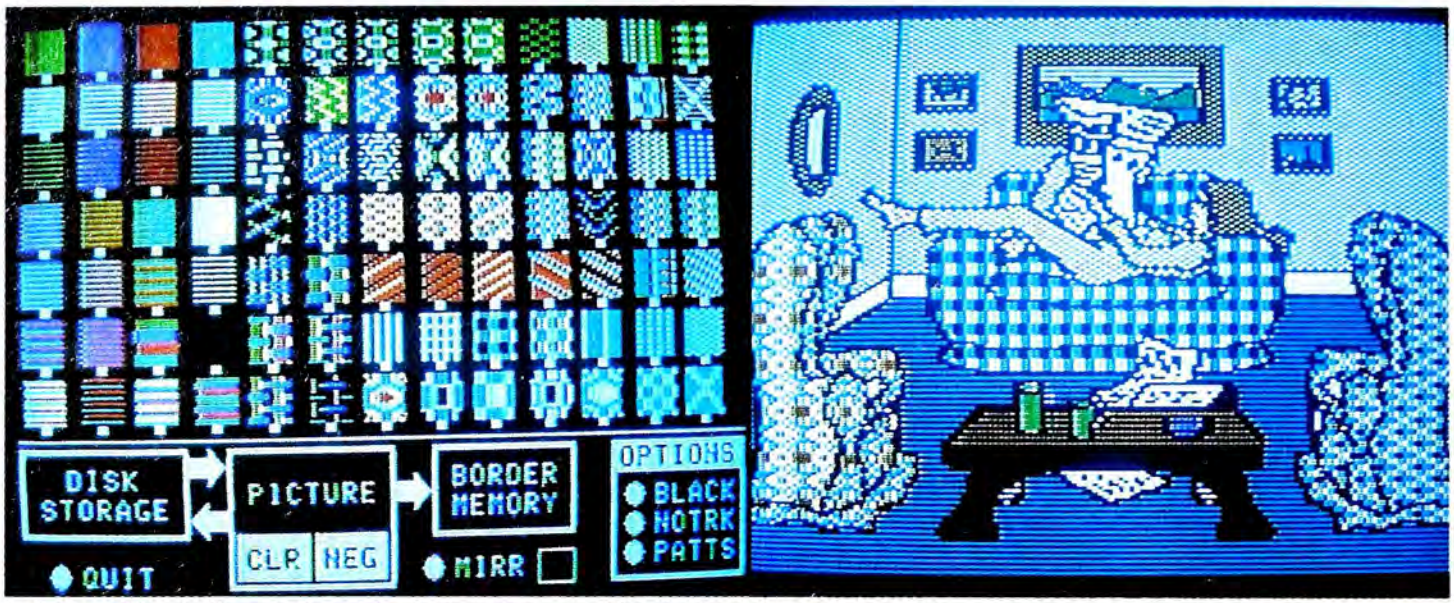
Penpainter is perhaps the most powerful and exciting program on the *Pentrak* disk. *Penpainter* is a fill program that doesn't have to be told twice. Where most fill routines may miss a section of the area they're supposed to cover and require the user to try again to get the missed areas, *Penpainter*'s fill algorithm never misses. It actually seems to find and fill its "missed" areas itself, so filling even the most complexly shaped area is always a one-step process.

The first thing you do when you enter *Penpainter* is load the picture into what Gibson has called "border memory." The picture you start with must be a black-on-white line drawing created with *Sketch*, *Penpainter*'s mini-sketch routine, the other programs, or any other graphics system. If your outline drawing is white-on-black, *Penpainter* can reverse it with a single pen stroke. Selecting the border memory option makes the black lines thicker and copies the screen to a separate location.

South of the Border. The purpose of the separate storage location is to allow you to change your mind. When you fill an area, *Penpainter* determines the area to fill by looking at border memory, not at the actual picture. It performs the action of filling on the displayed screen but leaves border memory as it is. If you don't like the pattern you first selected, you can replace it with another with no hassle—even if your first choice was black.

You may have noticed the word *pattern* where you might have expected *color*. This is another unique feature of *Penpainter*: it fills with patterns. The disk comes with a file containing ninety-one different patterns. Some are solid colors, some are mixed colors such as other graphics programs offer, and some are repeated patterns.

The beauty of this approach is that you can create your own patterns using another of the programs on the disk: *Pattern Editor*. You can easily create any conceivable pattern from wallpaper to herringbone, from water to brick wall.



Left: The palette of patterns in *Penpainter* displays ninety-one different color and pattern options. The Info-Flow diagram at the bottom not only shows the options available, but suggests the logical order of the painting process as well. Right: The domestic scene in color. Some of the patterns used came with the Patterns file on the disk; others were custom made with the *Pattern Editor*. Any of the patterns in the picture can be changed by selecting a new pattern and pointing the pen.

The outstanding system is not without problems. One minor annoyance is that these programs have no protection from ordinary disk errors, like file locked, file not found, and disk full. These problems won't occur if you do everything right, but to err is human. The only other problem with the current implementation of the graphics system is that you have to save the picture before you can pass control from one program to another. Gibson will release a unified graphics system that eliminates these problems by the end of November, but even in its present form *LPS II* is easier to use than any other graphics system extant. The update will be free to all *LPS II* owners.

Two programs are included that don't tie in with the others in the graphics system but are interesting in their own right. *Music* allows you to use the pen to compose short musical pieces that it plays with the *Pentrak* sound routines. *Animate* lets you make a twenty-frame graphic cartoon frame by frame and point by point. The graphics in the cartoon can be as complicated as your patience allows. While both of these are really only demo programs and have the limitations that that implies, Gibson plans to expand on them if there is sufficient user interest.

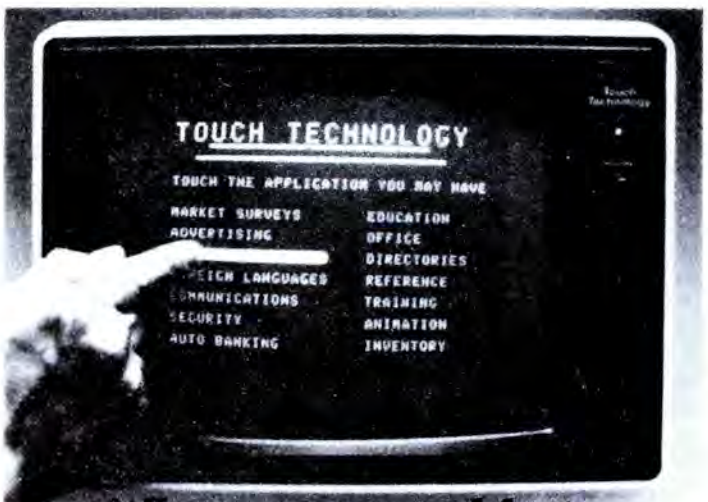
Happy Hour. All the programs are written in unprotected Applesoft Basic, so they're open for intrepid programmers to build on and modify. In fact, Gibson has deliberately left them uncopyrighted. He figures that if people take routines from his programs and put them into their own, even for commercial purposes, it won't hurt his business. It will just sell more pens.

For the Applesoft programmer, the programs that come with the *LPS II* are just the beginning. The *Pentrak* driver is the software heart of the graphics programs, but more than that, it was designed for easy access from Basic. The machine language routines that allow the pen to work its magic are available to the ordinary programmer.

Pentrak uses the ampersand hook, which may be somewhat familiar to those who have used the *Renumber* program from the DOS System Master. Simply, Applesoft's ampersand command (&) calls a machine language routine at a specific location. The routine is then able to read the characters following the ampersand in the Basic program and interpret them as further commands.

So loading the *Pentrak* driver adds a whole new set of commands to Applesoft. A *Pentrak* command that demonstrates the typical command syntax is *&PEN(X,Y,KEY,ZV60)*. This tells the computer to follow the pen's position on the screen and put the values for its location into the variables X and Y when an escape condition is met. Two escape conditions are given in this example. *Key*, the third parameter in the parentheses, says to escape when a key is pressed and put the ASCII value of that key into the variable *key*. *ZV* in the fourth parameter stands for zero velocity. *ZV60* says to escape when the pen has been aimed at the same point on the screen for sixty machine cycles, or one second. While *key* and *ZV* are the only escape conditions available, the variable parameter on *ZV* and the possibility of using the conditions alone or in combination make the commands that use escape conditions extremely flexible.

DocuDramas. The *Pentrak* system includes other commands and options to draw a black or white rectangle anywhere on the hi-res screen, produce sounds, write in various character sets on hi-res, negate a screen, switch to hi-res without clearing the screen, and perform many other



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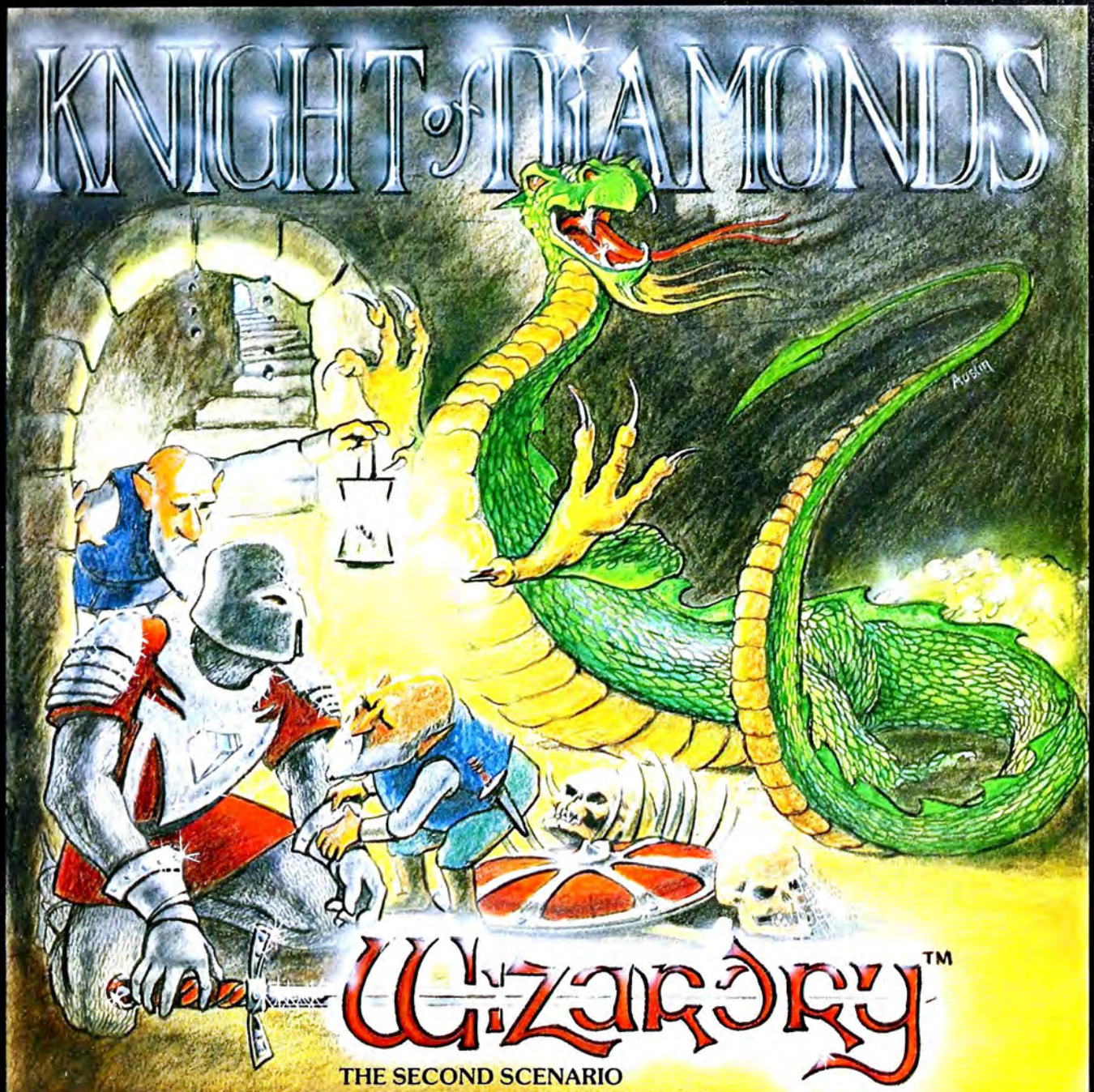
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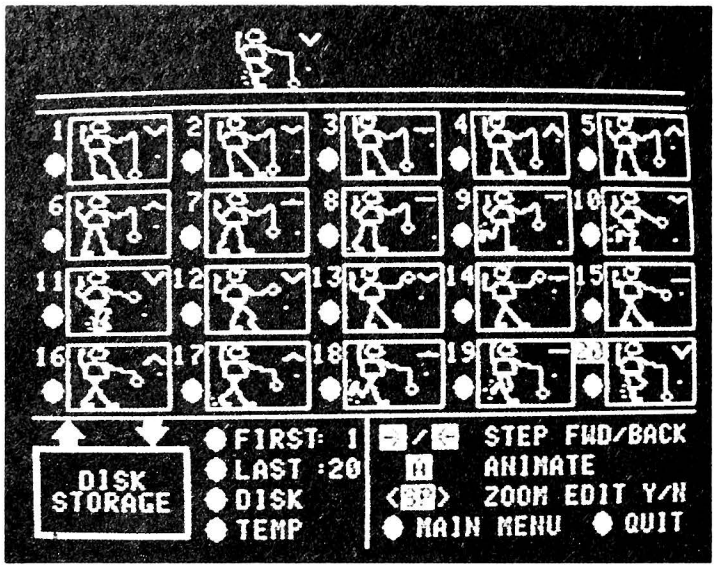
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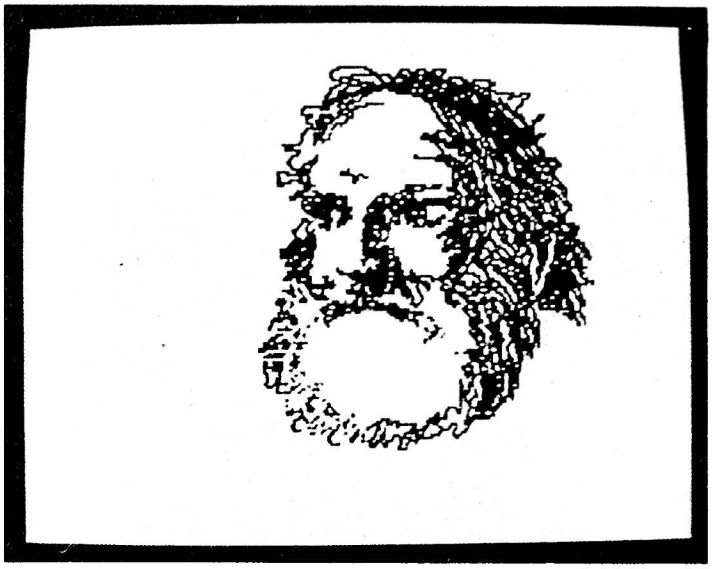
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Left: The main screen from *Animate* displays the menu at the bottom and the twenty frames of the animation in the middle. When the animate command is given, the figure moves across the top of the screen. Right: Even without the assistance of color filling, *Sketch* is capable of creating some striking artistic effects.

functions. The manual sections covering these commands are at times a little hard to follow, but by examining the demo programs and experimenting you can learn the new commands fairly quickly. Gibson offers documentation updates at no extra charge as they become available.

Gibson Laboratories's plans and policies for customer support are exemplary. Gibson offers a six-month warranty on hardware and software defects. Although more than five hundred pens have been sold, none have been returned defective. He also offers software and documentation updates free to anyone who returns the registration card.

There are some exciting programs soon to be released which will use the *LPS II*. The first game for the pen is called *LPS II Madness* by John Besnard. Stoneware is updating its *Graphics Processing System* to use the pen, and Island Graphics is releasing a hi-res drawing program, *Illustrator II*, with complete *LPS II* compatibility. Gibson Laboratories is working on *Pastrak*, a version of the *Pentrak* driver that will be compatible with Pascal, Fortran, and Pilot.

The Method behind the Magic. Here are some technical goodies for the electronics buffs. If you believe in magic, you may find the realities behind it a bit disillusioning, but if you believe in hardware, we will now answer the burning question, "How does it all work?"

Anyone who has seen a light pen before has probably been profoundly unimpressed. The typical device of that name is a passive light receptor that returns a value from 0 to 255 to the Apple through the game I/O port. This value represents an analog to digital conversion of the light intensity where the pen is pointed. It can't even tell if the light source is on the Apple screen or not. The only resemblance it bears to a pen is its shape.

The *LPS II* is in a class well beyond its unsophisticated predecessors. Its plastic-encased interface card looks like an audio cassette case with teeth. It plugs into a peripheral slot rather than the game port. Instead of reading light intensity, its hardware actually synchronizes with the computer's video signal. The pen's receptor is sensitive enough to determine when the monitor's scan line passes the tip. Because the *Pentrak* driver has been tracking the scan's horizontal and vertical positions, it can return a pair of numbers for the hi-res X, Y coordinates. Applesoft can read these numbers, and the magic begins.

At the moment, only about five hundred of Gibson's pens have been sold. That's less than two-tenths of a percent of the Apple user base. And yet, when professional programmers see this device they seem instantly to want to write software for it. To experience the wonder is to know that the *LPS II* will become a significant factor in the Apple marketplace. Now people are writing software that will help sell the pen, but in another year, it will be the pen that is selling their software. ■

Note: *The LPS II currently works with any monitor or television except for the Apple green monitor III and the green Amdek monitor. Gibson is testing wider spectrum diodes to eliminate this limitation. The Pentrak driver requires an Apple II with 48K and DOS 3.3.*

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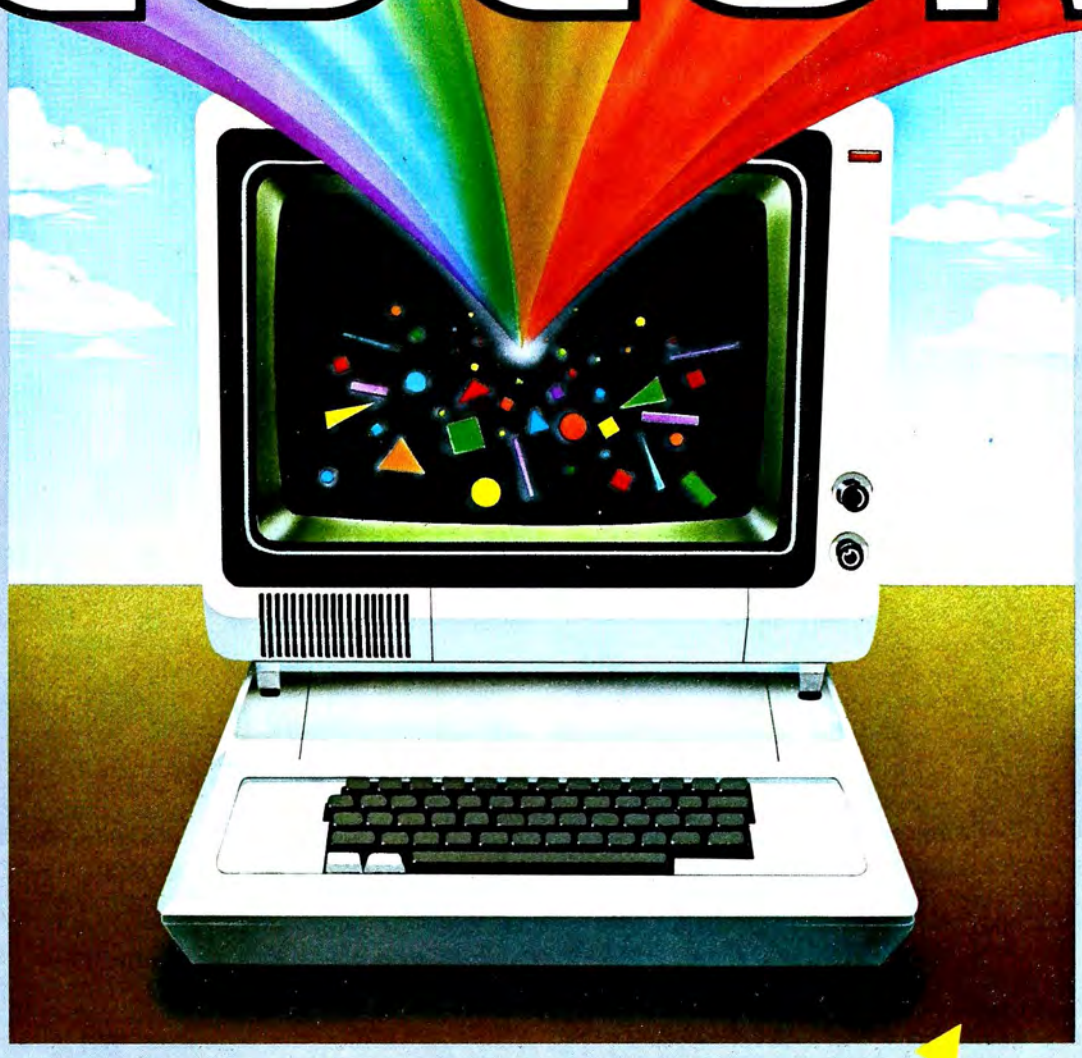
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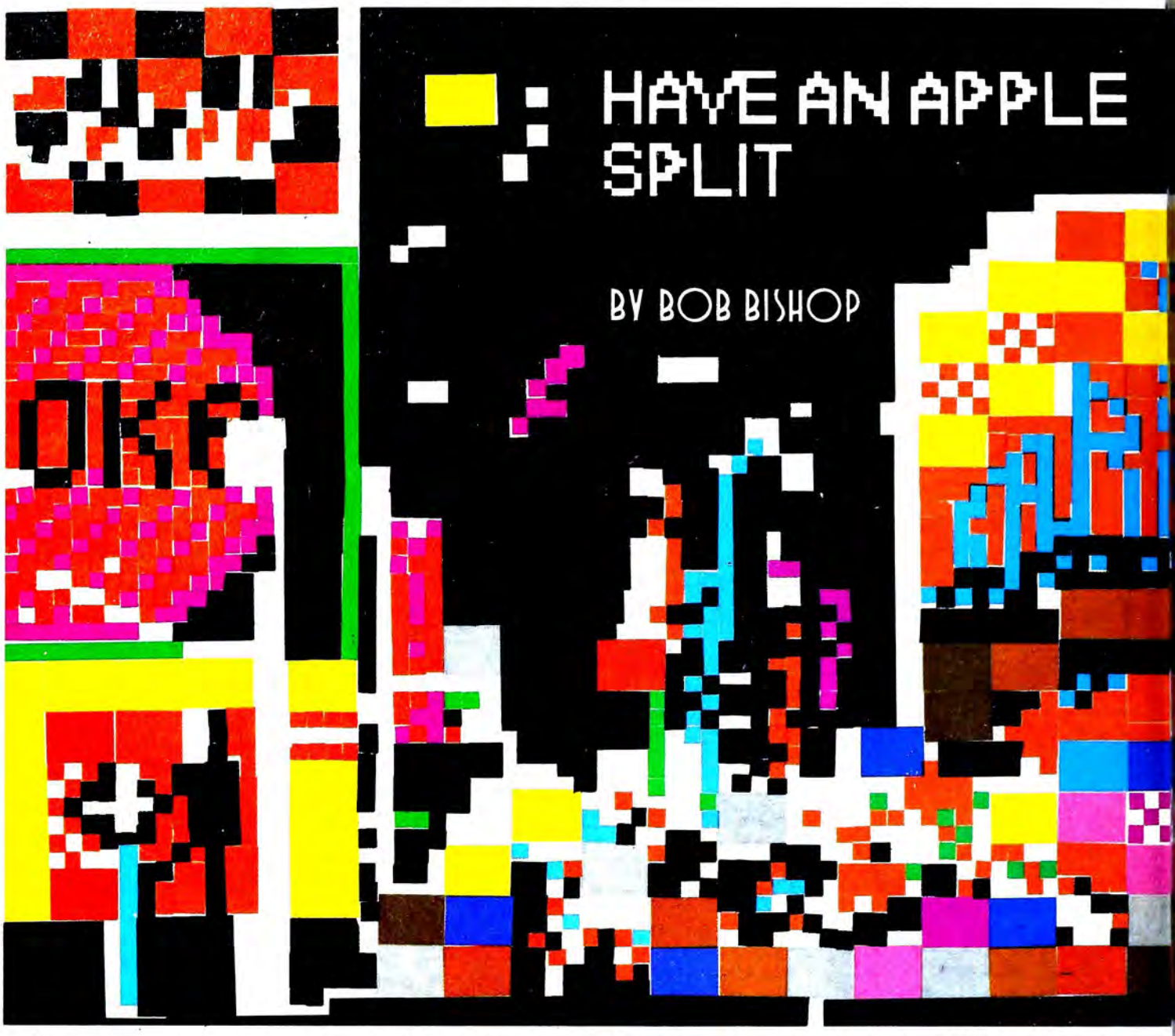
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Have you ever wanted to create a display with both lo-res graphics and hi-res graphics on the same screen? Or graphics with more than just four lines of text at the bottom? Or how about text with four lines of graphics?

As we all know, the Apple II has only five display formats. It can display all lo-res graphics, all hi-res graphics, all text, lo-res with four lines of text at the bottom, or hi-res with four lines of text at the bottom. The latter two formats are sometimes called mixed modes because they allow, in a very restricted way, the mixing of graphics and text. But, according to page 12 of the *Apple II Reference Manual*, "There is no way to display both graphics modes at the same time." Well, not only are there ways of displaying both graphics modes on the same screen, it is also possible to display any combination of modes!

The technique of mixing display modes by the process of *screen splitting* is familiar to programmers who've used the Apple III, the Atari 400 and 800 machines, and several other computers. These machines contain special hardware that helps detect what is referred to as *vertical*

```
100  HOME
200  FOR K = 0 TO 39
210  POKE 1448 + K,14 * 16
220  POKE 2000 + K,10 * 16
230  COLOR= K + 4
240  VLIN 25,45 AT K
250  NEXT K
300  VTAB 6: HTAB 17
310  PRINT "APPLE II"
400  CALL 768
500  GOTO 400
```

Listing 1.

```
0300-  8D 52 C0   STA  $C052
0303-  A9 E0      LDA  #$E0
0305-  A2 04      LDX  #$04
0307-  CD 51 C0   CMP  $C051
030A-  D0 F9      BNE  $0305
030C-  CA         DEX
030D-  D0 F8      BNE  $0307
030F-  A9 A0      LDA  #$A0
0311-  A2 04      LDX  #$04
0313-  CD 50 C0   CMP  $C050
0316-  D0 F9      BNE  $0311
0318-  CA         DEX
0319-  D0 F8      BNE  $0313
031B-  8D 51 C0   STA  $C051
031E-  60         RTS
```

Listing 2.



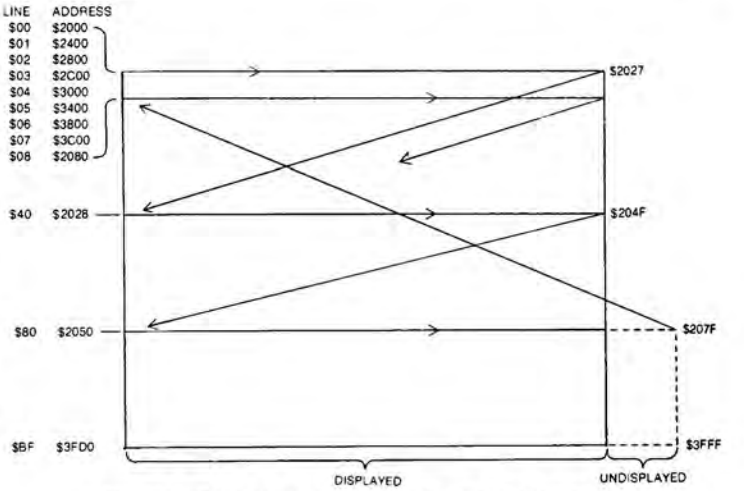


Figure 1. Memory mapping of bytes on hi-res page.

blanking and *horizontal blanking*. What is not generally known is that the blanking can be detected by the Apple II, even though it lacks the special hardware found in those other machines.

Example Program. Before jumping into a technical discussion of the hows and whys of screen splitting, let's look at an example of screen splitting on the Apple II. Listings 1 and 2 present a short Applesoft main program and a machine language subroutine that the program calls.

Take a few moments now to turn on your Apple and enter these two programs. Don't worry if you don't understand machine language. Just go into the Monitor from Basic by typing *call−151* followed by the return key. Then start typing in the hexadecimal values for the listing 2 subroutine that starts at $0300:

```
300:8D 52 C0 A9 E0 A2
```

and so on followed by the return key.

Now run the Applesoft program. What do you see? (Nothing, if you didn't type in the listings correctly.) You should see a text message in the top half of the screen and lo-res color graphics in the bottom half. This is a display mode that's supposed to be impossible to create on a standard Apple II computer!

To understand how to do screen splitting on the Apple II, you must be familiar not only with 6502 machine language but also with how the Apple maps its memory onto the display screen. (The latter information can be found on pages 14 through 21 of the *Apple II Reference Manual*.) The essence of what we need to know about hi-res in particular is shown in figure 1. Each line of the display is forty bytes long from left to right, and there are 192 such lines from top to bottom. The memory mapping seems somewhat haphazard: consecutive memory locations don't map onto consecutive lines of the display. Finally, for each set of 128 bytes of display memory only 120 bytes (three lines' worth) are displayed. The remaining eight bytes of the 128-byte set are never seen and are therefore sometimes referred to as the "undisplayed" or "unused" bytes. These undisplayed bytes all lie, conceptually, just off the bottom right-hand edge of the display, as shown in figure 1.

Text and lo-res both map in a way similar to hi-res, except that each cluster of eight lines now comes from one set of forty bytes instead of eight sets, and instead of the screen buffer being located at $2000 through $3FFF it lies at $0400 through $07FF. (Compare the *Apple II Reference Manual* pages 16 and 18 with page 21.)

Some Preliminary Insights. Let's try a few experiments that might give us some clues as to how screen splitting can be accomplished. From Basic type the command *call −151* (followed by return) to get into the Monitor. Next, clear the screen by issuing the escape−shift-P sequence. Now type *C051* followed by return. (Hitting return will always be assumed from now on.) The computer will probably display:

```
C051− A0
```

(If it doesn't, try typing *C051* again.)

Typing C051 from the Monitor is the way to turn on text mode if the computer is displaying graphics. But since we're already in text mode, nothing much happens—nothing much except that the contents of $C051 are displayed. But $C051 isn't supposed to be a readable address; it's merely a screen switch. So what does it mean for $C051 to contain $A0? Is it just a coincidence that $A0 is the hex code for an ASCII blank, and that most of the screen is also blank? What would happen if we typed C054? Or C056? Again, we tend to get $A0 if the screen is mostly blank.

Let's try another experiment. Again from the Monitor, type:

```
2000:73 2001< 2000.3FFEM
```

followed by:

```
C050  C053  C057
```

You should see some vertical hi-res lines with space for four lines of text at the bottom of the screen. Now type *C050*, or *C053*, or *C054*, or *C057*. Most of the time we now see $73 in the screen switch locations, and once in a while we see $A0. (Remember that the bottom four text lines on the screen are mostly blank.)

The results of the previous experiments suggest that by examining the screen switches we can somehow read the contents of at least part of the screen currently being displayed. But, to determine the time-history of what is being read, we must first find a way to "tag" the screen data and

```
100   FOR Y = 0 TO 191
110   GOSUB 1000
120   FOR X = 0 TO 39
130   POKE BASE + X,Y
140   NEXT X,Y
150   FOR Y = 128 TO 191
160   GOSUB 1000
170   FOR X = 40 TO 47
180   POKE BASE + X,Y + 64
190   NEXT X,Y
200   END
1000  L = Y:S = 0:Q = 0
1010  S = INT (L / 64)
1020  L = L - S * 64
1030  Q = INT (L / 8)
1040  L = L - Q * 8
1050  BASE = 8192 + 1024 * L + 128 * Q + 40 * S
1060  RETURN
```

Listing 3—Applesoft.

```
100  FOR Y=0 TO 191
110  GOSUB 1000
120  FOR X =0 TO 39
130  POKE BASE+X,Y
140  NEXT X,Y
150  FOR Y=128 TO 191
160  GOSUB 1000
170  FOR X=40 TO 47
180  POKE BASE+X,Y+64
190  NEXT X,Y
500  END
1000 BASE=8192+40*(Y/64)+1024*(Y MOD 8)+128*((Y MOD
     64)/8): RETURN
```

Listing 3—Integer Basic.

then sample the screen switches very quickly. Doing this would provide us with a cycle-by-cycle map of how the Apple's video is generated. In other words, we could determine which locations in memory the information in the screen switches is coming from during each clock cycle of the processor. Such a cycle-by-cycle map would be extremely useful in the implementation and understanding of screen splitting on the Apple II.

Tagging and Sampling a Hi-Res Screen. Now let's create a special hi-res display. We'll put zeros in the forty bytes of the hi-res memory buffer that correspond to line 0 and ones in all the bytes corresponding to line 1. Line 2 will contain all twos, and so on. In other words, line n will contain all n's, for n = 0 to 191 ($00 to $BF). But we still haven't tagged the undisplayed bytes in the bottom right-hand corner (screen lines 128 through 191). Let's fill these sixty-four sets of eight-byte "invisible" lines with the values $C0 through $FF. Then every byte in the primary hi-res display buffer ($2000 through $3FFF), whether displayed or not, will contain a known quantity from $00 to $FF. Listing 3 is a program for creating such a hi-res display of tagged screen data. Two versions are given; one in Integer Basic and one in Applesoft. Use Integer if you have it. It's faster.

Next we need to devise a way of quickly and uniformly sampling a screen switch over and over and saving each sample for later study. One way of doing this might be with a program like the following:

```
      LDX #$00
LOOP  LDA $C050
      STA $1000,X
      INX
      BNE LOOP
```

This program is very short and straightforward, but it suffers from two major flaws: first, it does not provide the fastest possible sampling (because of the time required for index register operations). Second, it allows only 256 data points to be sampled and stored. If we try to remedy the second flaw by changing the method of storage to STA (indirect),Y we not only aggravate the first flaw but introduce delays into the loop that cause us to generate unevenly spaced samples after every two hundred fifty-sixth fetch.

The best approach is to create a sampling program of the form:

```
LDA $C050
STA $1000
LDA $C050
STA $1001
LDA $C050
STA $1002
```

and so on. There's no loop involved; an individual set of LDA and STA commands is used for each check. Such a program is quite long (six bytes per sample) but executes very quickly (one sample per eight machine cycles) and yields uniformly spaced data. The programs in listing 4 generate the machine language program just described. Again, use the Integer version if you have that language.

We're now ready for business. Having run the programs shown in listings 3 and 4, we have the tagged hi-res data starting at $2000 and the sampling program starting at $4000. We run the sampler by entering the Monitor and giving the command *4000G*. After a brief flash of the screen the program terminates, leaving its collection of screen samples starting at $1000 in the Integer version or $8000 in the Applesoft version.

Figure 2 is a partial listing of the key results of the sampling program. The entire listing of all the samples is much longer. Interested readers are encouraged to generate their own complete set of data using the programs described above. Before we can begin interpreting these results, we must discuss some fundamental concepts about television video and the Apple.

Television Images. A standard television picture consists of 525 *interlaced* scan lines that start in the upper left-hand corner of the screen and end in the bottom-right. "Interlaced" means that the image on the screen is created by first scanning all the even lines of the picture and then going back and filling in all the odd lines. In each scan line, the electron beam starts at the left side of the display and travels across the screen to the right, displaying one line of the image as it moves. When the beam

```
10  PC = 16384
20   POKE PC + 1,80: POKE PC + 4,82: POKE PC + 7,87
30   FOR K = 1 TO 3
40   POKE PC,141: POKE PC + 2,192
50  PC = PC + 3
60   NEXT K
100  FOR LOC = 32768 TO 34816
110  POKE PC,173
120  POKE PC + 1,80
130  POKE PC + 2,192
140  POKE PC + 3,141
150 HLOC = INT (LOC / 256)
160 LLOC = LOC - (HLOC * 256)
170  POKE PC + 4,LLOC
180  POKE PC + 5,HLOC
190 PC = PC + 6
200  NEXT LOC
210  POKE PC,141: POKE PC + 1,81: POKE PC + 2,192: POKE PC +
     3,96
```

Listing 4—Applesoft.

```
10   PC=16384:LOC=4096
20   LDA=10*16+13:STA=8*16+13:C050LO=
     5*16:C050HI=12*16:RTS=96
40   POKE PC+1,C050LO: POKE PC+4,C050LO+2: POKE
     PC+7,C050LO+7
50   FOR K=1 TO 3
60   POKE PC,STA: POKE PC+2,C050HI
70   PC=PC+3
80   NEXT K
100  FOR K=1 TO 2048
110  POKE PC+0,LDA
120  POKE PC+1,C050LO
130  POKE PC+2,C050HI
140  POKE PC+3,STA
150  POKE PC+4,LOC MOD 256
160  POKE PC+5,LOC/256
170  PC=PC+6:LOC=LOC+1
180  NEXT K
190  POKE PC,STA: POKE PC+1,C050LO+1: POKE PC+2,C050HI:
     POKE PC+3,RTS
```

Listing 4—Integer Basic.

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```
1120- B7 F7 37 37 37 37 B8 B8
1128- B8 F8 38 38 38 38 B9 B9
1130- B9 F9 39 39 39 39 BA BA
1138- BA FA 3A 3A 3A 3A BB BB
1140- BB BB FB 3B 3B 3B 3B BC
1148- BC BC FC 3C 3C 3C 3C BD
1150- BD BD FD 3D 3D 3D 3D BE
1158- BE BE FE 3E 3E 3E 3E BF
1160- BF BF FF 3F 3F 3F 3F BA
1168- BA BA FA 3A 3A 3A 3A BB
1170- BB BB FB 3B 3B 3B 3B BC
1178- BC BC FC 3C 3C 3C 3C BD
1180- BD BD BD FD 3D 3D 3D 3D
1188- BE BE BE FE 3E 3E 3E 3E
1190- BF BF BF FF 3F 3F 3F 3F
1198- 80 80 C0 00 00 00 00 00
11A0- 81 81 C1 01 01 01 01 01
11A8- 82 82 C2 02 02 02 02 02
11B0- 83 83 C3 03 03 03 03 03
11B8- 84 84 C4 04 04 04 04 04
11C0- A5 85 85 C5 05 05 05 05
11C8- 05 86 86 C6 06 06 06 06
11D0- 06 87 87 C7 07 07 07 07

1780- 7A 7A BA BA BA BA BA 7B
1788- 7B 7B BB BB BB BB BB 7C
1790- 7C 7C BC BC BC BC BC 7D
1798- 7D 7D 7D BD BD BD BD BD
17A0- 7E 7E 7E BE BE BE BE BE
17A8- 7F 7F 7F BF BF BF BF BF
17B0- 80 80 80 C0 00 00 00 00
17B8- 81 81 81 C1 01 01 01 01
17C0- 82 82 82 C2 02 02 02 02
17C8- 83 83 83 C3 03 03 03 03
17D0- 84 84 84 C4 04 04 04 04
17D8- A5 85 85 85 C5 05 05 05
17E0- 05 86 86 86 C6 06 06 06
17E8- 06 87 87 87 C7 07 07 07
17F0- 07 88 88 88 C8 08 08 08
17F8- 08 89 89 89 C9 09 09 09

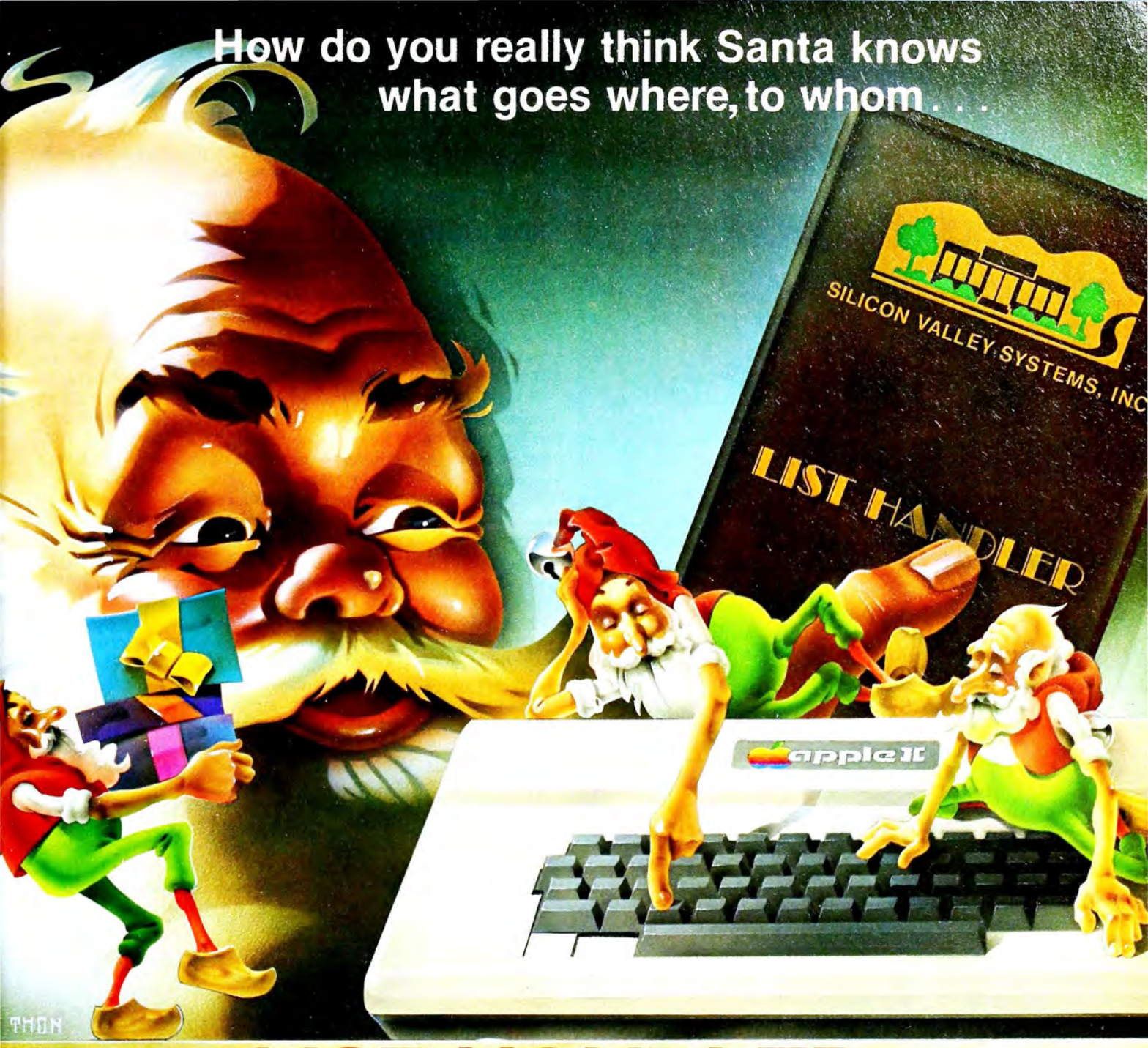
1970- B7 B7 F7 37 37 37 37 B8
1978- B8 B8 F8 38 38 38 38 B9
1980- B9 B9 F9 39 39 39 39 BA
1988- BA BA FA 3A 3A 3A 3A BB
1990- BB BB FB 3B 3B 3B 3B BC
1998- BC BC FC 3C 3C 3C 3C BD
19A0- BD BD BD FD 3D 3D 3D 3D
19A8- BE BE BE FE 3E 3E 3E 3E
19B0- BF BF BF FF 3F 3F 3F 3F
19B8- BA BA BA FA 3A 3A 3A 3A
19C0- BB BB BB FB 3B 3B 3B 3B
19C8- BC BC BC FC 3C 3C 3C 3C
19D0- BD BD BD FD 3D 3D 3D 3D
19D8- BE BE BE FE 3E 3E 3E 3E
19E0- BF BF BF BF FF 3F 3F 3F
19E8- 3F 80 80 C0 00 00 00 00
19F0- 00 81 81 C1 01 01 01 01
19F8- 01 82 82 C2 02 02 02 02
```

Figure 2.

finishes at the right end of each scan line, it shuts off for a few microseconds while it repositions itself at the beginning of the next line to be scanned. This shut-off period is referred to as *horizontal blanking* (HBL). When the beam reaches the bottom of the screen and finishes scanning the last line, it again shuts off, this time for a few milliseconds, while it repositions itself at the top of the display for the next frame of the image. This second turn-off period is referred to as *vertical blanking* (VBL). The total time required to complete one interlaced frame (including VBLs) is one-thirtieth of a second.

When the Apple computer was first being designed, it was discovered that a computer-generated interlaced video signal produced a display that had an objectionable flicker. So interlacing was not used, even though this meant that half of the potential vertical resolution would be lost. This lost *spatial* resolution allowed Apple to achieve increased *tem-*





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poral resolution; instead of generating only thirty video frames per second, the Apple generates sixty, because the Apple uses the interlace to display a new 192-line frame.

A second design consideration in the Apple II was the decision not to *overscan* the screen. "Overscanning" means that the image extends slightly beyond the four edges of the screen so that the picture fills the entire viewing area. Instead, so that information in the corners won't be lost, the Apple leaves a small dark border of unused screen in all of its display modes. This further reduces the number of visible scan lines in each frame, so that only 192 lines remain in the display.

The Apple transfers its video data to the screen at a rate of one byte per machine cycle. Each scan line requires a total of sixty-five cycles from HBL to HBL. Since the Apple produces a forty-column display (forty byes per line), we can deduce that twenty-five cycles of each scan line are spent in a turned-off state and forty cycles are spent turned on. But even when the video is turned off, the screen switches can still be sampled. What will they contain?

Interpreting the Sampled Results. Let's return to figure 2 to see what we can learn from our sampled data. Locations $119B through $119F all contain zeros. Our sampling program required eight cycles per sample. Consequently, the five samples represent forty machine cycles—exactly the duration of the visible part of one scan line.

Since the top line of our display was the only line containing all zeros, we infer that the data stored at $119B represents the beginning of a video frame. After three strange bytes ($11A0–$11A2) we see five ones in a row. These apparently represent the next scan line down, followed by three more strange bytes, and so on.

Well, if we've identified the data that isn't strange as representing the visible portions of the scan lines, then it follows that the strange bytes must be coming during HBL, and that HBL maps from $81 lines ahead of the line just scanned. The fact that HBL seems to come from such a far-away place is confusing enough in itself, but why an odd number like $81 instead of a nice power of two or something (like $80)? Something about these results doesn't feel right; they just don't seem to make any sense.

Well, our decision to attribute HBL to the *end* of a scan line was simply one of convention. Since HBL occurs *between* scan lines, we could just as easily have attributed it to the beginning of a scan line. Then our interpretation of the data in figure 2 would be that a scan line consists of its visible forty-cycle component preceded by its invisible twenty-five-cycle HBL component, which is mapped from $40 display lines earlier. This model assumes a circular screen; that is, if counting up $40 lines would take you off the top of the screen, continue counting up from the bottom.

If we interpret the data in this fashion, it soon becomes evident that: *a complete sixty-five-cycle scan line consists of sixty-five consecutive bytes of display buffer memory that starts twenty-five bytes prior to the actual data to be displayed.* (See figure 3.) We can even see the undisplayed bytes of the screen buffer (where we stored the values $C0 through $FF, remember?) in locations $119A, $11A2, and so on; they're right where we'd expect them to be.

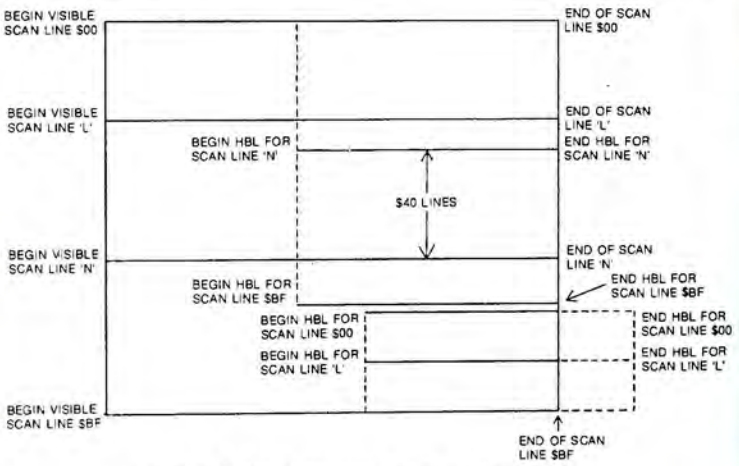


Figure 3. Cycle-by-cycle map of video frame.

If we now look at locations $17AB through $17AF in figure 2 we see that they all contain $BF, which represents the bottom line of the display. Thus $17B0 must be the start of VBL. During VBL the data acts just as if it were starting a whole new frame from the beginning, but it never finishes this pseudo-frame. After getting one third of the way through the frame (to scan line $3F), it suddenly repeats the previous six scan lines ($3A through $3F) before aborting to begin the next true frame. Examine locations $1970 through $19FF in figure 2.

If we had done our tagging and sampling exercise using a lo-res or text screen instead, the results would have been similar. The only difference would have been that each row of sixty-five bytes in the display would be repeated eight times, since both text and lo-res "characters" are eight scan lines tall.

Example Program Revisited. Now that we have a better feeling for what's going on, let's go back and try to understand how the screen splitting example in listing 1 worked.

The for-next loop in lines 200 through 250 does three things:

1. Line 210 pokes the value $E0 into the middle line of text/low-res display.
2. Line 220 pokes the value $A0 into the bottom line of the display.
3. Lines 230 and 240 create a simple lo-res pattern of colored vertical lines.

After printing a text message (lines 300 through 310) in the top part of the screen, the program calls (in line 400) the machine language screen splitting subroutine located at $0300. Line 500 then keeps re-calling the subroutine so that screen splitting will continue. Screen splitting is a *dynamic* process; it requires a program to keep it working. If the program stops, screen splitting stops. Try hitting control-C and see what happens.

Now let's examine the machine language subroutine. Ironically, one of the first things we have to do to produce a mixed mode display is to turn off the mixed mode screen switch, $C052. Since we'll be doing our own mixing we don't want the Apple to confuse things by putting in its own mode switching. The rest of the routine consists of two virtually identical *polling* loops.

The first loop ($0305 through $030E) sets text mode by referencing screen switch $C051 and, at the same time, waits for four consecutive $E0s to be scanned. Where do these $E0s come from? From the middle of the display screen where they were poked by line 210 of the Applesoft program! When the $E0s are detected, the subroutine enters the second polling loop ($0311 through $031A). This loop sets lo-res graphics mode by referencing screen switch $C050 and then waits for four consecutive $A0s (from the bottom line of the display) to be scanned. Once the $A0s have been detected, the mode is set back to text (at location $031B) and the subroutine returns to the main program.

There are a few subtleties here that should be pointed out. Why, for example, do we require four consecutive occurrences of $A0 and $E0 instead of just one? The reason for this can be inferred from figure 3. We see that *every displayed line also has a part of itself mapped into some other display line's twenty-five-cycle "invisible" HBL component.* This complicates the problem of detecting where the beam is currently scanning on the display. How do we know whether the data being sampled is coming from a visible scan or from an invisible HBL? Well, a visible scan consists of forty cycles of data, while the invisible HBL can only be twenty-five cycles at most. So, by requiring several consecutive samples whose fetching times total more than twenty-five cycles duration, we will eliminate false triggerings from HBL. Be careful not to exceed forty cycles or you'll miss the visible data too.

The process of mode changing sometimes tends to produce small unsightly glitches on the display screen. To test this out, change the contents of location $0305 in our example program in listing 2 to be either a $03 or a $02 and see if it makes any difference in the display. You can see how it's a good idea to try to change modes during HBL (or VBL) rather than in the middle of a visible scan line.

Another subtlety in the example program lies in our choice of $A0 and $E0 as tag bytes. While any values could have been used as tags, the values $A0 and $E0 are especially useful because they both appear as

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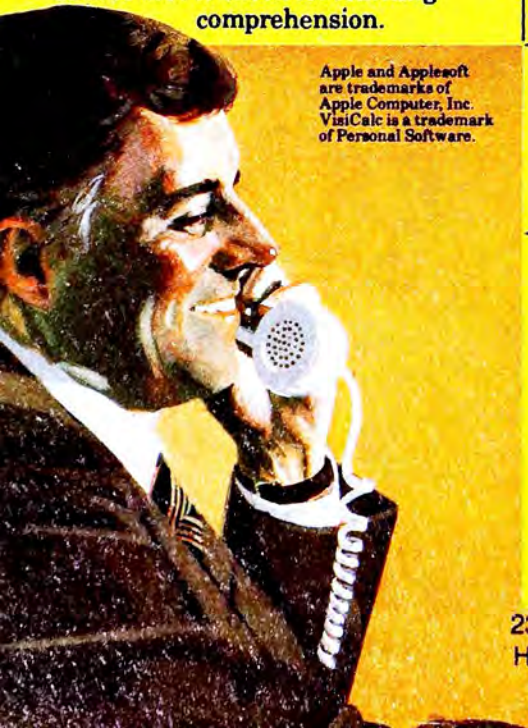
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blanks on a text screen. On a lo-res graphics screen they appear (in our example) as a row of black (or blank) over a row of color. Thus these values provide a convenient way of switching cleanly between text and graphics modes.

In Conclusion. From our examination of the example program, we see that screen splitting consists of essentially two steps. First, the screen must be preformatted with "tagged" lines at the points where screen splitting is to occur (that is, the $A0 and $E0 lines in our example). Second, a machine language subroutine must be written that detects these tagged lines and then quickly switches display modes. But the process is far from being trivial, and it requires a certain amount of creativity and ingenuity to design screens that can be split cleanly and effectively.

What are some applications of screen splitting? Well, it can provide for a little more variety and flexibility in display modes above and beyond the basic five that everyone knows about. To this end I have used screen splitting to create the opening displays for several commercially available games (*Maxwell's Demon/Bishop's Square*, from Datasoft, Inc.; *Money Munchers*, from DataMost).

In addition to splitting a screen, we can superimpose screens. For example, if we print some words on the primary text screen and plot some lo-res colors in the corresponding locations of the secondary lo-res screen, then by screen switching, we could produce text on top of a colored background (if we don't mind a little bit of flicker). Similarly, by combining the two hi-res pages in such a way that the primary page has all of its high bits off while the secondary page has all of its high bits on, we can generate true 560 x 192 hi-res graphics. It is then possible to write a hi-res character generator for this mode that, in effect, produces eighty columns of text (in hi-res) without benefit of an eighty-column card!

The possibilities arising from screen splitting seem quite exciting, to say the least. But there is, unfortunately, one fly in the ointment—the technique may not work on all Apples. Looking at the screen switches like we've been doing is called "reading the floating bus," and it's something that Apple Computer never intended to be done. Therefore, they make no guarantees that the data read in this manner will be meaningful, especially when certain peripheral cards are plugged into the expansion slots. In fact, this method of screen splitting doesn't work on the Apple III at all, even in emulation mode, because its bus doesn't float. But there seem to be very few Apple IIs in which the method can't be made to work when the incompatible peripherals are unplugged.

```
1000-  A2 00     LDX  #$00
1002-  20 1A 10  JSR  $101A
1005-  8D 50 C0  STA  $C050
1008-  8D 57 C0  STA  $C057
100B-  F0 00     BEQ  $100D
100D-  20 1A 10  JSR  $101A
1010-  8D 52 C0  STA  $C052
1013-  8D 56 C0  STA  $C056
1016-  EA        NOP
1017-  4C 02 10  JMP  $1002
101A-  A0 06     LDY  #$06
101C-  CA        DEX
101D-  D0 FD     BNE  $101C
101F-  88        DEY
1020-  D0 FA     BNE  $101C
1022-  A2 9D     LDX  #$9D
1024-  CA        DEX
1025-  D0 FD     BNE  $1024
1027-  60        RTS
```

Listing 5.

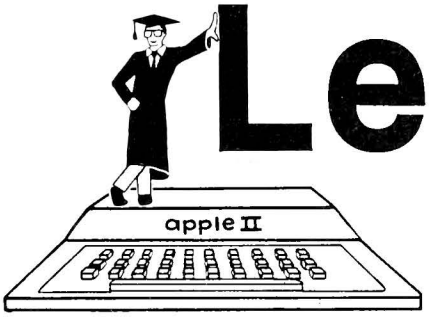
If you can't get screen splitting to work on your Apple, you might want to try running the machine language program shown in listing 5. Load a hi-res picture into the primary display buffer ($2000 through $3FFF), create any lo-res display on the primary lo-res screen, and then run the program at $1000.

This program is an example of screen splitting using nothing but timing loops. But there's no way to synchronize the splitting. So, each time you run the program, the split will occur at a different vertical position on the screen, depending on which scan line you just happen to catch the beam on. This program should work on all Apples. ◨

The author would like to thank D. Kottke, R. Nicholson, and B. Smith of Apple Computer for their helpful discussions on Apple II video hardware and L. Grossberger of Eclectic Electric for her suggestions and help in preparing the diagrams for this article.

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THE PASCAL PATH

By Jim Merritt

Tools of the Craft, Part 16

You may think of a single index array, such as those we discussed last time, as corresponding to a row of individual elements, all lined up, shoulder to shoulder, like suburban tract homes. Given the row of houses on, say, Tanglewood Street, you need only a single piece of information—the house number—in order to identify and find any particular one.

What if you want to find a certain house within the subdivision? Assuming that there are streets other than Tanglewood in the neighborhood, you must now use at least two separate pieces of information—the house number and the street name—to distinguish a single home from its neighbors. We cannot conveniently model an entire neighborhood using a single index array. Since we need two pieces of information to specify a particular house in the "real world," our computer model should use two independent indices, one denoting the street name, the other signifying the house number.

Matrices: Dimensions without End. When an array has more than one index, it is sometimes called a multiple index, or multidimensioned array. (A single index array is said to be one-dimensional, a dual index array is called two-dimensional, and so on.) More often, however, and from now on in this column, a multiple index array is called a matrix (plural matrices). One way to create a matrix is to declare a single index array such that the individual elements also happen to be arrays. Here's how that technique would be used to create a two-dimensional matrix, Neighborhood:

```
CONST
  MinHouseNum= 1;
  MaxHouseNum= 199 (* unrealistic *);
TYPE
  Home= Integer (* may be any data type *);
  Street= (* one-dimensional *) ARRAY
          [MinHouseNum . MaxHouseNum]
            OF Home;
  StreetName= (Redwood, Tanglewood,
    Sandalwood, Driftwood);
VAR
  Neighborhood
    :ARRAY [StreetName] OF STREET;
    (* two-dimensional!! *)
```

As you might expect, the array element Neighborhood[Sandalwood] refers to Sandalwood Street, and all 199 houses on it. But, since the array element is itself an array, you may append an extra index to it in order to access the information for any single house on Sandalwood Street. Thus, "Neighborhood[Sandalwood][153]" refers to 153 Sandalwood Street, "Neighborhood[Sandalwood][12]" corresponds to 12 Sandalwood Street, and so on. Similarly, "Neighborhood[Driftwood]" specifies all of Driftwood Street, while "Neighborhood[Driftwood][75]" refers to a single house on that street.

In defining Neighborhood, we declared the types Home, HouseNumber, Street, and Streetname, as well as the constants MinHouseNum and MaxHouseNum in order to shorten and clarify the final matrix definition. It's good practice to use such subsidiary types as tools for improving the readability of your programs, and we've already discussed the desirability of using named constants whenever possible. Still, this is a matter of programming style, and Pascal does not force you to do things this way. Here is a valid recasting of Neighborhood that does not use any subsidiary data types or named constants.

```
VAR
  Neighborhood
    :ARRAY [(Redwood, Tanglewood, Sandal-
    wood, Driftwood)] OF ARRAY [1 . . 199] OF
    Integer;
    (* two-dimensional!! *)
```

As you can see, this second version of Neighborhood is somewhat unwieldy, and less transparent than its predecessor. It isn't clear, for instance, that "Redwood," "Tanglewood," "Sandalwood," and "Driftwood" are street names; that "1..199" denotes a range of house numbers, or that the base element of the matrix, declared as Integer, is intended to model a home. Nevertheless, the Apple Pascal compiler will accept this form of array definition as readily as it will the more detailed form. It is up to you whether or not (or how often) to use subsidiary data types and named constants in your data declarations. Keep in mind that they contribute not only clarity but also flexibility to a program, as you'll soon see.

Of course, you may find yourself using subsidiary data types just to shorten matrix definitions. A declaration that looks like "*array . . . of array . . . of array . . . of array . . . of* .." may simply be too cumbersome for your tastes. Take heart! Pascal includes an abbreviated syntax for declaring and accessing matrices. You may group all the index descriptors (or indices) together, separating them with commas, between a single set of square brackets. For example, either

```
Mat1: ARRAY [Monday . . Friday] OF
  ARRAY [1 . . 10] OF Integer
```

or

```
Mat2: ARRAY [Monday . . Friday, 1 . . 10]
  OF Integer
```

defines a two-dimensional matrix that contains a total of fifty Integer elements, where the first index may range from Monday to Friday (which, we presume, are values of a previously declared enumerated type), while the second may range from 1 to 10. Similarly,

```
Mat1[Tuesday, 5]
```

and

```
Mat1[Tuesday][5]
```

are identical references to the fifth element in the Tuesday row of matrix Mat1. No matter how a matrix has been declared, Apple Pascal takes after its UCSD Pascal relatives in permitting you to use either the full or the abbreviated syntax in accessing matrix elements. Not every implementation of Pascal is so accommodating, however. Some do not permit you to use the abbreviated syntax when accessing a matrix that was declared using the full syntax. Be careful about this if you ever write programs for a different Pascal compiler.

Array Size Considerations. Apple Pascal does not limit the number of indices that a matrix may have. As we saw last time, only minor limits are placed on the range of values that an index may acquire. On the other hand, practical limits on both the number and range of indices are imposed by the availability of RAM memory in your Apple. Even an apparently small array can require prohibitively large amounts of memory, depending upon the number and ranges of its indices. For instance, here is an apparently small, three-dimensional matrix that takes the same amount of space as one thousand Integers:

```
BigMat: ARRAY [1..10,
          (Black, Red, Yellow, Blue,
          White), 1..20] OF Integer;
```

To determine the memory space required by any array or matrix, you must multiply the cardinalities of all the indices together, then multiply that product by the amount of space required by a single element. The *cardinality* of an index is the number of distinct values that index can assume. For example, the first of BigMat's indices can assume ten different values (from 1 to 10), so its cardinality is ten. The cardinalities of the second and third indices are five and twenty, respectively. Ten times five times twenty is one thousand. An Integer takes up two bytes, so BigMat requires two thousand bytes of your computer's RAM.

How Many Bytes? The built-in function SizeOf allows you to determine the memory requirements for any variable or data type. SizeOf takes as its single argument an identifier that names either a specific variable, or a data type. It returns, as its function value, the number of

bytes occupied by the specified variable, or by a variable of the specified type. SizeOf (Integer) is two, for instance. SizeOf (Char) and SizeOf (Boolean) are also two. SizeOf (Real) is four, and SizeOf (BigMat) is two thousand. What is SizeOf (Neighborhood)?

Use caution when applying the SizeOf function to large arrays or matrices. The number returned by SizeOf will be negative if the actual size of the structure is greater than 32,767 bytes. This is not a failing in SizeOf, but rather a natural consequence of the representation of Integers in Apple Pascal. Remember that under normal circumstances, Integers may never be larger than 32,767, nor smaller than −32,768.

Because of the characteristics of Apple Pascal's internal Integer representation, any number that grows larger than 32,767, but remains smaller than 65,536 (perhaps because of an addition or multiplication operation), is automatically translated into the negative region. For instance, 32767 + 1 = −32768, 16000*3 = −17536, and so on. Because of the difficulties of dealing with this *overflow*, your programs should not perform arithmetic on the value of SizeOf if the structure being measured is likely to exceed 32,767 bytes in size.

On the other hand, if you're simply curious as to the size of a particular variable or data structure, you can write a short program that merely displays the value that SizeOf returns for it. If the size is negative, you may assume that the actual size lies between 32,767 and 65,536 bytes. To determine the precise number of bytes occupied by the structure simply add the negative value of SizeOf to 65,536. Thus, 65536 + (−32768) = 32768 (or 32767 + 1). Similarly, 65536 + (−17536) = 48000 (or 16000*3).

Whither the Neighborhood? So long as its basic element, the Home, is designed to accommodate all the data that must be kept on behalf of a home and its occupants, our neighborhood matrix can serve as the foundation for an interactive data manipulation program, suitable for use by anyone who needs to organize and maintain information about individual homes in a neighborhood (for instance, newspaper distributors, utility companies, door-to-door vendors, governmental agencies).

The data that comprises an appropriate model of a single home, of course, depends upon the nature of the program's user. The newspaper carrier, for example, probably needs to know whether or not to deliver a paper at a given address, and also whether to deliver on weekdays, Sundays, or both. The Pascal definition of a Home would reflect these needs. On the other hand, a completely different definition would be required by a telephone company that is concerned with the number and location of outlets within a home, as well as the telephone number and type of service associated with each outlet (for example, rotary or touch tone).

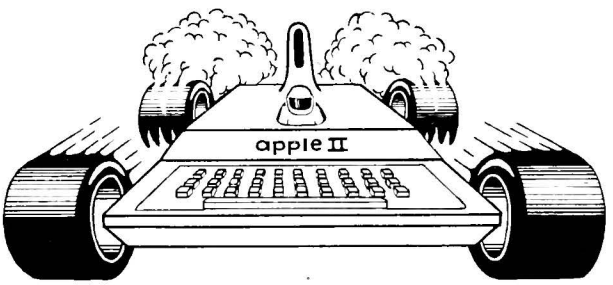
Once the data structure has been defined, it is a reasonably simple matter to write functions and procedures that permit its manipulation. A minimum program would provide some way for the user to examine the data for all or part of a neighborhood, and to update data for an individual home. In this and future installments, we will develop and refine just such a program, using the Neighborhood matrix, in which the definition of Home will be optimized to serve the needs of a hypothetical cable television company.

Birth of a Program. Despite what many pedagogues would have you believe, most programs don't spring full-blown from precise, comprehensive specifications written in English. Instead, they start as relatively small prototypes ("skeletons"), and are scaled-up and fleshed-out as necessary to improve their performance or increase their flexibility. Starting small means that the programmer need not wait very long to see the program in action. A program that does something useful can be built—and pressed into service—quickly.

When it comes time to improve the prototype, the programmer can take advantage of the software environment provided by the existing tool—constants, variables, types, procedures, and functions—rather than waste time creating and assembling a new (and possibly redundant) one. Moreover, building upon previously written, well-exercised code helps the programmer to confine his inevitable errors and misjudgments to only the comparatively small amount of new code that embodies the improvements or extensions, thus making it easier to detect, trace, and correct those mistakes.

Of course, it is possible to build a prototype program in such a way that it cannot evolve easily or cleanly. Unfortunate decisions made when defining key variables, data types, proce-

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dures, and functions will return to haunt you when the time comes to modify your prototype. You can avoid many of these pitfalls simply by remembering that your program is bound to change, sooner or later, as long as you continue to use it. This will help you to write programs that are amenable to modification. As we develop programs, we will try to make the "correct" design and implementation decisions, and will attempt to describe not only the rationale behind them, but also some of the mistakes that can be made at each developmental step.

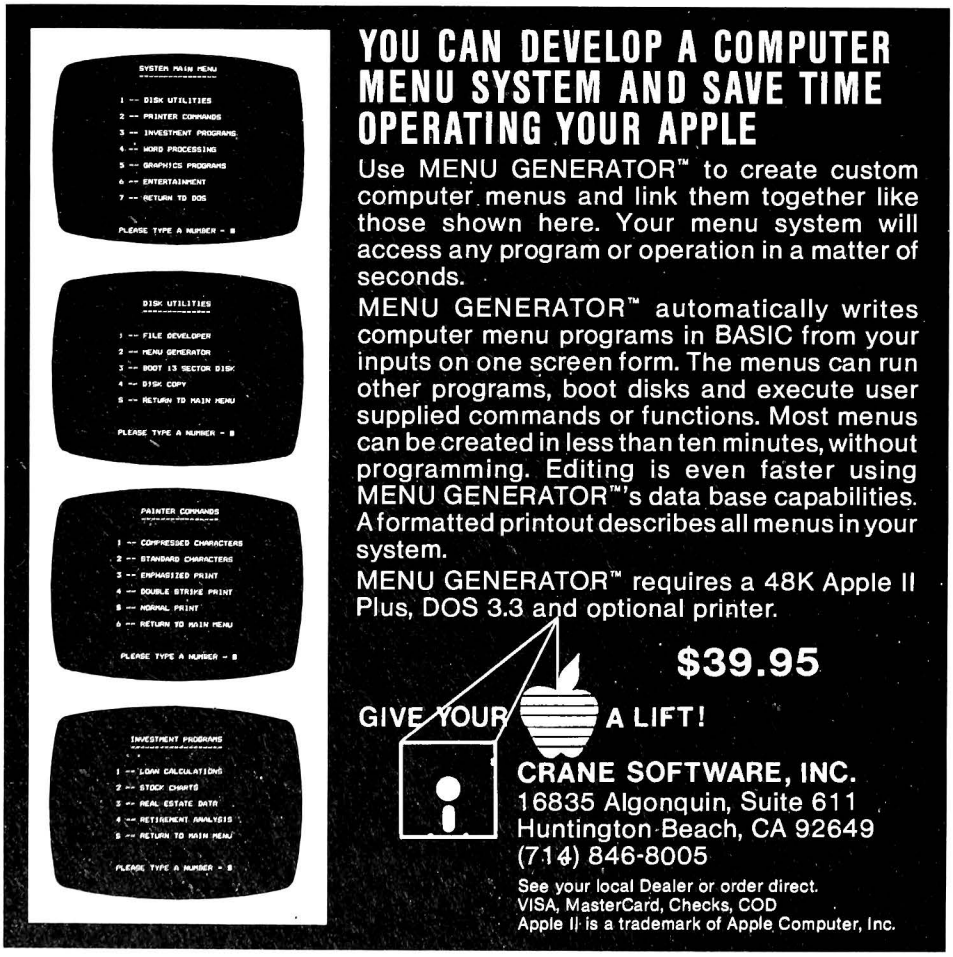
Here is the skeleton of the interactive data manipulation program, *Cable*.

```
PROGRAM
  Cable;
(* DESCRIPTION: Permit the interactive
  establishment and maintenance of records
  concerning a Cable TV franchise's
  subscribers. *)
  CONST
    Header='CABLE DATA BASE (V1.0
      10-Aug-82)';
    Blank= ' ';
    (* Maximum house number --
      unrealistic *)
      MaxHNum= 999;
    (* Customer account numbers range
      from 1 to MaxAcctNum; 0 as an
      account number signifies that the
      home in question contains no
      subscribers. *)
      NoSubscriber=0;
      MaxAcctNum=
        MaxInt;
TYPE
  AcctNumType=
      NoSubscriber . . MaxAcctNum;
  StreetName=
    (Redwood, Tanglewood,
     Sandalwood, Driftwood);
  HouseNumber=
   1 . . MaxHNum;
  (* How our model is structured:
     A Town is composed of named Streets.
     A   Street is composed of numbered
         Homes.
     A     Home is modeled by the information
           we wish to record about it and its
           residents. *)
    Home=
      AcctNumType;
    Street=
      ARRAY[HouseNumber] OF Home;
    Town=
      ARRAY[StreetName] OF Street;
  CCom Type= (* Cable program
      commands *)
    (Change, Display, Quit);
VAR
  Smallville
    :Town;
  PROCEDURE
    NewTown(VAR T: Town);
  (* DESCRIPTION: Ready the model of a new
      town, T, by "emptying" all its Homes. *)
  BEGIN (* NewTown *)
    (* stub *) WriteLn(Output, ' NEWTOWN:
    NOT YET IMPLEMENTED');
  END (* NewTown *);
  PROCEDURE
    Change Town(VAR T: Town);
  (* DESCRIPTION: Permit the interactive
    selection and modification of one (or more)
    Home(s) in a Town, T. *)
  BEGIN (* ChangeTown *)
    (* stub *) WriteLn(Output, ' CHANGETOWN:
      NOT YET IMPLEMENTED');
  :END (* ChangeTown *);
    PROCEDURE
      DisplayTown(VAR T: Town);
    (* DESCRIPTION: Permit the interactively
      controlled display of information recorded
      for one or more Home(s) in a Town, T. *)
  BEGIN (* DisplayTown *)
    (* stub *) WriteLn(Output, ' DISPLAYTOWN:
      NOT YET IMPLEMENTED');
  END (* DisplayTown *);
    FUNCTION
      CableCommand
        :CComType;
    (* DESCRIPTION: Prompts for, and accepts,
      user input characters until one corre-
      sponds to a CComType command, then
      returns the matching value. C, D, and Q
      map onto Change, Display, and Quit.
      Treats capitals and lower case as identi-
      cal. Echoes blank for blank, command
      name for command characters, and the
      input character itself, along with the mes-
      sage ' -- NOT A COMMAND', for all
      others. Pressing the return key is equiva-
      lent to pressing space bar. *)
    BEGIN (* CableCommand *)
      (* stub *) WriteLn(Output,
      ' CABLECOMMAND: NOT YET
      IMPLEMENTED');
      CableCommand := Quit;
    END (* CableCommand *);
  BEGIN (* Cable *)
    (* stub *) WriteLn(Output, ' CABLE: NOT
    YET IMPLEMENTED');
  END (* Cable *).
```

This skeleton concentrates on defining the data that will be manipulated by the program. The main structure, of course, is a two-dimensional matrix of Homes, indexed (and thus, organized) by street name and house number. We choose for now to represent a Home as only an account number (that is, as a nonnegative Integer), such that a number greater than zero implies that the corresponding Home subscribes to the cable service. If we are careful, we will find it easy to change the definition of Home at a later date, so as to accommodate a more complete informational model of a subscriber's home.

To promote future flexibility, the range of account numbers is defined as a subrange data type, expressed in terms of the named constants NoSubscriber and MaxAcctNum. The subrange type HouseNumber is also defined in terms of a constant, MaxHNum. Consistent use of these type and constant names throughout *Cable* will pave the way for changing the future size of our model, as necessary, simply by changing the declared constant values.

You have probably noticed that the structure previously known as a Neighborhood has been renamed a Town, in recognition of the fact that cable television franchises are seldom limited to a residential subdivision, but usually encompass entire municipalities. A Town is physically no different from our old Neighborhood, but the structure's new name seems more descriptive of its actual significance to our program's user. We have also moved the description of the Town structure into the type section, and have in fact chosen to describe no structures explicitly in the var section. Instead, every variable declared in the var section will be associated with a named type, as Smallville is



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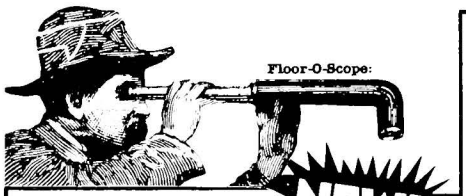
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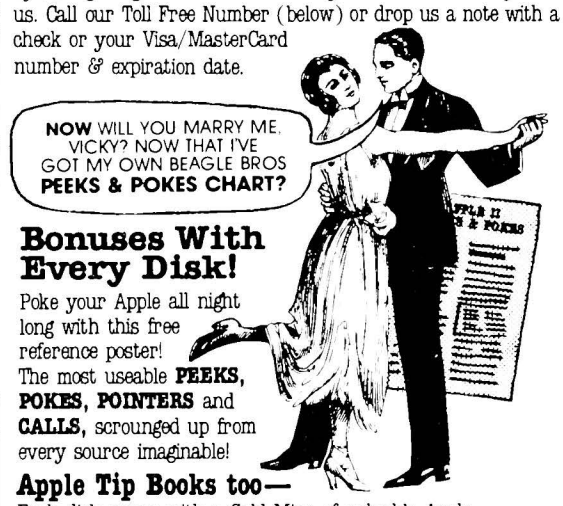
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associated with Town.

CComType exists because we'll need some way to select between *Cable*'s various functions; a variation of NewCommand, the command handler that we developed in the August 1982 issue of *Softalk*, should serve this purpose nicely. As you'll recall, NewCommand returned a value of a special "command indicator" type, hence CComType here.

The constants Header and Blank are the products of my own personal programming style. A program should always announce itself to the user, unless exceptional conditions dictate otherwise. A good method of doing this is to define a terse "header" message as a global string constant, then display that string at the earliest feasible point in the program. As far as Blank is concerned, long experience teaches that the blank is used throughout almost every program that employs interactive input and output. Furthermore, it's often confusing to see a single blank as a character constant in a printed program listing, especially one that has been set in type. It's good, therefore, to define a single blank as a named constant, and use it consistently to avoid ambiguity.

Now, let's consider the functions and procedures in *Cable*'s skeleton. Remember that we must always initialize variables, including arrays (and other structures that we'll study later). It stands to reason that we may have occasion to initialize a Town more than once in our program, so, rather than force ourselves to duplicate the necessary initialization code wherever it is needed, we have declared a special initialization procedure, NewTown. Next are procedures for modifying and displaying the data set: ChangeTown and DisplayTown. Last is CableCommand.

At this point, all of *Cable*'s routines are presented as *stubs* (or *dummies*). In a developing program, stubs serve not only to remind the programmer that more work needs to be done, but also to permit finished portions of the program to be exercised and tested, in a limited fashion, even if they rely on unfinished routines. A reasonable policy to follow when writing stubs is simply to have them send a message to the console, announcing their immaturity. Additionally, the stubs of functions should return "safe" function values that will not lead to complicated or potentially dangerous behavior on the part of the calling routine.

Function stubs must return some value, however, otherwise, the undefined value returned could cause the P-machine to abort the skeletal program after the function call, complaining of a "Value Range Error." This error occurs when the value of a variable, function, or expression exceeds the limits of its data type. (If, for instance, you tried to assign a negative value to a variable of type AcctNumber, which, by definition, excludes all negative Integers, you would get a Value Range Error.) Consider the stubs of NewTown and CableCommand. Although both display "not implemented" messages, CableCommand's stub also returns the safe CComType value of Quit. (Display and Change are less safe than Quit only because they force the *Cable* program to call still other unfinished routines.)

Arrays as Parameters. Every routine in *Cable* that deals with a Town requires a single var parameter: the name of the Town being affected. Thus, the procedure call

```
NewTown (Smallville)
```

would empty all the homes in Smallville, and

```
NewTown (Metropolis)
```

would initialize Metropolis. Had we not made provision for these parameters, we would have had to write each routine so that it accessed the global object, Smallville. If we then decided to change the name of our Town, or work with more than one Town, we would have had to update the bodies of three different procedures. Such concerns are eliminated by arranging to pass Towns to procedures as parameters.

An entire array or matrix may be passed to a function or procedure as either a value parameter or a var parameter, but there are a couple of important points to consider in deciding which method to use. Remember that the receiver of a var parameter gets to manipulate only a "voodoo doll" of the actual parameter. The "doll" is very small, requiring almost no memory space, and the P-machine takes practically no time at all in delivering it to the receiver. The receiver must take care, however, since anything it does to its "voodoo doll" permanently affects the actual parameter.

In contrast, passing an array as a value parameter can consume unreasonable amounts of time and (memory) space. Consider that Pascal provides the receiver of a value parameter with its own, private, full-scale copy of the actual parameter. This is fine if the actual parameter is an Integer, Char, Boolean, Real, or enumerated value. But what if it is an array? Then, Pascal must duplicate the array, including each and every element, for the benefit of the receiver. If the array has, say, five thousand elements, it might take a second or so for your computer to finish the task. That doesn't seem like very much time, but it could slow your program down greatly if the receiver of such a parameter is called often. Even seconds add up, eventually, to minutes and even hours of frustrating delay.

Of course, even if the copy operation took no time at all, your computer probably does not have enough memory to accommodate multiple copies of a large array or matrix. Keep this in mind when writing your programs; one good way to crash the system with a cryptic "stack overflow" is to pass a large value parameter to a procedure or function when there is insufficient memory for the copy.

Within the parameter list of a procedure or function, the only way to designate the type of a formal parameter is to use an identifier that names a declared data type; no explicit array descriptors, subranges, or enumerations are allowed in a formal parameter list. This is probably the most important reason for placing the description of the Town matrix in the type section. It is also a good reason to avoid declaring any structures explicitly in the var section, since you might eventually want to use them as parameters, and cannot, unless they are associated with named types. By taking the time to generalize your data declarations in this way from the very start, you provide the largest number of options for yourself when the time comes to change the program.

Rules of the Road. There are two good rules to follow when developing programs using the "evolutionary" method:

1. Don't walk away from a dead program. In other words, never postpone working on a program that will not compile and execute in its current form; keep working until you have something that the compiler likes, the execution behavior of which you can observe. When you return to the program later, observing its execution will help you to remember what's going on inside, and will better prepare you for "surgery." Note that the skeleton of *Cable*, as it now stands, will compile and execute, although execution will not produce exciting results.

2. Write the most "visible" code first. Complete first those parts of the program that will produce the most significant (and gratifying) results. There is just something about watching programs execute that gives programmers the inspiration and energy to develop them even further. It's a kind of snowball effect; the better a program runs, the more time and effort one wants to invest in it. Getting visible results early will help you stick with the project until the entire program is complete. A corollary to the latter rule is, "develop and verify gross program structure before turning to details." For instance, we should write the main program body before proceeding to the routines that embody the separate commands.

Here is *Cable*'s main body; note that it is very similar to that of *TestCom*, the test program in which we nestled the NewCommand function in August. Use it to replace the corresponding stub at the end of *Cable*'s skeleton.

```
BEGIN (* Cable *)
  WriteLn(Output, Header);
  WriteLn(Output);
  NewTown(Smallville);
  UserQuits := False;
  REPEAT
    CASE CableCommand OF
      Change:
        ChangeTown(Smallville);
      Display:
        DisplayTown(Smallville);
      Quit:
        UserQuits := True;
    END (* CASE CCom *);
  UNTIL UserQuits;
END (* Cable *) .
```

In order for this part of the program to compile correctly, we must declare UserQuits as Boolean in the global var area, but this is the only change to the rest of the program text that needs to be made.

Suppose we wanted to postpone working on *Cable* at this point.

Since the program will compile and execute, we would be justified in taking a break. Of course, the execution of this skeletal version results in nothing more rousing than a couple of "not yet implemented" messages (one apiece for NewTown and CableCommand). We haven't

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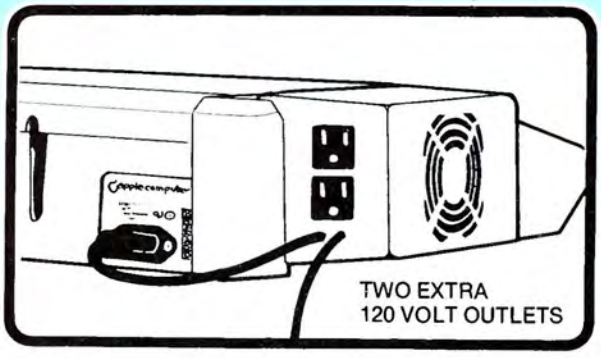


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DEALER INQUIRIES INVITED

really earned our break. Let's implement CableCommand before we retire for his month, thus leaving behind not only a working program, but a gratifying one. CableCommand is so much like its predecessor NewCommand that you should be able to code and install it within the *Cable* skeleton (replacing the CableCommand stub) inside of half an hour.

```
FUNCTION
    CableCommand
      :CComType;
  (* DESCRIPTION: Prompts for, and accepts,
     user input characters until one corre-
     sponds to a CComType command, then re-
     turns the matching value. C, D, and Q map
     onto Change, Display, and Quit. Treats
     capitals and lower case as identical.
     Echoes blank for blank, command name
     for command characters, and the input
     character itself, along with the message ' --
     NOT A COMMAND', for all others. Press-
     ing the return key is equivalent to pressing
     space bar. *)
  CONST
    Prompt= 'Command: Change, Display,
       Quit > > ';
  VAR
    ComCh
      :Char;
    Valid
      :Boolean;
BEGIN (* CableCommand *)
  Write (Output, Prompt);
  Valid := False;
REPEAT
  Read (Keyboard, ComCh);
  CASE Capital (ComCh) OF
    'C':
      BEGIN
        Valid := True;
        Write (Output, 'Change');
        CableCommand := Change;
      END;
    'D':
      BEGIN
        Valid := True;
        Write (Output, 'Display');
        CableCommand := Display;
      END;
    'Q':
      BEGIN
        Valid := True;
        Write (Output, 'Quit');
        CableCommand := Quit;
      END;
    Blank:
      Write (Output, ComCh);
  END (* CASE Capital (ComCh) *);
  IF ((NOT Valid) AND (ComCh <> Blank ))
    THEN
      BEGIN
        WriteLn(Output, ComCh, ' -- NOT A
        COMMAND');
        Write (Output, Prompt);
      END;
UNTIL Valid;
WriteLn(Output);
END (* CableCommand *);
```

The prompt chosen for CableCommand should be familiar; it was deliberately designed to mimic the style of the Apple Pascal operating system. By aping the operating system, we have not chosen the optimum prompting scheme, but it should work well for people who are used to working with Apple Pascal. At the very least, it indicates that a response is required, and suggests possible responses. In the future, we may see fit to rewrite CableCommand to be more friendly, but right now, we're more interested in seeing the entire program work.

The sharp-eyed reader will see that CableCommand relies on Capital, our standard function for letter-capitalization. This means that the code for Capital must also become part of the *Cable* program. But where should we put it? We could nest it within CableCommand itself, thus placing it precisely where it is needed, but since we've seen that Capital is such a useful, almost ubiquitous function, we're probably better off making it global, so that other routines may call it if necessary. I would place Capital between the end of the global var section and NewTown's procedure heading. In other words, I would make Capital the first procedure declared in *Cable*, thus ensuring that every routine in the program can "see" Capital, and therefore call it.

What's in Store. Next month's column will begin with a complete listing of *Cable*, in its present state. From there, we'll proceed to develop NewTown, DisplayTown, and (if space permits) ChangeTown. In the process, we should learn some interesting facts about the P-machine, more about arrays and matrices, and begin the study of string variables and record structures. Does that sound like a hearty Thanksgiving feast? No? Well, why not drop by anyway; this turkey would appreciate having you over to share some food for thought. ◨

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Word Processing:

Word Handler Goes to the Movies



BY JONATHAN MILLER

Life, Thomas La Mance once observed, is what happens to us while we're making other plans. George Catanzano, Jr., would agree. Back in the mid-fifties when Catanzano was making plans, the script in his life picture show seemed all but written. He'd gone straight from high school in Cambridge, Massachusetts, to being a medic in Uncle Sam's army and now, honorably discharged, he was heading straight for the rolling corn carpet of Iowa and Palmer College, fount of United States chiropractic instruction.

On the surface, the plan seemed something of a bold stroke. Not only was Catanzano entering a field still suspect in the eyes of many in the

medical fraternity, he was shipping out to Grant Wood country, to the vastness of the great American heartland. Why, for all this geographically untutored Yankee knew, Indians still roamed the fruited Iowa plain. And yet, on closer examination, the move, even the profession, made perfect sense—fit neatly into the unfolding scenario. Or so it seemed.

All the Home's a Stage. "I can still remember, from when I was twelve or thirteen, my dad calling my twin brother and me into the kitchen, closing the door, and saying, 'Hey, guys, I have these heart problems and I want you to take care of mom if anything happens.' " How many family crises, it seems, play out in the hard glare of cheery kitchens with ominous news exploding like a dropped plate. The elder Catanzano, near as anyone could determine, had already suffered something like eight or nine heart attacks. The doctors shook their considered heads and said the elder Catanzano didn't stand much chance of surviving the year. But of course he did.

That chance was chiropractic, the specialty Catanzano's father turned to in desperation. Not only did it relieve his severe angina pains, it helped extend his life seventeen years. And, by dint of favorable example, the experience fixed a career ambition in the mind of his earnest son.

"I became interested in chiropractic because of what it had done for my dad," says Catanzano, now forty-six. "I felt I owed it something."

Today, Catanzano sees that period from a different perspective. He sees a kid who went directly from high school to the army and bang into college, to cram four academic years into three by attending Palmer year-round. He sees a kid so in a hurry to get some place that he hadn't taken time to ask where he was going. He hadn't, that is, until the end of his sophomore year when he realized he was exhausted. George Catanzano needed a break, some time to himself, so he took the summer off. He luxuriated in the freedom and then, true to a tortured twentieth-century soul, felt dutifully guilty about enjoying it.

"Well, it was a mistake," he says today, laughing. "It was a mistake because I had a good time and decided to take another semester off. Then I wasn't sure whether chiropractic was what I wanted to do."

Into the Dream Palace. So while Catanzano considered alternative life plans—the big picture, as it were—he decided he might as well work. Almost any job would do. Then, as luck or the fates would have it, a chance encounter occurred with a fellow Palmerite who was working the summer as an assistant manager at a Davenport, Iowa, movie theater. The theater needed a fall replacement and, well, one thing led to a new career. It was just to be a temporary job, you understand, something to do while Catanzano sorted life's scenarios—those scripted for and by him over the past twenty years. But it worked out differently.

"I just got into the business," says Catanzano, now assistant film buyer and booker for Central States Theatre Corporation, "and fell in love with it."

That, as they say in Hollywood, was twenty-three years ago, twenty-three years of managing bijous in places like Davenport and Burlingame and then, in recent years, of playing the high-stakes game of theatrical bookings. Catanzano had gone from relieving pains through spinal manipulations to the even trickier maneuver of tickling funny bones, and wiser adult heads shook their hoary manes, much like the doctors with his father, and said, "George, you better look for a full-time job, because this industry is going downhill."

CRT Still the Enemy. Back in the pre-Wasteland fifties, you'll recall, the experts were predicting that television would empty theaters across the land. Today the mavens of the media are prophesizing death by video games, video tapes, and that creeping economic subversive, "the ever-increasing competition for the entertainment dollar." The subtext was clear: movies were high-risk enterprises, made even riskier by the Byzantine economics of movie distribution. Catanzano might as well be shooting craps in the dark. Perhaps, but therein lay its appeal. To book films and call 'em right was to be there on the cutting edge, to be where the myths are made.

"A generally good rule of thumb in the motion picture industry," says Catanzano cheerfully, "is out of every ten pictures made, seven lose money, two break even and one makes money."

These are not great odds, but they're probably no worse than those faced by Iowa farmers every planting season. The odds could be better, to be sure, but every now and then you get a surprise that makes it all worthwhile—financially as well as emotionally. Like *E.T.*, the film that has humbled industry forecasters everywhere: made for $10 million, bringing in upward of $200 million, 10 percent of which will be shared by theater operators. That's the kind of action that keeps you riveted to the big screen—keeps you riveted and then, by competitive turns, leads you to its home-size miniature, to the friendly monitor of an Apple II Plus, to word processing, and, yes, to a whole new way of looking at life.

Scene II. We observe our protagonist one crisp fall day in 1977 lugging a video recorder back to the Computer Emporium in his adopted home of Des Moines. He bought the thing to keep up on the competition, but he's not impressed with the quality or the experience. He's figuring to pocket the refund when his wandering eye catches a smiling Apple in yonder corner. There, animating its screen, is an intergalactic strategy game based on *Star Trek,* and Catanzano is enthralled. Absolutely.

For the first year or so, he is lost in monitor space, but a subplot is stirring. Catanzano, like his father and his father's father and his twin brother, has had a heart attack since last observed. It has shaken him up and reordered his life and led him back to the Roman Catholic Church. He is becoming more involved in his local parish and looking for ways to help.

"That heart attack changed my life dramatically," he says, trying to explain. "From a moralistic standpoint, tremendously. Prior to that, the primary objective of my life was to be a big businessman, to be the 'successful' businessman: to own a camper, two cars, a nice home—the keep-up-with-the Joneses syndrome. Those things are unimportant now. I think the best way to describe it now is that I value friendships rather than objects. I can honestly say I care about people, where before it was a question of using people. That's a tough thing to tell about myself, but it's a fact."

Came the Calling. He was looking for ways to use his Apple to lighten the church's workload when who should intervene as a computer angel but the pope himself.

In response to the invitation of a local farmer, Pope John Paul II included Des Moines on his American itinerary in October 1979. Catanzano volunteered his services and was told he had six weeks to coordinate press credentials and Secret Service clearances for eleven hundred reporters. The bishop's residence became the gathering place for fifteen Apples, including Catanzano's—the electronic nerve center for a communications and logistical network that greatly impressed the pontiff's party. Computers amidst the corn—it became something of an organizational mind blower.

Parishes throughout the diocese began to see the labor-saving benefits of word processing—of mailing lists, label reproduction, quantity correspondence, not to mention general accounting work. And Catanzano recognized an opportunity to provide a free service, which would give birth to a commercial enterprise destined to generate a quarter million dollars in sales last year. Only to get there, he first had to check out word processors for his Apple.

In the course of three-plus years, says Catanzano, he has demonstrated nearly every word processing program written for the Apple, not counting CP/M products. None comes close to *Word Handler* from Silicon Valley Systems. And one can readily see why, from his standpoint. It gets a movie exhibitor where he lives. Visually, viscerally. "That's one of the great things about *Word Handler,*" says Catanzano, echoing Silicon Valley's ad copy. "What you see [on the sixty-six character screen] is what you get on your printout. And that's the other beautiful thing about the program. It's all up there on the screen with the software."

Neatness Counts. What also scores at the box office with a movie exhibitor is packaging, and Silicon Valley has advanced the art of documentation. Instead of an oversized, intimidating loose-leaf with pages in wild disarray, we observe a small, tidy binder that's easy to look at and to read. "When you open it up, it doesn't give you a lot of verbiage to try to sell you on how to use the product," adds Catanzano. "It tells you plainly and simply how to use it."

Using it is made exceptionally easy, he says, by the simple logic of the control key strokes in the editing, insertion, and print modes. "If you want to do something with a line, you hit control-L. If you want to do something with a word it's control-W; bold, control-B; copy something,

control-C; format, control-F; and so on. It's just so simple."

Simple and yet sophisticated. Other program functions include a cap lock (permitting continuous typing in upper case), superscripting, vertical line spacing, variable line justification (allowing ragged and justified type within the document), searching in both forward and backward directions, and fold-sheet printing (a feature ideal for newsletters, a major Catanzano service). There's even a very useful function, overlooked by the documentation, that allows the typist to move the cursor from paragraph to paragraph (control-M).

Boldface Turnaround. The only problem that Catanzano's encountered, in fact, has been a certain incompatibility between *Word Handler* and his particular printer. He's had trouble generating a boldface printout on his IDS Prism Printer.

"Usually, when you call a software manufacturer," observes Catanzano, "you find that they're expecting a problem and they're ready to defend themselves; but these people at Silicon Valley are so nice, it's unbelievable. Every time I've had an occasion to call them, they've been very cooperative."

And so, it might be added, have the fates. The more Catanzano became involved with word processing for church groups, the more he recognized the need for secular spin-offs—a commercial extension of word processing services to local organizations and an even more ambitious project. About two years ago, he and his identical twin Jerry formed CATCO (for Catanzano Company). A diversified operation, it wholesales IDS printers, merchandises peripherals, offers consulting services, and designs custom software packages, drawing on the expertise of two resident programmers. A couple of research and development projects in progress: an interactive Bible storybook patterned after *Dungeons and Dragons* and a sophisticated program enabling a would-be Des Moines area dating service to mix and match as many as ten thousand lonely hearts.

Zing Went the Strings. In the process, Catanzano more than covered his initial $15,000 investment in hardware and software and gained a working knowledge of programming. But the big payoff, to hear him tell it, is emotional. He's simply doing good works and feeling better for it.

"There's a self-satisfaction but it isn't in the programming as such," he says, recalling work on a direct-mail solicitation for a local church group. "It was in accomplishing a goal with the program, in helping people."

It's people, says Catanzano, that connect his two worlds—the movies and computers. Both offer escapes from the tedium of life; both promise a greater congeniality and communication among their celebrants. Des Moines, after all, belongs to the Bible Belt, and Catanzano never loses sight of that cardinal fact of Midwest life.

"In addition to being in the film business, we're also involved in the community where we operate," he says. "We consider ourselves good citizens. We feel a responsibility to bring quality motion pictures of all types to the community."

That is the cinematic goal, but it is often frustrated by the products of Hollywood and the penchants of the movie-going public—even in Des Moines.

"The most severe limitation that we have is what Hollywood produces," says Catanzano. "There are things that we'd like to see made. I'd personally like to see the production of more family-oriented films. However, the film companies don't produce a lot of those films because, generally speaking, they don't make money. The things that sell in motion pictures primarily are, very frankly, sex and violence." Of the films made last year, 63 percent were rated R, Catanzano points out, which doesn't leave a whole lot left for G and PG rated products. For many producers, says Catanzano, a G rating is tantamount to the kiss of box office death with the prime movie-going audience in the sixteen to thirty-five year old age bracket.

When Good Is Bad. "When people see a G rating, they tend to say, 'Oh, that's a kiddie picture.' That's not true, but the producers will put in a swear word because they don't want the stigma of the G rating."

Catanzano is not a protector of public morals, though. His job, as he and his employer see it, is to select a money-making package of films for the chain's eighty indoor and drive-in theaters in Iowa and Nebraska. That may sound simple enough when you know your market, but in the mad, mad world of movie exhibiting it's anything but.

"It's a very strange and peculiar business to explain to somebody, because a lot of what happens in this industry runs counter to what appears to be good business sense." Take the case of blind bidding, a growing industry practice in which movie exhibitors bid on films before they're in the can.

"Would you buy a car from an auto dealer without test driving it?" he asks incredulously. "That's exactly how we feel about blind bids. In some cases we bid the picture before production has even started. That's when it becomes completely ridiculous."

The Law of the Cinema Land. All of which raises the question, why do movie exhibitors put up with it? According to Catanzano, they haven't much choice unless they operate in those few states that have declared the practice illegal, Iowa and Nebraska not being among them. There's a limited supply of films, essentially a single distribution source—namely Hollywood—and an increasing tendency industrywide to rely on up-front guarantees from exhibitors to secure financing for big-budget movies or prime playing dates during the peak Christmas and summertime release periods.

"The competition among distributors fosters blind bidding, particularly on play dates," Catanzano contends. "They don't want the other guy to get the jump on them."

Even without blind bidding, a movie exhibitor wagers at less-than-favorable odds.

"If Universal is selling *E.T.* and the film deal is ninety-ten with a seventy floor," says Catanzano, segueing into industry lingo, "then it's ninety-ten with a seventy floor for every single exhibitor in the country. Let's say we have a theater with an overhead of $3,000 and we gross $20,000. We subtract the overhead from the gross, leaving a balance of $17,000. Then we'd pay the distributor 90 percent of $17,000, or 70 percent of $20,000, whatever is greater."

A Piece of the Nut. On a blockbuster movie like *E.T.*, such arrangements can prove mighty attractive, but oftentimes an exhibitor is literally working for peanuts. "In some cases, if you're talking profit, concessions account for 100 percent of it," says Catanzano. "Distributors don't get a percentage of the concessions and they never will, because they'll effectively put every exhibitor in the industry out of the business."

Catanzano and Central States Theatre Corporation may occasionally lapse into wistful thinking about the good old days twenty years ago when the distributor/exhibitor split was more like 75/25, but they're evidently doing enough business to keep them in the game.

"If I had all the answers on what the public would buy," says Catanzano, "I'd be out in Hollywood making films and making a hundred million dollars. It's very difficult from a practical standpoint to pick out the successful films. I guess those of us who do it as a profession tend to guess right more often than wrong, which is why we're still in the business."

The larger question, of course, is what the nature of that business will be in five or ten years or even if there'll be a business. Television didn't kill the movies, but what about video games, video tape, and cable, not to mention the short-run effects of a lingering recession that has already cut box office receipts, particularly at drive-ins? Catanzano seems more concerned than worried. He just doesn't think the old tube can compete with the theater experience, with big screens, big sound, and the synergy of group emotion.

"How much can you enjoy a comedy in front of a television screen as opposed to in a theater?" he asks. "Laughter is contagious. All the emotions are."

The Bigger, the Better. When television reared its head in the fifties, Hollywood answered with wide screens, stereophonic sound, reserved seating—the really big show. Given the current challenge, Catanzano expects they'll answer with more of the same. In fact, producer/director George Englund (*The Ugly American*) has already previewed a possible prototype in Las Vegas and at the World's Fair in Tennessee—a wrap-around cinematic technique called Imax that evokes comparison with the Cinerama of yore. Catanzano foresees a number of technological breakthroughs keeping the competitive dogs at bay: theaters receiving pictures via satellite transmission, doing away with costly prints, and advances in

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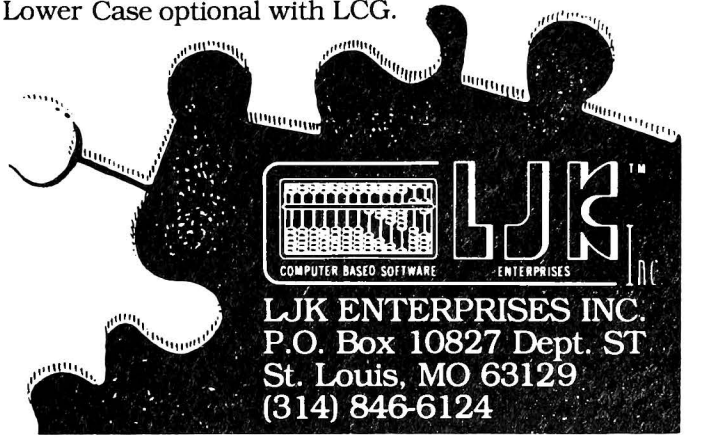
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3-D and holography making viewers literally feel a part of the film.

"It's really difficult to explain to people what good 3-D really is; they think of the arrow being thrown out in *Bwana Devil*, and that detracted from the story being told. I think in the future there'll be a better marriage between story and effect."

A case not in point, says Catanzano, is *Tron*, the Disney paean to computer graphics that bombed at the box office (and on Wall Street) this past summer.

"The computer graphics in *Tron* are absolutely out of this world," says an admiring Catanzano; "however, the story is very weak." All of which underscores a Catanzano box office maxim: People today go to see films, not to the movies. Movie-going is not the habit it was back in the Depression, when you could "slip an occasional stiff by the audience." Today's more discerning moviegoer, says Catanzano, demands a good product; stars can enhance a film, but they can't save a turkey.

Fickle Finger of Fate. Separating the winners from the turkeys is the hard part, for there's no sure-fire way of accounting for the public's fickle tastes. Quality alone is no guarantee of box office whammy. If you're a veteran movie exhibitor like Catanzano, you're resigned to that. Expectations about films, like plans about life, don't always turn out as you figured, so all you can do is try to think positively. And you savor the screen gems you called right, like *E.T.*, whose grosses exceeded your wildest estimates, and *Chariots of Fire*, which you had the prescience to book into a long run to build word of mouth.

"In some way, those good films are really our kind of contribution," says Catanzano. "It feels good to be associated with something that is upbeat and has good Christian and Jewish values.

"I hope *E.T.* goes on to be the number one film of all time, because that will mean the top two films in the history of the industry will be *Star Wars* and *E.T.*—classic cases of good triumphing over evil." ■

Olivieri's Outline of Word Processors

by Peter Olivieri

What equipment makes up a good word processing system? Generally, word processing systems come in two forms. The first is the stand-alone word processor. Designed specifically for word processing, this system usually has a video monitor, two eight-inch floppy disk drives, and a printer attached to it. Word processing systems like this are truly a dream to use. The keyboard is well-designed, with special keys labeled on the front with the name of a specific word processing task (center a line, delete a word, delete a sentence, or whatever). Some of the major manufacturers of these "dedicated" word processors include Digital Equipment Corporation, Wang, and IBM. These systems are relatively expensive.

The second type of word processing system you might encounter is a software package for use on a microcomputer. The equipment configuration used will vary, although the most common situation is one in which the system includes two disk drives and a printer.

There are, as you can see, some common denominators between dedicated word processing systems and word processing programs that run on microcomputers.

You'll need to have a monitor on which to view your document as you type it. There are all types of monitors. Some come with tinted screens and some give you the capability to display a full page of text exactly as it might look on a piece of paper.

It's nice if you can see your material displayed in both upper and lower case letters. Some word processing software packages require that you add a special board to your Apple to accomplish this, while others handle this problem with the software itself.

You'll need at least one disk drive. Clearly, having two increases processing speed and allows you to store more documents. The advantages of a hard disk system are obvious.

The printer is a key element in the system, since your documents must eventually exist in hard copy form. To many people, the quality of the print is the most important factor in their selection of a printer.

Typewriters That Think. When the term "letter quality" is applied to a printer, it's a way of saying that the output from that printer is of a quality consistent with what could be produced using a high-grade typewriter. Letter quality printers are expensive, ranging in price from $1,500 to more than $3,000. A decision about the kind of printer that will meet your needs is a decision only you can make. Some businesses simply will not tolerate documents or letters that look as though they were "printed by computer." Others are more forgiving.

Of course, all word processing systems are computer-based systems. It is the computer that gives systems the capability to move words around and to perform many of their fancy feats.

Using a word processing system on a microcomputer is almost as easy as typing. Essentially, all you do is place the disk containing your word processing program into the drive and start it up. You then begin creating your document. As you type each character, you see it appear on the video screen. During this process, there are a variety of commands you can issue to control what takes place. You can delete characters, words, or entire sentences; move text from one spot to another; capitalize it; underline it; or justify it.

At any point you choose, you can save what you have been working on and then recall it later when you're ready to modify or add to it. When you're satisfied with your document, you select a print option, issue instructions as to how your document should be printed covering such things as margin settings, line spacing, number of copies, and page numbering, and then press a button. Your document will now print, and the result will be just what you specified.

What Features Should You Consider? The features you want in a word processing system are precisely that—the features *you* want! These will vary from user to user and from application to application. For example, you may want a system that allows you to take data that is stored in your *VisiCalc* file and insert it into a document you're creating on the word processor. On the other hand, you may be more interested in hav-

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ing a system that takes customer names and addresses, merges them into letters, prints originals, and prepares mailing labels.

To help you decide what features you want in your word processing system, scan through the glossary in this month's column and make a note of those items you feel are essential ingredients of a word processing system you might want to own. The features defined there are among the major ones you'll find, to varying degrees, in some of the word processing packages currently on the market. In our profiles of the various packages later on, we'll indicate which features each includes. You can then compare your list with the attributes of various word processing systems and identify which systems possess the characteristics important to you.

There are a few other factors you might wish to consider when contemplating the purchase of a word processing program. One is the system documentation. How good is it? If the manuals that support that system are poorly written, it's very likely that you'll experience nothing but frustration when trying to use it. (In a way, it seems odd that a word processing manual might be poorly written. Oh well.)

Menus, Please. Does the system provide clear and complete menus that list the options available to you? Well-thought-out, menu-driven programs can be a lifesaver to both the experienced and the inexperienced user.

Word processing programs often call for you to use specially designated keys (or combinations of keys) to perform various tasks. If a program has a lot of different commands or command sequences to memorize, it becomes more complicated to use. Perhaps some of the vendors of word processing systems will begin releasing sticky labels that you can attach to the appropriate keys to indicate the word processing functions they serve. It would certainly be easier to remember, for example, that control-D means "delete a line" if the key had an appropriate removable label.

Another factor worth considering is whether you'll be using continuous form paper, single-sheet paper, or both. You must decide this by the time you are ready to purchase your printer since not all printers have the capability of providing both options. Some printers are friction feed only; others are only sprocket fed. And some have a special single-sheet feeder you can use to feed single sheets continuously into the printer. The important thing is: Know your printing needs and know your printer.

At this point, you should have a pretty clear idea of what a word processing system can do. In addition, you should be somewhat more familiar with the special features that might be part of such a system. Take some time to think about what the hardware requirements of your system are and about what word processing features are most important to you. During the next few months, we'll try to match your needs with what is currently available.

Word Processing System Features

Automatic paging: This provides for the automatic numbering of all pages, either at the top or the bottom of the page. Also, it's usually possible to suppress the numbering of pages if you like.

Centering: This results in the automatic centering of a word or a group of words. It's very useful when you're preparing headings.

Cut and paste: This capability is called by many names. What this option does is allow you to move a block of text from one spot in your document to another. If you've ever finished a document and then wished, upon rereading it, that a particular paragraph were somewhere else, this feature is for you.

Directory: Most systems have a facility for displaying a directory of all the documents currently on your disk. The directory might provide such information as the length of each document, the date it was created, the date it was last accessed, its name, and perhaps a brief description of its contents.

Displaying a page: This feature lets you see what a page in the document you're creating looks like. That way, if you have, say, a situation in which a single word at the end of a paragraph appears at the top of a page, you have the opportunity to alter your document as necessary for better appearance.

Document insertion: It's often useful to be able to insert one document (or a portion of a document) into another. This allows you to store text you use often and then to place it anywhere you wish in a new document without retyping.

Headers and footers: This capability allows you to place items at the top or bottom of a page. Chapter titles, the word "confidential," and page headings are all examples of headings. Footers might be page numbers, the company logo, footnotes, or even a special marketing message.

List processing: With a list processing option, it's possible to merge a list of data (usually names and addresses) with a document (usually a letter). The list processing task may also allow you to perform more sophisticated processing tasks. Some list processors allow you to specify a set of conditions for selecting which records from your list are to be merged with your letter. You could, for example, select only those records that had a state entry equivalent to CA and a personal income figure greater than $25,000.

Mathematics: Some word processing packages will actually perform some mathematics for you. For example, you may be creating a table that contains several columns of numbers and you may wish to have the "totals" become part of the final table. If your word processor has a math capability, this can be accomplished easily. If it's likely that your applications will require lots of calculations or mathematical processing, a system with a math capability is worth serious consideration.

Print control: How much control you have over what is printed depends in part on the word processing system you have and in part on the type of printer you own. Some capabilities worth thinking about are (1) underlining of words or phrases; (2) boldface printing (achieving a darker image by typing over a word a second time; (3) overprinting (for creating special characters, such as the not-equal sign); (4) page layouts (these include control over such things as the number of lines on a page, the size of the top and bottom margins, the spacing between lines, and the vertical spacing used); and (5) printing multiple copies.

Right justification: This refers to the fact that the right-hand margin is not "ragged" as is usually the case when a document is typed. When you use a word processing system that has the capability to right-justify, the right-hand margin will align perfectly, the way it does in this article.

Scrolling: This feature allows you to move through your document. By pressing a particular key, you can advance by word, by line, by paragraph, or even by page. Some systems also allow you to move quickly to the beginning or end of a document.

Search: When used alone, the search feature moves the cursor to the point in the document at which the word or phrase you're searching for first occurs. You can begin typing or inserting at that point, or you can move on to the next occurrence of the word or phrase.

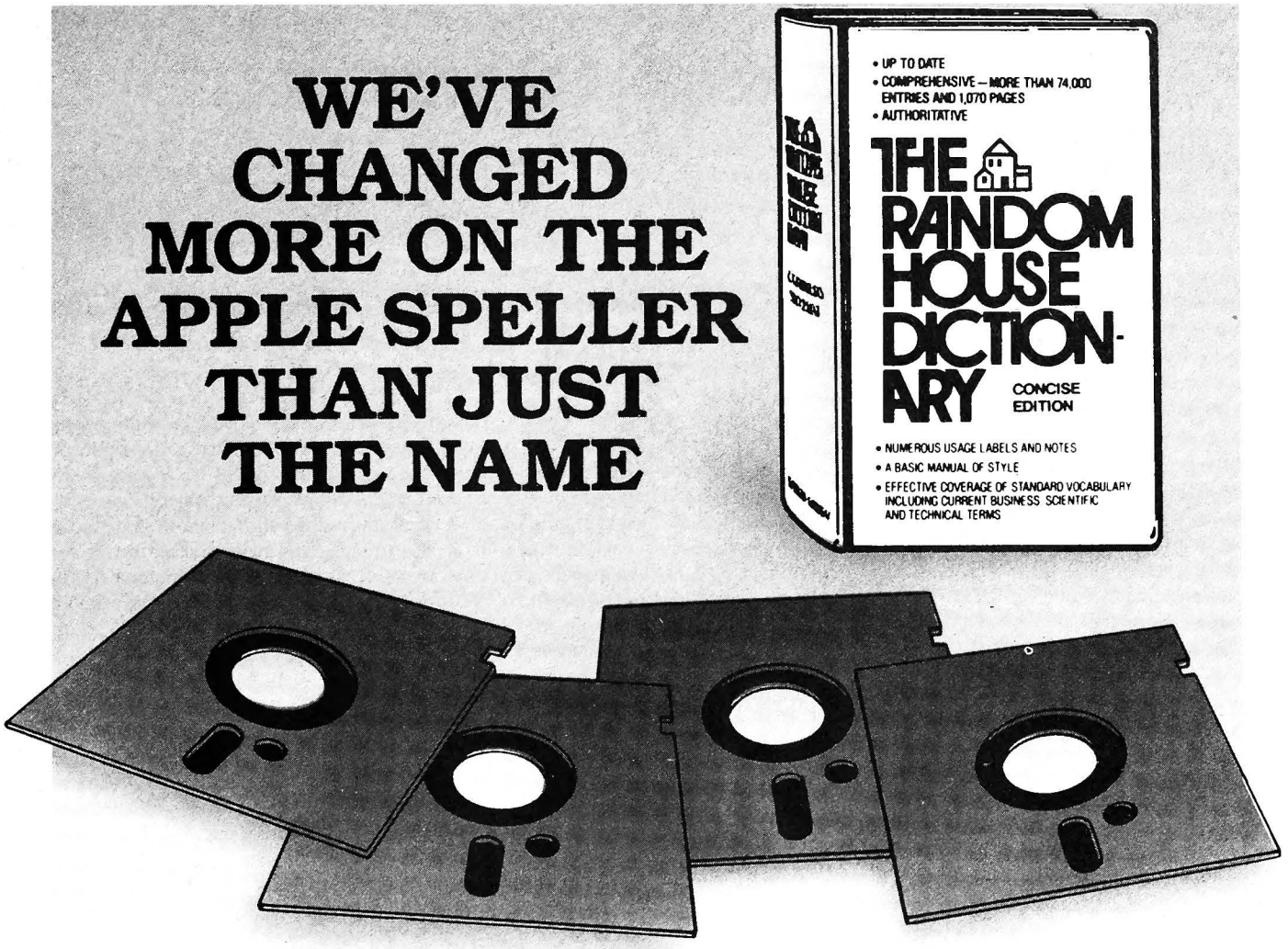
Search and replace: This feature allows you to search for particular letters, words, or phrases and replace them with other letters, words, or phrases. For example, you could change every occurrence of the word "color" to the word "colour" by means of a single command. Or suppose you were writing a document that frequently used the word "hexadecimal." Rather than type this word each time, you could type a # sign in its place and then use search and replace to replace all occurrences of the number symbol with the word "hexadecimal." Used in this way, search and replace can save a lot of typing time and may also cut down on typing errors.

Spelling checker: If you're a terrible speller, you may want to have an option that allows the computer to check your spelling. Some systems come with a 50,000 word vocabulary. There are even systems that allow you to enter special spellings of words that might be unique to your particular business or profession.

Subscripts and superscripts: Subscripts are numbers that are printed slightly below a letter or word (most often as part of a mathematical formula such as $X_1 + X_2 = 36$). Superscripts are printed slightly above a word and are most often used for identifying footnotes. If you have frequent need of either of these features in your writing, be sure the word processing system you select includes them.

Word wrap: This term refers to the fact that as you are typing and you reach the end of a line on your screen, the words "wrap" automatically around onto the next line; you don't have to press the return key. With word wrap, you no longer have to worry about accidentally entering the space that should be reserved for the right margin, typing "off the page," or splitting a word in half. ■

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- the hard cover RANDOM HOUSE DICTIONARY, CONCISE EDITION

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VENTURES WITH VISICALC

BY JOE SHELTON

Last month we set up a *VisiCalc* template to allow consolidations of data using both DIF files and normal *VisiCalc* files. We saw that the real key to doing consolidations is preparation in setting up the original template. Once that has been done, the rest is easy. This month we'll examine some ideas to keep in mind when designing templates, and we'll also design a template that may help you in your day-to-day life. In addition, we're starting a semiregular section for discussing and finding solutions to problems that might come up while you're completing a template.

Template Design. No matter how often you've done it, designing a new template can be a complicated task. It seems that once you decide on a method that permits easy template design, you find a new problem. And, invariably, once you've completed a template, you realize that you could have designed it in a different way that would make it (choose one or all): more compact/more logical/faster.

Recognizing that each template will be different, let's consider some things to think about when designing a new template. There's no set procedure for template design, so don't expect the answer here. Instead, look for hints and a clearer understanding. It helps if you look objectively at the template we're going to design. Don't look at what we are trying to accomplish; focus instead on *how* we are accomplishing it within the constraints of *VisiCalc*.

Today's economy being what it is, it seems logical to look at how *VisiCalc* might help you make ends meet. After all, as the saying goes, "Once you think you're about to make ends meet, somebody moves the ends!" Let's see if we can design a useful budgeting model.

If you purchased Apple III *VisiCalc*, you received a *VisiCalc Sampler* disk that includes a Personal Budget template. You might want to look at or use that template; the one we design here will be similar.

First Things First. The first thing to decide in designing any template is whether your objective is really within the capabilities of your Apple and *VisiCalc*. If you had hopes of putting General Motors's accounting system on your Apple, you're better off taking up kite flying. Be reasonable in your requirements and *VisiCalc* can help. (You *could* do a corporate analysis of General Motors's finances, for example.)

What's the next step? Decide what you are trying to accomplish, the component parts, and how you would solve your problem if you were to do it on paper. Think about our budget. From an operational standpoint, a budget is simply a cash flow analysis. A budget has two component parts: cash in and cash out. The bottom line is the comparison of these two values.

Next, list all the possible income (cash in) and expenses (cash out) you want to include. Remember to include occasional expenses (for example, car insurance) as well as to allocate money for clothes, entertainment, and so on. Look at housing, food, insurance, transportation—in short, everything you spend money on. You'll probably also want to include an entry for savings.

The next thing to do, before even turning your computer on, is to sit down with pencil and paper and sketch the basic layout of what you want to see in your printed result. It is infinitely easier to change your layout before you start the *VisiCalc* template than it is to make changes after it's completed. This becomes especially important if you plan on doing date conversions, having look-up tables, having antiforward referencing tables, and so on.

Once you have the basic idea of what you want to see, think about what's going to be required to achieve it. If your model is mostly values that will be summed, or columns or rows that will be added or subtracted, you won't have to worry about special considerations. But if you plan to do complicated computations (like date conversions with look-up tables), you should understand what will happen to your model if you have to expand it. If, for example, you have to insert a row or column that splits a look-up table, you lose the complete look-up function until you recombine the table. You also have to think about where to place look-up tables or groups of formulas that solve specific problems to minimize the number of recalculations necessary to finding the final solution.

The Overall Design. You can, of course, lay out the template in any manner you want. What we'll demonstrate here is just one method. There are probably going to be some similarities in most budgets. First you'll want to list and total your income and expenses in separate areas. It's beneficial to set up different expense categories with subtotals to help clarify where the majority of your expenses are. You'll also want to lay out the template in some periodic manner.

We're going to set up our template by months. If cash is tight, set it up by weeks. Which periodic format you decide on has no real effect on our template except that you need twelve monthly columns or fifty-two weekly columns for each year. You could even do individual periods in separate models for more precise analysis.

As you design and complete templates, two things will quickly become obvious. First, you rarely know or remember in the beginning everything you will include in the template eventually. Second, the size of the template and number of calculations *always* turns out to be larger than you planned. Your design must take these two factors into account.

Now boot *VisiCalc* and let's get to it!

Income First. Since your budget (and cash flow) would be pretty lopsided without cash coming in, we'll start with income. If you are part of a two or more income family, you'll want to list each of the incomes and then total them. This is a cash flow analysis, so enter take-home (net) pay rather than gross pay. See figure 1 for a sample income section. T.I. is an abbreviation for Total Income.

Now let's look at an example of planning template design to allow for additions (this works for expenses too). The formula in C5 could be either +C2+C3 or @SUM(C2...C3). We use the @SUM function rather than adding the individual incomes to allow for future expansion.

Suppose you take another job. Your additional income should be added to the Total Income. Then, rather than changing the formulas (fifty-two in all if you are doing weeks), you'll be able to insert a row between Income 1 and Income 2 and enter your new income. Your new income will automatically be added to the Total Income.

Want a better way to accomplish additions? In your @SUM expression, enter the cell containing the dashes below your last value (for

	B	C	D	E	F	G	H	I	J	K	L	M	N
1		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	Income												
3	Income												
4		---											
5	T.I.	0											

Figure 1.

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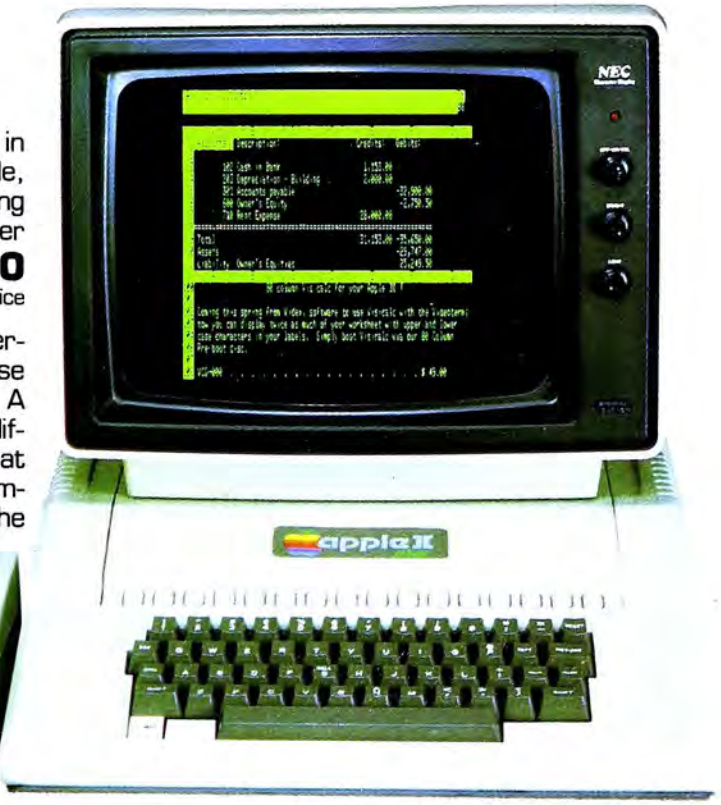


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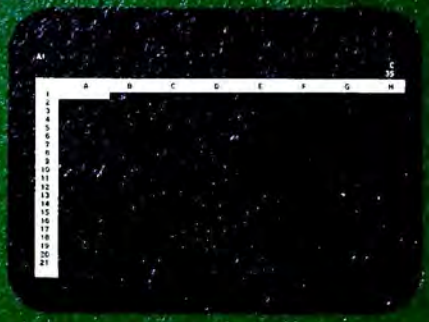
For those who need even more power, a more advanced version combines all the above features with the ability to use many of the memory expansion boards currently available. A configuration editor allows VisiCalc to use a mixture of different kinds of memory expansion cards. Just tell it what memory cards you have and which slots they are in. For example, you could use more than one language card equivalent. The memory cards can be combined to give you access up to 176 K of memory!

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VISICALC*



INTERACTIVE ELECTRONIC WORKSHEET **YES**

ON-LINE REFERENCE GUIDE **NO**

"NAMING" OF CELLS OR AREAS **NO**

PLAIN ENGLISH PROMPTS **NO**

INDIVIDUAL COLUMN WIDTHS **NO**

EXTENSIVE FORMATTING CAPABILITIES **NO**

PROTECTED CELLS **NO**

MULTIPLE, LINKED WORKSHEETS **NO**

SORTING CAPABILITY **NO**

VisiCalc® was a swell idea for then.

The next generation. First generation electronic worksheets were a good idea. They were early software management tools that could eliminate a lot of hours with a spreadsheet, calculator, pencil and eraser. Enter Multiplan, the next generation electronic worksheet that's as easy to use as it is useful.

Make comparisons. Compare Multiplan to any of the earlier electronic worksheets. We've given you some "prompts" above.

Compare learning time. Multiplan's tutorial book brings you up to speed. Fast. But Multiplan doesn't stop there. Multiplan's On-line Reference Guide gives you instant help if you have questions. It knows where you are in Multiplan and offers information related to your problem, right on the screen.

Compare ease of use. All Multiplan prompts are full length words or phrases. And Multiplan provides "naming," the ability to assign a plain English name to any cell or area. "Gross Profit = Sales—Cost" rather than "AA44=AZ23—BK154." Which means you can work more intuitively. And faster.

Compare utility. Multiplan lets you link related worksheets so that information is transferred between them automatically. For instance, you can keep regional sales forecasts on separate sheets but link them with your overall company forecast. Then, just change the forecast for any region, and the company forecast sheet is updated automatically. Something you can't do with first generation worksheets.

Compare reports. Not just the work you can do, but the way you can present it. Multiplan's flexible formatting options allow you to produce presentation-quality reports. And its sorting capability lets you sort by either alphabetic or numeric order. So a sales manager who normally lists sales regions alphabetically could sort by amount sold and conveniently rank by sales performance. The

*Based on features in releases VC 20280 AP2 and VC 156Y0 IBM of VisiCalc on the Apple II and IBM PC respectively.

MULTIPLAN



INTERACTIVE ELECTRONIC WORKSHEET **YES**



ON-LINE REFERENCE GUIDE **YES**



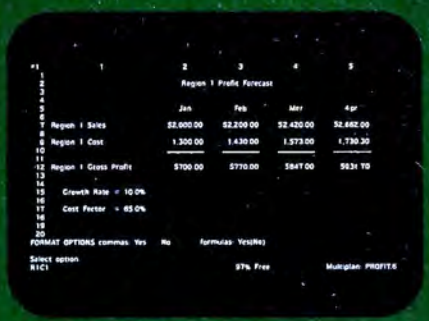
"NAMING" OF CELLS OR AREAS **YES**



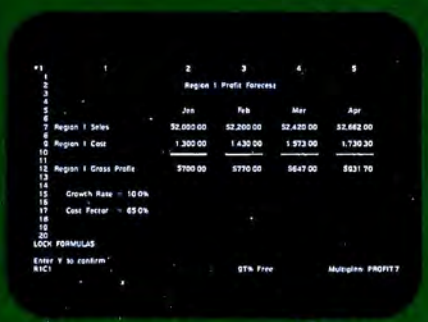
PLAIN ENGLISH PROMPTS **YES**



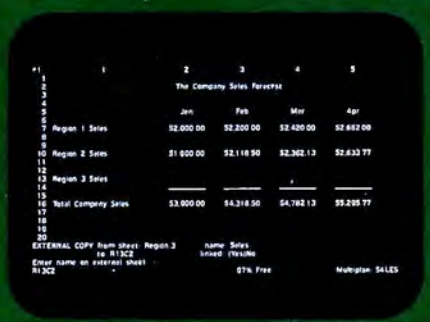
INDIVIDUAL COLUMN WIDTHS **YES**



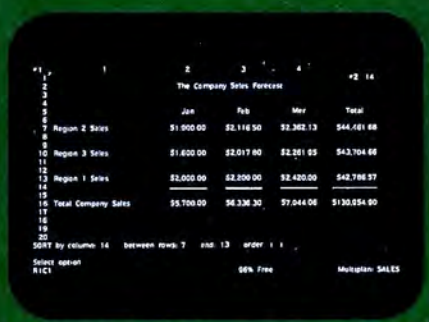
EXTENSIVE FORMATTING CAPABILITIES **YES**



PROTECTED CELLS **YES**



MULTIPLE, LINKED WORKSHEETS **YES**



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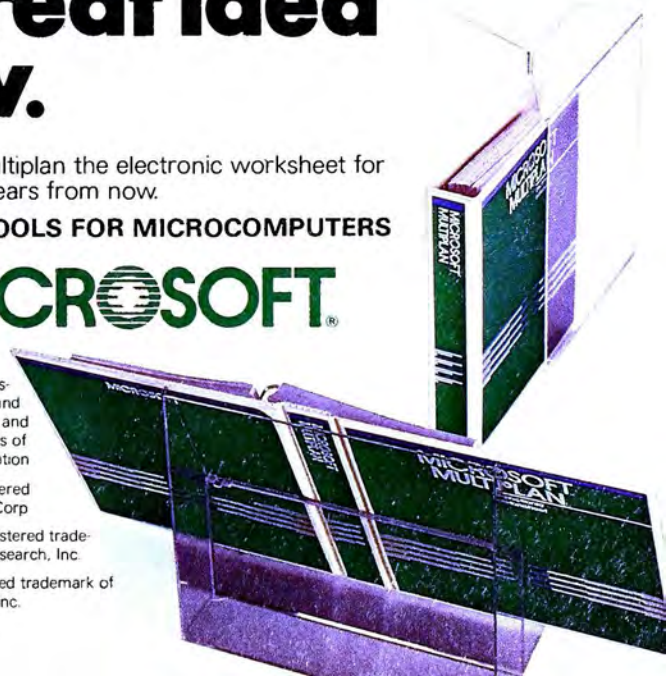
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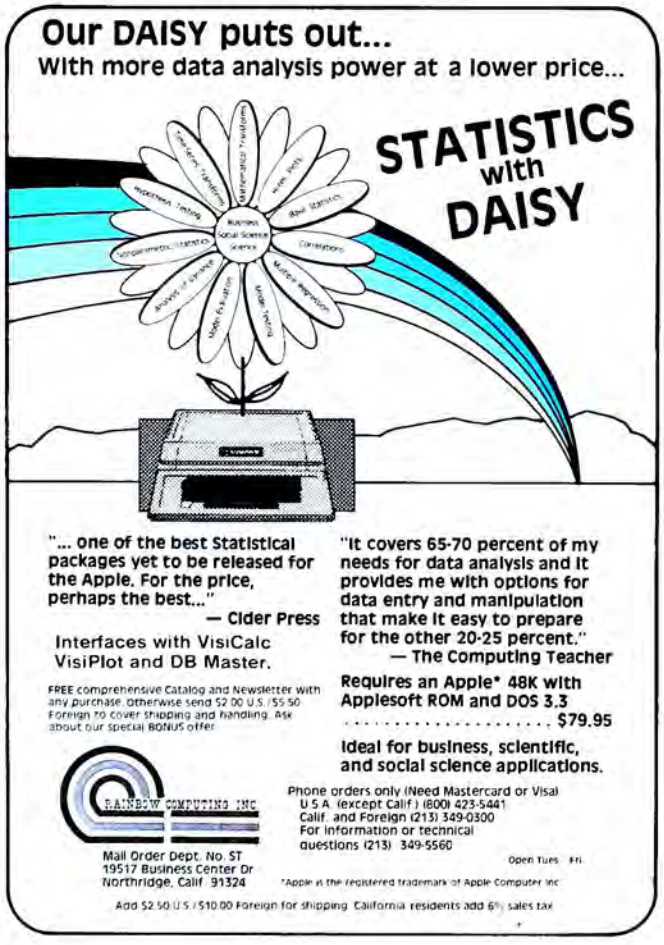
PERSONAL
- Barber & Beauty Shop
- Toilet Articles & Cosmetics
- Allowances

SAVINGS
- Bank
- Savings Bonds
- Credit Union
- Investments
- Stock Purchase Plan

Figure 2.

example, @SUM(C2...C4)). Then you can insert rows between your last income and the dashes and the rows will be automatically included in the sum. Recording any future additions to income or expenses will only require inserting a row and entering the values!

Use the same format to complete the expenses sections. We show a number of different expense categories in figure 2. You can enter as many specific expenses under each category as you want to and then sum each category.



Didn't think there would be so many? You should see the rest of the list!

Below the final expense category, enter TOTAL INCOME and below that TOTAL EXPENSES. Enter the cell reference for the sum from the Total Income cell above. In the TOTAL EXPENSES section, enter the cell references for the category totals for each of the expenses (for example, +C9+C14+C21 and so on). Below these, enter Total Cash Available (TTL CASH AVAIL) and enter the cell references for TOTAL INCOME minus TOTAL EXPENSES in that cell (+C55−+C56). See figure 3.

Replicating the formulas in each of the cells in column C across the template (using relative reference) gives you a basic budget template. Enter income and expense amounts in the appropriate cells and see the results. If you don't like the results, change some of the values and see what your new budget looks like. Remember "what if"? Now you have a perfect example.

Now What? The real world dictates that once you complete a template and find it workable, you'll want it to do something it doesn't. In the software development business, that paradox is called "creeping elegance." Let's look at a possible enhancement and how the design of our original template affects the way we implement our new feature.

From a cash management point of view, we'd like to see how expenses relate to our income. You could look at the totals and get a perspective, but corporations look at ratios and so can we. The idea is to compare each expense against total income. If take-home pay is $1,000 and rent is $500, then the rent expense is 50 percent of total income.

Some expenses, such as house payments, are constant and are not a variable part of the "what if?" scenario. Others, such as recreation, are highly subject to adjustment.

Look at the model we've constructed and decide which expense categories it would be logical to analyze. Consider two things. First, do you want to do this analysis monthly? Second, do you want to show these percentages with the rest of the budget, or in a separate analysis section?

For the sake of simplicity, we'll put the analyses below the expense category totals. You may have to insert rows under each expense cate-

A	B	C
54		
55	TOTAL INCOME	0
56	TOTAL EXPENSES	0
57	TTL CASH AVAIL	0

Figure 3.

gory total. If we had decided to put the analyses beside or under individual expenses, the model would have to be restructured by inserting additional rows or columns.

Suppose we had a look-up table in an area where an inserted row or column would affect it? The look-up table would have to be reentered. The fact that planning is an important part of template design is becoming more and more obvious.

Move to the expense total for the first expense category. Divide the Total Expenses for that category into the Total Income for the period. Do the same for the remaining categories and you have an analysis tool that will help you in planning your budget.

A Look at Problem Solving. This is the first installment in a semi-regular miniseries on solutions to problems you might encounter while designing templates. Its focus will usually be on using different functions and features in combination to solve normal design problems.

Let's start out with something prompted by a letter from a reader. The reader, a teacher, wanted a way to enter fifteen grades for each student and then to have *VisiCalc* automatically average the grades and assign a semester grade. The grade breaks are A = 90 to 100, B = 80 to 89, C = 70 to 79, D = 60 to 69, and F = 59 or less. We'll simplify matters by using *VisiCalc*'s @INT function to determine the integer value of the average.

Sound easy? It is, but before reading any further why not try solving the problem yourself and then compare your solution with the one given here? Incidentally, there are a number of methods for accomplishing this, so if you find the solution easy, try to figure out a second solution. To add another wrinkle, grades number 5, 10, and 15 count twice. In other words, they are for the midterm exams and count as two tests each. Hint—this gives a total of eighteen grades!

The Student's Bane. The first thing we must do is enter student grades. (In our example, we'll enter grades for just one student.) Enter 1 in cell A3. In A4 enter 1+A3 and replicate that, with relative reference, into A5...A17. This will indicate the fifteen individual grades and we will use it later. We are going to enter the grades vertically, but we could just as easily enter them horizontally. Next, enter random grades, between 1 and 100, into B3 through B17. See figure 4 for an example.

	A	B
3	1	89
4	2	84
5	3	93
6	4	88
7	5	95
8	6	87
9	7	85
10	8	88
11	9	90
12	10	94
13	11	88
14	12	90
15	13	91
16	14	89
17	15	97

Figure 4.

The next step is to compute the average grade for each student. You could use the @AVERAGE function, but does that really find our average? In this case, no—because we should count three of the grades as being worth two grades each. You could enter grades number 5, 10, and 15 twice and use the average function. But let's get tricky. Enter Average in A19 and the following expression in B19:

```
@INT(@SUM(B3...B17)+@LOOKUP(5,A3...A17)+@LOOKUP
  (10,A3...A17)+@LOOKUP(15,A3...A17)/18)
```

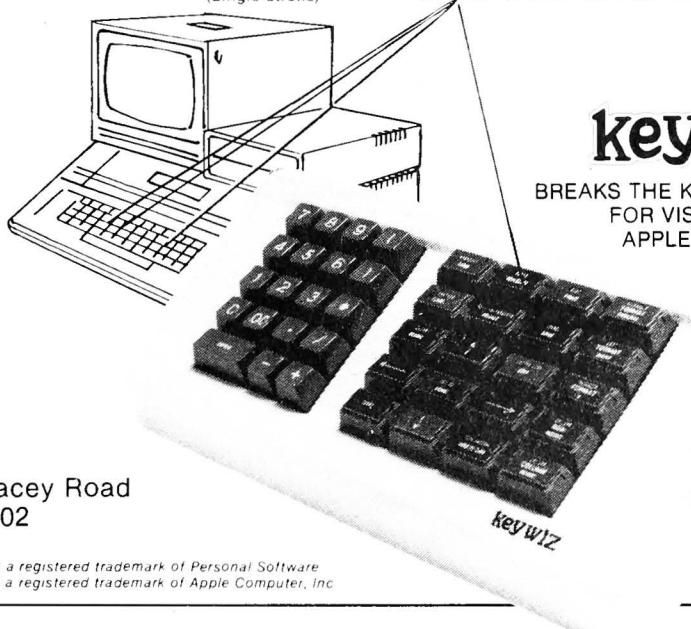
If this expression looks confusing, you could make it easier to understand by entering each component into a different cell, summing the components, and then dividing by 18 in a final cell. If you're thinking about model design, you'll want to do your computations in a separate

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area of the model and then reference the answer into B19.

The @SUM part of the expression sums each of the grades. Each of the @LOOKUP functions finds the look-up values for grades 5, 10, and 15 in column A and returns the value next to them in column B. They are added to the sum. Grades 5, 10, and 15 have now been included twice in the sum. The @INT function simply returns the integer portion of the total.

The expression computed a 90 point average for our example above. Had we used the @AVERAGE function on B3...B17, the average would have been 89—the difference between an A and a B grade!

One major advantage of this method is that grades 5, 10, and 15 are automatically summed twice. We have minimized the user's entries.

The next step is to determine the final grade. A look-up table is one easy method of accomplishing this. In addition, by using it we get to discover a little more about how to use @LOOKUP.

When designing a template, you'll usually want to place the look-up table away from the working part of the model. Enter the look-up table as shown in figure 5.

	H	I
12	Look-up	Table
13	0	0
14	59	0
15	60	1
16	69	1
17	70	2
18	79	2
19	80	3
20	89	3
21	90	4
22	100	4

Figure 5.

	A	B
3	1	89
4	2	84
5	3	93
6	4	88
7	5	95
8	6	87
9	7	85
10	8	88
11	9	90
12	10	94
13	11	88
14	12	90
15	13	91
16	14	89
17	15	97
18		
19	Average	90
20	Grade	4

Figure 6.

You'll notice that the values in column A define the beginning and ending values for each grade. The look-up function searches column A until it finds a value larger than the look-up value. It returns the value in column B next to the value equal to or smaller than the look-up value. Column B substitutes 4 for the A grade, 3 for B, and so on.

Now that we've completed the look-up table, let's compute a grade. In A20 enter Grade and in B20 enter @LOOKUP(19,H13...H22). That is your final grade. The final model should look like figure 6.

A Final Note. Those of you who share the feeling that *VisiCalc* is a powerful tool that anyone can use will be interested to learn that a junior college in the San Francisco, California, area offers a class entitled "Introduction to VisaCalc [*sic*], the 'Electronic Spreadsheet.'" We won't hold the misspelling against them; and isn't it interesting to see *VisiCalc* taught in the schools? New class members sometimes feel that the course should be listed under foreign languages! ◻■

VC-DOCUMENTER™

Translates Your VISICALC™ Model Formulas Into English

```
)F48:+F45*(1-F28)+F30
)F45:+F41-(F37*F24)-F26
)F41:(F39*F37)
)F39:+E39*(1+F35)
)F37:+E37*(1+F33)
```

Turns This

```
F48:  1983 NET INCOME =+ 1983 GROSS INCOME *(1- 1983 TAX RATE % )+ 1983 TAX CREDITS
F45:  1983 GROSS INCOME =+ 1983 REVENUE -( 1983 VOLUME * 1983 UNIT COST )- 1983 BURDENS
F41:  1983 REVENUE =( 1983 AVER PRICE * 1983 VOLUME )
F39:  1983 AVER PRICE =+ 1982 AVER PRICE *(1+ 1983 INFLATION RATE % )
F37:  1983 VOLUME =+ 1982 VOLUME *(1+ 1983 SALES GROWTH RATE % )
```

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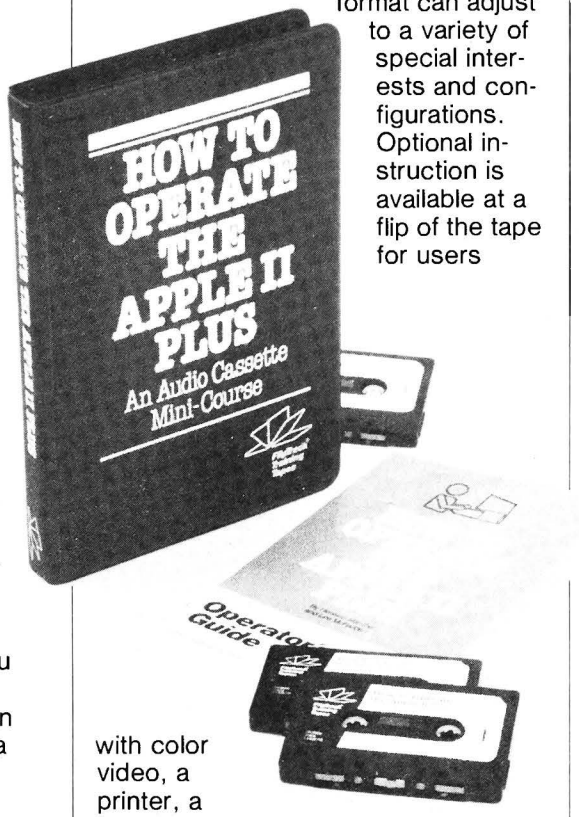
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Mind Your Business

BY PETER OLIVIERI



In many states, the arrival of the fall season is marked by special activities. Football games and tailgate parties have begun, and there's just a hint of the holidays on the horizon. For us this month, it's Mind Your Business as usual. We have two business user profiles, some Business User Group comments, and a product review.

Trying Before Buying. In July, we talked about how nice it would be if people who were considering the purchase of a software package could try it out ahead of time. This would allow consumers to experiment with several different programs and ultimately to choose the one that best suited their needs.

Now here's a variation on that idea. Marvin J. Plateis, a certified public accountant from Schenectady, New York, is half owner (with Dr. Marvin Englebardt, a dentist) of the Computer Assisted Self Help Center. The center has three Apples on which customers can rent time to do their computing chores.

Since the company doesn't sell software or hardware, customers can't try out an existing package before purchase. What they can do, however, is try out an Apple, and they can continue to use the Apple to develop applications that range from keeping financial or income tax records to improving their skill at blackjack. According to Plateis, a local restaurant owner uses the Apple in doing his payroll calculations and one of the contractors in the area is preparing job cost estimates with the aid of the microcomputer.

Customers pay eight dollars per hour for time on the machine. This doesn't seem prohibitively expensive, although it certainly could add up if you're a slow typist (aren't most of us?). The hourly rate includes a printed copy of the work you've been doing. If you're storing data, you can supply your own floppy disk or purchase one at the center for five dollars.

Users who encounter problems can get help; the center has hired students in the computer science program at the State University of New York at Albany as computer consultants. This can, indeed, save beginners a good deal of time. Center hours are 1:00 p.m. to 9:00 p.m. Monday through Friday; 10:00 a.m. to 6:00 p.m. on Saturdays.

The chance for a prospective Apple owner to get some hands-on experience before actually purchasing a system is perhaps the most valuable opportunity the center provides. For a very nominal cost (even if you were to spend several hours), it's possible to determine whether you can successfully operate a microcomputer, what some of the capabilities of such a machine are, what applications might be useful to you, and what equipment you'd need to meet your own special computing needs.

The next logical step for the center would be to maintain a library of software packages customers could try out before purchasing a particular one. Wouldn't it be great to be able to try out three or four word processing systems for twenty-five dollars before making that final purchase?

Apples Can Be Catching. It all started when Bob Singer, an ad salesman for two McGraw-Hill trade publications (*Electrical Construction and Maintenance* and *Electrical Wholesaling*), decided to invest in an Apple. His idea was that a microcomputer would make it easier to keep track of more than five hundred clients. Indeed, that certainly proved to be the case.

At present, Singer uses his Apple for a variety of tasks and applications. He maintains an up-to-date mailing list, creates promotional pieces using a word processor, prepares and prints letters, publishes his own monthly newsletter to keep clients informed about new products and services, prints out mailing labels, prepares reports for the sales manager, and prepares sales forecasts.

When they learned of the success Bob Singer was experiencing, members of the research division at McGraw-Hill decided that they, too, had uses for a microcomputer. In fact, according to research division director Gordon Ross, five people in the group now have Apples of their own at home. At the office, the fourteen members of the research division staff use two Apple IIs and an Apple III in their work. In addition, the sales, promotion, editorial, and finance departments have developed a variety of applications that take advantage of the Apples' capabilities.

Before the research division had Apples, staff members who needed computer services went through a costly and time-consuming interaction with a computer professional who had to translate their requests into language the computer could understand. They were glad to discover that in the world of personal computing, you can make use of the computer without knowing how to program since, in most cases, you can use an existing package to accomplish the application you have in mind.

Applications in the Research Division. The Apple that gets the most use in the research division is a 64K machine with two disk drives. It has an eighty-column card that's used primarily in word processing applications and a Z-80 card for CP/M applications. Within the division, many of the applications center on performing extensive market research.

Word processing was one of the first applications the Apple was used for. The research division developed numerous questionnaires on a regular basis, and these often had to be redone five or six times when they were typed up by hand. A word processing program speeded up the process a lot.

Easy Writer Professional was the first word processing program the division got. They found that it was not an easy program to learn to use,

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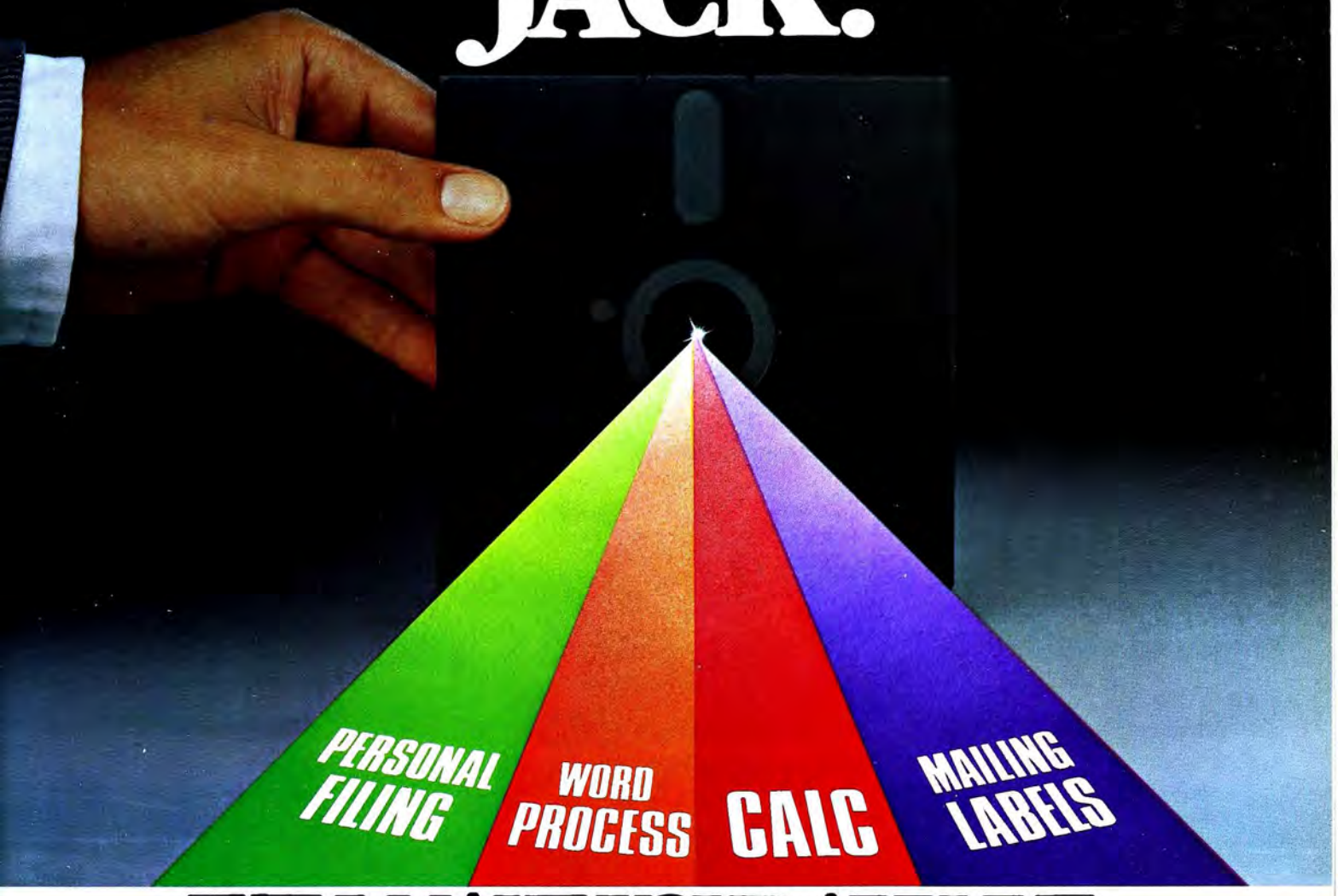
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especially for beginners, although they discovered that the learning went along much more rapidly once they had an understanding of the basic concepts and mastered the fundamental vocabulary.

Mailing lists constituted another important application area, since the company communicated with three reader research panels on a fairly constant basis.

A database package was used for keeping track of budget records. With it, weekly budget reports could be printed up. These reports gave summaries of expenses on projects that might have had bills from fifteen different suppliers over a three or four month period.

We all make "to do" lists, but not all of us create and store them on the Apple. The research division used *Apple Project Manager* as a way of reminding themselves about tasks that needed to be done. The package was originally designed to keep track of the progress of construction projects, but it was used in the research division to produce a calendar of events for each step of a project from start to finish. The project in this case was a large-scale mail survey. Since the calendar was circulated every two weeks to all who were involved in the project, everyone was aware if the schedule slipped or got ahead of the calendar. Relationships among people working together on the project improved considerably.

The division had not intended to use the Apple for tabulating the results of surveys. But since they had both *VisiCalc* and *The Data Factory*, it was inevitable that these tools would be put to use, particularly on some of the smaller jobs. *VisiCalc* is also used in estimating the cost of a survey. Indeed, once those involved became familiar with all the options available in *VisiCalc*, they were able to use it in estimating survey return rates, tabulation costs, and production costs.

Having used the Apple for approximately a year on a part-time basis, members of the research division feel that they are just beginning to realize the potential benefits it makes available to them. They anticipate that there is, indeed, much more learning to be done.

Business User Group. A reminder to you BUGs out there to send in your comments on printers and word processing packages as requested last time. Also, if you want to be an "official" member, please send your name and address, along with a little bit about your interests and skills. If we get enough response, perhaps we can create a directory.

One of our business users helps other business users. Paula Ozols is from Prairie Microsystems (Eden Prairie, Minnesota). Her company specializes in software development and computer services. Lately, the firm has been busy installing Apple IIs and Apple IIIs in the Twin Cities.

Oddly enough, however, they have found some businesses that have had Apples for as long as six months to a year but are not using them to any extent.

This seems surprising at first, although a moment's reflection suggests that the reason may have something to do with first-time users feeling intimidated when it comes to using the computer. There may, in fact, be a lot of Apples out there gathering dust . . . just waiting for an advocate in the company to awaken others to their potential.

Ozols reports that the two areas in which her company has the most requests for training are *VisiCalc* and database management systems. Having worked extensively with *DB Master*, *VisiFile*, and *PFS*, Ozols generally recommends *DB Master* to all but the least sophisticated user. Because it is an extremely powerful piece of software, a fair amount of time and effort must be spent learning to use it. An especially nice feature of the package is provided by the *Utility Pak #1*. This feature allows you to use *DB Master* files with other programs.

Users of *The Accountant Finance Database System* (Decision Support Software) are getting a free newsletter. This publication provides answers to readers' questions, alternative ways to represent financial transactions, announcements of enhancements and new products, and tips on using various options in the program.

If you're using *The Accountant* and are not getting this newsletter, contact Decision Support Software.

Are You in Voice? Micro Lab has a package that has been designed to handle the accounts receivable functions for a business that ships products. The package is called, appropriately enough, *The Invoice Factory*.

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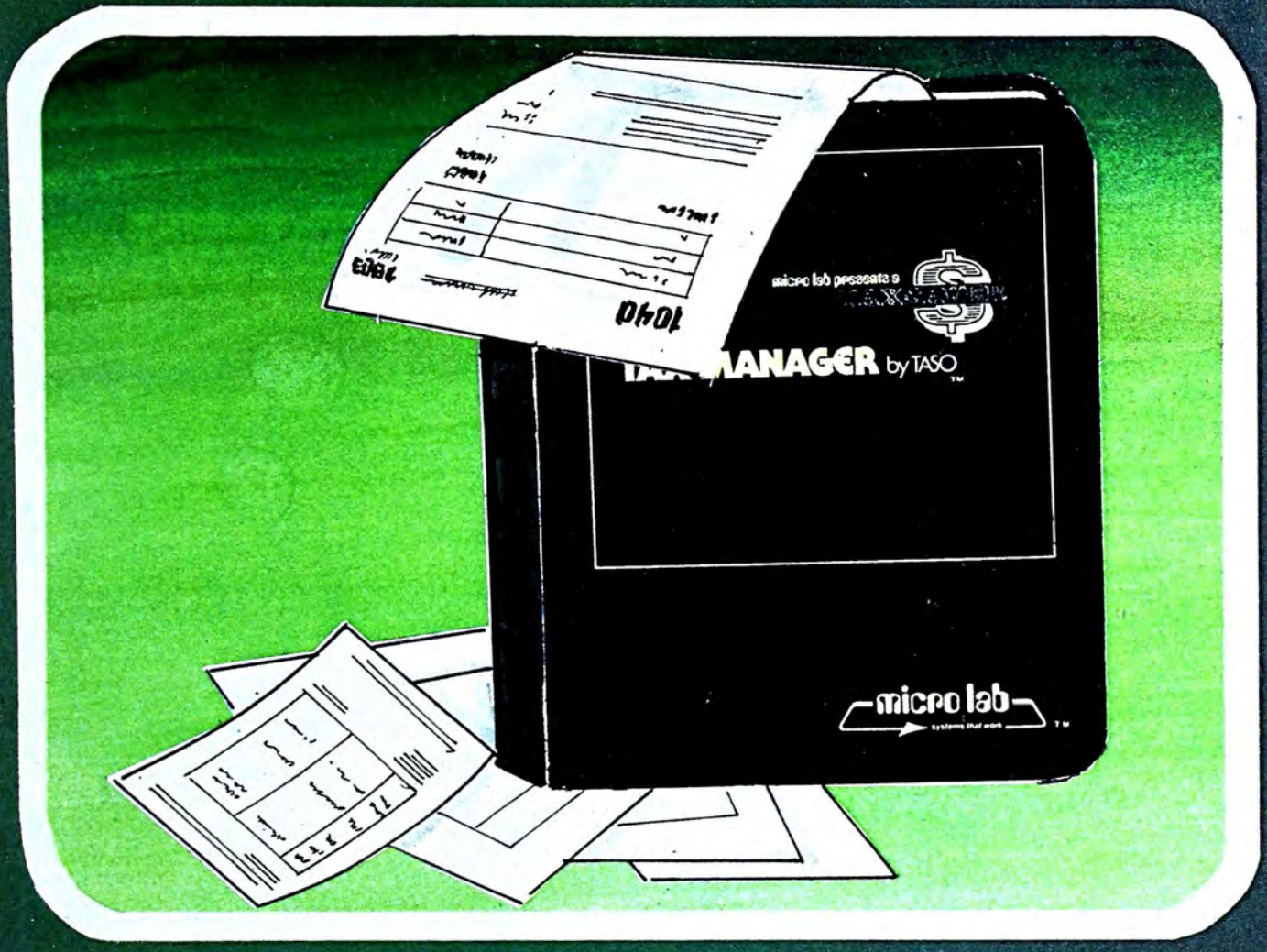
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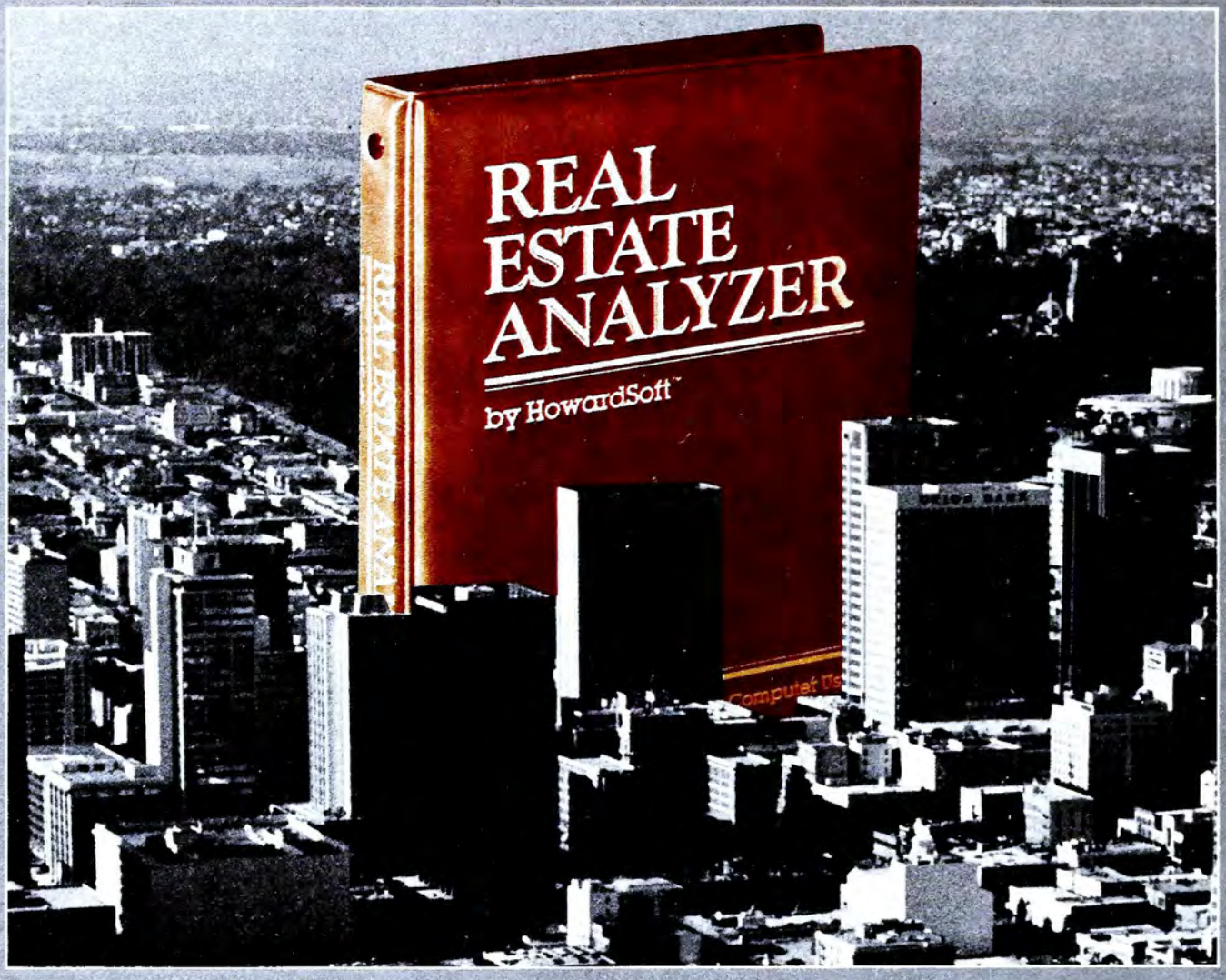
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plesoft in ROM, two disk drives, and a printer. *The Invoice Factory* is compatible with *The Data Factory* (a Micro Lab database management system), so it would be useful if you had that package available also, although *The Invoice Factory* does work as a standalone system.

As the name implies, *The Invoice Factory* prepares invoices. The program can handle as many as 550 active accounts, although you may only have 275 active accounts in the system (on line) at one time. This is about equivalent to the contents of one floppy disk. If your business has more than 275 customers, they can be accommodated; you'll just have to pair certain disks when using some aspects of the system.

The first step is to create some data. The information that can be recorded about a client includes an account number; the customer's name, address, and phone number; a contact person; salesperson number; shipping address; sales tax code; the terms (for example, net 1 to 30); a credit limit; a method of shipment; and a comments field.

Next, you're asked to enter information about shipping. Up to nine sales tax rates can be entered (these were identified by code earlier when accounts were set up). COD cost, handling cost, and UPS shipping data should then be entered. Of course, the UPS shipping information is automatically tied to the standard UPS shipping zones and the ZIP code in your own area. Finally, you can enter product, price, and weight information. *The Invoice Factory* can record data on up to one hundred products.

At some point, it comes time to enter specific invoice data. Three different types of invoices can be prepared.

The *standard invoice* allows you to select any of the one hundred products you have entered, and up to six products can appear on one invoice. The invoice you create is saved to disk for later printing. The *auto invoice* is used when you have several invoices that have the same product content but are for different customers. Those invoices can be sent to all the accounts in your master account file or to accounts you select. The third invoice, the *freeform invoice*, is very different from the other two. With this option, you can enter up to twelve products on an invoice; you enter product descriptions, prices, and so on, and the invoice is printed immediately after you finish. It is not saved to disk, so you can't perform any of the sales analyses available in this package when you select the freeform option.

Since we all make errors when entering data to these unforgiving machines, *The Invoice Factory* includes a procedure for editing the data entered. You can then search for a particular invoice in a variety of ways (by account number, customer number, date, and so on). It's easy to look at other invoices while you're in the edit mode.

Eventually, it will be time to print the invoices. Since they've been saved to disk, this can be accomplished rather easily. Some sample invoice forms are standard forms on tractor-fed continuous sheets and are as attractive as most we've seen. You are then given some instructions on preparing your printer for the printing process. When these instructions have been followed, all of your invoices will print.

After the invoices have been printed, you may wish to send out statements. Simple statement forms are also included with your purchase. While these statements don't have your company name and address on them, *The Invoice Factory* user manual has a listing of a program for the Epson printer that allows you to print your company information on the top part of the form. An order form that enables you to order your own forms directly from the manufacturer is also included.

When payments start to come in, you can use *The Invoice Factory* to record them. The program accepts the appropriate information about a customer and then posts the receipts. This part of the package is very powerful. It allows you to identify each invoice, including overpayments, void invoices, underpayments, and so on, and a second option can be used to resolve overpayments.

Finally, the package allows you to generate a dozen special reports. These reports are:

1. accounts receivable by invoice number
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8. a sales analysis (you can analyze up to ten products at a time); one

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of the more powerful parts of the package, this is particularly useful in conjunction with *The Data Factory*.

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While there can be a good deal of disk swapping with this system, it is quite easy to get accustomed to and to use. As usual, Micro Lab has included backup copies of all the program disks. You can also get replacement disks at nominal cost.

The user manual is clearly written. It would have been preferable if the manual had included screen images (or representations) of various menus. Even though the manual is meant to be used in conjunction with the program, it would have been more useful if these screen images had been included.

John Stalnaker of Sarasota, Florida, writes to warn prospective Apple III users not to assume that all software written for the Apple II will work on the Apple III. Although the Apple III comes with an emulator program on disk that allows the computer to think it is an Apple II, this does not guarantee that software will work on both machines.

Stalnaker found that *The Home Accountant* from Continental Software, described in an earlier column, does not work in the emulation mode on the III. Continental, a company that is most responsive to customer questions, does not imply that *The Home Accountant* will run on the Apple III, since it was designed for the Apple II Plus. The point Stalnaker wants to make is that the purchaser of Apple II software for the Apple III must be aware of whether or not that particular package works on the III. He has found that, in general, local sales people don't know the answer to this question.

The Readers Speak. "I just wanted to let your business readers know that they should be serious about computer security. We recently set up a microcomputer lab with ten Apples. Since the lab was in a main office building, very little thought was given to the possibility of someone walking off with a machine.

"Well, no one walked off with a machine. However, we have "lost" two of our *VisiCalc* disks, one DOS 3.3 disk controller card, two sets of paddles, and several blank disks. We now have a system to prevent this, but it was a bit too late for us. Perhaps our experience will prevent the same from happening to someone else."—At a Loss, Cambridge, Massachusetts.

We agree with you that business users tend to be less serious about the question of security when it comes to microcomputers. We recommend that the machine itself be permanently attached to a desk or table (this includes the disk drives and the monitor). It's particularly important to be sure that the cover of the Apple can't be removed easily (would someone really remove a chip?).

Software should be kept in a central location and issued by one person. Users should sign software out when they need it. This is a minor inconvenience, but it ensures that the package will be available when they need it. Of course, backup copies of software should also be kept in a secure place. There are even situations in which it wouldn't hurt to restrict access to the computer itself.

While we're on the subject of security, let's talk about an aspect of this issue that is often overlooked. As you know, a programmer (or competent computer person) is capable of causing your computer system to do some strange things. Sometimes these things are funny; other times they're not so funny.

So if you have a programmer working on a system for you, it's important that you recognize the control this person has over your system. Build in safety checks, particularly for financial systems. Have an independent auditor check your system occasionally, and don't take your system for granted. Doing so may turn out to be an expensive mistake.

Well, that's about it for October. Take care, and keep those cards and letters coming. Hope to have you back as a reader next month. ◨

Computer Assisted Self Help Center, 1019 Keyes Avenue, Schenectady, NY 12309; (518) 377-2296. Continental Software, 11223 South Hindry Avenue, Los Angeles, CA 90045; (213) 417-3003. Decision Support Software, 1438 Ironwood Drive, McLean, VA 22101; (703) 241-8316. Micro Lab, 2310 Skokie Valley Road, Highland Park, IL 60035; (312) 433-7550.

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THE ANIMATED APPLE With GraForth Part 2

BY PAUL LUTUS AND PHIL THOMPSON

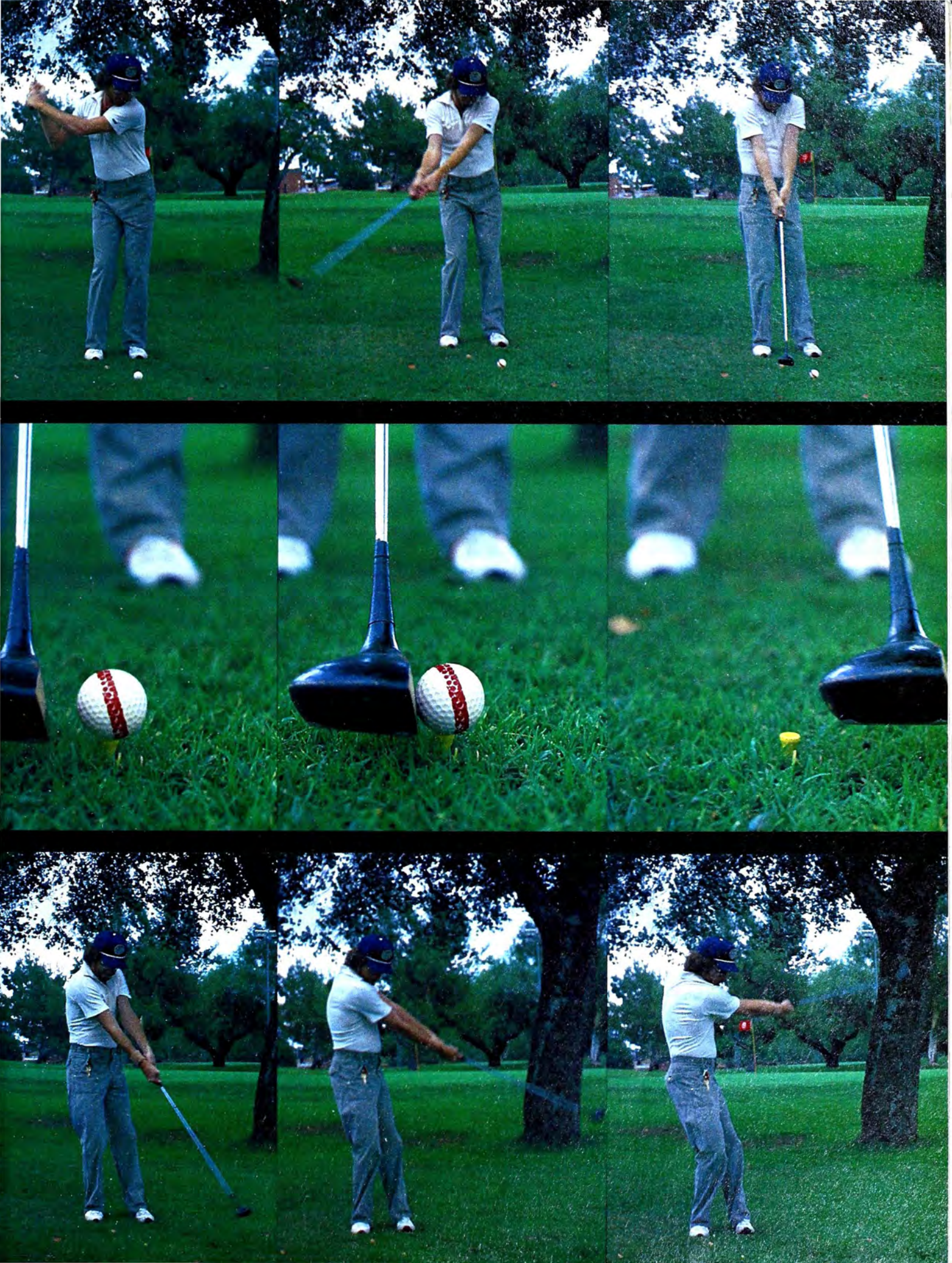
Last month, we introduced GraForth and discussed a number of its special language and graphics features. We also promised to show how to create animations using character graphics. Before we start, let's take a look at some of the more advanced conditional and looping commands available in GraForth.

The branching and looping capabilities of GraForth are much more varied than those of Basic. There is only one branching command found in Basic that GraForth does not have a parallel to: goto. However, GraForth has a number of constructs not found in Basic that not only make the goto unnecessary, but increase a program's readability as well.

The simplest is the *if–then* construct, which is similar to Basic's. In either language, a test is made, and if the test evaluates as true, the code following the test is executed. The format for GraForth's if–then is somewhat different, though: A test is done before the word if, leaving a number on the stack. If the number is nonzero (meaning true), the words between the if and then are executed. If the number is zero (false), then the words are skipped and execution continues after the then. Here is an example of if–then, along with a similar statement in Basic:

```
GraForth:   X 5 = IF
              L 1 + -> L
            THEN
Applesoft:  40 IF X=5 THEN L=L+1
```

The first extension to Basic-like capabilities comes with *if–else–then*. This works like *if–then*, except that if the test is true, the words between the if and else are executed; otherwise the words between else and then are executed. This allows for a simple choice between two options and clearly defines the program statements for each.



```
GraForth:   X 5 = IF
              L 1 + - >L
            ELSE
              L 1 - - >L
            THEN
Applesoft:  40 IF X=5 THEN L=L+1 : GOTO 60
            50 L=L-1
            60 ....
```

Last month we discussed do-loops (similar to Basic's for-next loops). GraForth provides two looping constructs to simplify programming when the number of repetitions is not known ahead of time. The first of these is *begin-until.* In a program, the words between the begin and until are executed, then until removes a value from the stack (placed there by the previous words). If the number is zero (false), execution loops back to the words following the begin. This loop continues until the top stack value is nonzero (true) when the until is executed.

```
GraForth:   BEGIN
              L 1 + - >L
              X L * - >X
              X 1000 >
            UNTIL
Applesoft:  40 L=L+1
            50 X=X*L
            60 IF X<=1000 THEN 40
```

Another looping construct, *begin-while-repeat,* allows the test to occur before a group of words are executed. Control is first given to the words between begin and while. While removes a number from the stack. If the number is nonzero, the words between the while and repeat are executed, then the loop repeats back to the begin. If the number is zero, then the program hops past the repeat and continues from there. (It's easiest to remember that the second group of words are executed *while* the test is true.)

```
GraForth:   BEGIN
              X L * - >X
              X 1000 <=
            WHILE
              L 1 + - >L
              M L + - >M
            REPEAT
Applesoft:  40 X=X*L
            50 IF X>1000 THEN 90
            60 L=L+1
            70 M=M+L
            80 GOTO 40
            90 ....
```

The last test construct, similar to Basic's on-gosub, is *case:-then.* Here, a number of separate words appear between the case: and then. The word case: removes a number from the stack to select and execute one of the words. A zero selects the first word, a one selects the next, and so on. The program continues following the word then. Each word in the list can, of course, be a complicated routine itself, calling many other words.

```
GraForth:   CASE:
              COLOR.IT
              DRAW.IT
              UNDRAW.IT
            THEN
Applesoft:  40 ON X GOSUB 100, 150, 200
```

As we discuss various aspects of animation in future columns, we'll be using these branching and looping words quite a bit. In introducing character graphics animation, however, we're going to rely on the good ol' do-loop construction.

In the GraForth demonstration program (*Graphics of the Second Kind*), you can see an animation of a small man walking across the screen. The man (actually the collection of images making up the man) is called Maxwell and originated from Apple Computer. Maxwell is an example of character graphics. We'll discuss the basics of animation with character graphics and present a short program showing how to make Maxwell walk across the screen.

When GraForth first boots up, it loads its standard character set, which is simply a table containing the shapes of all of the printable characters. Whenever a character is to be printed on the graphics screen, GraForth looks up the shape of the character in the character set and draws the character at the appropriate position on the screen. The GraForth disk contains a number of character sets, with different shapes for each character. These shapes can be either various lettering styles, other symbols or images, or parts of larger images which are printed as a rectangular block of characters.

Maxwell is an example of this last type of character shape. The character set Chr.Maxwell contains three separate pictures of Maxwell, showing three phases of a single walking step. Each picture, or block, is two characters wide by three tall, using six characters in the character set. Each individual character makes up one-sixth of the block.

The GraForth manual discusses how to create character shapes and plot individual character blocks on the screen. The plotting process can be broken into a few simple steps: (1) Load and select the desired character set, (2) set the size of the block to be printed with *blksize,* (3) position the cursor with htab and vtab, and (4) print the desired block by calling *putblk.*

Animation with character graphics, as in cartoons, is created simply by rapidly displaying a number of still images one after another, creating the illusion of smooth motion. This is precisely what happens when Maxwell walks across the screen. The three character blocks are repeatedly displayed in order and moved to the left across the screen.

Before we do any programming, let's have a look at what we're about to animate. Start by loading the GraForth character editor into memory:

```
READ " CHAREDITOR "
```

The disk will whir as the character editor is read and compiled into memory. Since the program does not automatically clear the screen (a feature we'll find very useful in future columns), do so now and run the character editor program:

```
HOME RUN
```

Get (G) the character set named Chr.Maxwell and type D for Display. At the bottom of the screen (in inverse) you will see many standard characters and a number of different shapes that are the images that make up our Maxwell character. The shapes have been redefined to look like a walking man, rather than alphanumeric characters.

Type B and select a Block size of two characters wide by three tall. Now type R, then the number 64, to Read the two-by-three character block that begins with character number 64. The first of the three Maxwell images will appear in the upper left corner of the screen.

Now read from character number 70, then from number 76. This will display the other two positions of Maxwell. Note that each of them shows him in different stages of walking, moving from right to left within the character block. Read each of the three images in turn back to the screen again, one right after another. You have just performed a simple animation: Maxwell has taken a step. (That's one small step for Maxwell, one giant leap. . . .) A GraForth program that shows Maxwell taking one step (not very exciting yet) would simply display each of the three images in turn.

The next step is to convince Maxwell to walk all the way across the screen. That's not at all difficult to accomplish, but it does require a bit of planning. As Maxwell took his one step, note that his upper body moved smoothly from right to left, nearly an entire character width. If we start the three-part animation over again, one character position to the left, his upper body will continue its smooth leftward motion as his legs maintain their stride.

There is one more thing to consider: When we showed Maxwell taking only one step in the character editor, each character block was cleanly drawn over the top of the last one, completely erasing it. But if we start

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shifting the blocks one position to the left, then the right side of the previous two-character wide block will still be visible after the new block is drawn. It's up to us to erase it. Fortunately, GraForth has a command to do that. It's called *unblk*.

Let's write an actual program to animate Maxwell. We'll build it in four steps, using separate word definitions for each step. You can type the entire program into the editor, compile it, and watch it run; or you can enter each word definition one at a time and see how each word builds on the last. If you choose the latter, we do have one suggestion, which is best demonstrated: Type Q to Quit the character editor, then type:

```
2816 CHRADR
```

Location 2816 is the default address used by the character editor, and thus is the current address of the Maxwell character set, still in memory. Chradr selects this as the character set to use when doing character graphics or displaying text. The prompt, Ready, will appear as a combination of letters and pieces of Maxwell. You can see that the Maxwell character set was never intended for normal text display! Recover the normal characters by typing either *chrset*, *chradr*, or *abort* (cheaters can press the reset key).

The moral of the story is this: After using character graphics, remember to return to the system character set if you want things to make sense. Enter the following short word definitions:

```
: IN ERASE 2816 CHRADR 0 VTAB ;
: OUT CHRSET CHRADR 15 VTAB ;
```

In clears the screen, sets the character set (in this case, the one at memory location 2816), and moves the cursor to the top of the screen. *Out* puts us back into the system character set, and moves the cursor down so that the graphics won't be overwritten by text. In and Out can be helpful when used before and after any immediate mode character graphics work.

If you didn't follow us through the character editor example, you'll need to load the character set into memory and select the block size before continuing:

```
CR 132 PUTC PRINT " BLOAD CHR.MAXWELL,A2816 " CR
2 3 BLKSIZE
```

Now, on to the example itself. GraForth is fast enough to draw many large character blocks on the screen quickly, so with a single small block like this, a delay loop is needed each time the block is drawn. Without it, Maxwell would skitter across the screen like a paper doll in a hurricane. The animation starts with the following word definition:

```
: ONE.FRAME
  PUTBLK
  1000 0 DO LOOP ;
```

The word *one.frame* removes a number from the stack, which is used by putblk to select and draw the appropriate character block; then it waits for a moment. (A loop to 1000 in GraForth takes about a tenth of a second.) To see one.frame work by itself, you can type:

```
IN 64 ONE.FRAME OUT
```

This selects our Maxwell character set and draws the first of the Maxwell images. It then returns us to the normal set and stops. One.frame can be called once for each of the three blocks that make up one walking step:

```
: ONE.STEP
  64 ONE.FRAME
  70 ONE.FRAME
  76 ONE.FRAME ;
```

If you want to see this much in action, type:

```
IN ONE.STEP OUT
```

Here's another way to do one.step. This version simply uses a loop to do the same sequence:

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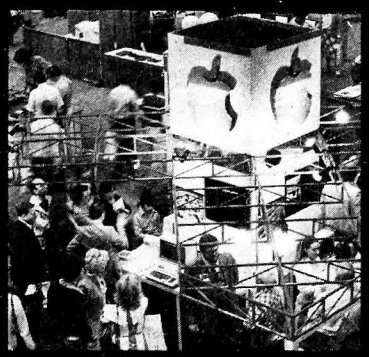
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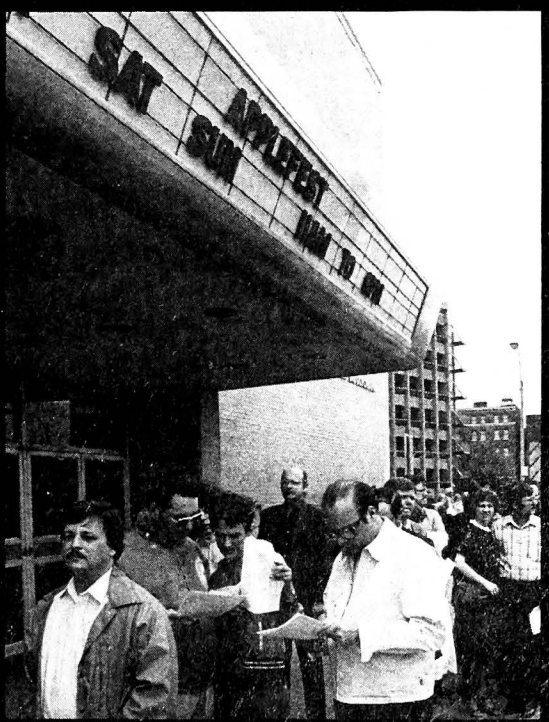


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```
: ONE.STEP
  77 64 DO
     I ONE.FRAME
  6 +LOOP ;
```

Next is the word definition that runs the show:

```
: WALK
 -1 37 DO            ( Start a loop to move left across the screen )
    2 3 BLKSIZE      ( Set the 2 by 3 block for Maxwell )
    I HTAB           ( Tab to the position set by the loop )
    ONE.STEP         ( Have Maxwell take one step )
    1 3 BLKSIZE      ( Set the block size to erase half of the block )
    I 1 + HTAB       ( Tab to the right half of the block )
    UNBLK            ( Erase it )
 -1 +LOOP ;          ( Loop back and repeat )
```

The walking sequence is in a loop, counting backwards from 37 to 0. (Remember that GraForth do–loops stop one short of the final value.) This loop provides the horizontal positioning as Maxwell walks from right to left. Inside the loop, we first set the block size. The loop value is recalled and used by htab to position the block, then one.step is called and Maxwell takes one step.

Now we have to erase the current block before the next block appears one space to the left. Actually, the next block will overwrite the left half of the current one, so we only need to erase the right half of the block. That makes a block one character wide by three tall, and we set the block size accordingly with blksize. We then position one more space over by htabing to the loop value plus 1, and call unblk to erase it.

The loop repeats and Maxwell takes one step after another. Animation! The sequence is started by typing:

```
IN WALK OUT
```

One last complication appears at the end of the walk: The last image drawn is partially erased with the unblk at the end of the loop, and half of a Maxwell remains on the left side of the screen. In most animation applications, you will want to erase this leftover image. Let's clean it up with one more unblk and combine the entire animation in a single word definition:

```
: MAX.WALK
  IN
  WALK
  0 HTAB UNBLK
  OUT ;
```

The animation shown here is fairly simple, but the same basic concepts can be used for designing much more complicated character graphics, with more movement and more shapes. Insoft recently released two new Apple games, *Spider Raid* and *Zargs*. Both of them are written in GraForth and use animated character graphics extensively. Here is a quick overview for producing any sort of animated character graphics:

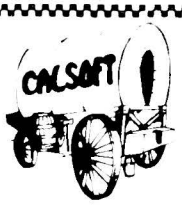
Animation is simply a series of still pictures rapidly displayed one after another. Each still picture, or block, should be planned with regards to its relationship to previous or subsequent pictures. Choose the block size(s), and design the shapes with the character editor, storing them into one or more character sets. To display the animation, simply draw each block in turn, with a short delay created by either a time-wasting loop, or graphics being drawn elsewhere on the screen. If the picture doesn't move about on the screen, each block can simply be drawn over the top of the previous one. If movement is required, then all or part of the block will have to be erased before moving. For maximum speed, erase only what will not be drawn over.

Next month, we'll describe more advanced character graphics and introduce the use of color and different character sizes. We'll conclude with greater detail on how GraForth manipulates characters on the screen, giving you the tools to create complex animations with character graphics. Remember, if you have any suggestions for this column, send them to *Softalk*. ■

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THE BASIC Solution

By Wm. V. R. Smith

The typical method of producing hard copy of an Applesoft program is to use the list command. This may be the best way of doing things for some people simply because it is the only way they have available. But producing hard copy this way does have its drawbacks.

One problem centers on the commands you may need to use to initialize your printer. Issuing a pr#1 command isn't so difficult, but for some printers you also have to issue a special control code to get eighty columns. After all, eighty column format looks a lot better than forty columns, and you paid for that, right?

Finally, for all your trouble, your copy still has glitches that make it difficult to read. Words and Basic commands are broken indiscriminately, control over the margins is at best difficult to achieve, and no breaks are provided for page perforations. There has to be a better way.

Well, there is. The Applesoft program in listing 1, *Basic Lister*, will give you readable hard copy, ready for you to refer to or to bind neatly in a notebook. It provides page headings and numbers, automatic form feed (even if your printer doesn't have form feed) at page perforations, and a handy line count at the end of the report. It also gives you the choice of page length (sixty-six lines is fairly standard for an eleven-inch page) and page width.

As an added feature, if you end any line with *P (which must be in a *rem* statement to avoid a syntax error), *Basic Lister* will automatically put that line on the top of a new page. This feature is useful for isolating important subroutines. All *Basic Lister* needs is for the program to be on the disk in the form of a text file.

"A what?" you ask, knowing that Basic programs are not normally stored as text files. This is true, but a fairly simple method of conversion is available. All you have to do is open a text file on the disk and list our program to it. Adding the following lines to your program and typing *run 32000* (assuming the program itself has no line numbers greater than 31999) will do the trick.

```
32000   D$ = CHR$(4)
32010   PRINT D$;"OPEN HOLD TEXT"
32020   PRINT D$;"WRITE HOLD TEXT"
32030   LIST 0,31999
32040   PRINT "END"
32050   PRINT D$;"CLOSE"
```

So now you have the knowledge and the programming tools necessary to create a formatted listing of your programs. Just follow these steps:

1. Load the Basic program you would like to list.
2. Add the six lines starting at 32000.
3. Type *run 32000*
4. Run the *Basic Lister*
5. Type *delete Hold Text*

"Wait a minute," you exclaim. "You said this was going to be easy!" Well, there are two ways to make something like this easier: enslave a friend, or let the computer do the work for you. We can't help you with the first method, but the second is right up our alley.

You want to be able to load the Basic program (step 1) and to let the computer take care of steps 2 through 5. No problem! The tool for your purposes is the *exec* routine.

An exec routine is simply a text file of a series of entries that the Basic interpreter can deal with. It can be used to add lines to a program in memory, issue DOS commands (like load and run), issue Basic commands, respond to input requests from programs, and other neat things. Truly a useful type of file. But how do you create an exec routine?

Admittedly, it is not easy to create one from the keyboard. Some word processors create text files, but we'll assume you don't have one of these and give you a program to do the trick.

Actually, the routine we used to make the Basic program into a text file isn't too different in spirit from what we'll be doing here. Just add the lines in listing 2, *Exec File Maker*, to the *Basic Lister* in listing 1, and save the whole thing. Then, instead of running it from the beginning, type *run 1000*. Lines 5 through 480 are not executed here, but are put into our exec routine along with the other necessary commands.

There should now be on your disk a text file called Trans, and things will not be as simple as we said that they would be. To get your formatted listing now, simply load the program and type *execTrans*. After a lot of disk activity, you will be asked for the program name and the date (this information is for the header) and the desired page length and width. From there on, the computer does all the work.

You may find that you want to customize *Basic Lister* for your own purposes. For instance, you may wish to create standard values for page width and length if you use the same printer every time. You may want to make the listing double spaced, or add some new features to the end report. To make these and other modifications, you'll need to make the changes in *Basic Lister* and then re-create the text file Trans. Be sure you delete or rename the original Trans first, as your new file may not overwrite all the original, which will cause problems when you exec it.

There are many possible ways of personalizing *Basic Lister*. From the response received on July's *BasiCalc*, it's clear that many of you are very creative and capable programmers, so, until next month, the ball is in your court.

```
5       D$ = CHR$(4)
10      TEXT : HOME : PRINT " BASIC
        PROGRAM LIST UTILITY": PRINT
20      VTAB 10: INPUT "PROGRAM NAME:
        ";N$: IF N$ = "" THEN 20
30      GOTO 430
40      PRINT : INPUT "TODAY'S DATE:
        ";DT$
45      PRINT D$;"RENAME HOLD
        PROGRAM,";N$
50      PRINT : INPUT "PAGE LENGTH:
        ";L$:PL = VAL (L$)
60      PRINT : INPUT "PAGE WIDTH:
        ";W$:W = VAL (W$): IF W < 8 THEN
        60
65      PRINT : INPUT "CORRECT? ";C$: IF
        LEFT$ (C$,1) = "N" THEN 20
70      PRINT : INPUT "POSITION PAPER
        AND PRESS RETURN";A$
80      PRINT D$;"PR#1"
90      PRINT D$;"OPEN HOLD TEXT"
100     PRINT D$;"READ HOLD TEXT"
110     LC = PL - 5
120     IF LC >= PL - 5 THEN GOSUB 180
125     GOSUB 390
```

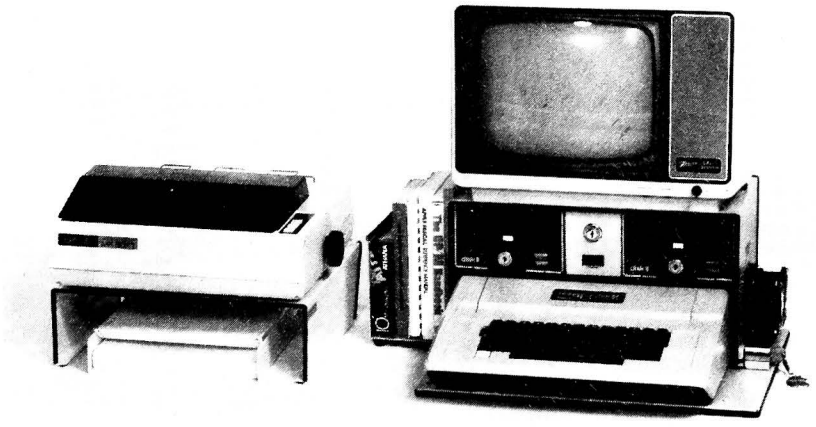
```
127   IF RIGHT$ (A$,2) = "*P" THEN
      GOSUB 180
130   IF A$ <> "END" THEN 150
135   GOSUB 180
140   PRINT : PRINT "***** END OF
      REPORT FOR ";N$;" *****"
143   PRINT
145   PRINT "LINES LISTED ";LL - 2
147   GOTO 360
150   L = LEN (A$): IF L < = W THEN 155
151   Z = W
152   IF MID$(A$,Z,1) <>" " THEN Z = Z
      - 1: GOTO 152
153   PRINT " "; LEFT$ (A$,Z): A$ = "    "
      + RIGHT$ (A$,L - Z):LC = LC + 1
154   GOTO 150
155   PRINT " ";A$:LC = LC + 1:LL = LL
      + 1
160   GOTO 120
180   P = P + 1: IF P = 1 THEN 205
190   PRINT : FOR X = 1 TO 80: PRINT "*";:
      NEXT : PRINT
195   LC = LC + 2
200   FOR X = LC TO PL + 3: PRINT :
      NEXT
205   LC = 3
210   REM
220   FOR X = 1 TO 80: PRINT "*";: NEXT :
      PRINT
230   PRINT "** LISTING FOR PROGRAM
      *** ";N$;
235   PRINT " *** DATE ";DT$;
240   PRINT "    PAGE ";P
250   FOR X = 1 TO 80: PRINT "*";: NEXT :
      PRINT
260   PRINT    .
265   LC = LC + 4
270   RETURN
360   PRINT D$;"PR#0"
365   END
370   PRINT D$;"DELETE HOLD TEXT"
380   END
390   A$ = ""
400   GET B$: IF B$ = CHR$ (13) THEN
      RETURN
410   A$ = A$ + B$
420   GOTO 400
430   ONERR GOTO 480
440   PRINT D$;"UNLOCK ";N$
450   PRINT : INPUT "FILE EXISTS SHALL
      I REPLACE? ";A$
460   IF LEFT$ (A$,1) <> "Y" THEN POKE
      216,0: GOTO 50
470   PRINT D$;"DELETE ";N$
480   POKE 216,0: GOTO 40
```

Listing 1. Basic Lister.

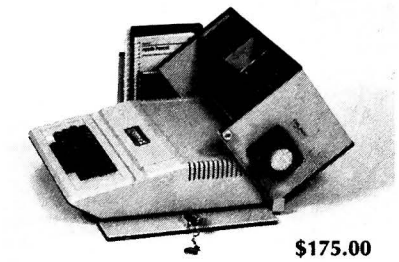
```
1000  D$ = CHR$ (4): PRINT D$;"OPEN
      TRANS"
1010  PRINT D$;"WRITE TRANS"
1020  PRINT "SAVE HOLD PROGRAM"
1030  PRINT "32000 PRINT CHR$(4);";
      CHR$ (34);"OPEN HOLD TEXT";
      CHR$ (34);""
1040  PRINT "32010 PRINT CHR$(4);";
      CHR$ (34;"WRITE HOLD TEXT";
      CHR$ (34);""
1050  PRINT "32020 LIST 0,31999"
1060  PRINT "32025 PRINT"; CHR$ (34);
      "END"; CHR$ (34);""
1070  PRINT "32030 PRINT CHR$(4);";
      CHR$ (34);"CLOSE"; CHR$ (34);""
1080  PRINT "32050 END"
1090  PRINT "RUN 32000"
1100  PRINT "NEW"
1110  LIST 5,480
1120  PRINT "RUN"
1130  PRINT D$;"CLOSE"
```

Listing 2. Exec File Maker.

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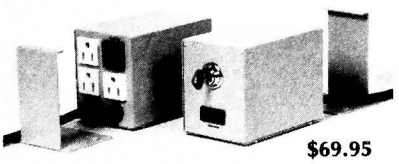
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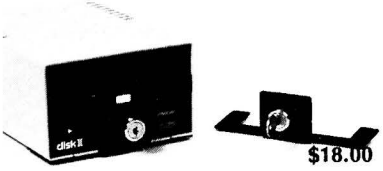
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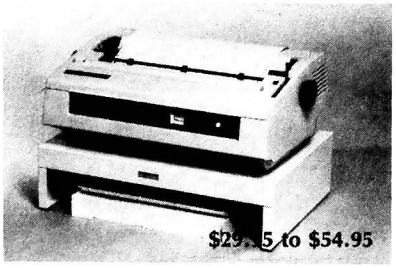
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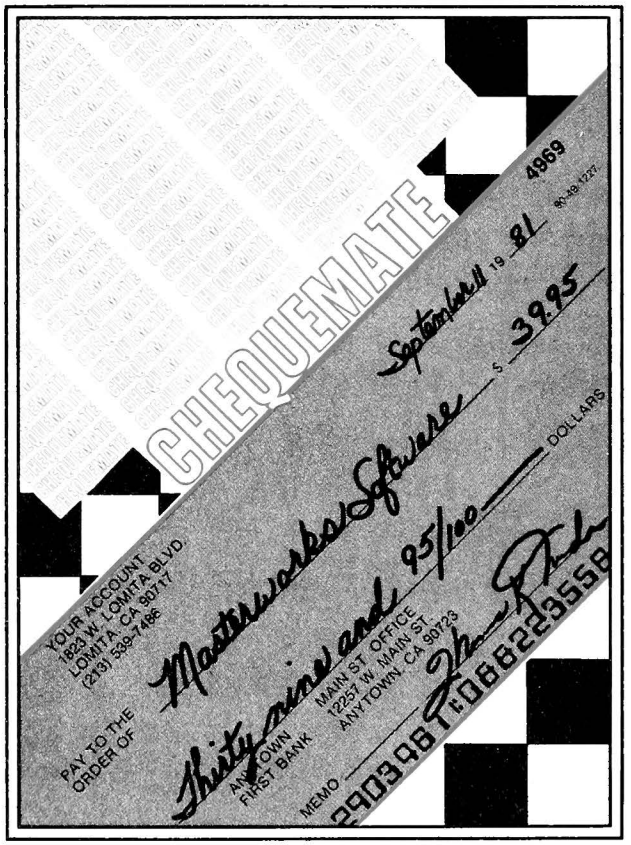
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All About Applesoft

by Doug Carlston

Last month we completed two of the four modules of a shape table utility that allows us to draw shapes on the high resolution screen; change their size, color, rotation and screen position; and then save them off to disk or tape if we want to save them.

The third module is the one that displays our shape, in any position, size, or rotated position, and in any of the Applesoft colors.

The first thing we want to do is retrieve our shape from the shape table and display it to the screen. To start off, let's just display it normal size *(scale = 1)*, without any rotation *(rot = 0)*, in the middle of the screen (*X = 140* and *Y = 96*). For color, let's use the ever-popular white (*hcolor = 3*).

Rather than just plugging these numbers in with the appropriate commands, we are going to issue this series of instructions in two steps, using variables (so we can easily change them later):

```
2000  SCL = 1:RT = 0:X = 140: Y = 96:CLR = 3
2010  SCALE = SCL: ROT = RT: HCOLOR = CLR
```

By jumping back to line 2010 later on in the program, with new values in the variables SCL, RT, or CLR, we shall be able to change the characteristics of the shape we draw to the screen.

There is a little more set-up work to be done, as you may recall. We still have to tell the computer where in memory the shape table is located and *poke* that address into the shape table address pointer at 232 and 233. Since the shape is located at 768, which is the same as $300 hex (3*16 squared), we need to *poke* the right two digits (in hex) into 232 and the rest of the digits into 233, thus:

```
2005 POKE 232, 0: POKE 233, 3
```

Now all we have to do is draw the thing:

```
2020 DRAW 1 AT X, Y
```

Next comes the fun part (the part you've been waiting for). We are going to add some lines to the program to permit us to change the size, rotational position, X or Y position, and color of the shape.

First, we have to let users tell the Apple which of these five characteristics they wish to change. Let's do that by setting a variable (call it *mode)* equal to a value from 0 to 4, depending on which of the five characteristics is to be fiddled with. Users can enter preferences by typing single keystrokes. Here is a suggested list (chosen because they should be fairly easy to remember):

Keystroke	Function To Change	Mode Value
S	Scale	0
R	Rotation	1
X	Horizontal start	2
Y	Vertical start	3
C	Color	4

Then the only trick is to get a keystroke from the keyboard and check it against this list:

```
2030 GET C$
2050 IF C$ = "S" THEN MODE = 0
2060 IF C$ = "R" THEN MODE = 1
```

You can write this section without my help, right? Now, the trick is to pick two more commands that say change the value of the appropriate mode either by increasing it a set amount or decreasing it a set amount. The two arrow keys might be good for this, so let's set up a section to increase values with the right arrow and another section to decrease values with the left arrow. Then if an arrow key is pressed we can check this and jump to the right section:

```
2090 IF ASC (C$)<>8 THEN 2200
2200 IF ASC (C$)<>21 THEN 2300
```

The ASCII value of the left arrow is 8; the value of the right arrow is 21. Attentive readers may remember the trick for discovering these values: temporarily add the following line to your program, and run it:

```
1 GET A$: PRINT ASC (A$): GOTO 1
```


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Try typing the two arrow keys, then hit reset and delete line 1.

We have blocked out the area from line 2100 to 2199 for dealing with what happens when the left arrow is pressed (line 2090 skips straight to 2200 if the left arrow hasn't been pressed). Similarly, the area from 2200 to 2299 has been set aside for dealing with the consequences of pressing the right arrow.

Let's try writing the right arrow section first. What we want to do, of course, is to increment (a computertalk word meaning "add one to") the appropriate variable, depending on which mode we're in. For example, if the value of *mode* is 0, that means that you, the user, have chosen to fool around with the scale of the shape. Therefore, pressing the right arrow means "set scale one higher!" We can do that like this:

```
2210 IF MODE = 0 THEN SCL = SCL + 1
```

There's just one problem. *Scale* can run from 0 to 255, but if it exceeds that amount, your Apple will bite you. To prevent this we want the above line to read "If *mode* is equal to zero, then add one to the variable *scl* . . . unless, of course, *scl* is already equal to 255, in which case just forget the whole thing." In computerese you might write this:

```
2210 IF MODE = 0 THEN SCL = SCL + 1 * (SCL < 255)
```

What you have here is a clever use of a logical variable. If SCL is less than 255, then the expression (SCL < 255) is true and is evaluated as a one. So the value one times one is added to SCL. All well and good.

However, if SCL has been added to until it equals 255, then (SCL < 255) is *not* true and is evaluated as zero. As we all remember from college, one times zero is equal to zero so nothing whatever gets added to SCL. Which is just the way we wanted it.

Try adding lines 2220 through 2250 on your own before continuing. The upper limits for the different values are: RT=64; X=279; Y=191; and CLR=7. Go to it.

If we are thinking along the same lines, your code should look something like this:

```
2220 IF MODE = 1 THEN RT = RT + 1 * (RT < 64)
2230 IF MODE = 2 THEN X = X + 1 * (X < 279)
2240 IF MODE = 3 THEN Y = Y + 1 * (Y < 191)
2250 IF MODE = 4 THEN CLR = CLR + 1 * (CLR < 7)
2260 GOTO 2010
```

The same logic can be used to design the left arrow section, except that we will be decrementing all of the values. This part is entirely up to you.

If curiosity drives you to try the program at this point, you'll discover at least one weakness in it. It isn't erasing the old shape before it draws a new one. Line 2040 has been left open for you to add the line that fixes it. Try it on your own.

Did you come up with *hcolor = 0:draw 1 at X, Y*? If so, go to the head of the class.

We have to tie up the loose ends at line 2300, too. This is where program control was sent if the key you pressed was neither of the two arrows. We ought to add a couple of extra commands here before wrapping it up:

```
2300 IF ASC (C$) = 13 THEN RUN
2310 IF ASC (C$) = 12 THEN GOSUB 4000
2320 IF ASC (C$) = 19 THEN GOSUB 4500
2330 GOTO 2010
```

Line 2300 gives us a chance to clear the screen and start over again, just by pressing return (CHR$(13)). The next two lines check to see if we have pressed control-L (CHR$(12)) *or* control-S (CHR$(19)), which stand for load and save respectively. These two commands give us the opportunity to jump to the fourth and last part of the program, the part that saves and retrieves shapes from disk or cassette.

Let's start with the save routines first, since you'll have to save something before you can possibly load it. Applesoft doesn't have any nice *shape save* command; we have to save the appropriate area of memory using the *bsave* command if we have disk drives—and a very cumbersome method indeed if we are saving to tape.

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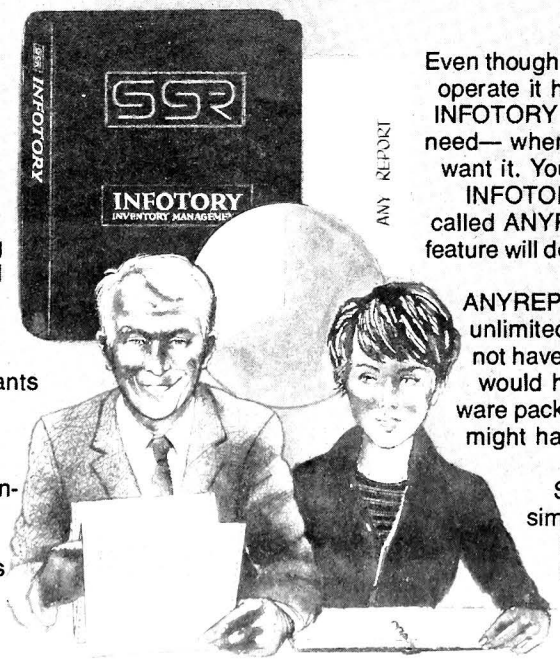
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However, first things first. Let's get to the text screen and ask some relevant questions:

```
4500  TEXT: HOME: VTAB 5
4510  INPUT "D)ISK OR C)ASSETTE: ";C$: IF C$ <> "D" AND C$
      <> "C" THEN 4510
4515  IF C$ = "C" THEN 4600
4520  INPUT "SAVE AS WHAT FILE: ";FILE$
```

Since the save routines for disk and cassette are entirely different, we have had to determine which medium will be used to record the shape. The easiest way to determine this is to ask the user. If cassette is to be used, the program branches to line 4600. Otherwise, it continues and asks a name to save the file under.

At this point it would be useful to get a catalog of the disk, so we can employ the same trick we tried when building our word processor:

```
4530  IF FILE$ = "" THEN PRINT: PRINT CHR$ (4);"CATALOG":
      PRINT : PRINT : GOTO 4520
```

We can save the shape table to disk by using *bsave*. We know that the starting address was $300. The length will be equal to *bnum + 1* (can you figure out why we have to add the 1?).

```
4540  PRINT CHR$(4);"BSAVE ";FILE$; ", A$300,L";BNUM + 1
```

All that remains then is to turn the hi-res graphics back on and return to the main routine:

```
4550  POKE -16304,0: POKE -16299,0: RETURN
```

The cassette save routine should merely be taken as a matter of faith. In point of fact, the Applesoft designers appear wholly to have overlooked the problem, and the following lines of code are required to manipulate the Apple's built-in cassette routines directly, something no self-respecting Basic programmer should ever have to do.

```
4600  POKE 0, BNUM + 1: POKE 1,0: POKE 60,0: POKE 61,0: POKE
      62,1: POKE 63,0: CALL - 307
4610  POKE 60,0: POKE 61,3: POKE 62,BNUM + 1: POKE 63,3:
      CALL - 307
4620  GOTO 4550
```

For those who just gotta know, line 4600 puts a header out to the tape telling how many bytes of information will be in the shape. Line 4610 puts the starting address of the shape in locations 60 and 61 and the ending address in locations 62 and 63 and then jumps to the cassette writing routine.

No point in flogging a dead horse. Let's move on. We use a similar structure in designing our load routine. You should be able to write most of the disk load part without my help. Then take a look. Here is is.

```
4000  TEXT : HOME : VTAB 5
4010  INPUT "D)ISK OR C)ASSETTE: ";C$: IF C$ <> "D" AND C$
        <> "C" THEN 4010
4015  IF C$ = "C" THEN 4100
4020  INPUT "WHICH FILE TO LOAD: "; FILE$
4030  IF FILE$ = "" THEN PRINT : PRINT CHR$ (4);"CATALOG":
      PRINT : PRINT: GOTO 4020
4040  PRINT CHR$ (4);"BLOAD ";FILE$; "A$300"
4050  GOTO 4550
4100  SHLOAD : GOTO 4550
```

Shload is Applesoft's cassette shape load command. It loads the shape into an area in high memory and automatically changes the values of locations 232 and 233 to point to this area.

There it is in all its glory, our first full-length, homespun utility. Shape tables are not necessarily the most useful things in the world, but their manipulation requires some programming skill, and the ability easily to create images on the screen is very rewarding. Sincere thanks to Brian Crouch, who designed this utility for your enjoyment. ■

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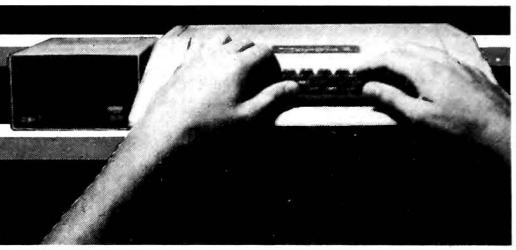
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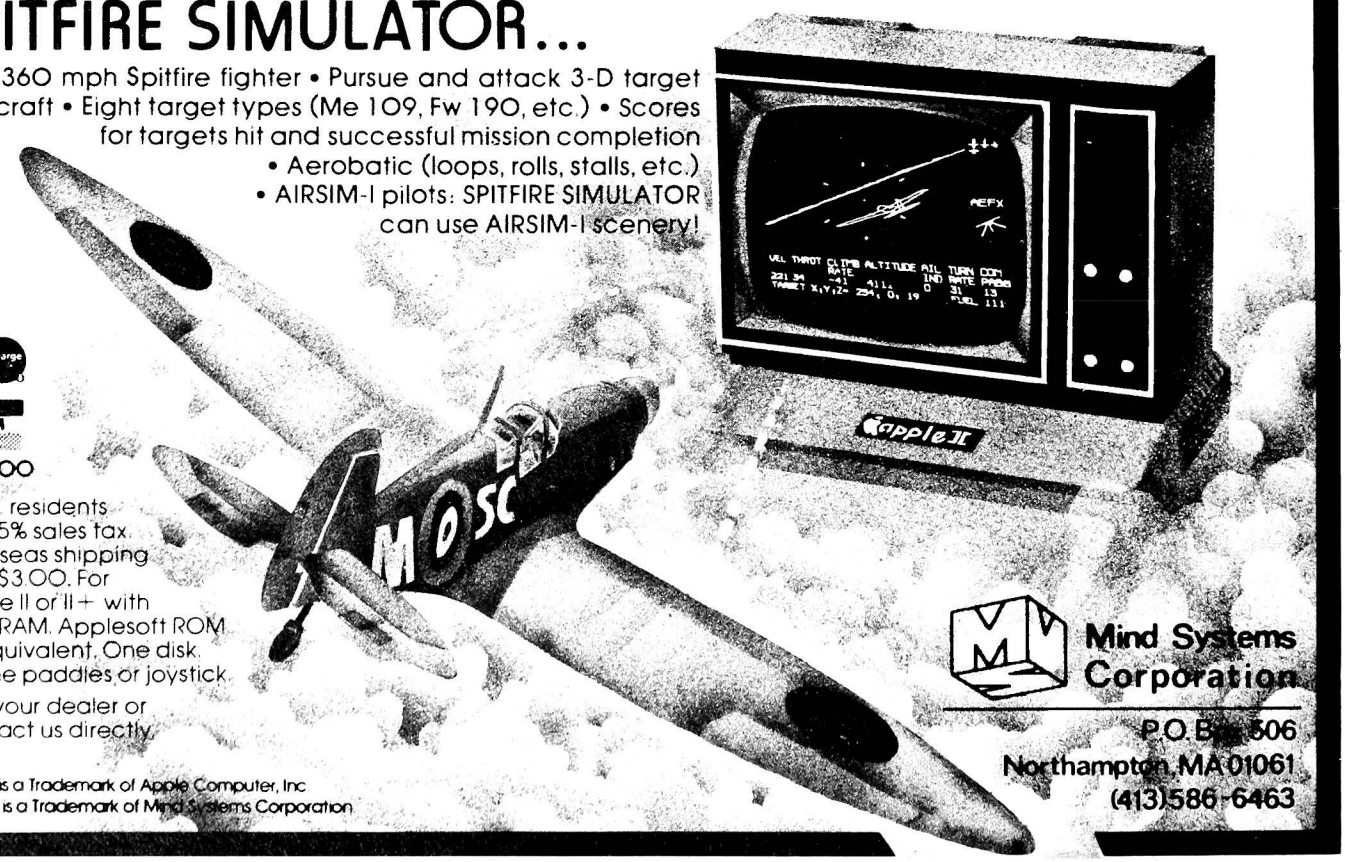
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GRAPHICS/PARALLEL PRINTER CARD

Sophisticated text and graphic routines available via simple keyboard commands. Avoid "squashed" printouts. GRAPHITTI on-board firmware lets you utilize the Apple high resolution graphic screens – circles are printed as circles. Use with most of today's popular dot-matrix printers. Graphic support for Epson, Okidata, NEC 8023, C-Itoh Prowriter, and IDS Prism. Compatible with most software packages including PFS:Graph,™ CP/M,™ and Apple Pascal.™

Firmware 'text' features include: Set Line width via standard ^InN format, Enable or Disable Line Feed after Carriage Return, Set Lines per Page, Set Left Margin, Set or Clear 8th Bit. Print High Resolution Page 1 and/or 2, Double Size, Emphasized Mode, Inverse Mode, Rotate 90 Degrees, Specify Left Margin . . . and more.

GRAPHITTI Graphics/Parallel Printer Interface
Suggested list **$125.00**

V. EXPAND–A–RAM. . .

16K to 128K EXPANDABLE RAM CARD

A low cost solution to future larger memory needs. Start with 16K (**$225**), 32K (**$249**), or 64K (**$375**), and expand to 128K later. Or, simply order the full 128K size now (**$495**). No Apple modification required. All cards include memory management software, ram test, and utility functions. Disk Emulators for Apple DOS,™ Apple Pascal,™ and CP/M™ available. Optional: Expand Visicalc™ to 128K and 80 column format.

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III. VERSAbox. . .

THE ONLY INTELLIGENT SPOOLER/BUFFER WITH AN OPTIONAL REAL TIME CLOCK INTERFACE DISPLAY

For use with all Centronics parallel and RS-232C INPUT/OUTPUT interfaces. VERSAbox's high-speed input combined with up to 60K buffer (more with character compression) frees up your computer from the slow job of printing. Modems and other compatible devices can also be buffered. Multiple software selectable outputs permit you to choose between two or more VERSAbox outputs or use them simultaneously. You can buffer multiple inputs simultaneously too.

Add the optional REAL TIME CLOCK to VERSAbox and you get a six digit LED numeric time display. Your computer can read the time via the RS-232C port. Another useful option is the SWITCHED 120V SOCKET that can turn external devices on and off by clock control.

Cabinet is 11"W, 8"D, 8"H. VERSAbox suggested list price with 16K buffer **$249.00** Options extra.



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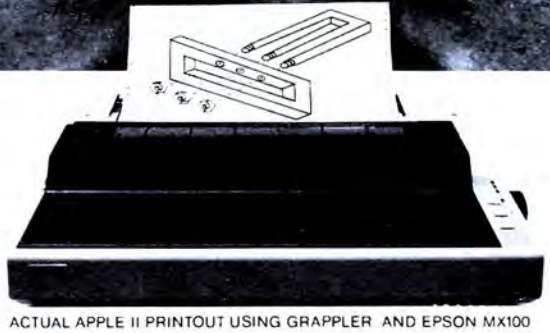
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ACTUAL APPLE II PRINTOUT USING GRAPPLER AND EPSON MX100

Completely Redesigned. Now, the Grappler+.

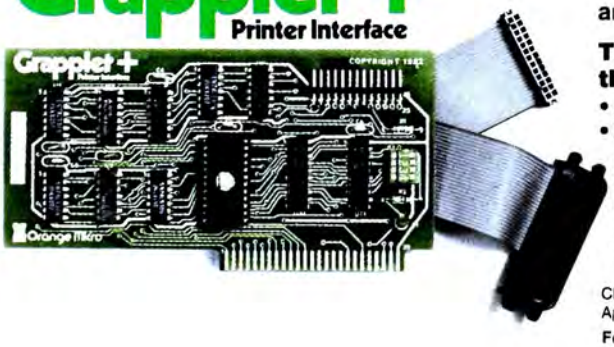
The original Grappler was the first graphics interface to give you hi-res screen dumps from your keyboard. The new Grappler+ with *Dual Hi-Res Graphics* adds flexibility with a side-by-side printout of page 1 and page 2 graphics.

Interfacing the Grappler+ to a wide range of printers is easy as changing a dip switch. 4K of exclusive firmware makes the Grappler+ the most intelligent, full-featured Apple® Printer Interface made. And, the Grappler+ is Apple III compatible.*

The imitations are many, so insist on the #1 Apple Graphics Interface on the market. Insist on the Grappler+. Available now at most Apple dealers.

*Requires additional software drivar.
**Requires graphics upgrade.

With The Grappler+™ Printer Interface



The Grappler+ Features:

• Dual Hi-Res Graphics • Printer Selector Dip Switch • Apple III Compatible* • Graphics Screen Dump • Inverse Graphics • Emphasized Graphics • Double Size Picture • 90° Rotation • Center Graphics • Chart Recorder Mode • Block Graphics • Bell Control • Skip-over-perf • Left and Right Margins • Variable Line Length • Text Screen Dumps.

The Grappler+ works with Pascal and CPM.

The Grappler+ interfaces with the following printers:

• Anadex • Centronics • Datasouth • Epson** • IDS • NEC • C-Itoh • Okidata**

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for business or scientific applications. Features pie and bar charts, multiple exploded pie segments, zooming, panning, and strip chart scrolling. Includes high precision text in seven different fonts, with control over size, spacing, angle, and character slant. Supports digitizers, light pens, cursor keys, and joysticks. Requires CP/M. $600. Also available from Peachtree is the *Business Graphics System*. Can be used to develop graphics for presentations such as overhead transparencies, slides, business charts and graphs, and word charts. Includes interface to *PeachCalc* and *PeachText*. Requires CP/M. $400.

☐ **S-C Software** (2331 Gus Thomasson, Suite 125, Box 280300, Dallas, TX 75228; 214-324-2050) allows you to speed up and simplify development of Applesoft programs with *Es-cape*, an extension of their *S-C Applesoft Program Editor*. Provides split-screen editing window, global search and replace, automatic line numbering, DOS command menu, user-definable keyboard macros, and list control. Completely menu driven. $40.

☐ **American Training International** (3800 Highland Avenue, Suite 300, Manhattan Beach, CA 90266; 213-546-4725) produces interactive software packages. Disk courses contain periodic refreshers and usually can be completed in less than forty-five minutes. Targeted toward the professional, ATI's programs cover training in *dBase II, WordStar, SuperCalc,* and MBasic. Requires CP/M. $75 each.

☐ New stuff from **Avant-Garde Creations** (Box 30160, Eugene, OR 97403; 503-345-3043): Picking up where *Hi-Res Secrets* left off is the *Graphics Application System* (G.A.S.), a package that takes the user through hi-res graphics in assembly language, electronic and architectural design, business graphics, arcade and adventure game creation, and 3-D shapes. $75. Electronics buffs can create and print computer-generated electronic circuit plans with the help of *Hi-Res Electronic Schematic Design*, a subsystem of *G.A.S.* $29.95. Design buildings with the aid of *Hi-Res Architectural Design*, another subsystem of *G.A.S.* Plan and design individual rooms, complete floor plans, and total buildings. $29.95. *Super Quality Epson Hi-Res Dump* creates mirror images, negatives, flip images, and rotated images at the stroke of a key. $25. *Audio-Visual Equipment* is a courseware disk that explains the operation of all types of audio-visual equipment and includes a section that familiarizes newcomers to the Apple. $29.95. Simply input a formula and type of graph desired and *Ultra Function Plot* will display sine, cosine, line graphs, parabolas, quadratics, polynominals, and bell curves. Also will calculate asymptotes, area under a curve, intersection of two curves, and solutions to equations. $59.95. *Introductory Algebra* operates in a question and answer format. Level three can generate more than nine trillion algebra problems. $29.95. *Special Products and Algebraic Factors* will develop skills, accuracy, and speed when working with distributive law, bi, tri, and quadrinomials. $29.95. *Arithmetic Drill and Practice* challenges the pupil to perform the four mathematical operations in a race against time. $15.95.

☐ Multiuser financial modeling software has been introduced by **TeleVideo Systems** (1170 Morse Avenue, Sunnyvale, CA 94086; 408-745-7760). The modeling tool, *TelePlan*, enables users to share the same financial information simultaneously. Several people can prepare individual plans or models, then consolidate them all into a single document. Allows one person to call up another's work, revise it, and send it back. Requires CP/M. $995.

☐ Educators: decide what you need for your school's computer system with the help of the *1982-83 Computer Directory for Schools*, the guide to the selection of microcomputers and peripherals, courseware, computer assisted and managed instruction systems, resources, literature, and free materials. Published by **Instructor** (757 Third Avenue, New York, NY 10017; 212-888-3400). 200 pages. $19.95.

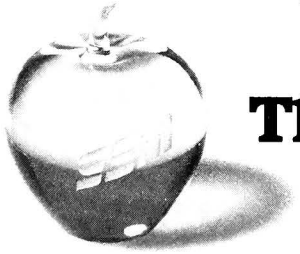
☐ Users of **Starcom** (Box 592, Westminster, CA 92683; 714-898-6541) can reduce their phone bills by using Starnet, a long-distance telephone service that saves up to 75 percent over Bell Telephone rates. As with other discount services, you dial a local access number, an authorization code, and then the phone number. Serves more than four thousand cities in the United States. $5 per month.

☐ *Zip* from **Nexus** (5455 Wilshire Boulevard, Suite 802, Los Angeles, CA 90036; 800-227-3747; 213-937-0554 in California) is a screen handler



Don't let Apple II™ interfacing tie you up in knots. Set yourself free with simple, low-cost boards from SSM to connect printers, modems and other peripherals. We offer serial, parallel, multi-function interfaces, IEEE 488 controllers, clock cards and more. Just plug in and go. Two-year warranty and money-back guarantee if not satisfied. Call us or your dealer and ask about the hassle-free interfaces from SSM.

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SCRG Presents

FOR YOUR APPLE™ II OR II+

THE $79.95 NUMERIC KEYPAD

THE KEYPAD

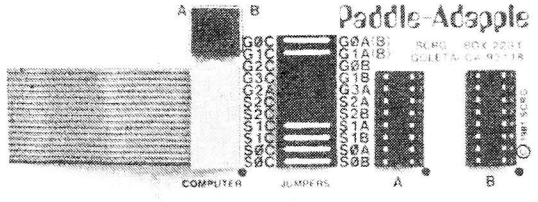
- Converts APPLE™ keyboard to one of eight 10-key or hexadecimal keypads
- Hardware conversion—compatible with **ALL** software • Decals provided
- Works with any revision APPLE™ II or II+
- Instantly switches between standard keyboard and keypad • Custom layouts available
- Installs easily, no soldering
- Lowest priced numeric keypad available—**$79.95**

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Everything That **THE KEYPAD** Gives You, Plus . . . .

- At the flip of a switch, select beween standard "QUERTY" keyboard and your choice of **DVORAK, A.S.K., MONTGOMERY, LEFT & RIGHT ONE-HANDED,** and **ALPHABETICAL ORDER**
- Easy modification and optional PROM allows true upper/lower case entry.
- **$89.95**

Paddle-Adapple



- Works with all Apple compatible joysticks and paddles
- Unique "Jumpers" socket allows you to configure to meet your needs.
- Select one of two devices or
- Use 4 paddles simultaneously
- BPI™ users can have BPI™ device and paddles plugged in simultaneously.
- Gives you four push-button inputs
- Supports shift key modification
- Exchange X & Y joystick axis
- Small and compact—adheres to computer with supplied foam tape
- All strobes, annunciators and power available on both connectors
- **LOW PRICE—$29.95**

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The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The **EXTEND-A-SLOT** works well with all slow to medium speed cards, such as Modems, Printers, Clock, Music, etc. It is not recommended for high speed data transfer devices such as disk drive controller cards. **$29.95**

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and report writer for MBasic, CBasic, and *dBase II* that creates formats for an input screen or printout up to eighty-eight lines long. Typically used for invoices, time sheets, inventory listings, menus for applications programs, and data input screens in general. Allows user to embed Basic or *dBase II* statements, such as commands for opening disk files and printing items, within the blank areas of the form. Requires CP/M. The *dBase II* version is available directly from **Ashton-Tate** (9929 Jefferson Boulevard, Culver City, CA 90230; 213-204-5570). The MBasic and CBasic versions are available from Nexus. $160.

☐ Three new disk drives give Apple III users a big choice. **Micro-Sci** (2158 South Hathaway Street, Santa Ana, CA 92705; 714-662-2801) has added three 5¼-inch disk drives with capacities of up to 572K. The thirty-five track A3 and 143K is similar to the Apple Disk III, offers Apple II emulation mode, but costs less. $449. The next up is Micro-Sci's seventy-track A73, which delivers 286K with track-to-track access of five milliseconds compared to eighteen milliseconds for other systems. $649. Topping off is the 140-track A143 with the same five millisecond seek rate plus 572K capacity. Can also be used to back up a ProFile hard disk. $799.

☐ So you finally bought an Apple. Now what the heck do you do with it? *Big Things from Little Computers,* by Dale Peterson, is a clearly written book created for the novice computer user. Covers personal computing in the home, school, office, and laboratory. Devoid of intimidating computer jargon, the book takes readers on a voyage of discovery that unveils the intriguing realms of personal computing. 224 pages. From **Prentice-Hall** (Englewood Cliffs, NJ 07632; 201-592-2348). $12.95.

☐ Software for investors, from **Hourglass Systems** (Box 312, Glen Ellyn, IL 60137; 312-690-1855): *High Yield* is menu driven and records all the investor's funds by name and vital information, provides for transaction entry, calculates performance measures, does what-if analysis, and monitors IRA and Keough plans. Requires CP/M. $75. *Fast Figure* offers calculations such as depreciation, present value and net present value, internal rate of return, compound growth, standard deviation, and conventional spreadsheet analyses. Has three-dimensional file-sharing for multiple spreadsheets from one file without repetitive input. Requires CP/M. $150. Spot stock market trends by using the same information professional analysts and brokers rely on to make buying and selling decisions. *Market Time* provides a database of selected market statistics that may be analyzed with moving averages and plotted to screen or printer to spot market turning points. Requires CP/M. $75.

☐ More than two thousand items for the personal computer enthusiast are listed in the *JMC Computer Source Book* from **James M. Conway Corporation** (1025 Industrial Drive, Bensenville, IL 60106; 312-595-0210). Computer programs for home, business, education, and entertainment are listed for the Apple and those other home computer brands. 71 pages. $2 includes postage.

☐ An electronic mail package for interoffice mail has been announced by **Software Connections** (1800 Wyatt Drive, Suite 17, Santa Clara, CA 95054; 408-988-3704). *Mail Monitor* allows as many as sixty-four users on a local area network to send letters or data to each other. Optional version that supports modem allows information to be sent to distant networks. Post office program acts as a distribution center, and a mailbox program is run by the user to create and send letters to specific locations or general distribution. $495; with modem support, $750. Coming up in 1983 will be an Apple III version.

☐ **Isys Corporation** (50 Church Street, Cambridge, MA 02138; 617-491-6221) has produced a large-scale investment database for investors, pension fund executives, stockbrokers, and mergers and acquisition analysts. *Micro/Scan* instantly screens 1,400 stocks and eighty-eight industries to look for "buy" or "sell" ideas, performs stock valuation studies on industries or on portfolios, and plays what-if games with investment criteria. Cost includes updated Ford 1400 database on two disks and complete updates each month for twelve months. $3,600; demo disk with documentation, $25.

☐ The Cool Stack Sentry II from **FMJ** (Box 5281, Torrance, CA 90510; 213-325-1900) locks and cools your Apple, holds two disk drives and a monitor, and tilts all back safely for easy access to your Apple's insides. Disk drives lock onto the shelf, Apple locks onto the bottom plate, and the whole module can be secured to another surface. Has a fan to keep

things cool and a library rack to hold books and manuals. $175. Options for the Sentry II: Power Sentry Module fits in between disks drives, has power surge suppressor, separate switch for rebooting, four power outlets, and a keylock switch to keep out nosy tamperers. $69. Disklocks for disk drives provide added security. $18 each. Package price for Sentry II, two disk locks, and Power Sentry Module, $268. For the printer, Printer Pal comes in three models. All feature below-printer paper storage, welded steel construction, cable clip to separate cable from paper path, adjustable paper support brackets, and baked enamel textured finish. The P80 holds Epson MX-80, Okidata 82, NEC 8023, and other similar printers and has center slot paper feed option. $29.95. The P100 is for Epson MX-100, Okidata 83 and 84, and Paper Tiger 56 type printers; also has center slot option. $39.95. For larger printers, the P700 is compatible with NEC Spinwinder, Diablo, C. Itoh Starwriter, Qume, and others. $54.95.

☐ Educators (again): the *1983 Classroom Computer News Directory of Educational Computing Resources* is filled with descriptions of periodicals, professional associations, current projects, funding, and sources of ideas and materials. Compiled by educators for educators, the directory focuses on kindergarten through twelfth grades and lists more than six hundred colleges that offer degree courses in computer science and educational computing. From **Classroom Computer News** (341 Mount Auburn Street, Watertown, MA 02172; 617-923-8595). 200 pages. Softcover, $14.95; hardcover, $29.95.

☐ If you think *Softalk* contests are rewarding, the **American Heart Association** (Greater Boston Division, 33 Fourth Avenue, Needham, MA 02194; 617-738-4920), in conjunction with **Classroom Computer News,** is sponsoring a Heart Health Computer Programming Contest to solicit the development of programs on health education for eventual national distribution to schools. The best entry could receive $1,500; eleven other entries may receive $500. Programs are to be written in Basic for the Apple, Atari, TRS-80, Texas Instruments, or Commodore PET computers and aimed at elementary, junior high, or high school students. Deadline is January 31, 1983. Contact the American Heart Association for details.

☐ **VisiCorp** (2895 Zanker Road, San Jose, CA 95134; 408-946-9000) gives you until October 31 to take advantage of their three-for-two offer. When you select three different VisiCorp products, you pay only for the two highest priced ones and receive the third one free. The offer applies to both Apple II and III software.

☐ For warmongers, **Mind Systems** (Box 506, Northampton, MA 01061; 413-586-6463) releases *Spitfire Simulator*, a simulation of the fighter plane used in the Battle of Britain in 1941. Features 3-D scenery and moving target aircraft, options for flaps, aileron-rudder coupling, and control sensitivity. *AirSim-1* owners can use *AirSim-1* scenery with this simulator. Manual includes flying lessons for novice pilots. $40.

☐ So you accidentally erased that CP/M file? **Digital Marketing** (2670 Cherry Lane, Walnut Creek, CA 94596; 415-938-2880) helps recover them with *Filefix*, a program that also protects, deletes, and renames files, as well as forges multiple user links to a single CP/M file. Allows you to view CP/M directory block allocation map, display files in short form—including erased files—display files with block and sector status, and display complete disk status. Requires CP/M 2.2. $100.

☐ The *Powersharing Series* from **Martha Stuart Communications** (Distribution Center, Box 246, Hillsdale, NY 12529; 518-325-3900) is a series of five videotapes that explain in plain English the revolutionary implications of microcomputers and the various kinds of equipment and programs available. They cover: introduction to *VisiCalc*, how the micro gathers and displays information, statistical analysis, word processing, databases, and an in-depth trip through *VisiCalc*. Formerly $250 each, or $1,000 for the entire package, the whole series is now available on one Betamax cassette for $250 or on two VHS cassettes for $275.

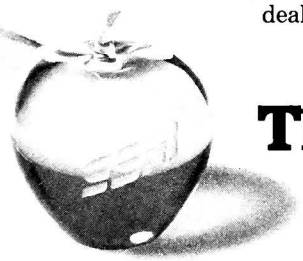
☐ *The Mask of the Sun* is the premier release in a series of animated adventures from **Ultrasoft** (24001 S.E. 103rd Street, Issaquah, WA 98027; 206-392-1353). Each hi-res screen features professional artwork and pictures are reduced to 1K for faster loading. Game has easy-to-read upper and lower case text and allows for entry of commands in plain English. $39.95.

☐ Micromodem II users can make their dumb terminals smart with *Super Smart*, smart terminal software from **Softspoken** (Box 7000-863,



Don't go on a tear over paper correspondence. Join the computer age. Correspond in minutes, not days, with SSM's low-cost full-featured Transend 3 Electronic Mail software for the Apple II™. Transend's state-of-the-art, menu-driven design features password security, unattended operation, versatile text editing, and more. Supports most interfaces including 80-col. video cards and 110/300/1200 baud modems. Call SSM or your dealer for details. Also ask about Transend 1 and 2.

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(408) 946-7400, Telex: 171171

Redondo Beach, CA 90277; 213-325-6060). Captures, creates, edits, prints, and saves to disk up to 21,224 bytes of data. Will send or receive telegrams, hi-res pictures, Basic or machine language programs, and canned messages. The editor is screen oriented with twenty-three function keys that can be reassigned if desired. Requires Hayes Micromodem II. $60. From the same company is *MSM*, an enhancement to the Mill Assembler Development Kit. Merge *MSM* with ASM09.BIN and you get MSM09, a *brun*able 6809 assembler with these added features: faster disk I/O, text or binary object files, control-S to suspend assembly, and control-C to abort assembly. Autostart ROM not required; supports eighty-column cards. Requires the Mill 6809 Coprocessor Board and the Mill Assembler Development Kit. $35.

☐ *Hola, que tal amigos?* If you answered, "Huh?" then *Spanish Language Review* from **Study Guide Software** (Box 11601, Costa Mesa, CA 92627; 714-450-8343) may help. Contains 1,024 words and phrases to help the user learn the basics in grammar, directions and motoring, entertainment, medical aid, restaurants, shopping, and general travel help. Programmed for both the student and the traveler to prepare for examinations and trips. $29.

☐ E.T.'s fingers had nothing on Bend-a-Light, an ingenious new flashlight from **Inmac** (2465 Augustine Drive, Santa Clara, CA 95051; 408-727-1970) featuring a high intensity light beam at the end of a flexible shaft to make small, inaccessible places easier to see. Shines light around corners and in holes and slots only a quarter-inch wide. Accessories include a pick-up magnet that attaches to the shaft to retrieve lost metal objects and a clip-on magnet that mounts Bend-a-Light to any metal surface. $49.

☐ Cartoons on the Apple? **BalbeSoftware Systems** (#6 White Plains Drive, Saint Louis, MO 63017; 314-532-5377) has released the *Animator*, a system for producing animated "film" strips. The user enters key frames, then the *Animator* calculates the frames in between. The key frames are entered either visually, numerically, or from a library. Includes three tutorials for creating, editing, and incorporating strips into programs. Also included is a system for creating shapes and shape tables that can be used independently of the program. $49.95.

☐ An eight-inch controller for the Apple III is now available from **Sorrento Valley Associates** (11722 Sorrento Valley Road, San Diego, CA 92121; 714-452-0101). Pro-Guard, when configured with two Shugart-compatible drives, provides up to two megabytes of on-line storage or hard disk backup for all standard SOS and DOS application programs. Allows data transport via eight-inch floppy between the Apple III and other computers, including IBM mainframes. $695.

☐ The first commercially available computerized home monitoring and control system is available from **Compu-Home Systems** (333 East Florida Avenue, Denver, CO 80210; 303-777-6600). *TomorrowHouse* controls heaters, air conditioners, lights, appliances, security systems, and yes, even the hot tub. Has synthesized voice to remind you of appointments and tasks. One glance at the screen tells you the status of all household functions—even the position of your garage door. From $700 to $1,300.

☐ **Cut the Bull Software** (Box 82761, San Diego, CA 92138; 714-223-3576) has the answer, the ASCII Answer, a chart that compares both regular and Apple ASCII and covers hexadecimal, flashing, inverse, normal, lower-case adapter display, keyboard modification, and printer output. Included are appendices showing how to read the screen and write to the printer from Basic and assembly language. $4.95.

☐ It's only October now, but **Century Software** (Box 26516, Phoenix, AZ 85068; 602-863-1424) is preparing for April with *The Tax Byte '82*. Designed for professional financial planners to assist with tax related investment decisions, the program provides an electronic worksheet for the user to analyze 1982 income tax information through the what-if approach. Divides 1040 form into four worksheets; includes schedules A, B, C, D, E, G, and form 4797. Data is entered and analyzed for specific tax situations and can be changed to simulate other tax advantages. $47.95.

☐ **Graphic Dimensions** (8 Frederick Road, Pittsford, NY 14534; 716-381-3428) has published *Typesetting by Microcomputer*, a report dealing with the functionality of a microcomputer as an input device for typesetting. Sections include case history of the use of the Apple as a front end for a second generation phototypesetter and a section offering many resources for hardware interfaces and specialized software. $10.

☐ For word processing, **Sof/Sys** (4306 Upton Avenue South, Minneapolis, MN 55410; 612-929-7104) offers you a *Personal Secretary*. This word processor includes a lower-case adapter as well as shift-key modification. Features built-in database and mail list merging. Buyers of the package can get a $50 exchange credit toward *Executive Secretary* when they choose to upgrade. All files of *Personal Secretary* are compatible with *Executive Secretary*. $99.95.

☐ The Guild Computer Rack comes in a choice of finished solid mahogany or ash. Fits over your computer, holds one or two drives, supports a monitor on top, and is vented to accommodate fans. For information, contact **Guild Computer Rack** (225 West Grand Street, Elizabeth, NJ 07202; 201-351-3002). Mahogany, $69.95; ash, $54.95.

☐ **Merry Bee Communications** (815 Crest Drive, Omaha, NE 68046; 402-592-3479) presents *Nursery Time*, an early childhood package that is neither tutorial, nor drill, but an open-ended electronic book to develop literary appreciation and verbal fluency. The two-sided disk integrates a variety of color graphics, animation, and music in 124 routines. For ages three to nine years. $29.95.

☐ The *SBCS Agri-Ledger* is a double entry accounting system for agricultural operations from **Small Business Computer Systems** (4140 Greenwood, Lincoln, NE 68504; 402-467-1878). Provides for income statements and balance sheets, budget reports, comparison of performance against projections, enterprise analysis and report combinations for as many as twenty-six operations and ninety-nine enterprises, schedule F information, and yearly history. $395. Demo package available for $30.

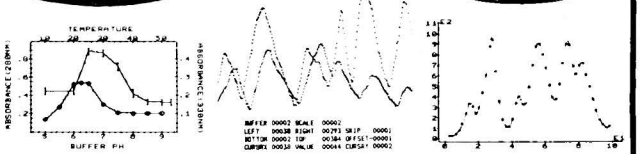
☐ **USI Computer Products Division** (71 Park Lane, Brisbane, CA 94005; 415-468-4900) expands its line of monitors with Pi-4, a monochromatic monitor with nine-inch amber display. Features forty-four square inches of display, front panel brightness and contrast controls, and LED power indicator. $215.

☐ Need a low-priced data storage system? **PMH Computing** (424 West Commonwealth Avenue, Suite 307, Fullerton, CA 92632) has the *Information Storage and Retrieval System*, which provides capabilities for searching, adding, deleting, changing data, and printing reports. Unprotected to allow user modification, the system's Pascal source bar graph

Powerful Lab Graphics

For Your Apple II + ® Computer

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SCIENTIFIC PLOTTER **48K APPLE II +, $25**

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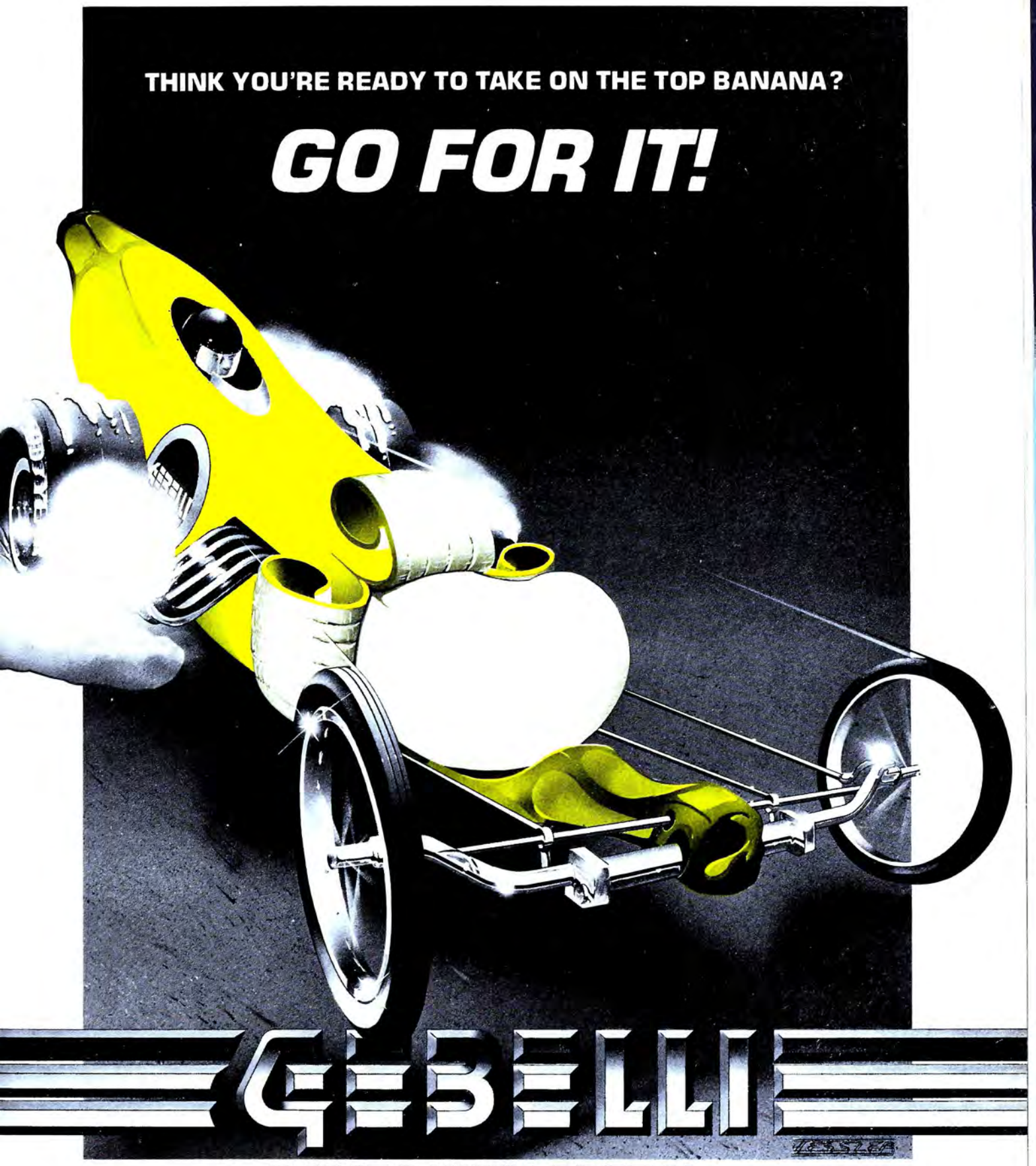
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☐ **Technical Educational Consultants** (11 Barby Lane, Plainview, NY 11803; 516-681-1773) analyzes your needs, develops and implements cost effective processes, and evaluates programs. In computer assisted instruction, TEC offers consulting services, customized software, course design, computer interactive video, computer-based testing, self-paced instruction, dynamic graphics, and color and sound.

☐ An advanced text formatter for the UCSD p-System is available from **Datamed Research** (1433 Roscomare Road, Los Angeles, CA 90077; 213-472-8825). The *Incredible Text Printer* works with any text editor and any printer. Analyzes text and automatically adjusts it for current printing conditions; allows format modifications without having to change text format. Features underlining, boldface, subscript, superscript, alternate ribbon colors, strike-through capabilities, and many word processing functions. Price includes free updates for six months. Requires UCSD p-System and two or more disk drives (or hard disk drive). $249; demo, $60; manual, $30. Datamed Research also announces *Miniac*, a system for writing complex, high level, interactive business oriented programs to end user specifications in one-tenth the normal time. *Miniac* is a superset of Pascal and contains powerful macros in the areas of file management, data entry, sorting, and report generation. Designed for programmers, not end users. Requires UCSD p-System. $450; demo, $80; manual, $30.

☐ **Ticom Systems** (13470 Washington Boulevard, Marina del Rey, CA 90291; 213-827-7118) is the distributor of the Modula-2 language for UCSD Pascal systems. Modula-2, by **Volition Systems**, is the language considered to be the successor to Pascal for the design of portable high-performance systems. Package includes Modula-2 compiler, a standard set of library modules, and a library management program. Also includes the *Advanced System Editor*, file manager, and other utilities. From $550 to $1,000.

☐ **Queue** (5 Chapel Hill Drive, Fairfield, CT 06432; 203-335-0908) is planning several hands-on workshops on microcomputers in education for this fall and winter in the greater New York and Connecticut areas. Microcomputers in the Language Arts Curriculum will be held November 5 and 6 and will include exhibitions of leading software in reading, vocabulary, spelling, language, and social studies. Microcomputers in Mathematics, Science, and Computer Education Curriculum, to be held November 12 and 13, will feature exhibitions of software in computer education, computer literacy, mathematics education (preschool through calculus), and science. The third seminar, Administrative and Classroom Management Applications of Microcomputers, will take place January 21 and 22. Featured will be software for teacher authoring systems, classroom management, and school administration. All seminars: $45 for one day; $75 for entire session.

☐ The Mayday Uninterruptable Power System means no more disasters resulting from power surges or brownouts. Has 150, 250, and 600 watt capacities for Apple II and III and comes with a battery pack designed to give a minimum of thirty minutes backup at full rated power. All Mayday systems provide for high current and hard disk start-up. Alarm lets user know when battery level gets low and an automatic shutdown circuit will shut down the system before the battery goes below its minimum safe operating voltage. From **Sun Research** (Box 210, New Durham, NH 03855; 603-859-7110). Prices from $240 to $500.

☐ Here he comes to save the day! With *Super-Ratt*, a radio-teletype (RTTY) program from **Universal Software Systems** (9 Shields Lane, Ridgefield, CT 06877; 203-438-3117), you can have your own RTTY radio bulletin board service (RBBS) on-line quickly and easily. Will operate in ASCII as well as in Baudot code at any speed from 40 to 300 baud. Runs in either manual or RBBS modes. In RBBS mode, features thirty-five English commands and automatically saves nearly one hundred user messages to disk. Program is modifiable to user's tastes. Includes free one-year subscription to the user newsletter, *The Ratt's Nest*. $59.95.

☐ Dust-Off II from **Falcon Safety Products** (1065 Bristol Road, Mountainside, NJ 07090; 201-233-5000) features a lockable valve that provides continuous, triple-filtered, dry blasts to get rid of dust, dirt, and lint from your screen, computer, or printer. $24.95; refills, $4.50. Stat-Off II fits over the Dust-Off II valve to produce an ionized blast, neutralizing static charges to free dust, lint, and foreign particles, which are then blown away. $17.95. Complete Dust-Off System II, $42.50.

☐ **Columbia National General Agency** (88 East Broad Street, Suite 1800, Columbus, OH 43215; 800-848-0598; 614-224-7235 in Ohio) offers insurance for personal computers. The Safeware program is the first comprehensive policy for personal computers in use either at home or at the office. Safeware covers damage to hardware and software resulting from all sorts of mishaps: from fire and theft to accidental damage, including power surges. Annual premium covers total value of the system, including all hardware, media, and purchased software up to an amount stated by its owner when the policy is issued. Annual premium for a system valued at $6,000 would run approximately $60 with a $50 deductible.

☐ Expand your memory with Ramex-128, the 128K expansion card that requires no chip replacement or motherboard adjustment; it plugs into any slot. This card from **Omega MicroWare** (222 South Riverside Plaza, Chicago, IL 60606; 312-648-4844) comes with software that makes Ramex-128 into a super-fast disk drive emulator. $499. As a separate program, *Super Expander* will allow *VisiCalc* users the full capacity of Ramex-128. Large files and complex models that normally take up to sixteen minutes to load will load in seconds. $64.95. For investors, Omega announces *The Investor's Toolkit*, a collection of more than thirty programs available either separately or in a choice of four packages grouped as *Chart Trader, Market Analyst, Financial Trader*, and *Professional Trader*. Programs cover data manipulation, technical analysis tools, trading systems with optimization, and various trading systems. Programs from $39.95 to $149.95; packages from $149 to $699. Demo, $5.

☐ Find the computer literature you're looking for with *Survey*, an index from **KVA Associates** (2821 Camino del Mar, Del Mar, CA 92014; 714-755-0041) that overviews literature of the personal computer and microprocessor industries. First section for nonengineering users includes program listings and reviews of disks. Second section is for engineering readers and indexes articles on chips, circuits, design, and construction. The third section is of general interest and covers applications and

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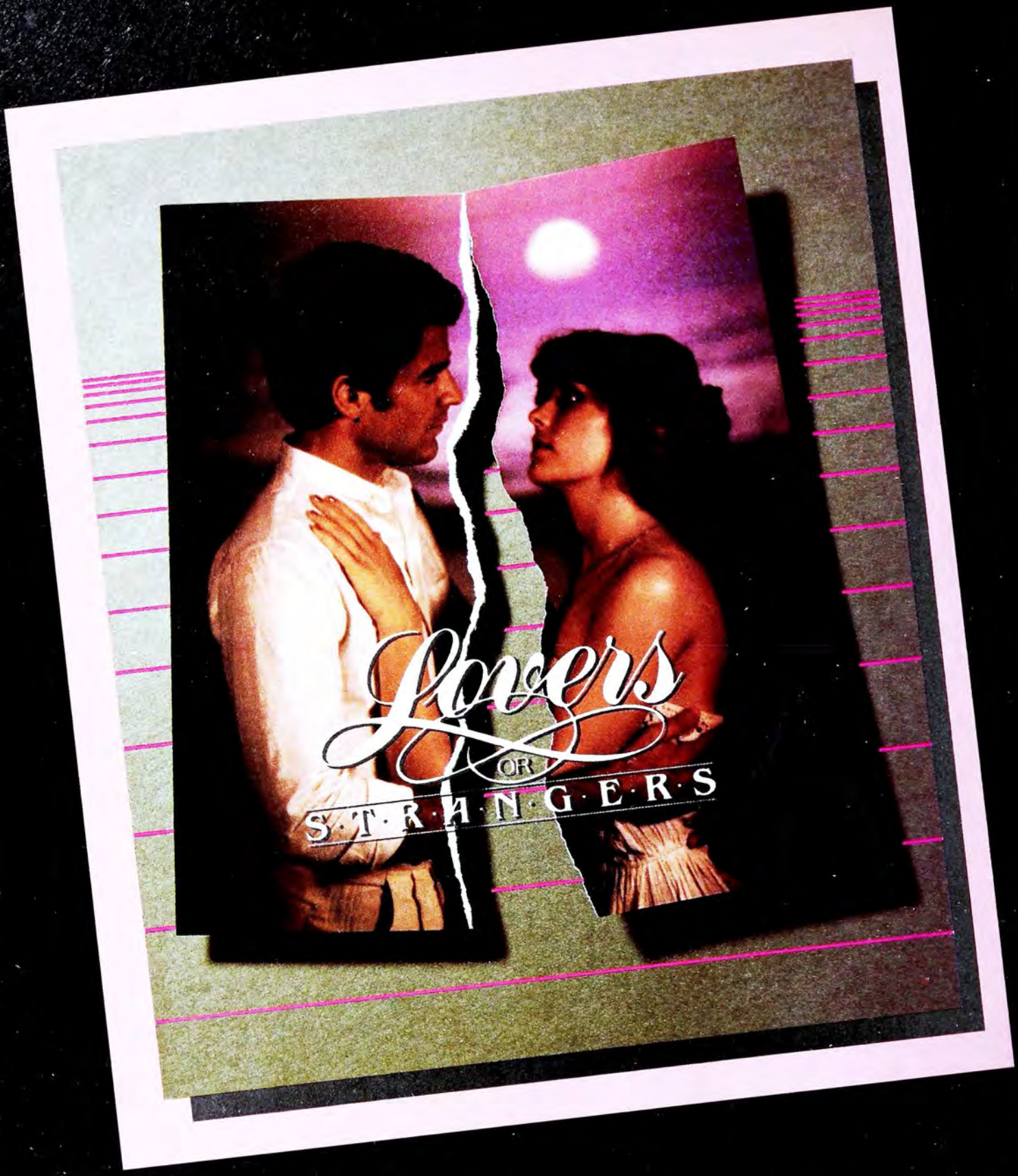
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☐ **Entech, The Computer Skills Center** (354 Veterans Highway, Commack, NY 11725; 516-543-3352) provides professional, personalized, hands-on training to help businesses, professionals, and individuals familiarize themselves with microcomputers and business related applications. Seminars cover selection and use of a microcomputer for business or profession, uses of *VisiCalc* and *SuperCalc*, general accounting, Basic programming, and word processing hardware and software. Obtain a brochure plus seminar schedules by phoning or visiting Entech.

☐ Two weather related programs for farming from **Climate Assessment Technology** (11550 Fuqua Street, Suite 355, Houston, TX 77034; 713-484-3604): *Farm Weather Center* produces charts and reports on the daily progress of soil moisture and crop development after rain gauge and temperature data are entered. $125 for one crop, either corn, soybeans, or spring wheat; $200 for all three crops. Next, the *Weather Analyst* stores and analyzes weather observations from your farm, home, school, or local airport. Allows simple entry of daily temperatures and precipitation amounts which are stored, then summarized. Produces tables and graphs showing accumulated excess of deficits, departures from normal, degree days, and more. Compares weather of current year with any other year since 1951. $59.95.

☐ If it's true that clothes make the person, then **Station Products** (Box 90898, Los Angeles, CA 90009) will make you into a software programmer supreme. Engineer caps made of hickory striped denim are available with either a Software Engineer patch or a Chief A#1 Engineer patch. Impress your friends and strut your stuff. Adult sizes small to extra large; child sizes extra small to large. $6.

☐ Software managers and designers can use the *Fortran Coding Guide* to help in formalizing standard practices. The forty-page guide from **Associated Technology** (Route 2, Box 448, Estill Springs, TN 37330; 205-837-4718) provides an easily applied methodology which ensures the construction of top-down programs that are structured, testable, and easy to maintain. $20.

☐ For higher-level players of *Snake Byte* and other level-oriented games, you no longer have to wade through the wimp rounds to get to the challenging stages. Replay is a device that fits in any slot and allows you to create a copy of your game (runs only with the Replay card; tough luck, matey) that begins at your level of play. From **Computer Hideout** (Box 264, Opelousas, LA 70570; 318-942-9446). $130.

☐ A gift product line in the shape of 4½-inch tall computer terminals featuring a framed "screen" for photos has been introduced by **Compu-Gift** (Box 1408, El Toro, CA 92603; 714-768-8223). The Computer Caddy is also a pen and pad holder, the Computer Planter will hold small plants, and Junior can stuff his allowance into the Computer Bank when his piggy is full. Variety of colors. $12.

☐ Need a simplified data storage system? **PMH Computing** (424 West Commonwealth Avenue, Suite 307, Fullerton, CA 92632) has the *Information Storage and Retrieval System*, which provides capabilities for searching, adding, deleting, changing data, and printing reports. Unprotected to allow user modification, the system's Pascal source code is available for $20. Runs without a language card or Pascal software. $45.

☐ *Millionaire* is a game that brings the user into the world of Wall Street. In this game from **Blue Chip Software** (18653 Ventura Boulevard, Suite 215, Tarzana, CA 91356; 213-881-8288), players manipulate as many as fifteen different stocks and exercise buying and selling stocks, put and call options, buying on margin, borrowing against net worth, and others. Experts of the market will recognize real-life accuracy; provides friendly atmosphere for novices to learn. Requires CP/M. $79.95.

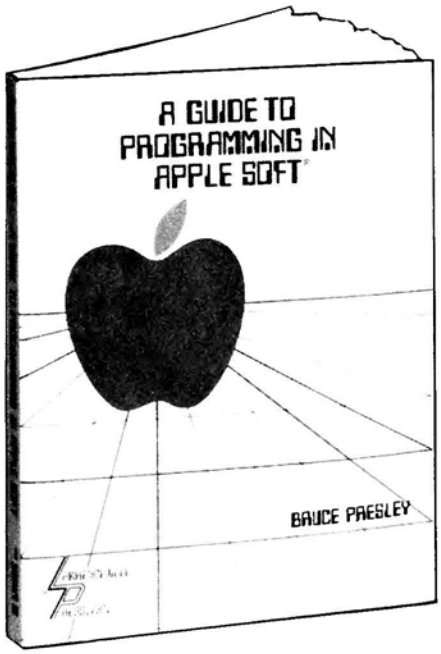
☐ If you have the Model 10190 VersaModem from **Bizcomp** (Box 7498, Menlo Park, CA 94025; 408-745-1616), the Term Emulator II will allow you to communicate with the Source, Dow-Jones, and university computers. A low-cost cable plugs into the game port, eliminating the need for an interface card. The RAM-copy feature allows you to capture data from remote computers. $29.95.

☐ **Computer Stations** (11610 Page Service Drive, Saint Louis, MO 63141; 800-325-4019) presents *Combined Graphic Writer*, an addition that allows flexibility in printed output. Permits a number of fonts, as many as ten at once. Prints underlined text, boldface, inverse, or a combination. Fonts include those of the *DOS Tool Kit*, gothic, pudgy, back-

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☐ *Language Translators*, by John Zarrella, describes and explains assemblers, interpreters, and compilers in a way that's easy to understand. This book from **Microcomputer Applications** (827 Missouri Street, Fairfield, CA 94533; 707-422-1465) presents an introduction to the concepts of lexical analysis, parsing, code generation, and optimization. Macros and symbol tables are also discussed. Softcover, 200 pages. $12.95.

☐ **Davong Systems** (1061 Terra Bella Avenue, Mountain View, CA 94043; 415-965-7130) allows Apple III users to expand to five, ten or fifteen megabytes hard disk memory with its DSI-A206. All systems support as many as four hard disks, backup files larger than a floppy disk, and support dynamic flawing to improve disk operation. Davong hard disk system's software supports all software running under SOS. Five megabyte formatted (six unformatted), $1,995; ten megabyte formatted (twelve unformatted), $2,495; fifteen megabyte formatted (nineteen unformatted), $2,995.

☐ Owners of Epson printers with Graftrax Plus can add *Print+Apple*, a collection of programs from **MicroWest Software** (868 North Second Street, Suite 100, El Cajon, CA 92021; 714-447-4444) that allow you to print eight different stationery letterheads, three different return address styles on envelopes, addresses on envelopes, file labels, lined notebook-style sheets, recipes, poetry, and more. Prints in bold, dark letters, and disables the "no paper" alarm without hardware. $24.95.

☐ Protect your computer against voltage spikes that can cause memory glitches, unstable CRT displays, or other malfunctions with the Noise Filtering Surge Protector from **Inmac** (2465 Augustine Drive, Santa Clara, CA 95051; 408-727-1970). The new device can also filter out radio frequency line noise. Has two power outlets and weighs just half a pound. Prices from $96 to $149.

☐ Three new hi-res board games have been introduced by **Odesta** (930 Pitner, Evanston, IL 60202; 800-323-5423). The series is authored by two computer chess champions and a top-ranking Othello player. All three games give advice on the best moves, have both auto and manual modes, include take-back and replay features, and more. *Chess* has an opening library of more than seven thousand moves, enactment of more than thirty classic games, and seventeen levels of play. *Checkers* can play against itself on sixteen levels or instantly replay an entire game. *Odin*, played by U.S. Othello Association rules, plays fast and is easy to learn. *Chess*, $69.95; *Checkers* and *Odin*, $49.95.

☐ **Specialty Software** (7403 West Canal Drive, Suite P-396, Kennewick, WA 99336; 509-735-2186) really specializes. The *Safety Report Program*, a program for the safety professional and nonprofessional responsible for safety reports and statistics, will calculate ANSI Z16.4–1977 rates on a monthly and annual basis, and from job or project start. Calculates and maintains a rate for fatal cases, a compilation of first aid cases, and man-hours worked. $100.

☐ You can personalize your information processing with *Savvy Personal Language* from **Savvy Marketing International** (100 South Ellsworth Street, Ninth Floor, San Mateo, CA 94401; 415-340-0335). Allows users to work in their own words, phrases, and expressions by using a pattern recognition processor. Numbers and figures can be called up with a "I need my July shipments," or a "Gimme July's output." Also understands languages other than English. Includes firmware board and software; provides general ledger, accounts receivable and payable, payroll, mailing list, document writer, and inventory programs. $950.

☐ Debuts from **International Software Marketing** (120 East Washington Street, Suite 421, University Building, Syracuse, NY 13202; 315-474-3400): *Prism* is the first in ISM's Storydisk line, the tale of a young boy who must find three magical and ancient keys. It's a concept that ISM hopes will become to the microcomputer what books are to libraries. It's also a puzzle to be studied and solved. $19.95. ISM's follow-up to *MatheMagic* is *GraphMagic*, which creates visual diagrams from mathematical data. Pie charts, line graphs, bar graphs, and scattergrams are among the options. Can be used alone or with *MatheMagic* or *VisiCalc*. Pie chart has three modes of color display and features highlighting of pie slice. The bar graph has automatic bar width scaling, bar justification, five-color selection, and axis scaling. The line graph offers three modes of display lines, points, five-color fill selection, and vertical and/or horizontal grid. Under $100. ◨

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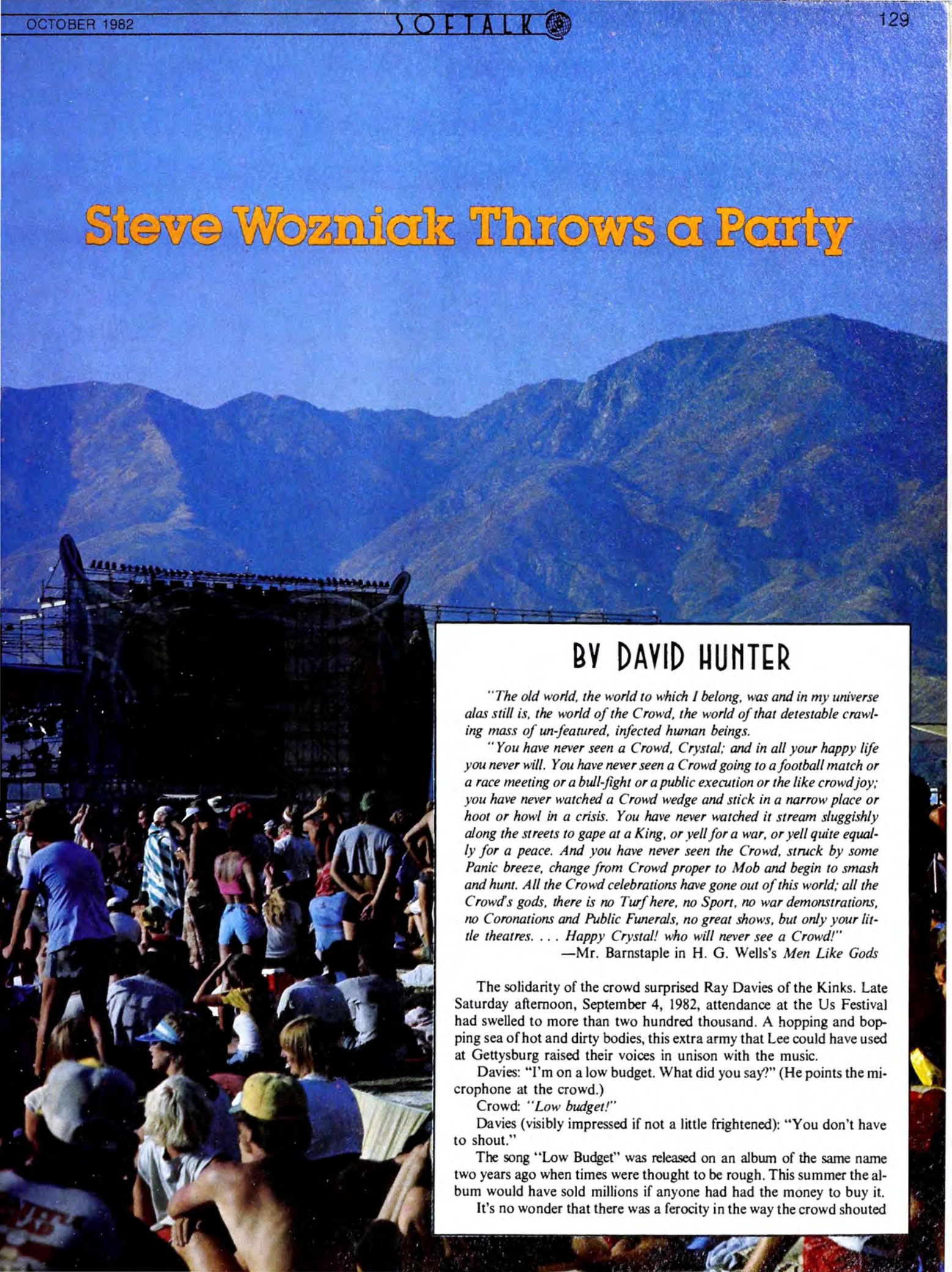
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Steve Wozniak Throws a Party



BY DAVID HUNTER

"The old world, the world to which I belong, was and in my universe alas still is, the world of the Crowd, the world of that detestable crawling mass of un-featured, infected human beings.

"You have never seen a Crowd, Crystal; and in all your happy life you never will. You have never seen a Crowd going to a football match or a race meeting or a bull-fight or a public execution or the like crowd joy; you have never watched a Crowd wedge and stick in a narrow place or hoot or howl in a crisis. You have never watched it stream sluggishly along the streets to gape at a King, or yell for a war, or yell quite equally for a peace. And you have never seen the Crowd, struck by some Panic breeze, change from Crowd proper to Mob and begin to smash and hunt. All the Crowd celebrations have gone out of this world; all the Crowd's gods, there is no Turf here, no Sport, no war demonstrations, no Coronations and Public Funerals, no great shows, but only your little theatres. . . . Happy Crystal! who will never see a Crowd!"

—Mr. Barnstaple in H. G. Wells's *Men Like Gods*

The solidarity of the crowd surprised Ray Davies of the Kinks. Late Saturday afternoon, September 4, 1982, attendance at the Us Festival had swelled to more than two hundred thousand. A hopping and bopping sea of hot and dirty bodies, this extra army that Lee could have used at Gettysburg raised their voices in unison with the music.

Davies: "I'm on a low budget. What did you say?" (He points the microphone at the crowd.)

Crowd: *"Low budget!"*

Davies (visibly impressed if not a little frightened): "You don't have to shout."

The song "Low Budget" was released on an album of the same name two years ago when times were thought to be rough. This summer the album would have sold millions if anyone had had the money to buy it.

It's no wonder that there was a ferocity in the way the crowd shouted



Clockwise from top left: Ray Davies of the Kinks on the screen over the festival stage. Wandering minstrels play at the technology fair. Woz plays *Defender*. Keeping snakes cool. Mickey Hart, Bob Weir, and Billy Kreutzmann of the Grateful Dead at an aquatic press conference. Youngsters play Cavalier's *Teleport*. An enterprising musician plays human jukebox. Center: Cooling off in a stream under a shade tree.

"Low budget!" at Davies on the stage and at his image projected on a huge video screen high above. No one has been hurt more by the current recession than the fifteen year old through twenty-five year old age group. Try finding an unskilled job. Fat chance. It's slim pickings.

U. S. Blues. There's only one cure for the low budget doldrums and that's a good party. You get together with friends and carouse away the specter of joblessness and the shadow of poverty. After all, recessions go away, given time. As Tom Petty would say: "It's the waiting that's the hardest part."

Three cheers for Steve Wozniak and his grand party! Three cheers for Steve Wozniak and his twelve million dollars that made it all possible! Surely the event of the year, it's far too early to call the Us Festival the event of the decade. But an event it was, long to be remembered by those who attended.

The big story at the Us Festival was that it all worked. You could even say it worked smoothly. Sure, there was dust—a whole lot of dust (not just of the angelic variety). Sure, the temperature was more than one hundred degrees all three days. Sure, the distances between things meant trekking like Lawrence of Arabia across the Sinai Peninsula every time you wanted a drink of water. Sure, you were liable to be cornered by a half dozen drunken, mostly naked concertgoers asking for a light or directions to the nearest beer garden.

It was worth it. Dust, heat, and blisters were only minor distractions from an otherwise enjoyable and enriching weekend in the desertlike foothills of Devore, California.

All Day and All of the Night. Some attendees complained of the heat, blaming the concert promoters for insisting on the lucrative Labor Day weekend to hold the festival. Actually, the temperature at night dropped just enough to be comfortable. This was fortunate because many attending the Us Festival came dressed in bathing suits to watch the music acts. Some even whisked those off to be as comfortable as possible. If the concert had been held later in the year, the weather might have been a much more serious problem than it was.

Through the whole weekend, about two thousand people were

Inside Apple

Vol. 1 No. 1

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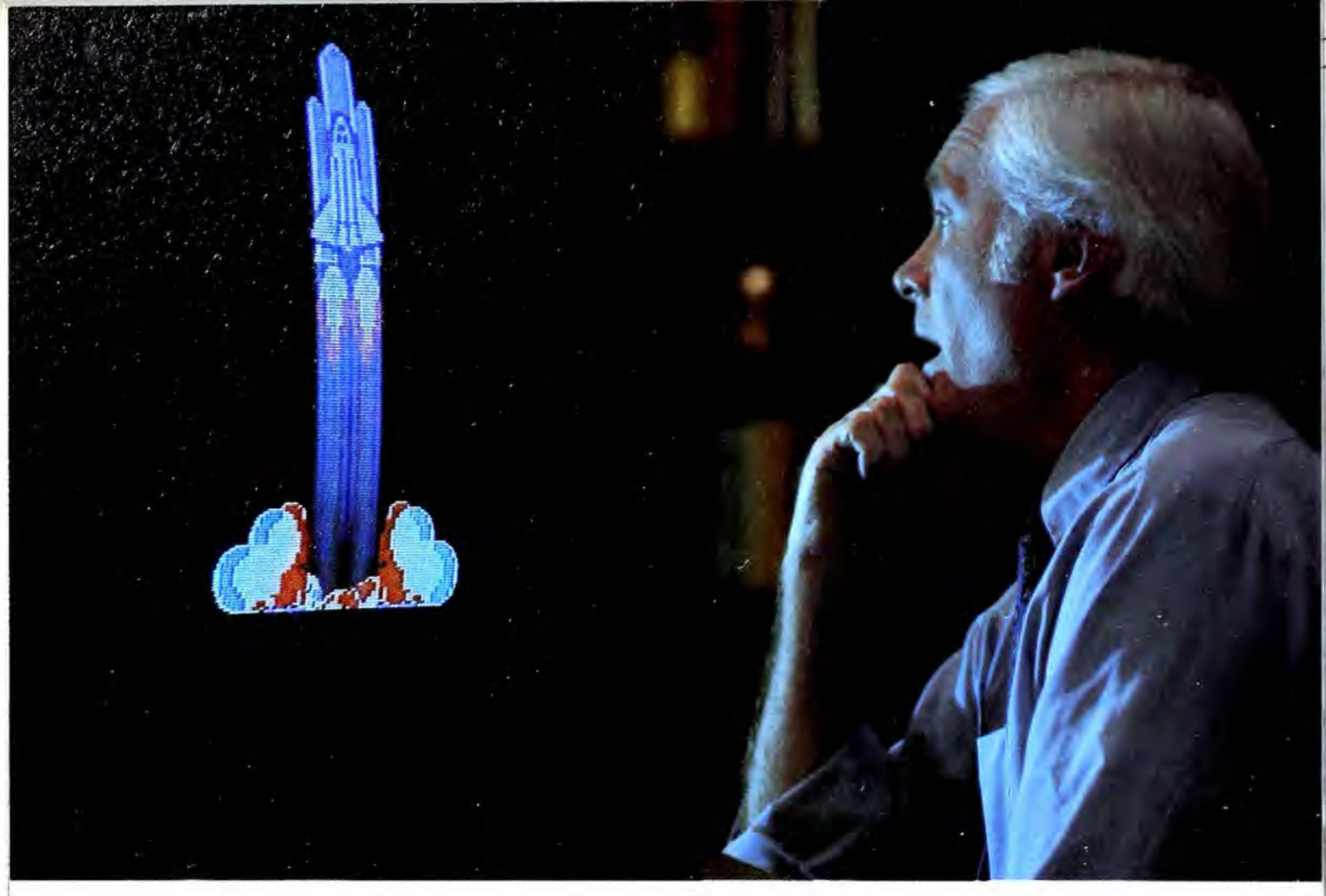
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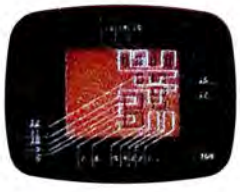


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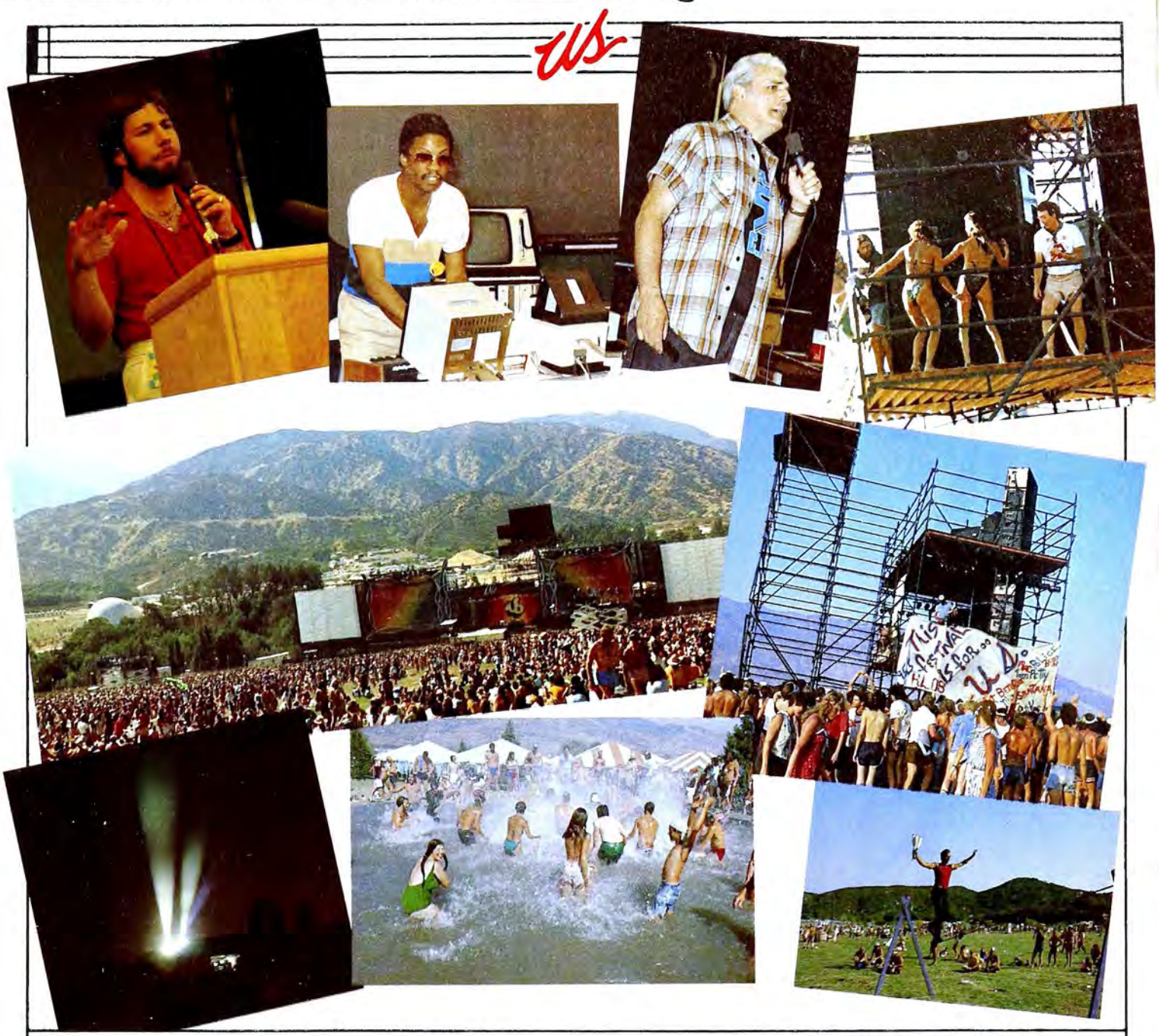
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Top (left to right): Woz wraps up the weekend on the speaker's platform. Herbie Hancock on new frontiers in music. Bob Moog on the history of music synthesis. Young dancers on another speaker platform. Center: The mountains, the stage, the multitudes. The audience beating the heat: hosed off from above. Bottom: The spotlights at night. The beer garden wading pool: wet T-shirts and cool water. A tightrope walker enhances the carnival atmosphere.

treated at the festival's medical tent. The problems ranged from sprains and drug overdoses to asthmalike attacks caused by the swirling dust. Sixty-seven people were treated at local hospitals. The only death associated with the festival occurred the morning before it opened. A man was killed on the freeway in a car accident near the site.

For the most part the attendees were law-abiding, except for drugs and nudity. There were only thirty-six arrests, mostly for vehicle theft, drugs, and carrying concealed weapons. A T-shirt salesman was abducted at gunpoint and robbed. There was one reported rape and several cases of assault. That's it. In a city of more than two hundred thousand inhabitants such good behavior for a holiday weekend is a minor miracle.

Sprawling over five hundred acres, the Glen Helen Regional Park the evening before the opening of the festival was a scene to remember, like Yorktown before the arrival of Cornwallis. Frenzied activity was evident most everywhere except in the concert area, which was remarkably peaceful. The massive grass and dirt amphitheater was silent and empty.

Later Thursday night the crowd began pouring into the area. They came in trucks, vans, cars, helicopters, and buses. They rode motorcycles, hitchhiked, and walked. They came from all over the North American continent and farther, mainly to hear the music acts. They would find much more.

Seen and Not Seen. A decision was made a month before the festival to advertise it primarily as a rock show. Wozniak's original idea was to have a spectacular technology fair that would complement the entertainment and add punch to the philosophy behind the Us Festival. There was a technology fair, housed in five huge circus tents, but one got the impression that many people were more thankful for the air-conditioned environment than for the content of the exhibits.

A wildly diverse group of exhibitors spread their wares for the steady stream of sweaty bodies. Fox Video Games unleashed their "Games of the Century," including *Worm War I, Deadly Duck, Beany Bopper*, and *Fast Eddie*. Produced by Sirius Software, the games are compatible with the Atari Video Computer System and the Sears Tele-Games machine.

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Fox Video, a wholly owned subsidiary of Twentieth Century-Fox Film Corporation, must have been pleased at the attention awarded their new games at the Us Festival. Jerry Jewell of Sirius was in attendance and actually smiled once or twice.

Computers, computer games, video arcade games, science, music, and science fiction were the main themes of the technology fair. Apple, Atari, and Quantel Computers all had respectable displays. Exhibiting products for the Apple were Link Systems, Softape, Novation, R. H. Electronics, FMJ, Passport Designs, and Syntauri, to name a few. Three of the tents had several dozen standup arcade games each. Old and young alike tested their skills against *Defender, Tempest, Zaxxon, Red Clash, Centipede, Krazy Kong*, and others.

Kittlevision had a small booth where they imparted information on various components for home satellite receiving stations. There were brochures for Television Receive Only, TVRO, billed as the "finest home entertainment system available today." From United Satellite Systems, TVRO features more than fifty television channels and they're predicting one hundred and fifty by 1985.

Life during Wartime. Claiming to be the "biggest SF novel ever published," L. Ron Hubbard's soon to be published *Battlefield Earth* was the recipient of a lavish spread. A ten-foot-tall replica of one of the aliens in the novel, called Psychlos, was chained between two walls. Booth attendees dressed in Scottish garb explained what was going on. Besides being more than nine hundred pages long, *Battlefield Earth* is going to have its own soundtrack album written by Hubbard along with jazz talents Chick Corea and Stanley Clark.

In the speaker tent, Chick Corea gave a demonstration of the Fairlight computer synthesizer, which allows sounds to be recorded, stored, and then played through a keyboard. The music for *Battlefield Earth* is being called Space Jazz, where real sounds are used for melodies and rhythms with a jazz beat. The sound in the speaker's tent was loud and raspy, eliciting howls of pleasure from the music-hungry crowd of shade-seekers.

Other guest speakers included jazz great Herbie Hancock, also playing Fairlight. When asked whether he was completely abandoning more traditional instruments for the computer variety, Hancock said he would never do that, but sophisticated synthesizers like the Fairlight were fascinating and revolutionary. Bob Moog, the father of the synthesizer, gave a presentation on the history of electronic music. It was difficult to see slides in the sunlit tent, but Moog gave an interesting talk.

Give the People What They Want. The wizard Woz himself made a much publicized talk about the history of the Us Festival, where he candidly discussed some of the problems encountered. Scheduled to speak on the first day, Wozniak cancelled once and then again. He finally spoke on Sunday to a packed tent, receiving several standing ovations.

It all started when he was driving down the freeway listening to the radio. How neat it is, Wozniak thought, to hear several different types of music at one sitting. From these humble beginnings began all the rumors and legends. Having been beat up worse than Muhammed Ali's punching bag by the press and doomsayers, Wozniak seemed pleased and very confident on Sunday.

He made it clear he was throwing a party for a few thousand of his friends. This was not meant to be some political statement or great cultural showpiece. The theme of the festival, for Wozniak, was people working together. Despite some difficulties between Unuson and Bill Graham Presents, Wozniak proclaimed the ambitious endeavor a certified success as far as he was concerned. The crowd agreed.

Another much delayed event was the opening of the Sensonics Theater. Thursday afternoon, the power went off around the exhibition area and the sixty-foot inflatable dome that housed the theater collapsed. Two days later the video and audio display was still not working, but on Sunday it was finally up and running. The waiting made expectations soar. Unfortunately, the promoters didn't make full use of the dome as a circular video screen, projecting a standard rectangular image on two sides of the dome's wall.

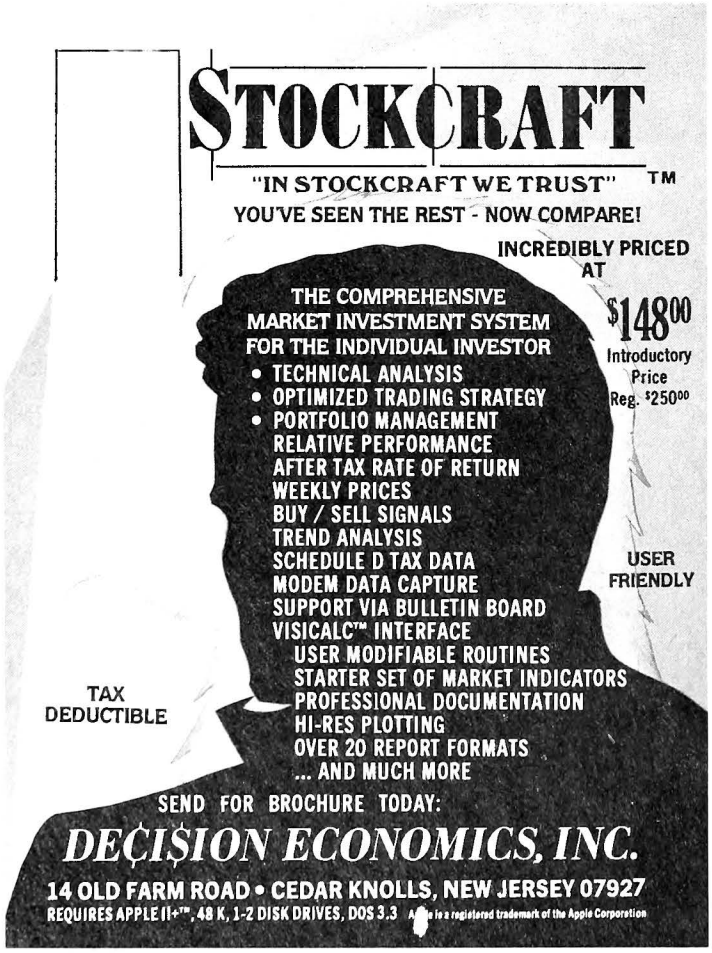
The Sensonics theater uses the dome structure as a parabolic reflector for eight channels of discrete sound. Needless to say, the audio portion was somewhat better than the visuals, though marred by the boisterous audience, who quickly discovered that any sounds they made were amplified by the dome just as well as the eight-channel sound was. Illuminated at night, from the outside, the Sensonics Theater resembled half of a giant crystal ball.

Catch Me Now, I'm Falling. The sale of tickets to the Us Festival went through several phases. At first only three-day tickets costing $37.50 were announced, but, despite a solid lineup of music acts, sales were slow. Then one-day tickets costing $17.50 were announced, with promoters still claiming that no tickets would be sold at the festival site. The final agreement was to sell tickets at the door, though the wait would surely be long.

There were remarkably few hassles in this regard. Everybody who showed up willing to pay got in. The camping areas were large enough and the facilities adequate, though nowhere near the Ritz. Port-A-Potties numbered two thousand and were strategically placed all around the festival site and the camping areas. There were never lines. Hundreds of drinking water outlets brought water to the dehydrated masses. There were both drinking fountains and faucets for those wanting an improvisatorial minishower.

Two communal shower areas were popular, as was a shallow and fantastically cold pool in one of the beer gardens. The promoters were always thinking of the attendees during the preparations. One nice touch was a good sized sound system at the far beer garden (half a mile from the stage) bringing the music live and loud to those punishing brews or relaxing in the pool. Many attendees grumbled about the two lakes being off limits to swimming. Wide and deep, the main lake was wisely fenced off for safety reasons. The other lake was in the backstage area and very few people got anywhere near it.

Water was the most precious possession of the weekend, but food in great quantities was also needed. Though open campfires were banned, many attendees brought their own food. There was plenty at the festival site for those with only cash in their possession. Hot dogs, hamburgers, corn, and other munchies kept the hunger pangs at bay. The longest lines were for the sweet and sour pork at the one food stand offering more than the usual ballpark delicacies.





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From Small Things, Mama, Big Things One Day Come. Late Friday afternoon, a special press conference was held with Steve Wozniak and Bill Graham in attendance. They announced the first direct television broadcast ever between the Soviet Union and the United States to occur that night. Plans for this had been alive for more than a year and Wozniak thought the time was right. Graham reportedly went along but protested that this kind of thing was inappropriate for a rock show.

That night, between Talking Heads and the Police, a broadcast from Moscow was beamed to the three large video screens around the stage. The content of the first broadcast was less than exciting. It consisted of a short travelog around Moscow. The next day, portions of Eddie Money's set were beamed to the Soviet Union and snippets of a crowd attending a rock show in Moscow were shown to the Us Festival crowd. It was a brief but historic encounter, and Woz made it happen.

One of the measures of success in an event the size of the Us Festival, according to Wozniak, is how the end product is received. In the case of the Us Festival, the most important end product was the music and it was an unqualified success. Sure, there wasn't a superstar act like Bruce Springsteen, The Who, the Rolling Stones, or Stevie Wonder. But heck, Betty Boop on that stage with that sound system would sound like a million dollar act.

In terms of presentation, the festival stage and sound system were unparalleled. Measuring in at three hundred feet by sixty-seven feet, the stage area was easily big enough to hold a chained-up King Kong and twice the usual amount of Radio City Music Hall Rockettes. The sound system was loud and clear, three times the size of the typical Rolling Stones setup.

Two fifty-foot Eidaphor screens on either side of the stage and a twenty foot by thirty foot Diamond Vision screen above the stage provided a front row view of the music acts almost anywhere in the fifty-seven acre amphitheater. Several video cameras set up around the stage and one on a swinging boom in front of the stage provided a variety of angles. Unfortunately, the same image had to be projected on all three screens at once during the live broadcasts. Still, the total effect, enhanced by spectacular spotlights and the awesome sound system, was a religious experience.

Almost Saturday Night. Between music acts all three days and nights, video images were projected on the Diamond Vision screen, usually in time with music. Janek Kaliczak of the "World's Largest Apple System" (December 1981 *Softalk*) used a font generation program he's been working on for a year and a half to display graphics and text on the Diamond Vision screen. Usually given two to three minutes between acts, Kaliczak and two Apples were responsible for displaying the Us Festival logo and brief messages.

"Sometimes we had a lot more than three minutes," explains Kaliczak, "because the regular video equipment would break down from the heat. The Apples were not down at all, even when we ran them fourteen to sixteen hours a day."

Hidden behind a door with the sign "Applefex" stuck on it, to let people know where he was, Kaliczak also digitized images of notables like Wozniak for displaying on the Diamond Vision screen. "This was a good field test of the system," Kaliczak said. "Everything worked perfectly, though this wasn't what the system is designed for. It's meant to be used in regular studio broadcasting and industrial displays."

Saturday night, between Pat Benatar and Tom Petty, the crowd of two hundred thousand was treated to the most spectacular laser display this side of *Star Wars*. A dozen or so bright green slivers shot off in all directions, blinking on and off and swiveling in time to music. Other lasers projected fantastic geometric and hyperbolic patterns on special screens next to the stage. If there hadn't been so much dust and if the night sky had been clearer, the effect would have been even more stunning.

Crawling from the Wreckage. Every night after the show was over, concertgoers would stream from the amphitheater, a human tide in the dust and trash. Many helped clean up as they left. There were no stampedes, no mad rushes, no serious altercations between attendees and security. The crowd was good, because the music was good. The end product reached and surpassed expections.

In this age of telecommuting and pay TV, it's good to know that large crowd gatherings can still come off with relative ease. The Us Festival is a crowning achievement for the promoters and planners. The list of those responsible is long, much too long to mention all. But special kudos are due Stanley Kephart, responsible for land development and public safety; Otis Swanson, construction coordinator of the festival site; Craig Tocher, in charge of architectural design and land restoration planning; and Pancho Rodriguez, head of the production team for site development.

Wozniak, Unuson president Peter Ellis, and Bill Graham were the inspired generals of this strategic effort. Unuson may produce another festival next Labor Day weekend or sooner. This year's Us Festival will live long in the annals of rock and roll and Apple Computer lore.

Mr. Barnstaple, you don't know what you're missing. ◼

Thoughts from the Crowd

The following vignettes and impressions were gathered during the three day festival by Al Tommervik, David Durkee, Matthew Yuen, and David Hunter.

Countering the counterculture: Seen Sunday on the concert grounds was a rotund, elderly man with a T-shirt carrying the legend, "If you want to get stoned, drink wet cement." AT

Sign: "Jim from Laytonville, where are you?" MV

Planned pickups: Despite possible ideological shortcomings, the festival was very well planned and executed for an event involving more than two hundred thousand people. Parking was reasonably well organized, even to having shuttle buses running from the outlying parking lots five miles away. DD

In-tourist service: Sweatshirt and T-shirt legends indicated that just about every state in the union was represented by attendees. Canadian and Texas flags represented the foreigners. AT

Bikers: Four men dancing under and waving a Canadian flag came down from Edmonton, Alberta, on three motorcycles. For them, the Us Festival "is just the beginning of a month-long party. We're going back home in October." MV

Comparative Review: First speaker of the festival Stewart Brand, editor



and publisher of *Coevolution Quarterly*: "What's the difference between the Us Festival and the Nuremberg Rallies? The music's better." DH

Exhibition blues: More than half the exhibitors were associated with microcomputers, but it was the music exhibits that got the most and biggest play—among them Syntauri and Passport Designs, who use Apples in conjunction with their keyboards. AT

Tech talk: Although more heterogeneous than Applefest, the technology fair was no more exciting. Some exhibits successfully got across the point of what new technologies are doing and can do for mankind. The L-5 society is a national organization for promoting and supporting space development from the grassroots level. Their small booth had posters, pamphlets, and people willing to talk about the present and future of our involvement in space. DD

More acreage? Concerning the cancellation of the announced robot marathon, one disgruntled exhibitor said: "They didn't give us enough room." DH

Where were the Moonies? The booths that really had something meaningful to say were the hardest to find. They had to compete with the bigger, flashier exhibits of the mass-market organizations like Atari with their home video systems, Mattel Electronics with their electronic drums and games, and L. Ron Hubbard's people, who were hyping Hubbard's latest science fiction opus and its soundtrack album. DD

Eye-opening sights: Computer shows were never like this. The high temperature caused the flower of southern California youth to come dressed as scantily as is legal. The following week's Miss America contest was hard-pressed to match the pulchritude on display. AT

Reach for the sky. By Sunday afternoon, sheriffs in the security towers and sound engineers in the light and speaker towers were sharing their high-perched viewing areas with bikini-clad women who danced to the audience's delight. MV

When you're hot, you're hot: Despite free showers and misters to keep the audience cool, the hundred-degree temperatures probably had a lot to do with the tameness of the crowd. Standing in that kind of heat for six hours will take the aggressiveness out of anybody. AT

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Hey, mister: The most popular concession offered by the organizers was a simple plant sprayer with the festival logo that became a way of sharing comfort with others. Mist a stranger; make a friend. DD

All seasons: Three retired couples from San Jose, California, who decided to attend the festival together the same day they returned from a vacation in Hawaii, loaded up their motor home, drove more than three hundred miles, and bought tickets at the door. "Our kids go to these shows all the time; we wanted to see what it was all about." MV

A bit commercial: The concessions for Miller and Tecate beers and Coca-Cola were hefty money earners but welcome alternatives to water even at the somewhat inflated prices. Us Festival T-shirts in many forms, some official, some home-grown, were sold at stands and by itinerant vendors. DD

Messages from above: Skywriting filled the sky all three afternoons. The messages were mainly commercial in nature. "E. T. Phone Home" and "Fast Times at Ridgemont High" advertised popular movies. "It's a Boy" alluded to Wozniak's newborn child. DH

The pub with no beer: One of the two beer gardens actually went dry Saturday. With a more rowdy crowd, that could have been an invitation to disaster. At Glen Helen, it merely resulted in miscellaneous grumbling. AT

Wet ones: Jerry Garcia, during the Grateful Dead's set: "At Woodstock we all had to help each other keep dry. Here we have to help each other keep wet." In the hundred and ten degree heat and the almost choking dust of the amphitheater, Garcia had neatly encapsulated the feeling of togetherness at the Us Festival. DD

Breakfast with the Dead: The Grateful Dead are legends from the sixties, but they exhibited considerable pulling power Sunday morning. More people came from outside southern California to hear the Dead than any other group. AT

Counterpoint parables: A barefoot Bob Weir of the Grateful Dead crossing a stream backstage: "Watch the Dead walk on water." DH

Lead singer Sting of the Police: "This is the largest audience we've ever played to, but it doesn't mean anything unless we all act together. We must have cohesion." MV

Red, white, and blue: Near the end of Jackson Browne's set, an American flag was carried through the crowd to great cheers. And when, except for the Olympics, have two hundred thousand people gathered in one place cheered Old Glory? AT

The beat goes on: Toward the middle of the concert area gathered a crowd of more than a hundred who clapped and bounced off each other as one man provided rhythmic drive on a set of congas. It wasn't long before other spectators joined the act by setting up an impromptu limbo dance, moving in unison to the crowd's continuous chanting of "Us! Us! Us. . . !" On the outside of the circle, you couldn't see what was going on in the middle, but you didn't care. You just picked up a rock and a cup, or two sticks, or anything that would make noise, and joined in the fun. MV

Fistful of dollars. Close to two hundred thousand people waited for something to happen before the Ramones played on Saturday afternoon. Suddenly the title track of *The Good, the Bad, and the Ugly*, one of Clint Eastwood's spaghetti westerns, boomed on the mammoth sound system. Hollywood would have paid a lot more than twelve million dollars to capture such scenes. DH

We're all together. But what was all this "us" business about anyway? The message was getting through, if not verbally, then emotionally. If you were looking for an "us" answer, nobody told you. You just felt it. You did it. It was the people staying after the show each night to help pick up trash. It was the security guards offering rides in their golf carts to festivalgoers who had long walks back to the campgrounds. It was the mutual spraying of water at each other in efforts to keep cool, or just to say hello. MV

Another Apple Seed: Bill Graham's looking to take credit for the Us Festival, even to the point of obnoxiously croaking "My Way" with piano accompaniment after Fleetwood Mac closed the show. Fact: Graham is merely a booking agent; the warmth and generosity of spirit that pervaded the attendees was another manifestation of that special feeling that is Apple. What Woz proved is that Apple esprit de corps is portable to other environments. AT

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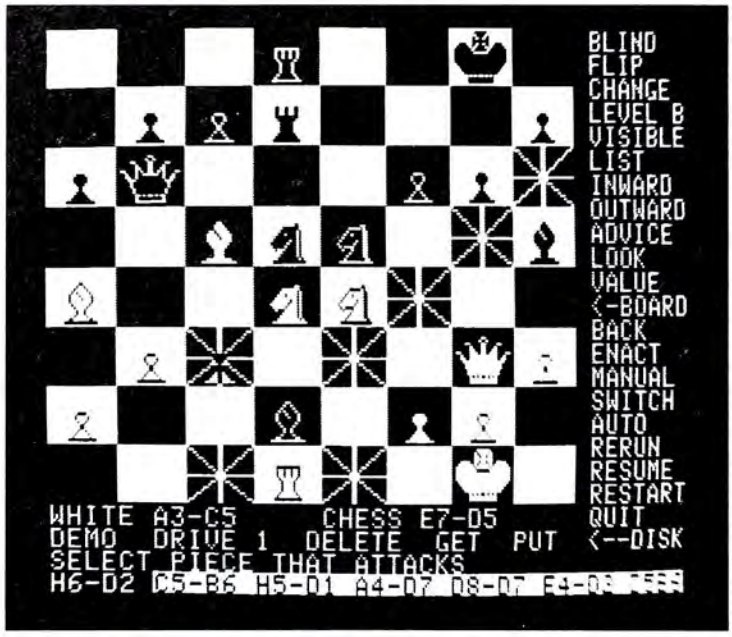
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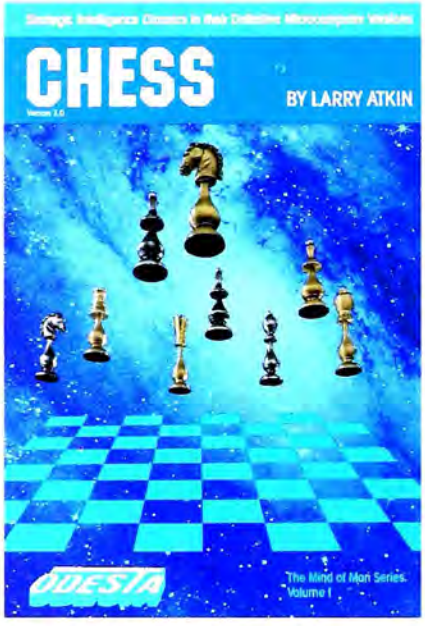
- Variations of blind-fold play—camouflaged or invisible pieces
- Invert board to play black on bottom
- Change pieces on board during game, or set up position
- Change between 15 levels of play, plus postal and mate-finder modes
- Show move that Chess is thinking about
- List played moves for each side
- Lines of force in: attacks and defenses on a square
- Lines of force out: squares attacked and defended
- Chess suggests a move
- Show moves Chess thinks you will make, and its responses
- Evaluation of a position
- Return to board or switch to command menu
- Take back a move (repeatable)
- Play move suggested by look-ahead search
- Chess plays neither side
- Switch sides
- Chess plays against itself—one level against another
- Replay through most advanced position
- Skip to most advanced position
- Start new game
- Leave program
- Save, get, and delete games to and from disk

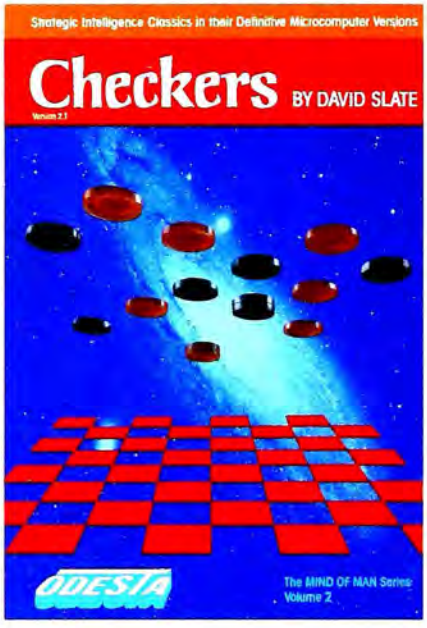
All features self-documented; all choices cursor-controlled
Screen shows "outward" and "look" features being used

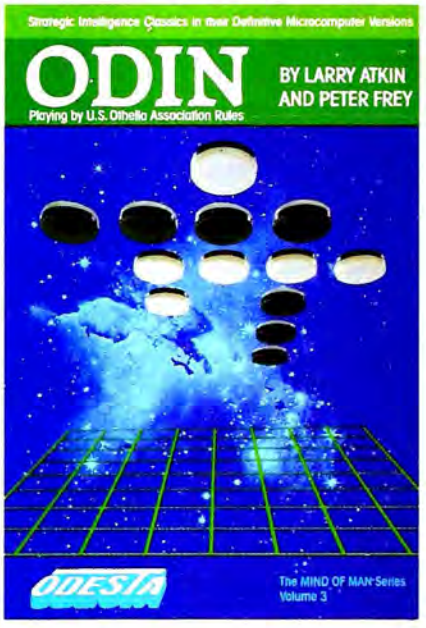
THE PEOPLE BEHIND THE PROGRAMS:

Larry Atkin & David Slate: Authors of the Northwestern University Chess 4.7 program—World Computer Chess Champion, 1977-1980

Peter Frey: Northwestern University professor
Editor: **Chess Skill in Man and Machine**
One of U.S. Othello Assoc.'s top-ranked players

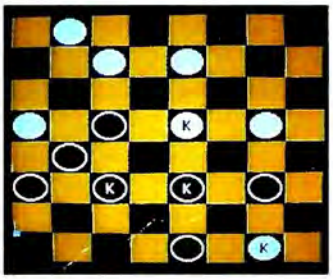




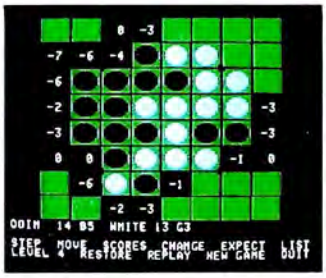




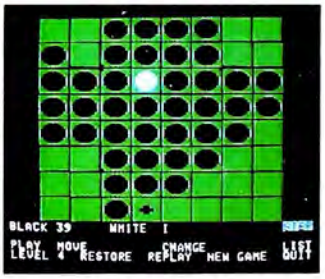
Checkers' features



Black to move and win
(From Checkers documentation)



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MARKETALK Reviews

Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

Prisoner 2. By David Mullich. Maybe you were one of the lucky ones who escaped from the Island. In doing so, you proved yourself a master of cunning strategy and brilliant logic. Many of your compatriots in the Service were not as lucky. Some live there still; others found suicide the ultimate solution to getting off the Island.

You changed your name, enlisted the aid of a plastic surgeon, and assumed a new identity. For months you hid in the shadows, relying on your former training in the Service to scavenge the necessities of life. You could smell Pax lurking around every corner. After a while you began to relax your defenses and chose to leave the safety of your sanctuary. At the airport you purchased a ticket but found it strange to be the only person on the plane. Only when the voice of the Caretaker crackled over the cabin intercom did you realize the horrible truth.

The Master never forgot about you. He figured that a little time on the outside would erode your defenses. Could you now be persuaded to break down and reveal your resignation code—the three digit number that summarizes your reasons for resigning the Service? Are you an easier, softer mark for the Master or has the constant fear of being recaptured kept your senses as finely tuned as before? A few days on the Island in *Prisoner 2* and both you and the Master will know.

Prisoner 2, like its predecessor, is a science-fiction nightmare. Again, you are charged with the task of searching for clues to help you escape from the Island. Only this time the Master and Caretaker have added thirty-two brilliant colors, hi-res animation, and sometimes jarring, often hypnotic sounds to distract you from your purpose—all for just a few dollars more than the price of the original game. Every structure, path, stranger, and object you encounter is part of a grand deception with the dual purpose of extracting vital information from you and breaking down your spirit of individualism. The Caretaker has a diabolical new set of tricks to get you to reveal your resignation code. Your every move is monitored and points are assigned for intelligent play.

Each of the twenty buildings on the Island is itself a game of wit and logic that is further veiled by a curtain of glitter, color, and sound. Even worse, upon repeated visits to many of the buildings, you'll find that their layouts have changed—or are you losing your mind, perhaps? More than anything, *Prisoner 2* is a game of details. In the early stages of the game you will face many dead ends and assimilate a lot of what seems to be irrelevant information. You must persevere. Take careful notes; no clue can be considered too trivial to the overall solution. You must read between the lines, use logical deduction, and throw out your old thinking patterns. When all else fails, rely on intuition.

Beginning with a newly designed three-dimensional maze (hint: don't go out empty-handed), you'll find that even the keyboard functions change as you move through the game. What you press on the keyboard is not always what appears on the screen. Persistence is the key. Sometimes it wins you points when you least expect it.

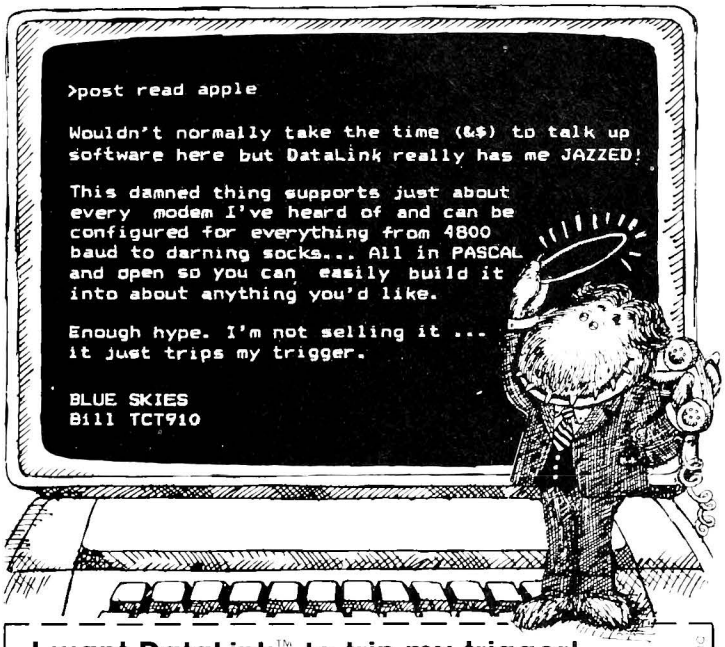
A word of caution: There is a stop and save feature built into *Prisoner 2*. By typing control-C or Stasis at a convenient time the game will be suspended and you will be able to check how the Caretaker has been rating your performance. Every decision you make is scored, and your score is dependent upon how well your actions reflect individual thinking. A number of doors will be closed to you until you reach a high enough score. And if you have stopped the game (to rest or seek psychological treatment) any player booting the disk will automatically be transported to the Island and assume your identity. If the newcomer succumbs to the

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maniacal, relentless interrogation of the Caretaker, all could be lost. Guard your copy, as your sanity may depend on it.

You have been forewarned. The time and patience you devote to delving into the mysteries of the Island will be well spent. Be seeing you.

Prisoner 2, by David Mullich, Edu-Ware Services (Box 22222, Agoura, CA 91301; 213-706-0661). $32.95. NB

Sales Order Entry III. By Richard Loggins. Nobody's going to compare *Sales Order Entry III* with *VisiCalc III* and nobody's going to utter Richard Loggins's name in the same breath with Robert Frankston. But it's the appearance of software such as this that contributes to the growing conviction that the new, improved Apple III can be more than just a specialized spreadsheet and word processor.

Sales Order Entry III is a perfectly straightforward program that does what its name purports—it allows you to enter orders into your system, track their progress, ship them to the correct address, bill them to the correct party, and track the efficiency of your salespersons. What's remarkable about the program is not that it does all these things, but that it does them so easily.

Author Richard Loggins has capitalized on the power of SOS to keep several interactive files open at all times, allowing rapid passage of data from one part of the program to another. Capturing this data in like fashion on an Apple II would be an arduous and tortuous task. On the Apple III, it all comes down slick and easy. Working with this software gives you the feeling of minicomputers, not microcomputers.

This program has gone through several development stages to get to this point, but it still has a couple of rough edges. Its mailing label sort is slow, and the author has defined field names and record lengths for you—a noxious practice. Turnkey microcomputer software won't be truly modern until those items are totally user definable. On the other hand, Loggins redeems himself by leaving his program unlocked. If you have the time, knowledge, and inclination, you can modify his definitions to better meet your needs.

Sales Order Entry III is a specialized database application that takes advantage of the power and sophistication of the Apple III. Every dealer selling IIIs and every aspiring author of III software should have a copy. Loggins's code may not be pretty, but his program sure is. ART

Sales Order Entry III, by Richard Loggins, Plain and Simple Software (9003 Lexington N.E., Albuquerque, NM 87112; 505-293-2448). $250.

Teleport. By Mike Abbot. *Teleport* is Cavalier's watershed product in many ways: It's the first Cavalier product lacking the Jim Nitchals byline, it's the first Cavalier product in several months, and it's the first Cavalier product the company will try to sell outside their former exclusive distribution agreement with Softsel. It's also the first verbose arcade game, although you don't need the sound to enjoy the action.

Teleport is a maze game in which several lost aliens wander through one of ten mazes. It's your job to stun the aliens and haul them to a warp chamber so they can be transported home. But don't come in contact with an unstunned alien—that's instant death.

Author Mike Abbot has drawn from recent Cavalier entries *Bug Attack* and *Microwave* in that there's lots of action on the screen at all times. Up to five aliens at a time wander the maze. The warp chamber entrance moves every few seconds, which can be terribly disconcerting when you're within pixels of it.

Also on screen at all times are two teleport doors. Should several of the lost aliens be closing in on you, you can enter a teleport door and be relocated elsewhere in the maze. Sometimes your relocation is directly on top of a wandering alien, however. Periodically appearing in the maze are two stars—the happy star is worth points, the grumpy star is death.

All these elements combine in a form that should keep arcade fans interested for some time.

Abbot wrote the program, which has sound effects either way, to work with the Votrax speech synthesizer, but even owners of the Votrax might never be able to prove it. The Votrax device requires a serial card, and it turns out that all serial cards are not created equal. In fact, serial cards are so unequal in the way they handle data that Cavalier could find only two that were compatible with their game—the CCS and the MPC cards. So possession of a Votrax unit is not guaranteed to get *Teleport* to talk.

Luckily, the vocal aspect of *Teleport* is just the frosting on the cake and not the whole pastry. The mute *Teleport* stands by itself as one of the five best of the early Christmas season entries. ART

Teleport, by Mike Abbot, Cavalier Computer (Box 2032, Del Mar, CA 92014; 714-755-8143). $29.95.

Wayout. By Paul Edelstein. At last! A maze game that doesn't require you either to eat or to leave a trail of dots. Instead, you merely need to find the way out. Merely? Perhaps a stronger word is in order.

You begin with a choice of twenty-six mazes. Upon selecting one, you enter the maze armed only with a compass and a mapmaker. The compass shows on the screen as an arrow within a diagram of the four cardinal points. The mapmaker creates a twisty maze of purple lines at the bottom of the screen to show where you've been so far. Using these two devices, you must hunt for an exit, represented by a flashing colored rectangle.

There are a few obstacles to be overcome in *Wayout*. One is the wind, which may or may not originate from the very exit you seek. At times this wind is so powerful that you can't move directly into it. You'll be able to tell when this happens by the simple fact that you can't go forward. There are fireflies in the various mazes, and at times they'll drift by, indicating from which direction the wind is blowing. Take note of this when it happens, for it can give you a clue to the direction of the exit.

A much more aggravating obstacle is the Cleptangle. This revolving orange and white rectangular critter is an irrepressible sneak thief. Any time it gets near you, your mapmaker, compass, or both will be stolen. The only way to get them back is to chase the Cleptangle through the maze until you have it trapped in a corner somewhere. But even after you've taken back your possessions, watch out! The Cleptangle never tires of petty thievery. And it has no trouble with the wind. The other obstacles are the mazes themselves. Each one is exceedingly complex and endowed with the quality of looking virtually like any other spot in the maze. Down here disorientation is a way of life.

The graphics in *Wayout* are outstanding. The mazes are three-dimensional and quite confusing, while remaining true to themselves. Each maze is extensive and bewildering. Your point of view is that of a person

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walking—actually more like roller skating in speed and smoothness—through; what you see is what you get. The graphics are so remarkable that you can pirouette rapidly and see the maze swirl all around you in all its detail.

The package comes with a cardboard compass and a set of *Wayout* protective goggles. Don the goggles, grasp your compass, and prepare to venture forth into the most challenging set of mazes ever brought to the CRT screen. You have nothing to lose but your sanity. DA

Wayout, by Paul Edelstein, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $39.95.

Serpentine. By David Snider. Every now and then, mixed in with the flood of new game software, a truly great game appears. *Serpentine* is one of these.

The elements of the game are relatively simple. You are initially represented by three small serpents in a nest. Your opponents are three large serpents in a maze. You and your opponents grow in size and power by eating frogs, the eggs of the other serpents, and the other serpents themselves head-on (if they are smaller than you). Serpents are reduced in size either by laying eggs or by having bits of tail bitten off. The frogs love eggs and will go after any egg available, although they seem to like yours best. The other serpents' eggs hatch if you don't eat them; then you have another serpent to contend with.

When you've eaten all the opponents, you move to the next and more difficult level, scoring higher points for eating eggs and serpents. If one of your eggs survives through the round, it hatches and returns to your nest, giving you another reserve serpent. You receive bonus serpents when you reach twenty thousand points, fifty thousand points, and at each multiple of fifty thousand points.

Serpentine offers a good challenge to plan your strategy and, with a little experience, you can take advantage of the different maze configurations. Each level through twenty has its own unique maze. There are no sudden surprises; no threat will suddenly appear out of thin air. You can see everything that's happening in the maze.

The hi-res color graphics, while not flashy, are well done and very smooth. Color is nearly essential, because it is the only easy way to know if you dare face an attacking serpent head-on.

The sound effects are descriptive and realistic. Frogs sound like frogs and eggs eaten or hatched sound like little shells breaking. However, in consideration of late-in-the-night players, the sound may be turned off.

Considering all the detail and activity, the speed and smoothness of the game is surprising. It is very responsive to input commands, either by assignable keys or with a joystick. Play may be suspended at any time by pressing the escape key, and a bad beginning can be cancelled by hitting control-R, giving yourself a fresh start without rebooting the disk. There is a provision for recording the ten all-time high scores, and the top five scores in the current session are kept whether they make the "Hall of Fame" or not.

Above all, *Serpentine* is addictive. No matter how experienced you may be, you'll see the mistakes you made and feel certain that if you play just one more game you'll do better—and you probably will. JDH

Serpentine, by David Snider, Broderbund (1938 Fourth Street, San Rafael, CA 94901; 415-456-6424). $34.95.

Transylvania. By Antonio Antiochia. One more variation on an old theme, *Transylvania* contains just enough twists and innovations to make it seem fresh and bright. But the story is not the big story. The big story is the graphics.

There's been a spate of software acknowledging Penguin Software's graphics packages as tools, and the graphics have been singularly mediocre. Now Penguin leader Mark Pelczarski and right-hand Dave Albert have conspired with newcomer Antonio Antiochia to show us what *The Graphics Magician* can do.

The result is consistently the best graphics ever in a hi-res adventure. There are faster graphics, though few, but there are none more attractive, none clearer, none more thoughtfully done. Everything is recognizable; there are no glitches, save the normal fast-fill, drop-where-it-will variety.

The author is equally considerate in the story. You will never be killed in *Transylvania* without a chance to see the peril and overcome it or flee it. Of course, once you see it, well, then you'd better make the correct move right away.

There are vampires and werewolves, goblins, witches, wizards, black cats, fleeing rats, hooting owls, howling dogs, and nasty bats. Some just keep their eyes on you; others you must deal with. Remember that warding off danger is not always the best course; at some point the danger must be dealt with. (Hint, hint.) There are also frogs and eagles and princesses and a big surprise.

Rescuing the Princess Sabrina from the evil vampire is your mission. (Once more, female readers have to pretend to be male; the game's still fun—it's the reward that loses meaning.) First you must do away with some more pesky creatures, gather several implements, and take the vampire who holds the princess captive out of the picture. Then you must find her and free her. And all within five hours of dark midnight; she dies at dawn.

The puzzles are excellent, of an easy to medium variety, and logical within the realm of fantasy. There are no foolish tricks designed just to trap you.

Transylvania is not a word game. The author has attempted to include every word you might try in the game's vocabulary; and if the game doesn't know a word, it tells you whether it's the command or the noun that it's stuck on.

Overall, this is a thoroughly enjoyable adventure, of normal proportions, with delightful graphics and some good surprises. In its first foray into the field, Penguin has proven itself a worthy adventurer. MCT

Transylvania, by Antonio Antiochia, Penguin Software (830 Fourth Avenue, Geneva, IL 60134; 312-232-1984). $34.95.

Pie Man. By Eagle Berns and Michael Kosaka. Starring Lucille Ball.

"Now, Mrs. Ricardo, it's quite simple. The pies come out of the machine here. You add the whipped cream topping and put a cherry on top. Take the finished confections and place them on the shelves over there. That's simple enough, isn't it, Mrs. Ricardo?"

"Yes, Mr. Higgenbottom."

"Very well, Mrs. Ricardo. Should you have any difficulty, simply

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push the power switch to the 'off' position to stop the machine temporarily."

"Yes, Mr. Higgenbottom."

That memorable scene from a classic television series leaps instantly to mind when describing *Pie Man*. What fun it was to watch Lucy battle the miracles of automation as the machine eventually won. The only difference in *Pie Man* is that you are a baker's apprentice filling in a summer position, and there is no "off" switch to save you.

You must run to get the topping from one area, cherries from another, and put the pies away when finished in another area. Nothing complicated here. Pies begin appearing one at a time, allowing you to finish what you start before moving on. Later, they come out closer together, forcing you to make such professional baker's decisions as "Should I put toppings on both pies and then cherries, or should I do one pie at a time?" It won't be long before you start to feel like an actual real-life baker making actual real-life baker moves.

And, as if that weren't enough, sacks of flour, grease spots, and a wobbly footed wedding cake baker appear, only to become obstacles in your path. Job performance evaluation is simple: let seven pies drop and you're fired.

You begin to wonder: Why can't you move the pie toppings and cherries closer to the conveyor belt so you don't have to dart back and forth? Why don't they fire the honyock who's leaving the flour and grease all over the place? And, finally, when they invented this pie-making machine, why didn't they include the topping and cherry functions as well? Quit complaining; if they did, you'd be out of a job.

Pie Man is playable either from keyboard, with eight directional movement keys, or with a joystick, the preferred mode. There are no numbered levels of progression; but you get promoted as your pie-making efficiency increases.

At first, putting toppings on pies may not seem as glamorous as shooting down fifty thousand points' worth of wicked aliens or bombing out the bad guys as you valiantly rescue captives. But you may change your mind when you start reaching the enviable positions of lead baker and, finally, master baker. MTV

Pie Man, by Eagle Berns and Michael Kosaka, Penguin Software (830 Fourth Avenue, Geneva, IL 60134; 312-232-1984). $29.95.

Acey Deucey. By Larry Sherman. By their nature, computers are good at organizing data, retrieving data, and gambling. In probably the oldest and simplest of the noble games of chance, your Apple has a definite edge. Success at *Acey Deucey* depends on your ability to figure the odds of a third card falling between the high and low values of the first two cards. If it's lower than the low card or higher than the high card or equal to either, you lose. (You can't "pass"; you can only bet low.) The game is named for the gambler's golden ideal of an ace and a deuce flanking the crucial third card, a situation in which one can't lose . . . almost.

The computer version of this venerable game allows up to four players, all starting out with $50 apiece. You can try to break the bank, assigning any astronomical amount you wish for an endless game, or draw on a modest fixed pot that shrinks and expands according to the fortunes of the players.

The attraction of the game, on the computer as in the real world, is its speed and economy. Bet everything you have on one likely chance and you can double your money on the turn of a card. Do this successfully a certain number of times and laws of geometric progression will smile upon you with a shining radiance.

That simple attraction is, of course, most people's downfall. It looks so easy. A five and a king? How can you lose? Very simply. The Apple's circuitry is confused neither by greed nor trepidation. In such a play, it instantly figures the odds on one of the seven desired cards being the third drawn, compares them to the odds of one of the six losing cards turning up, and then bets exactly the right amount—enough to add substantial if not spectacular winnings to its stake, and not so much that a loss would take more than a few more cooly reasoned wagers to make up. If it has $650, it can afford to drop $85 on what may look like a foolhardy risk. It will never make the disastrous bet from which there is no recovery—at least, not before you do. The law of averages is a harsh mistress and all must fall before her. You can depend on the Apple always to bet everything on an ace and a deuce (it's only human), and the third card will occasionally be the same as one of the two. You win. The mighty computer is a sucker for a "sure thing." But then, so are you.

Though this is not an Apple action game, what action there is is beautifully done; the cards are painstakingly detailed and realistic. Using real money in the Apple version would be redundant (and a no-no in many states). All players' pots are displayed and added to or subtracted from at the instant the crucial card is turned. One is also saved the fatigue of shuffling, math mistakes, forgetting whose turn it is, and drunken brawls over accusations of cheating—though it's fun anyway. Observing your Apple's technique can allow you to pick up a lot of valuable bad habits. AC

Acey Deucey, by Larry Sherman, L&S Computerware (1589 Fraser Drive, Sunnyvale, CA 94087; 408-738-3416). $29.95.

Crazy Mazey. By Ron Meadows. It's the least flashy of DataMost's games to date, but *Crazy Mazey* is definitely the most fun.

It's original, it's challenging, it's addictive, and it's enduring—at least your money's-worth long and probably longer.

Crazy Mazey presents two challenges, and, chances are, you'll choose to master one before you go on to the other. If so, you'll find yourself with two games; the first is a strategy game, the second a skill game.

You control a car attempting to collect money from various pickup stations. Thieves in other cars—slightly faster than yours—wish to thwart your efforts. On each maze through nineteen you must contend with the number of thieves' cars corresponding to the maze number. You can't outrun four cars coming every which way, much less nineteen, and you have no weapons with which to eliminate the rascals, so you're left with pitting them against one another or tricking them into getting stuck where they can't harm you.

The thieves aren't very smart. They know so well where you are that they move in relation to you; but you can use this against them. Conning them into crashing into one another scores points as well as lightening your burden.

Once you've collected all the money, you must make your way to an exit, which leads to the next level. High scores bring extra cars.

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Determining working strategies for the multifarious mazes takes courage and cunning, and it's great fun.

To master the mazes calls for slow going. Once you're there, you're ready for the second game. There are seven speeds ranging from very slow to very, very fast. Jump just three speeds faster than your strategy-planning snail's pace and you're into a game of skill and dexterity. It's a whole new challenge. And it's exciting—the kind of excitement that'll have you on the edge of your chair forgetting to breathe. After all, by now you know how to get these guys—but can you execute your knowledge?

The graphics are colorful and finely done, although not particularly appealing (you won't care); the animation is very, very smooth. The sound is a high point. Except for fairly standard blips when you pick up money or when two cars crunch, the only sound is a jazzy, almost West Indian sounding offbeat syncopation punctuated by subdued castanets. It speeds up and slows down with the game speed, but, at any speed, it's charming and enduring.

If you like *Crossfire*, you're apt to like *Crazy Mazey*—it's not quite the masterpiece, but it's the same kind of pleasure; if you gave up on *Crossfire* because of the complex keying, don't give up on *Crazy Mazey*—it uses the usual A–Z-arrows combination. (Then, if you like *Crazy Mazey*, go back and master *Crossfire*, it's worth the effort.)

The documentation implies a new experience for those who master level nineteen; no one here has. If you do, and learn the secret, write to Mazey Softalk. If you're first from your state, you won't win a thing. But we'll print your name and achievement here.

Crazy Mazey is a darn good game, despite its ridiculous name. Look for it to soar. MCT

Crazy Mazey, by Ron Meadows, DataMost (9748 Cozycroft Avenue, Chatsworth, CA 91311; 213-709-1202). $29.95.

Combined Graphic Writer. By Joel Upchurch and George W. Baltzell. If interchangeable typefaces enhance the value of an IBM Selectric typewriter or a daisy wheel printer, then *Combined Graphic Writer* will make your dot matrix printer a more valuable component of your word processing system.

Theoretically, a dot matrix printer, since it doesn't have its characters carved in stone (or, like daisy wheels, plastic, metal, or nylon), ought to be extremely flexible in the size and style of characters it prints. Unfortunately, with most (if not all) printers, the character set is carved in silicon, which can be just as bad. The few options they do offer for changing the output—boldface, double width, or half width, for example—are either not controllable from software or are documented so cryptically that Sherlock Holmes would find them a challenge to decipher.

With this in mind, *Graphic Writer* was designed to unleash the potential of the dot matrix printer. What the *DOS Tool Kit* allows you to do on your screen, *Graphic Writer* lets you do on your printer—you can print out text in any of the twenty-one fonts supplied on the *Graphic Writer* disk, or any font you can create with the *Animatrix* program from the *DOS Tool Kit*.

Actually, *Graphic Writer* is even more powerful than that, because you can combine up to ten different fonts in a single printout. Think of what that could mean in a report: one typeface for the main title, another face for subject headings, and still another for captions. In addition, it has options for underlining, boldface, inverse lettering (white on black), large or small print, and any combination with any character set. All *Graphic Writer* commands consist of two characters: a] (shift-M) to signal that a *Graphic Writer* command follows, and a number (0 to 9) to indicate character font or one of seven letters for all the other style options. They can be embedded anywhere in the material to be printed. *Graphic Writer* can give almost any kind of printout a very professional appearance.

Although *Graphic Writer* isn't compatible with every word processor, it is flexible enough that it can probably be used with your system. It is directly compatible with and documented for *Apple Writer* 1.0 or 1.1, *Magic Window*, and *ScreenWriter II*. It can also be used to format the printout of Basic programs, lending itself to custom report generating applications.

Graphic Writer has formatting programs for twelve different popular printers and several interface cards, all listed on the outside of the package. DD

Combined Graphic Writer, by Joel Upchurch and George W. Baltzell, Computer Stations (11610 Page Service Drive, Saint Louis, MO 63141; 314-432-7019). $54.95.

ƨǝʎɹɹǝ. By Nhoj Dranseb. This unusual offering is a home-arcade game from an unhuman perspective. So how do you review a game written by an alien? It certainly isn't easy! The reviewer approaches the task with all-too-human biases. But the time has come for humanity to be open-minded about extraterrestrials. How do you know that the guy standing restlessly behind you in line to see *E.T.* for the third time isn't just homesick?

Accepting aliens is one thing, but being one is another. For that is exactly what this intergalactic gamegrammer expects of his more down-to-earth customers. You are the spaceman. Protect yourself at all costs from the belligerent Earthlings.

If you believe the cosmic propaganda in the ads for this game, the aliens at the top of the screen (which you control with a joystick, kind of reverse *Space Invaders* style) are on a peaceful exploratory mission. The Earthlings attack from below (obviously trained for violence from an early age by insidious video games), exhibiting a shoot-first-and-ask-questions-later mentality. The question is: if the aliens are so pacifistic, what are they doing with all those explosives? Perhaps they decided Earth looked like an inconsequential planet, perfect for running experiments on the effects of seismic shocks on plate tectonics.

Well, that isn't for us to say. Communication is the root of understanding, so perhaps a look at the manual will help put us in their shoes. Unfortunately, the manual looks like they dipped a three-toed Denebian slime greeb in an inkwell and trained it to dance on blank paper. A spokesman for Southwestern Data Systems claims that the manual is translatable, but into what?

As if that isn't bad enough, the first things you fight in the game are Space Shuttles. The carnage is like the finale of *Moonraker*. These are humans that are dying, not ugly little monsters that are easy to hate. Clearly it is necessary to adopt a schizophrenic sense of identity in order to master this game.

2. Where is it possible to go while seated on the back of a flying horse?

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By Norman J. Wazaney Jr.



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"Singles' Night" runs on 48K Apple II, Applesoft in ROM. 3.3 DOS/One Disk Drive
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The second level is a little better, as your alien alter ego is defending itself against somewhat more threatening tanks, using mines and missiles. But between levels there appear more of the greeb-scratchings they call instructions. What are they trying to do to us, anyway?

As you can see, it is difficult for a human reviewer to maintain a detached objectivity here. The game begins to grow on you, once you figure out how to read your score. It challenges the reflexes and offers good joystick control. You might lose yourself to a more galactic Weltanshauung, develop an interest in xenobiology, and yearn for the feel of freefall under your feet again. Your alien equivalent of adrenaline flows as the humans attack in bigger and bigger waves. The rules begin to make sense to you, but the world you live in seems to have become foreign. Don't be distressed; perhaps the alien way is the better way. Now where did we leave that joystick? DD

ƨƨƧɿɘƨƨ, by Nhoj Dranseb, Southwestern Data Systems (10761-E Woodside Avenue, Santee, CA 92071; 714-562-3670). $34.95.

The Dithertizer II. By David K. Hudson, George Baltzell, and Kile Mullen. Dithertizing is a lot of fun, it really is. The name has probably misled you to believe that it's just another new weight-loss fad. Now try saying it three times, fast. See how fun it can be? And don't be discouraged when your friends start accusing you of having a lisp.

The Dithertizer II is a frame-grabbing video digitizer. It consists of a circuit board that goes into the Apple's slot seven, a video camera, connecting cords that hook up the camera to the computer, and one disk containing all the software needed for capturing images on the monitor screen. And the pictures come out well. The camera has no view finder; the computer monitor is used for that. The game paddles are used to adjust the intensity and contrast of the on-screen image; then all you do is press escape to freeze the frame. By hitting another key the picture is saved to disk for later retrieval and you're ready to grab another pose. By adding the proper graphics dump program (the manual explains how), you can print the shots you've taken.

A digitized image is certainly interesting to look at, but it doesn't compare with traditional photography in resolution and clarity. Considering the costs involved, why bother with video digitizing just for the fun of it? The answer is simply because the potentials inherent in the Dithertizer transcend the digitizing process itself.

A creative artist could have a heyday with this thing. The printed compositions could be used as preliminary sketches, springboards for works that might encompass other media. Digitized images could be subjected to further manipulations and treatments by a dexterous hand wielding a good light pen. How about figuring out a way to take a series of frames, frozen by the Dithertizer, and animating them? Specific scenes could be captured to disk and, when printed out, used to create story boards for films, or even comic strips. Obviously these suggested applications are only a beginning. The value of the Dithertizer only appreciates when it is coupled with a lively imagination.

Easy to use, the Dithertizer II will show you a good time. And though you may be no Avedon, at least you can enjoy being a dithering idiot! TC

Dithertizer II, by David K. Hudson, George Baltzell, and Kile Mullen, Computer Station (11610 Page Service Drive, Saint Louis, MO 95014; 314-432-7019). $650.

Taipan! By Art Canfil. Venture forth into the exotic and dangerous world of silk trading and opium smuggling on the China Seas in the late 1800s. Travel among seven ports, buying and selling general cargo, arms, silk, and the always forbidden opium. Short of cash for that big trade? No problem—elder brother Wu will be glad to lend you the needed money, although this Chinese "family" charges even steeper rates than the loan sharks in the urban cities. Sudden storms, the dreaded tai-funs, can sink an overladen ship, and roving street gangs will rob you of excess cash. The real challenge, though, lies in the only hi-res graphics sequence of the game—the battle with the feared Chinese pirate fleet. You get to watch the effect of your shells on each of the pirate ships during the barrage, and have the pleasure of seeing several ships slowly sink below the waves. If you can evade or overcome all these obstacles and keep from getting your valuable opium cargo confiscated by the local authorities, then it is possible to rise in the merchant ranks until you achieve the exalted title of Taipan, or master trader of the China Seas. (But don't forget elder brother Wu—he won't forget you!) RRA

Taipan!, by Art Canfil, Avalanche Productions (2460 Embarcadero Way, Palo Alto, CA 94303; 415-856-4881). $39.95.

Pest Patrol. By Mark Allen. For all those legions of *Threshold* addicts, something new has finally emerged. Imagine taking *Threshold* out of space and combining it with elements of *Centipede*. The result is the hot new game from Sierra On-Line (yes, that is good old On-Line with an image lift), *Pest Patrol*. The battlefield is the jungle of your garden, and your only weapon against the armies of invading bugs is a can of pesticide.

There are six basic types of pests, although one metamorphoses into another species. The fleas are the most numerable and worth the least points. Beetles fly down at you, and, upon reaching the ground where you are, slide across horizontally in the direction that their head is facing. Once they land, they are impossible to avoid if they are coming your way! Waldoes take three squirts to kill and are worth ten points. Here also are the famous hopping spiders, requiring three shots to kill and very difficult to avoid once they land. The spiders hop back and forth across the screen several times before they disappear. Careful timing will allow the spider to jump over the can.

The snails are an intriguing addition to the game; they are totally immune to the spray and, unlike every other pest whose contact with the can destroys the can, the snails can only be killed by stomping on them with the can itself. Because they are immune to the spray, the snails become highly effective shields for other species of pests to hide behind as they descend. Worms are the ones you really have to watch out for. They take four shots to kill as they slowly move across the screen, but if you don't kill them in a certain amount of time, the worms undergo a metamorphosis into killer butterflies. Killer butterflies take five squirts and are worth 250 points. They are incredibly dangerous once they emerge, swooping and darting from all angles.

And—as if this were not enough—all the pests drop any one of four different types of bombs on you. There are simple bombs that explode on impact with the ground, homing bombs that move horizontally to-

3. How long was this product on the top thirty?

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This adventure game holds an all time record for its long held position on the Softalk top thirty. Once you play the game, you will understand why. WIZARD & THE PRINCESS features some of the most challenging and imaginative puzzles in all adventure-dom and has stumped players all over the world! You can't call yourself a master adventurer until you've played WIZARD & THE PRINCESS. Available from your local computer store for $32.95 or order directly from SIERRA ON-LINE.

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ward the can, time bombs that sit on the ground for a while before they explode, and the truly delightful homing time bombs which do everything all at once.

The game has forty levels of difficulty, with the first twenty-nine being selectable with the plus key. Levels thirty to thirty-nine can only be reached by skillful playing and luck. One very exciting new feature of this game is that it contains a practice mode. How many times have you been really frustrated trying to get down the pattern skills needed to survive some high level? You've had to replay the game up to that level, hoping that you still have a few men left and usually getting wiped out in a few moments. Then you have to replay the entire game to get back up there.

Pest Patrol simplifies your life! In the practice mode you have seventy-seven cans and can still play any level up to level twenty-nine for as long as you like until you have developed sufficient mastery of that level to go back to the regular game mode. If *Threshold* had had this innovative idea, many more people would have enjoyed the artistry of the different aliens—spinning Volkswagens, swooping killer seagulls, and the infamous marching letters—on the higher levels. While the arcade freak will certainly like the intense challenge of the higher levels, the ordinary player is more likely to enjoy the cleverness of the graphics and the surprises of each level. It is refreshing to see an author cater to both worlds.

Pest Patrol, by Mark Allen, Sierra On-Line (36575 Mudge Ranch Road, Coarsegold, CA 93614; 209-683-6858). $34.95. RRA

Statistics With Daisy. By Kevin C. Killion. This is a tool for specialists—people who work with statistical data analysis for such arcane purposes as the modeling and prediction of various business and scientific processes. *Daisy* will not teach you how (or when) to use the various techniques of statistical analysis; but if you know those techniques already, *Daisy* can make it easy to apply them.

Daisy (data analysis, interactive statistics) works with a rectangular array of numbers: each row represents a case being studied, and each column represents one of the points being observed on each case. *Daisy*'s pet trick is generating new columns, based on relationships among the old.

You can think of *Daisy* as a calculator or number-crunching system with an extra dimension: she operates on whole columns, not just individual numbers. Where a calculator would multiply a worker's pay rate by his hours worked to get his paycheck, *Daisy* will generate a whole column of paycheck values by applying the same process to each row in the array.

And she can do much more than simple arithmetic operations. She can do comparisons or range checks, mathematical transforms like log and inverse, time-series transforms, and standardization (producing a column with mean = 0 and standard deviation = 1); fill a column with random numbers; rank the rows (or sort the entire table) on a chosen column; and so on.

That's the basic, nonspecialist stuff: then *Daisy* begins to get sophisticated. She also offers correlations and covariances, Spearman and Kendall rank correlations, ten modes of hypothesis testing, and several flavors of regression and regression testing. She can also draw sequence and scatter plots (some with choice of log, semilog, or normal axes), histograms, and even fitted curves. The drawings can be saved on disk and (depending on your printer) printed.

Speaking of disks, the data in all those rows and columns can, of course, be saved to and loaded from disk. Also, a disk file can be selectively overlaid onto a file in memory, overwriting part of it to merge the two.

There's more, but why go on? It should be clear by now that *Daisy* has enough capabilities to be worth checking out—if you need those kinds of capabilities.

The best thing about *Daisy* is that she's very friendly to strangers and easy to get to know. If you're not a statistics person, she may seem exotic, but she'll try to make you understand. There's not only a help file which lists the various commands (it reminds you about it if you goof) but also a file that gives you a definition of each command. The manual is clear, simple, and organized more for "read through and learn" than for "look up and review." It's rather big for that; but that's a minor point.

All in all, *Daisy* is a very attractive and capable program, and if you have a use for her abilities, you should certainly meet her. JR

Statistics With Daisy, by Kevin C. Killion, Rainbow Computing (9719 Reseda Boulevard, Northridge, CA 91324; 213-349-5560). $79.95.

Starship Commander. By Gilman Louie. *Starship Commander* has the makings of a brilliant simulation. Drawback: it is programmed in Applesoft. Faster than light, it's not.

The game turn proceeds as follows. The first display you get is labeled motion detector, and it shows the movements of your ship and the one to three enemy ships you are expected to beat in combat. This is followed by about a minute of disk access and data calculations. Then the command mode menu is displayed.

Starship Commander's method of accepting commands is brilliant in its simplicity and ease of use. Next to each option on the main menu and all of the submenus is a box. The paddle controls the position of a blinking arrow. When the arrow is next to the option you want, simply push the paddle button. Any time you have to input a range of numbers, such as speed, course, or degree of evasive action, you use the paddle to tell it to increase or decrease the number, and push the button when the number is what you want. This can take some time to get right, but you never have to touch the keyboard.

The options of command mode are communication, defense, engineering, life support, navigation, science, weapons, end of game, and end of turn. Every station on the ship is represented by a hi-res control board which has a graphics display and all the available options grouped under convenient headings like status and action. It is not necessary to go through every option on each turn. For instance, communications only gives three options: bluff, surrender, and ask for surrender, to be used only in appropriate situations. To Captain Kirk fans, the bluff will be familiar as the Corbomite maneuver. When you are in deep trouble, you radio headquarters and say you are going to blow yourself up. The enemy ships back off to a safe distance and you move out as fast as possible. This does not work except in a situation where the enemy would believe that you would actually self-destruct. Asking for surrender usually elicits the mocking response, "You must be joking."

The other options, of course, relate to various subsystems of your ship. Some of them offer control, others just monitor power levels or enemy status. All power allocation to the engines, weapons, and shields is through engineering. Firing weapons and changing course and speed are accomplished through the weapons and navigation stations, respectively. Note that you are only giving orders here. Weapons firing is all done simultaneously when you select the end-of-turn option. Course changes actually take place at the beginning of the next turn, displayed on the motion detector.

As captain of the USS *Ranger*, you have control over every aspect of life aboard ship. That means *every* aspect, right down to individual crew assignments. This is the life-support option. At each of four major work stations there are three crews to assign. At any time, one crew must be on duty, one on standby, and one asleep. A readout will tell you the relative efficiencies of the crews. If an individual in the crew is injured or killed, it is up to you to replace him.

With all those options, such carefully done graphics, and such an easy way of entering commands, you would think that *Starship Commander* must be a cut above the ordinary space battle game. If you really want to control all those things, it is. Though the name of the game is *Starship Commander*, you must be prepared to do the work of all the officers of the ship. DD

Starship Commander, by Gilman Louie, Voyager Software (Box 15-518, San Francisco, CA 94115; 415-982-3906). $39.95.

Crisis Mountain. By David Schroeder. *Crisis Mountain* is a slow starter that builds fast and hooks you forever. You find yourself in a cutaway view of a cavernous mountain, in which are interred a couple of rapidly ticking nuclear devices. The mountain is basically unstable and has a plentiful supply of boulders constantly rumbling through its narrow passageways to prove it. There are also a few bubbling magma pits waiting to catch you should you miss your jump over a yawning chasm in your frantic efforts to get to the bombs and disarm them. It's a nice place to visit. . . .

This is one where you have to read the documentation, at least a little, to get the most out of the game or to play it very long. Learning how to jump, when a boulder is coming your way, how to crawl through the

tight spots, and, especially, how to dig out the bombs, is what the game is about. You generally don't live long enough to find out through trial and error. *Crisis Mountain* succeeds in generating real suspense and provides a lot of interactive *Perils of Pauline* climaxes—though they generally have unhappy endings, at least at first.

Play levels alternate between more intricate cavern layouts and the layout from a previous level with more bombs and rolling boulders that become bigger, faster, and meaner. (Never will you have appreciated the escape key more.) Boulders, should you lack the agility and good manners to get out of their way, only cause mild, temporary disablement. After making several such contacts, however, you must shuffle off this mortal coil, which is performed in a neat little arcade-style routine. (Remember *Boot Hill*?)

After deactivating the bombs, you get a bonus run, during which your unused time on the clock adds ten points to your score for each additional second you remain alive. Now comes Miller time. You get to draw a deep breath, have a look around your interesting surroundings, and pick up a couple of the nifty sparkly and whirly things that you didn't have time for previously and which will add additional hundreds of points to your score.

Fat chance.

Such delusions of glory and easy living will net you a bonus run of about five seconds. If you so much as get tagged on the ankle by a flying pebble, it's all over. If you're going for a high score, your best bet is to crawl under a ledge where the boulders can't get you and you're not likely to fall into a lava pit, and just let the numbers accrue in an orderly fashion until your time is up for that level. You are at the mercy of the mighty forces of Mother Nature, you craven, sniveling wimp.

If you liked *Apple Panic*, have fond memories of the old *Mousetrap* game of many years ago, or loved the opening sequence from *Raiders of the Lost Ark* (that got 'em), this game will push your buttons.

Speaking of which: *Crisis Mountain* does not appear to like joysticks. It can be played with them, but it is happiest when button 0 and button 1 are each on their respective paddles. AC

Crisis Mountain, by David Schroeder, Synergistic Software (830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216). $34.95.

Guadalcanal Campaign. By Gary Grigsby. Strategic Simulations has come a long way since *Computer Bismarck*. That game, the company's first, was almost entirely concerned with naval search and combat. The German side had little more than a single battleship. And the game was slow.

Guadalcanal Campaign is also a naval game, and it is based on similar principles of movement and combat. Like *Computer Bismarck*, it can be played solitaire. But it is a much broader game—each side controls land, sea, and air forces, and must worry about supply and transport as well as combat. *Guadalcanal* offers a better-balanced conflict—the Japanese and the Americans both have tremendous resources. Both are stretched thin, fighting far from home in the vast, empty expanse of the Pacific. Both have only an incomplete idea of what the other side is doing. And, for all their heroics, both are dependent on a very slender trickle of reinforcements.

Until the final five-inch shell goes home, this game will keep a player sitting on the edge of his seat, his head full of anxious questions: When does the *Tokyo Express* make its next run? Do I have enough Wildcats to protect my carriers? Where the devil are his submarines? Though no arcade game, *Guadalcanal Campaign* is both fast and exciting.

There are five scenarios of varying lengths included and a campaign game that runs about three hundred turns. Since the game can be saved on disk, you can take the campaign in small bites over the course of a month. There are four levels of difficulty for solitaire play, and most people will find the enemy plenty dangerous even at the first level.

Grigsby has simplified things to make it easy for the players to control all of their diverse forces. For example, you have every ship that fought in the battle, but you don't have to maneuver them individually. Instead, ships are assigned to task forces, each with a mission—combat, transport, or bombardment—and task forces are moved by single keystrokes. Land forces are recorded simply as numbers of troops (for combat) or numbers of companies (for transport). Aircraft appear as numbers of each type available at each base or carrier. Day by day, they are assigned to strike, counterstrike, search, patrol, or transfer. Float planes, like the Catalinas, are factored into the game abstractly.

Of course, not all of this simplification is for the good. The cruiser *Chicago*, which attacked and pursued the Japanese in the battle of Savo Island, can't do it in the game because its mission is bombardment. "Mad Jack" Cram, who blew up a transport in a dangerous daylight torpedo run, has no combat role in the game because his plane was a Catalina. However, the dread surprises of combat have not been ignored. The player is often put in the position of the sailor who spots torpedo wakes heading for his ship, or the Marine who sweats and swears in his dugout while the Japanese pound Henderson Field. But the player wears the admiral's shoes as well, deciding whether to trade planes for ships, or ships for time.

How accurate is *Guadalcanal Campaign*? In its details, only so-so. The navy's patrol torpedo boats, which made things "exceptionally difficult" for the Japanese historically, just aren't there. The P-400 "Klunkers" of the Cactus Air Force have also vanished, along with other types of aircraft. There is no mention of the Australian coast watchers, whose secret radios gave warning of many a Japanese attack. On the other hand, the game re-creates the drama of the campaign very well. The night attacks, the deadly peekaboo of the naval forces, the unquenchable hunger of Ironbottom Sound—all have their place in the game as in history. Considering the limitations inherent in a game like this, the author has done a remarkably good job. If you like strategy games, give it a try. FJ

Guadalcanal Campaign, by Gary Grigsby, Strategic Simulations (465 Fairchild Drive, Suite 108, Mountain View, CA 94043; 415-964-1353). $59.95.

IRA Assessor. By Frank Smith. This past year has seen a lot of interest develop in retirement plans and the IRA-style plan in particular. ABT has come up with another one of their minimodels that will help anyone decide what an IRA could do for them in their particular circumstances. A *VisiCalc*-type template is provided that shows, over a period of years, what is accrued from an IRA, a non-IRA before taxes, and a non-IRA

4. What valuables await the wise detective in this classic adventure game?



The mention of mystery brings up images of huge old victorian houses, trap doors, narrow escapes and — most of all — MURDER!!!
Over two years ago, a tantalizing adventure was released that combined all of these images and made them hotter through the use of HI-RES GRAPHICS. Now,that adventure has been made bigger because the original authors and Bob Davis (creator of ULYSSES and the GOLDEN FLEECE) have added new puzzles and pleasures to that game,made better through the use of 21 color Hi-Res Graphics to really make the adventure come to life. What treasure awaits you if you solve the mystery? Find out by playing MYSTERY HOUSE, available from your local computer store for $29.95 or order directly from SIERRA ON-LINE.

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after taxes. The results can be rather impressive.

The example given is one of $2,000 per year being put into an IRA account for thirty years at a 12 percent rate of return with a marginal tax rate of 40 percent, filing jointly with no early withdrawal. In the example, the total accumulated would be $540,585, while the total on the non-IRA after taxes would be $125,976 on the same money. Now that is certainly putting your money to work for you! Each person's particular situation can be explored through the what-if aspect of the model. A very handy utility to assist you through the economic jungle of retirement options. RRA

IRA Assessor, by Frank Smith, ABT Microcomputer Software (55 Wheeler Street, Cambridge, MA 02138; 617-492-7100). $25.

U-Boat Command. By Charles J. Fleishman. If you're tired of killing aliens in space; if you've had it with shooting unidentifiable insects; and if eating things while jaunting through a maze is getting old, then come back to reality and some good old earthbound destruction. *U-Boat Command* is a game that will take you back to those days of old and put you on the bridge of a submarine at sea.

Your mission: to sink the aircraft carrier.

Not exactly an arcade game, *U-Boat* is not a complete strategy game either where you can think for a few minutes and make a decision. It's a combination of the two.

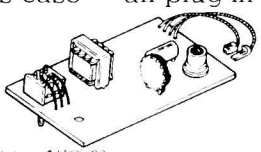
You have two viewpoints in this game. The periscope view allows you to see what's going on in the air and on the surface. While using this view, you can fire torpedoes at the vessels and use your main deck guns against aircraft. The map view shows you where you are in relation to islands, the mainland, and the aircraft carrier you are out to destroy.

Also on your screen are various gauges indicating your boat's status. Your sonar screen will alert you to vessels in your area, though they appear just as clearly in your periscope. A compass tells you your direction; and depth, air, and fuel supply indicators are also present. Keyboard input maneuvers you around the seas and joystick or a set of paddles controls your guns.

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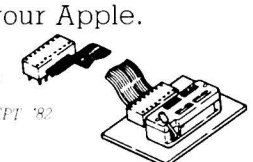


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As you sail about, unidentified vessels appear on the horizon. The best strategy is to approach with caution and hope you can identify them before they fire upon you. Once they're identified (either they will shoot at you or their enemy/friendly status will appear on the control console), you have several options. If it is a submarine supply boat, you will be replenished with torpedoes, fuel, or men.

If it's an enemy ship, you can either fire a torpedo or take a dive and wait for them to pass by. But choosing the latter option makes you vulnerable to depth charges, and they never miss. It's not hard to hit them with torpedoes, it's just costly—you start out with nine and seldom have more than that.

Also harassing you on the way to the aircraft carrier are (understandably) aircraft. Appearing as small dots in the distance at first, they approach in a lifelike manner, becoming more definite visually as they get closer. They'll bomb you if you let them, but don't you let them—downing them is a breeze. You're given unlimited gunning ammunition.

The object of *U-Boat* is to sink the enemy aircraft carrier. It's worth one thousand points, almost ten times more than any other vessel, but sinking it is no harder than sinking the others, requiring only one torpedo to send it to the bottom. But once you do that, you don't get to sail home to ensconce yourself in glory or any other hero's reception. You must stick around and fight other smaller vessels until you are sunk, run aground, or until time expires. (Sort of like wallowing through the *Applesoft Tutorial* after you've mastered machine language).

At first there seems to be something wrong with this game. No U-boat commander in his right mind would go one-on-one with aircraft, aircraft carriers, or destroyers. Even if he did, the chances of winning are marginal at best. And sinking an entire aircraft carrier with just one torpedo? C'mon, let's be real. Well, *U-Boat* is not meant to be a historic simulation in any respect (you even get to name your own countries); it's all in fun and should be taken that way.

Sound effects in *U-Boat* are deliciously realistic. The sonar sounds like a sonar, and when you get hit you can hear the steam leaking from pipes as you scream orders to the torpedo room. If the sound bothers others in the room, the period key toggles on and off. Don't use it. *U-Boat* plays much better with it on. Better to tell those peeved at your discourteousness just to leave the room.

One of *U-Boat*'s annoying features is also one of its most realistic. As your crewmen become casualties and their number diminishes, the execution speed of your commands slows down. Why? Fewer men means more work per man. Obviously twenty men's work will be done faster by twenty men than by ten.

Typical playing time is long enough not to discourage novice players and short enough to get in several rounds at one sitting. The game features four levels of play to provide for beginners and experienced players; each gives you a choice to add aircraft or not. If you enjoy exercising your reflexes, making real-time decisions, and implementing effective strategies, *U-Boat Command* will hook you. MTV

U-Boat Command, by Charles J. Fleishman, Synergistic Software (830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216). $34.95.

The Physical Exam. The most time-intensive everyday job in the typical medical office is filling out medical examination reports. Who wants reports? Insurance companies, prospective employers, various governments, and, of course, the physicians themselves. Reports are often three or four pages each, and patients usually wish to take the physical exam reports with them to the appropriate institution. And none of this can occur until the doctor has noted the state of health or disease in many areas of the body.

Physical Exam solves these problems ingeniously and simply. Initially, each of the body parts relevant in the practice must be input, along with the definition of what is normal and usual for each one. This information is stored permanently, the definitions serving as defaults.

The doctor examining a patient notes any variances from normal under the appropriate headings in the program; these findings replace the default descriptions for this patient. At this point, the doctor may enter a summary diagnosis.

Assuming the patient's name and personal data have been input as a matter of course, the program is ready to print out multiple copies of the necessary reports, ready for the doctor to sign.

After printing, the system erases all information entered for the patient and resets itself to the default information. There is no provision to retain the individual patient's information in a disk file.

The program comes with a brief, well-written instruction manual.

The Physical Exam, Professional Medical Software (3604 Foothill Boulevard, La Crescenta, CA 91214; 213-248-2884). $99. RJR

Succession. By Chris Eisnaugle. Just as advances in Chatty Cathy technology made a talking dolly into a talking, crying, wetting, blushing dolly, so Apple game programming know-how has now produced an eating game in which you can throw up.

That's only one of the new features in this new version of the most popular of computer games. Your food does not consist of anonymous dots; the objects of your hunger are manifestly alive. Also, they bear numbered placards informing you of the order in which they are to be consumed. Should you devour one out of order, you are immediately seized with the urge to regurge, and you must start all over again. Before that happens, your time may run out and you'll have to go back to the beginning. Before that happens, the guardian of the maze may introduce you to his uvula, in which case you don't have to start all over again; one of your remaining munchers (three to start) comes to the fore to take up where the last one left off.

Does this make it hard enough? Need you ask? The delectables scamper about in cheerful randomness and are hard to catch, let alone in numerical order. The guard, though there is only one, almost always knows where you are and is indestructible. Escape hatches at the top, bottom, and sides of the maze, though numerous, are not the escape hatches we have come to know and love. Entering one will not safely deposit you through the opposite doorway, but will materialize you at some random location in the maze. The maze itself is more intricate than usual, cutting down on mobility no matter how nimble your fingers get (keyboard only). It also has a lot of randomly appearing doors that invariably disappear when there's something nasty on the other side and slam in your face when something nasty is right behind you. There are four levels, each one faster than the one before and each with an extra little creature to catch; up to eight in all.

It does take getting used to and it can be done. For the real eat-'em-up game freaks, the primary pleasures of the genre have always been the random race to gobble dots in whatever pattern was most expedient at the time, then rising up to slay one's persecutors at the propitious moment. *Succession* does not do that. Nor does the construction of the game allow the crucial submersion into the Alpha state, when your consciousness exists only between the first and second knuckles of your fingers. You must watch the numbers, you cannot trust your environment to act in any predictable manner, and you must constantly be on the defensive.

For these reasons, it probably is not destined to become a classic. It is, however, different. While its differences may alienate the traditional audience for the eat-'em-ups, they are also likely to attract a new one—not to mention its obvious potential for early education numbers drill. If used as such, there would certainly be a veritable explosion of previously slow-learning children who would suddenly be able to count to eight.

Succession, by Chris Eisnaugle, Piccadilly Software (89 Summit Avenue, Summit, NJ 07901; 201-277-1020). $29.95. AC

Tunnel Terror. By Eric Popejoy. Anyone who hung out in vacant lots as a kid will remember the popular game King of the Mountain. You stood atop a mound while the others tried to dethrone you by pushing, rolling, kicking, or throwing you down the hill; whoever succeeded became the next king. The contest, like so many other childhood games, ended when it got too dark to play, or when moms started calling the kids in for dinner.

If any game simulates this at all, it's *Tunnel Terror.*

As you cruise around the top ledge of the tunnel, which looks more like a polygonal pie, Walker-Carriers try to clamber up the insides to face you on equal ground. The most sensible thing to do is shoot them down before they get to that point, and that's exactly what you do. The only problem is that when you hit them, you're not sure if you've really hit them, because they blink on and off while climbing. Once they reach the top, real strategy is needed.

Though moving around the tunnel takes you in a complete circle, you are only allowed two full trips around before you are forced to circle in the other direction. Once the Walker-Carriers reach the top—and they will—they turn into Walkers and will try to destroy you. One touch from the Walkers is all it takes to melt you down to size. However, it's no great task to get them before they get you. Just bear down on the rapid fire button and mow them down.

Each level has more walls than the one before, providing more avenues of ascent for the W-Cs, and at the higher levels, Crazies appear. They are invulnerable to your energy blasts, so it gets to be a game of cat and mouse as you try to outrun them until they either catch you or tucker out and fall back down.

For those who have never experienced *Tempest*, this game may be somewhat interesting. There are no real aliens to kill in the sense we're familiar with. All you really see are nondescript shapes zooming up the tunnel toward you. Who are these guys? They have no faces, no appendages; they don't even look dangerous. All the same, it's zap or be zapped.

Tunnel features sixty-one levels of play, each just a bit more challenging than the preceding one. One nice feature of this game is that it gives you the option to start at higher levels if lower ones prove to be too simple. When you first boot the game, you are only allowed to start as high as level five. But as you progress to higher levels, you can start new games as high as those levels.

The game is playable with either keyboard or paddles, and plays equally well with both. For glory hounds, four persons can play the game at once; for bigger glory hounds, *Tunnel* saves high scores of the day to memory. Unfortunately, once the game is terminated, so is your score.

As the author's premier game for Adventure International, *Tunnel* provides a challenge to both the novice and experienced player, allowing them to play side by side with equal time at the controls. MTV

Tunnel Terror, by Eric Popejoy, Adventure International (Box 3435, Longwood, FL 32750; 305-862-6917). $29.95.

Pascal Tools I. *Pascal Tools I* is a collection of seven utilities that run

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

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

Display shown is actual photograph of IBM PC color version. Other versions vary with hardware limitations.

Versions for CP/M**, Atari** and TRS-80** should be available before Christmas.

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under the Apple Pascal operating system and are primarily directed at handling text files. Each tool is executed from the Pascal command mode and the operation is smoothly guided by meaningful prompts.

The first tool, called Xref, generates a cross-reference listing of any Pascal program, showing each identifier that is used in the program followed by the line numbers on which it appears.

The next tool is called Diff. It examines two text files and then reports the differences between them. This tool is ideal for determining the differences between versions of a given program under development. It can also be used to compare the text output from various versions of a program to see what changes, if any, resulted from modifications in the program.

Diff prompts for an output file (defaults to *console:*) and then asks for pairs of input files to be compared. The *.text* suffix is again optionally supplied by Diff. Several other options are also supported, such as determining whether leading blanks should be significant during comparisons.

Page is a general-purpose pagination utility that simplifies the formatting of text output and its transmission to a printer. A specific version of the Page utility, containing user-specified defaults for the options, can be created using files contained on the *Pascal Tools I* disk.

The next two utilities, Cat and Split, allow the concatenation and splitting of several text files to or from one larger file. The Split utility will most likely be used on files that are too big to fit into the Pascal editor.

Finally, there are two datafile-textfile conversion programs: *Maketext* and *Makedata.* These tools may prove helpful in transporting files between the Apple Pascal environment and other operating systems. Another possible use would be as an alternative to Pascal's extremely slow I/O with text files. Programs could use the faster block I/O operations using a straightforward file representation. To use such a file with the Pascal editor, you have only to run it through Maketext to convert it back to a regular text file. Conversely, files created with the editor can be converted to the data format for quick access by programs.

The documentation is precise and complete; some knowledge of the Pascal operating system is assumed. Anyone with a serious involvement in Apple Pascal will find *Pascal Tools I* a valuable aid. JM

Pascal Tools I, by Silicon Valley Software, from Advanced Business Technology (12333 Saratoga Sunnyvale Road, Saratoga, CA 95070; 408-446-2013). $75.

Pascal Tools II. Like *Pascal Tools I*, this is a collection of utilities for the serious Pascal programmer. While *Tools I* deals mainly with text files, these six utilities concentrate on handling the binary data in any type file.

The first utility in *Tools II* is called Patch. This is a disk file editing program similar to the "disk zap" variety used with DOS. Any disk block can be displayed, edited, and rewritten at will. In fact, it is not even necessary to know the actual block numbers—you can edit according to file name. A block is displayed on the screen in both hexadecimal and ASCII, simultaneously. The display automatically configures itself to either forty or eighty columns according to your system. The information provided by Patch can also be sent to your printer for a hard copy of the hex dumps. The editing display shows either one-half or one-quarter of the block at a time, depending on your screen size. A cursor can be quickly positioned anywhere within the block to make changes in the hex data and a helpful indicator reminds you when you've made changes to the block.

The next utility, Dumpcode, is a p-code disassembler. This program takes a Pascal (or Fortran) code file and displays it in symbolic form using the p-machine op-codes as described in the *Apple Pascal Operating System Manual.* Dumpcode also displays various information about the segment and procedure structure of the code file, and information used by the linker in processing compilation units. All of this may be meaningful to only the advanced programmer, but it can provide a wealth of details about a program which would otherwise be hidden from the user.

The General-Purpose Pattern Grabber and Replacement Utility, or GREP for short, performs several text editing functions on text files. Like the Pascal Editor, GREP accepts a search pattern and, optionally, a replacement string of characters. The input file is then scanned for all occurrences of the specified string and each successful match is displayed on the screen. If a replacement string is specified, an entire new file with replacements is created.

The real power of GREP, however, is that it allows multiple search patterns (and corresponding replacement strings) to be entered as a complete list. Thus several search (and replace) operations can be performed on a single file simultaneously.

Cmp is a binary file-compare similar to the Diff utility in *Pascal Tools I.* This program, however, operates on all files (code, text, or data) and compares them on a byte-by-byte basis. Once a difference is detected, the program makes no attempt to resynchronize matching bytes. Therefore, when comparing text files, the Diff program should be used.

The Filegen utility is used to create nonstandard files such as text files with embedded, nonprintable (control) characters.

The final utility in *Tools II* is a keyboard character code display called Echo. This is a short program which simply indicates the corresponding character code for each key that is pressed on the keyboard. This can vary from system to system depending upon your console device (Apple keyboard, eighty-column board, external keyboard, and so on) and also because of various software patches. Knowledge of the exact key codes is useful in preparing input files for the Filegen utility.

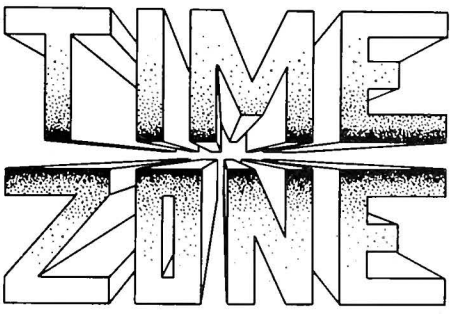
Like its predecessor, *Pascal Tools II* is very professional and well written, though it is definitely for the more advanced Pascal programmer. Some technical information on the inner workings of the Pascal operating system and compiler would have been useful, although this information could probably fill an entire book by itself. JM

Pascal Tools II, by Silicon Valley Software, from Advanced Business Technology (12333 Saratoga Sunnyvale Road, Saratoga, CA 95070; 408-446-2013). $75.

Tharolian Tunnels. By Rod Nelsen. The three difficulty levels of *Tharolian Tunnels*—Pilot, Captain, and Commander—all seem much the same: extremely difficult.

The play of the game also remains constant: you must (1) get past the planetary defenses, (2) navigate the title tunnels, (3) get past the internal planetary defenses, (4) navigate through a bank of lasers, and (5) land at the bottom. Initially, you are faced with two rows of alien ships descending inexorably toward you in your traditional position at the bottom of

6. How big is



Everyone knows by now that TIME ZONE is the biggest adventure game in history, but how many disks does it take just to hold the actual TIME ZONE program? How many disks does it take to hold an adventure that features over 1200 Hi-Res color pictures and covers all of time? How big is the end product of a project that took the likes of Ken and Roberta Williams, Bob Davis, and Jeff Stephenson over a year to develop?
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the screen. Planetside, there are also zipping drone torpedoes (injurious) and plummeting fireballs (fatal) to enliven the proceedings. Your slow-moving ship fires slow-moving bullets at measured intervals. The speed of your foes, in true arcade fashion, increases as their numbers decrease. By the time there is just one left, screaming down the screen like a lunatic typewriter carriage return while you wallow in your trough like a wounded garbage scow, your only strategy is to stay in one place and hold down the fire button. (It's called "luck.")

This gamut run, you are free to wend your way through the miles and miles of tunnels down to the heart of the planet (Tharolia, center world of the Metal Universe, home of the robot termites), squeaking through narrow passages or using up energy to blast out expensive larger ones, depending on your attitude toward fuel conservation. Once refueled at a handy halfway refueling station, you continue your tortuous descent through even narrower tunnels, passing through some rather listless drone torpedo fire and blasting some noncombatants who appear to have wandered into your tunnel and are pretty much minding their own business, but with whom, nevertheless, it would be inadvisable to collide. The White Rabbit does not appear.

That is the general idea. It takes considerable patience to get past the fighter phalanx in the first part; getting past the laser bank at the end . . . well, good luck. Wearing you down by degrees, this game seems to have perfected the Communist brainwashing techniques pioneered in the Korean War. The tunnels themselves are claustrophobia-inducing; the play alternates between extreme tension and concentration and sedate passages in which nothing much happens. After a while, you may start throwing yourself into tunnel walls (game over), ramming alien fighters (game over), and sitting under fireballs (game over). You leave exhausted. You're lucky to leave. AC

Tharolian Tunnels, by Rod Nelsen, DataMost (9748 Cozycroft Avenue, Chatsworth, CA 91311; 213-709-1202). $29.95.

Multiploy By Paul Coletta. Here is an educational game that introduces the excitement of an arcade game into the learning and practicing of arithmetic skills, as well as reading and typing. As you begin, a single space saucer with a math problem inside descends from the top of the screen. Let it get too low and it will zap you with its laser. Type the correct answer to the math problem and your command post will zap it with lots of color pyrotechnics.

But don't get distracted. The saucers keep coming, up to four on the screen at one time, each carrying its own math problem. The speed of the saucers and the complexity of the problems can be set separately. There are up to six levels of difficulty based on speed and complexity, along with a choice of addition, subtraction, multiplication, or division. The levels of difficulty span the second through fourth grades and offer a valuable refresher for fifth-graders and above. SC

Multiploy, by Paul Coletta, Reston Publishing Company (11480 Sunset Hills Road, Reston, VA 22090; 800-336-0338). $19.95.

Mars Cars. By David Husch. A wonderful solution to the frustration of maze games is being able to burn them down as you go from level to level—and get points for it. *Mars Cars* has this fiery new feature, as does *Firebug* and *Mine Sweep*, one of the games in *Laf Pak*. Snap, crackle, pop! The burn-'em-up games have arrived.

Each of the sixteen mazes in *Mars Cars* is striped in different patterns. The object is to drive your car up and down the stripes trying to capture barbells from the four corners. You must have all four before you can go to the next level. The space between the stripes is inhabited by various deadly creatures who zig-zag and bounce about, spoiling your keen sense of geometric destruction. As you travel, you burn up stripes for points and they crackle like kindling on a crisp fall day.

The levels of the game don't get progressively harder as you ascend like most games do. Some are excellent for making lots of burn-points if you like high scores; others are better for just grabbing the barbells and running if you're ambitious. Watch out, though; the Martians get smarter and seem to be able to track you as you climb higher in the game. Occasionally a rampaging Martian will burst through the walls at you and crash you out of a turn (you have four tries at a level). There ought to be a law!

Mars Cars is enjoyable home-arcade fun—like the kind you had when you rode the bumper cars at the carnival when you were a kid—combined with the crackling of a roaring good fire. MF

Mars Cars, by David Husch, DataMost (9748 Cozycroft Ave., Chatsworth, CA 91311; 213-709-1202). $29.95.

Ergono I. Rarely does any piece of computer furniture generate more than a passing glance, much less exude any aesthetic appeal. At the recent Applefest show in Boston, however, one of the talks of the show was the new computer stand from Sensible Software. It derives its name from the term ergonomics, which is the study of the use of human energy to accomplish tasks in the most efficient manner, more commonly referred to as human engineering.

The oak wood grain and the roll-top dust cover do lend an aura of days gone by, but the attention to the user's needs is up-to-the-minute. Under the Apple is a sliding tray. Thus, the Apple can be rolled out to have its cards changed or its joystick replaced by paddles. What a difference from the other models available, where the entire superstructure has to be removed to get inside the Apple! To the left of the disk drive slots sits the other very nice feature—a separate power supply with four grounded outlets. One of these outlets is always "hot," while the other three are controlled by two separate lighted switches. Thus, the Achilles' heel of the Apple, its on-off switch, can be circumvented. As an added bonus, circuit breakers and surge suppressors are built in. These are certainly the surroundings an Apple deserves in the executive suite or in the professional office. RRA

Ergono I, Sensible Software (6619 Perham Drive, West Bloomfield, MI 48033, 313-525-0752). $169.95.

Neptune. By Nasir Gebelli . . . Jerry Mathers as the Beaver.

"Hey, Beaver, what are you doing?"

"Oh, hi, Wally. I'm playing this new game me and Whitey saw down at the computer store. It's called *Neptune.* The man at the store said it was supposed to be pretty good."

"Golly, Beav, you don't just go out and buy something because the man says it's pretty good. You gotta try it out; you know, kinda like basketball tryouts at Medfield High. Heck, even Lumpy can go around saying he's pretty good at point guard."

"Well, it is a neat game. You have this submarine ship, sort of like Captain Nemo's, and you go through the water and try to shoot and bomb these underwater aliens. But the trouble is some of them pop up and down, which makes them harder to hit, and some of them just sit there. Those are the ones you have to drop bombs on."

"What's so hard about that?"

"Boy, Wally, you think just because you got a date with Mary Ellen Rogers Friday night that you can do anything. Watch. Okay, see those rocketlike things? Those are Neptunians. They'll shoot up and down when you don't expect it. And those bouncy things on the bottom? Those are the Jellyfish. You have to bomb those, but it's kinda rough with the Neptunians sitting guard next to them."

"That's a cinch. Here, let me try it. Hey, why aren't my bombs dropping on the Jellyfish?"

"I tried to tell you about that. You're limited to only twenty bombs. Kinda like the way Larry Mondello limits himself to twenty apples a day. Anyway, next you gotta get through the Pupfish, and they never stop moving."

"Hey, look at that, Beaver! You mean after I sweat through those creepy underwater guys, that I have to dodge torpedoes too?"

"Those aren't torpedoes, they're Octonians. They're a breeze; just don't get too close to the top or bottom. Those bubbles are deadly. What's rotten is that once you get through this level, you gotta make a choice in this fork in the road. If you make the wrong choice, you end up getting mashed. Kinda like when Lumpy took his dad's car to the prom."

"Heck, Beav, how am I supposed to know which way to go?"

"Phil, the man at the store, said that if you shoot as little as possible at the Neptunians, Jellyfish, and Octonians, there will be something to show you which way to go, but if you just shoot like crazy, it's all luck."

Door opens.

"Hey, Sam, what's shaking? Heh, heh, heh. Are we gonna go down to the malt shop and score with the chicks, or are you gonna hang around here with the squirt all day?"

"Aw, knock it off, Eddie. Beav and I are playing Gebelli's *Neptune.*

Look, he's already at the refueling stage."

"Hey, squirt, that's a pretty jazzy rhythm the game plays when you're at the filling pumps. Let me try this game—uh, not that I'm normally into these kiddies' things. What's this? I'm swimming upside down?"

"Boy, are you in for it now, Eddie. You busted the game!"

"No, he didn't, Wally. The next time around you go through the whole thing, and everything's upside down. And later on, there's sharks and stuff, but they're almost impossible to kill. And after that. . . ."

"Aw, c'mon, Sam. This stuff is for kids."

"Golly, Eddie, you don't gotta get sore about it."

"Yeah, you didn't have to break the pins off of Beaver's joystick. Now he won't be able to play anymore."

"It's okay. I can also play *Neptune* from the keyboard, but it's a little harder."

"Let's go to the malt shop, Wally. The kid's beginning to sound like a software review."

The boys leave Beaver and enter the hall.

"But I was just down at the malt shop today with Mary Ellen Rogers."

"Okay, let's go down to the computer store and see if there are any more *Neptunes* left. I just didn't want the punk to know I actually think the game's pretty good. I mean, did you see how smooth the animation was? And the color! And how 'bout the way those smiling Jellyfish bounce up and down with their little bow ties on, and those purple sharks. . . ."

"Boy, Eddie, you sure are something else. Now *you* sound like a commercial."

"Hello, boys. Off to the malt shop?"

"Oh, good afternoon, Mrs. Cleaver. That's a very becoming housecoat you have on. Wallace and I are going to the computer store to broaden our knowledge on the latest in technology."

"How nice, Eddie. You be sure to be back for dinner, Wally."

Boys exit.

"What was that all about, June?"

"Ward, I'm worried about the Beaver. He's so tied to that *Neptune* game from Gebelli that he doesn't get into as much trouble as he did in the old days. I just hope our series doesn't get cancelled." MTV

Neptune, by Nasir Gebelli, Gebelli Software (1771 Tribute Road, Suite A, Sacramento, CA 95816; 916-925-1432). $29.95.

Retirement Planner. By William L. Hamilton. Many people these days are trying to plan far in advance of their retirement and finding the undertaking quite complex and confusing. This simple forecasting model from the government think tank, ABT, will help clear some of the fog away for the average person. Via a step-through menu, a wide range of variables are input such as your current age, earning level, total current assets, social security benefits, pension income, and income from assets.

The model handles all of the complex calculations, figuring out what happens to all those variables over the length of time between now and the time you would like to retire. Even IRA accounts, for self-pensioning, can be included. When all the figures are ground out, graphs are generated, plotting out each of the separate trends.

Seeing what your future looks like in thirty or forty years is a rather sobering experience. Retirement is one of those things in life that seems to exist in the sweet by and by; we always feel it will somehow take care of itself and just be there when we need it. Actually seeing the harsher economic realities can be disconcerting. Fortunately, the designer of this program realized that, for he has included the saving grace of "what if?" in his design. So if you don't like what the crystal ball shows you for your future, like the Ghost of Christmas Yet To Come, you can make changes.

It is still amazing to watch the old pebble rolling down the snow bank and turning into a mighty avalanche. But a few extra thousand saved here, a raise there, a wiser investment with a higher rate of return over here, and *presto*!—a veritable ton of money at the other end. Ah, now doesn't that feel better? RRA

Retirement Planner, by William L. Hamilton, ABT Microcomputer Software (55 Wheeler Street, Cambridge, MA 02138; 617-492-7100). $55.

Understand Yourself. By Mike Taylor. From the time of Plato, if not before, humankind has been preoccupying itself with the puzzling task of gaining self-knowledge. In the momentary interstices that form between our perennial struggles for survival have evolved elaborate methods to address the riddle that is us. History is littered with attempts to penetrate the mysterious bastions we erect that belie our avowed thirst and serve as monuments to the deep-seated self-dread uniquely borne by self-conscious creatures. The arts and sciences contain the artifacts of historical points of view that are all too quickly superceded by others that prove just as illusory.

Psychology, that hazy "discipline" that deigns to institutionalize our quest for self-decipherment, proselytizes the Enlightenment myth of scientific reductionism as a methodological panacea. Inculcating itself with all the trappings of a nascent "hard" science, psychology directs its minions to seek the demigod Quanta and to pay obeisance with technical rituals that quickly become supernumerary. In point of fact, such rituals manage only to distract us with their glossy scientism. Our goals can only be frustrated when an increasing fascination with our chosen tools becomes a major diversion even as our need for self-scrutiny reaches a fevered pitch.

The software program temptingly titled *Understand Yourself*, based on unspecified psychological premises, purports to be a viable tool for facilitating self-knowledge. The claims made by this program seem at least as questionable as similar claims made by self-help books and astrology manuals. The latter species are no doubt quite essential to many and find their niche alongside such portentious devices as augury. A closer look at the program enables a further deduction to be drawn.

Consisting of a series of questionnaires, the disk is derived in toto from *The Test Yourself Book*, by practicing psychologist Dr. Harry E. Gunn. Material from the book appears here unexpunged, and the book author is given full credit—but the book contains many and various psychological questionnaires and tests not contained in the disk version, while the disk is easily three times as costly as the original book.

All this is unmitigated by certain points of convergence between the book and the disk. Both claim, by means of seemingly arbitrary sets of

7. What can be on level three that can help you to the top of the hill in a hurry?

in



As a little soldier in CANNONBALL BLITZ you've run your legs off to scurry up two screens full of uphill battle. What leg saving device will you find on the third screen to get you up the hill in a hurry?
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questions, to be able to unmask the true disposition of the user in such areas as aggression, possession of conscience, marital adjustment, sense of values, and others, vaguely defined. When an attempt is being made to evaluate such things so nebulously termed, the implication is that the evaluation occurs vis-a-vis some standard. The standard used in making evaluations of the user is never stated. No bibliography or references to bolster the claimed veracity of this particular approach are offered in the book or with the disk. The user, as hapless truth seeker, must rely on the credentials of the psychologist-author—a dubious consolation if one were really to take seriously the findings of these questionnaires.

Much controversy continues to rage in professional circles regarding the meaning and usefulness of psychological test procedures. Even well-researched and extensively used standardized tests of this kind remain open to question. The publisher of a software program that attempts to tread into such territory should be obliged, at least, to offer some caveat in the advertising or packaging. The user will inevitably be impressed by the certainty that there are more reliable paths to self-understanding, and the astrology industry may thereby gain more adherents.

It's fun though. TC

Understand Yourself, by Mike Taylor, Huntington Computing (Box 1297, Corcoran, CA 93212; 800-344-5106). $24.99.

Casino. By Bob Rosen. Strains of *The Entertainer* greet you as you walk into the Golden Apple casino. The Golden Apple offers five forms of entertainment, more or less resembling their Las Vegas counterparts: blackjack, keno, poker, roulette, and baccarat. Your friendly microcroupier will prompt you with rules and options and will keep track of your winnings and losings, storing the data safely on disk when you take a break from a playing session. It will do this as well for any friends you care to bring along, and it'll present a game-by-game ranking of the five toughest players it encounters.

Blackjack at the Golden Apple is a one-deck game with typical Las Vegas Strip rules—except that the croupier only counts in integers, so blackjack payoffs are two-to-one instead of the usual three-to-two. Keno seems to pay a little better than typical Vegas locales, but it's still a bad game for the player. The Golden Apple is kind enough to print in plain sight the odds against each possible bet; careful study of this information ought to save Golden Apple clients a bundle when they get to the real place. For those who like to buck the laws of nature, there's a maximum payoff of one hundred thousand to one for certain astronomically improbable outcomes.

Poker is slot-machine style, which means that you get five cards plus the option to throw away and redraw three. Payoff is according to the unlikelihood of your final holding. For anything under a pair of jacks the machine keeps your money (well, it debits your account); two pair pays even money, three of a kind five-to-one, and so on. If you score a royal flush, you'd better grab the first plane out before the Apple wins it all back.

Roulette looks like its namesake, except that the wheel is unaccountably square. Meanwhile, the Golden Apple's baccarat offers us two-dollar players a chance to don imaginary black tie and ruffled shirt. It may be the closest we ever get to playing Nevada's most sophisticated big-money game.

As you wander from table to table in the Golden Apple, you'll be followed by that same mariachi troupe that greeted you at the door. They've got an extensive repertoire—rooted in the classics—with which to serenade your every play. A shut-up switch is provided, in case you find their accompaniment distracting. CS

Casino, by Bob Rosen, DataMost (9748 Cozycroft Avenue, Chatsworth, CA 91311; 213-709-1202). $39.95.

Link Pascal Utilities. By Rudi Diezmann and Curt Bianchi. As someone has probably said somewhere, "The number of $495 16K RAM cards in use is exactly equivalent to the number of Apple Pascal Language Systems that have been sold and one-fourth the number of Pascal system disks lying unused in dark corners."

The scenario goes something like this. In a flush of excitement and expectation you run out and plunk down $495 not only to obtain the Pascal system, but, as a bonus, an additional 16K of RAM memory. Upon arriving home and opening the package you find not one, but two



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equally dense, thick, and indecipherable manuals. One is named the *Apple Pascal Operating System Reference Manual* and the other the *Apple Pascal Language Reference Manual*. The former is a bulging 300 pages with a 14-page addendum, and the latter is 210 pages with a 16-page addendum.

Something happened to the Apple manuals between the *Applesoft Tutorial* and the Pascal books, and that something was that someone forgot that we are really all beginners in this computer learning game and need a very gradual, hand-holding advance to gain any ground at all. To aid in this, there is now a series of Pascal tutorial and utility programs from a young and dynamic programming group in Santa Monica, California—Link Systems. The programs can be divided into two groups. The first is the tutorial, *LinkSampler 1*; and the second, three utility disks for programmers, *LinkVideo, LinkDisk* and *LinkIndex*.

LinkSampler is a Pascal teaching aid and tutorial that attempts by demonstration and instruction to get the Pascal novice to a level where he can make use of the Apple Pascal manuals. This is done by leading him through the early steps of Pascal programming with some well-documented, understandable examples. As the manual puts it: "We feel that a lot of people need just a little more help to get over the initial stumbling blocks of learning a new language."

The manual starts out by telling you in simple language how to catalog a Pascal disk and how to send that catalog to your printer. You are then shown how to print listings of the programs on the disk so that you can visually follow the explanations on the screen and in the manual. This may not seem like much of an achievement to someone who has not spent a couple of hours trying to figure out how to do these seemingly simple tasks. Those who have know that after a few such humiliating attempts, the temptation is to give up altogether.

After that first step you are taken to a three-line program which is used to illustrate what a program looks like and what the basic requirements are. In this fashion a few new terms at a time are slipped into the mind of the unsuspecting apprentice along with a bit of understanding and a nice feeling that Pascal may become as accessible to us as Applesoft.

After many such simple advances you will find yourself being able to look at a Pascal program and understand what it's doing. Soon you will be able to write your own simple programs and, more importantly, you will be at a level where the Apple Pascal manuals actually become tools you can use. Along with all of this knowledge you will find that the twenty-odd demonstration programs are in themselves interesting and useful. They include simple add, divide, and prime number calculation routines, progressing to loan and future value programs, and finally to two simple games, *Hanoi* and *Maze*. In all of the programs care is taken to make you understand the language and programming points being covered. If this isn't the best deal you can get for $59.95 and a few evenings' diligent study, the one that beats it must be a dilly.

We turn now to the programming utilities: *LinkVideo, LinkDisk*, and *LinkIndex*.

LinkVideo is a set of screen formatting tools that can be used in every program you write. It has capabilities that will give any program a professional look and make it easy to format screens quickly. You can create menu and input screens that automatically format the information given it by the operator and also validate it so that common errors are trapped before they hit your files. These routines are "terminal independent." That means, for instance, that you can use the Apple forty-column screen, an eighty-column card, or an external terminal, and the program will adapt itself by searching memory to find the proper codes to operate the device being used. If you have ever tried to adapt an existing Applesoft program for use with a Videx eighty-column card, you will love this program for this feature alone. If the expected input is a phone number, it will be sure that all inputs are numbers and will also skip over dashes. It can be thought of as a black box with ten functions that will be performed just by calling them, and this calling is automatic from within your program.

LinkDisk is a free-standing Pascal utility unit which was designed to fill the need for manipulating individual bytes of Pascal mass storage media. In addition, in order to ease the transition for those who want to upgrade their applications systems from Basic to Pascal, *LinkDisk* provides a facility for translating data files, both text and binary, from DOS 3.3 volumes to Pascal volumes.

In use, the *Link Disk* routines are added to the *System.Library* on your Pascal program disks and are thus resident whenever you are using the Pascal system.

Entering the *examine* command transfers control of the program to a menu of commands that do most if not all of the things we associate with track and sector programs. An interesting innovation in this area is the screen display of the individual disk sectors. In addition to the usual hex or ASCII display toggle, you can request a *mixed* display which, as the name implies, causes printing characters to be displayed as ASCII, and nonprinting characters to be displayed as two hexadecimal digits. As an extra, *LinkDisk* can also compare two Basic volumes.

A new version of *LinkDisk* due out shortly will also provide a *text compare* function. (Link Systems's policy at this time is to provide upgrades to all registered owners of Link products.)

The third offering in this group is *LinkIndex*. This utility can also be added to your *System.Library* and linked into your programs after they are compiled. The program implements the tried-and-true B-Tree indexing method, capable of finding one name out of 6,000 in a mailing list in a maximum of three disk accesses.

Making *LinkIndex* a UCSD Pascal unit has separated the details of Pascal operation in the implementation portion of the unit, and provided seven simple procedures and functions that interface the application program with *LinkIndex*. These seven procedures and functions allow the programmer to open and close the index file, as well as to search for, insert, and delete keys. Thus the programmer need not be concerned with the mechanics of a B-Tree while taking advantage of its benefits.

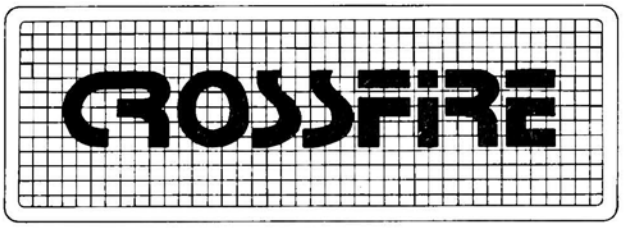
Once again, the routines are well documented and sample Pascal text files and executable code files are included on the disk. RJR

LinkSampler 1, $59.95; *LinkVideo*, $54.95; and *LinkDisk*, by Rudi Diezmann, $69.95. *LinkIndex*, by Curt Bianchi and Rudi Diezmann, $149.95. Link Systems (1640 19th Street, Santa Monica, CA 90404; 213-453-1851).

GOTO 185

8. How many times can a monster be reincarnated?

Play



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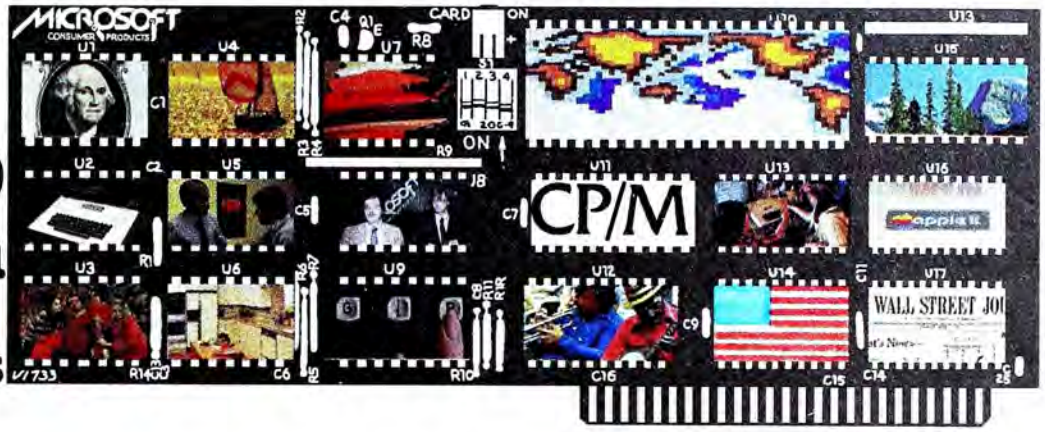
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SOFTCARD Symposium

by Greg Tibbetts



In the past fourteen monthly columns, most of our discussions have centered on the utility programs distributed with CP/M on the SoftCard. The first goal of this series has been to provide a good grounding in the language and concepts that describe CP/M (and to have a little fun as well).

Now that we have accomplished this, it's time to go deeper into the subject of generic CP/M—what it is, how it operates, to what purposes it can be put, and so forth. Since we're still dealing with the Apple, the bulk of our specific examples will still come from Microsoft CP/M; but we'll attempt to show them against the background of the rest of the CP/M world to present a broader picture of this subject.

These last fourteen months of preparation in the language tools and basic constructs should make it easy for you to assimilate the information that's presented. While we'll still attempt to organize material so that beginners will be able to follow it, we won't go to quite the same lengths in definition. Those of you who find the information difficult to follow from this standpoint can find the necessary background in nearly any of the CP/M primer-type books available at your local bookstore or computer store.

First off, let's look at operating systems in general and CP/M in particular in light of what we've done in the last year. What is an operating system? Although its functions may be very complex, for the most part, an operating system is a communications interface between the system processor and its environment.

In its simplest form, a microcomputer is nothing more than a microprocessor, memory (in the form of a number of RAM chips with their decoding circuitry), and a series of electronic pathways or lines over which the processor can send and receive electronic impulses. Such lines are sometimes grouped together to form buses. Two major ones are the address bus and the data bus, both of which connect the RAM and the processor. In other cases, these lines may be single pathways that supply power, supply a ground path, and connect the system clock signal, all of which are necessary for the processor to function.

Typically, all the lines just described, plus a few others that are needed by all or most components of the system, combine to form a single system bus. It is this bus that is being tapped into by the contacts on the edge connectors of any peripheral cards you may have in your Apple. Once all this is taken care of, surprisingly little is actually required for the processor to be functional—that is, to read and write memory, make comparisons, and manipulate numeric values in some very basic ways. Such a micro, however, has no way of interacting with the environment outside itself.

In order to communicate with the outside world—the keyboard, the video display, and so on—additional electronics, providing channels, are required. Lumped into a single category, these signals are referred to as input/output, or simply I/O, and the electronics are referred to as I/O circuitry. The actual mechanics of how the I/O is performed depend on processor type, bus architecture, and other factors. The specifics in electronic terms are not really relevant to this discussion, so we'll let it suffice to say that most systems use one of two types of I/O: memory mapped I/O or port driven I/O.

As its name implies, memory mapped I/O reserves a quantity of memory addresses to act as channels of communication rather than as memory storage cells. These addresses terminate at external devices rather than at system RAM. When such addresses are accessed through memory reads and writes, however, the processor cannot distinguish between them and normal system memory cells. During a write, the electronics in the external device uses the signals received either as normal data being communicated or as a trigger signal telling it to perform some standard function such as changing from one mode to another. In like manner, when the external device is interrogated by the processor, it places data on the system data bus just as normal RAM would.

The 6502 processor and the Apple computer itself are examples of memory mapped I/O systems. The 6502 processor has no port I/O implemented; therefore, all external device data transfer must take place through memory locations. The 4K block of addresses at 6502 location

9. What kind of a game can you make with

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$C000 is the memory mapped I/O area in the Apple II.

Port driven systems have (usually) 256 ports, numbered 0 through 255, that are used for these communication signals. These ports are not accessed as memory locations and are completely independent of system memory. Processors that support port driven I/O have special op-codes as part of their instruction set, usually with the mnemonics IN xx and OUT xx, where xx is the port number. These instructions direct the data stored in the appropriate register out the port or request data in from the port. Once this occurs, the external device handles it in exactly the same ways, that is, as data or as a trigger signal.

The Z-80 is an example of a processor with port capabilities. Although using the ports is more memory efficient, systems based on such processors are sometimes implemented with memory mapped I/O for some other reason that's perceived to be important.

You may be wondering how all this relates to our discussion of operating systems. When there's such diversity even in so basic a function as the transfer of signals from processor to video display, it becomes obvious that a totally universal operating system will have to await a future where there's more standardization in hardware design and protocol. This is true even when it comes to computer systems that are based on the same processor.

In fact, it's easier to deal with the difficulties that arise from having different processors than it is to remedy those that occur because of different hardware protocols. The use of higher level languages such as Pascal, C, and others when writing operating systems, as has been done with the Bell System's UNIX OS for sixteen bit processors, can solve problems that relate to having different processors.

In the practical sense, though, there will always be the hardware design differences to one degree or another, and as such, there will always be the need for some portion of the operating system to be custom designed as well. For this reason, the term *universal operating system* has come to mean a group of specific systems that, although they may be radically different internally, share a common set of protocols wherever they are visible to the user.

CP/M is such an operating system. Internally, some sections of it are different in every different computer on which it is implemented. In other very important ways, however, it is identical in each of these systems. Our examination of CP/M's structure will call special attention to these differences and to what they mean to you as a CP/M user.

In our earlier discussions, we said that CP/M was made up of three separate modules: the BDOS or Basic Disk Operating System, the CCP or Console Command Processor, and the BIOS or Basic Input/Output System. From the earlier description of communications, it should be obvious that the BIOS contains most of the differences between CP/M systems running on different machines since, as its name implies, it is the module concerned with I/O. It is safe to say that wherever differences between different CP/M systems exist in the BDOS and CCP modules, these differences are simply a result of the efforts of one manufacturer or system supplier to introduce a few extra bells and whistles into a product. In all important respects, the core of these modules will be the same.

The BDOS module is the heart of CP/M. It occupies approximately 3.5K, and its location determines the absolute end of user memory space. The BDOS module must reside in RAM memory unchanged whenever the system is operating. Note that this statement only describes conditions where the "system" is operating. It is in no way contradicted by those few programs that may overwrite the system to perform some stand-alone function, such as a RAM memory test, requiring a complete cold boot when finished. The BDOS uses the BIOS as its communications link to peripherals and other devices external to the processor; the BDOS performs no direct accesses itself.

Design of the CP/M was based on the assumption that no direct access to the BIOS routines would be made by any module or program except the BDOS, including even the CCP and the Digital Research utility programs. For this reason, the BDOS structure was set up to utilize com-

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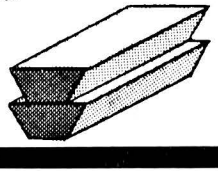
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binations of very simple tasks to perform any conceivable system function. This set of tasks, known as *system calls*, was implemented by assigning a unique numeric value to each call and defining a protocol for passing to the BDOS both the identifier value and any additional information necessary to perform the task when that system call was used. Code within the BDOS identifies the call value, preserves any additional information (called parameters), and, based on the call value, branches to code that performs the function.

In many cases, the BDOS makes use of the same less complex routines over and over again to perform a more complex one, as in the case of the system call to print a string of characters on the console. In that specific case, the BDOS uses the same routine it uses to print a single character on the console repetitively until it encounters the special character being used as a delimiter for the string. We'll come back to a discussion of system calls and internal BDOS functions at a later time.

The CCP is the module that allows the user to interact with the system on a direct rather than a deferred basis, deferred meaning under program control. As its name implies, the CCP's responsibility is primarily to scan the keyboard continually for command input and, when a command is received, to identify it and call upon the system to perform the appropriate task(s).

Consisting of approximately 2K of code, the CCP resides just below the BDOS module and is in control of the system any time a program is not running in user memory. User memory is also known as the Transient Program Area or TPA. Since the CCP is not used during the execution of programs, it may be overwritten to provide an extra 2K of free space for the program to work with at the upper limit of the TPA. The designers of CP/M recognized that not all programs would use this area and therefore established the means either to reload the CCP easily and restart it or to simply return to the existing CCP image in memory at the completion of the program. The former is accomplished through the warm boot process that we'll discuss in detail later. The latter is done simply by executing a RET instruction, since before the CCP releases its control of the system to a transient program, it places its own return address on the system stack to be used or not as the programmer wishes.

The CCP is probably the most often altered of the two "standard" modules, since all sorts of special functions may be implemented in it without having much effect on the universal nature of the system. At least one reasonably sophisticated special version of the CCP, called ZCPR, exists as a public domain, assembler source file in the CP/M user group bulletin board of the Micronet timesharing network. Any Micronet subscriber may download, assemble, and install it in place of the standard version for only the cost of the Micronet time charges.

In any case, the CCP must perform a set number of standard functions to fulfill the minimum operation criteria of CP/M. These are: command scanning, obtaining a disk directory, erasing a file, renaming a file, changing to a different user directory, displaying the contents of a disk file, and, finally, executing a transient command. The first of these functions is performed constantly whenever the CCP is operational; the others are performed on command.

The first five commands are the ones you are familiar with by now: DIR, ERA, REN, USER, and TYPE. The last is actually several functions: identifying the command word as a transient command, finding a disk command file (one with the extension .COM) by that name on an accessible disk drive, loading an image of that file into the TPA, and passing control to the code at the beginning of the transient command program.

Other functions that have been implemented in specialty CCP's are the ability to use one certain user area as universally available to all user areas (eliminating the need to place copies of often used utilities on each user area), the ability to search beyond the logged-in disk drive for files named in commands without specifically entering the drive specifier ahead of the file name, the ability to query the user before erasing disk files to verify that the user actually wishes all files found to be deleted, the ability to use so-called wild card file name conventions with the rename command, the ability to load programs at other than the bottom of the TPA, and so on, ad infinitum. The CCP performs all of these functions through the use of system calls into the BDOS, never accessing the BIOS directly, and in that sense is itself more like a transient program than an actual part of the system.

The BIOS module, being unique to every different computer's system, has no specific size, since its size is dependent on the complexity necessary to perform its communications tasks. Typically, the BIOS module begins at the very end of the BDOS and occupies the entire space to the end of available system RAM. Its length is what usually determines the total user RAM available in the system by designating where the BDOS module will be located. In actuality, only a very small portion of the BIOS module need be located here. This portion consists of a jump table comprising fifty-one bytes which must follow the end of BDOS and a set of Disk Parameter Headers or DPHs, comprised of sixteen bytes for each disk drive that it would be possible to connect to the system. This maximum number of disk drives in the system must be determined when the BIOS is created, and whether they are ever actually installed or not, DPHs must be established for them at that time. With the exception of these two components, the rest of the BIOS is accessed by BDOS either through the use of the jump table or by examination of the DPH to find the location of information about a particular drive. This being the case, all the other routines that comprise BIOS may be placed anywhere that they can be protected from user programs and the operation of the system.

With the exception of the Apple and other systems that can use bank-switched RAM, the BIOS in its entirety resides right next to BDOS, since this is by far the simplest way to proceed and nothing is gained by shifting things around. In the Apple and other such systems, however, considerable gains in TPA size can often be accomplished by placing portions of the BIOS routines into banked RAM and having a few bytes of code in the normal BIOS location to switch in the bank and execute the banked code, switching it back on completion.

The normal BIOS supplied with SoftCard in its 56K configuration

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does not use the 4K bank present on RAM boards. Add-on peripheral manufacturers, especially suppliers of large-capacity disks who often need large amounts of extra BIOS space, have been able to use the banked area for their extra routines, thereby not removing TPA space from their customers' systems. In at least one case, extra banked RAM was provided on the peripheral interface card to accomplish this same purpose. We'll be looking at the BIOS organization in detail as our discussion continues.

There are two more areas of CP/M that, while they are not specifically identified as modules, are as necessary to its operation as any of the sections we've discussed so far. These are the system workspace, located from memory location 0 to location 0FFH inclusive, and the collection of routines usually known as the *cold start loader* or simply the *boot code.* The former is present in nearly identical format in all CP/M systems, while the latter differs greatly from system to system, with some of the boot code being located in the BIOS, some loaded temporarily and then overwritten, and so on. Since the boot code precedes the operation of the system, we'll examine it first and then move on to the system workspace.

The boot code actually makes use of three separate sections: the cold loader, the system initialization routines, and the warm loader. It should be noted that the warm loader is used very frequently by itself and even has a separate entry in the BIOS jump table. It is therefore not strictly a part of the boot code; however, its use by the boot code is almost mandatory.

How the boot code is organized in a given system is dependent on the configuration of the system itself. In large part, the key factor is what the computer system contains exclusive of anything being loaded from disk; that is, those programs present in ROM that are available when the computer is first powered up. Some computers contain a ROM that serves as a system monitor or housekeeper and has as one of its functions the loading of the first disk sector from the first track of a disk in the highest priority drive. In other systems, it is a matter of having the Monitor load this sector by executing a separate ROM contained on a disk interface. In any case, it is common practice to reserve the first sector of track 0 to contain the necessary code for loading the remainder of the operating system into memory at a specified range of addresses. This is the physical process known as *cold start loading.*

In SoftCard CP/M, the cold start loader is itself made up of two separate parts: the boot sector and the Z-80 finder. The boot sector is a 256 byte segment or code that, like all the other boot sectors used with the Apple (whether they be DOS, Pascal, or whatever), is loaded and executed automatically at 800H by the boot ROM on the Apple disk controller card.

Since the Apple disk controller ROM and electronics are fairly primitive compared to the ROM and disk controller chip combinations used with most eight-inch drive systems, the cold loading process on the Apple is much more involved. Where a disk controller chip is in use, it is relatively easy to program a ROM that specifies track, sector (or number of sectors), and load address to the disk controller and, in one or more simple operations, can load a major portion of a disk.

The Apple, on the other hand, as you may have learned by reading *Beneath Apple DOS* or some other such text, utilizes not a disk controller chip, but a state machine. This allows considerable freedom in the way data is stored on disk and gives the system programmer total control of all segments of drive operation, from turning the motor on and off to stepping the head from track to track. But it is a complex type of work and extremely sensitive to such factors as timing and memory usage. In addition, the Apple boot ROM is designed to load only the sectors available on track 0. It has no inherent capability of stepping the head to track 1. Since most operating systems require at least two tracks (SoftCard CP/M, for example, requires nearly two tracks for just the boot and BIOS code), it is generally not practical to load the entire system using the boot sector.

For these reasons, the most common path when working with Apple booting systems is to use the boot sector and the Apple boot ROM to load a section of code known as RWTS or Read Write Track and Sector. This code more closely simulates the type of ROMs found on eight-inch systems and accesses the state machine directly to perform the various functions required to read or write all parts of the disk.

Usually, at the same time RWTS is loaded, a second stage boot routine is loaded also and this segment uses RWTS to load the remainder of the system. In SoftCard CP/M, this is, in fact, what is being done. The Apple Autostart ROM executes the disk controller boot ROM on power-up (the old monitor ROM will execute it via PR#6 from Basic or 6[CTRL−P] from the Monitor), thereby loading the boot sector at 6502 address 800H. This code is then executed, loading the next ten sectors from track 0 into memory beginning at 6502 address 0A00H. Of these ten sectors, the first five and most of the sixth make up the RWTS routines. The remainder of the sixth sector is the 6502 warm loader. The other four sectors that load at 6502 address 1000H are the Z-80 finder, which also detects the configuration of the system and does some patching of the IOCB based on what it finds, and an image of the IOCB itself that will eventually be moved to 6502 address 300H. There is code in the Z-80 finder that handles moving it down. The IOCB is loaded high and moved because its normal location is used by the Apple disk controller ROM when it is operational.

At the completion of this ten-sector load, control is branched to the Z-80 finder, and from this point on, the boot sector image at 800H is no longer used. It is, in fact, overwritten as the system becomes operational, being used as the general-purpose disk I/O buffer.

The Z-80 finder first shuts off the disk drive motor and then does some system initialization, both on its own by accessing the I/O circuitry directly, and also by using some Monitor routines. Essentially, everything is brought to the power-on/reset condition. From this point, the Z-80 finder moves down the IOCB, determines the system configuration, and locates the SoftCard. When this has all been completed, provided there are no problems, the Z-80 finder executes the warm loader subroutine. This routine, which we mentioned was in the last part of 6502 page 0FH, loads not only the CCP and BDOS on the initial execution, but also the remainder of the BIOS. It is later backpatched so that on future

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calls it will load only the first two modules.

Up until now, all routines executed have been purely 6502, and with the exception of the warm loader and RWTS routines, all are overwritten by subsequent system operation. Even the Z-80 finder's being located in what will become the system TPA will be overwritten soon by the first transient program loaded. In any case, having finally set the stage, the Z-80 finder turns on the Z-80 and executes the more traditional boot code that is analogous to the one found in standard CP/M machines. This Z-80 boot code is located in the BIOS portion loaded immediately following BDOS.

In a 56K system, the CCP loads at Z-80 address 0C400H, the BDOS at 0CC00H, and the BIOS at 0DA00H. The Z-80 boot code is responsible for setting up the Z-80 system initialization, using the information discovered by the Z-80 finder during its checking of the peripheral slot contents. Various vector addresses and Z-80 jump instructions are patched based on this information. Finally, the sign-on message is printed, and now that the system has been fully identified, all recognized hardware devices are initialized. At this point, control is passed to the CCP, and SoftCard CP/M becomes fully operational. The Z-80 boot code, like its predecessors, is also overwritten when completed, in this case by using its location for one of the BDOS workspaces. This is a brief description of the boot code and its function. In upcoming columns, we'll examine this topic in depth.

The final module of the system is the work area between Z-80 addresses 0 and 0FFH. Since we are limited as to space, we'll do a quick identification of the module's component parts in the remainder of this column and go into those parts in more depth as our series continues.

At location 0 is a Z-80 jump vector which, during the initial booting process, points to the beginning of the BIOS jump table. The first entry in the table is the address of the Z-80 cold boot code we just finished describing. Since this is overwritten later, the jump vector at 0 is altered by the boot code itself to point to the second entry in the table, the address of the warm boot routine.

At location 03H is the IOBYTE. This single byte, a constant indicator to the operating system of which logical devices correspond to which physical devices, is not implemented in every system. We will take up its structure and purpose when we cover the IOCB in detail, as the two are closely interrelated.

Next, at location 04H, is a value corresponding to the currently logged drive, with 0 being drive A, 1 being drive B, and so on through value 0FH being drive P. This is initialized by boot to a value of 0.

At location 05H is another jump vector, this one pointing to the entry of BDOS. In the 56K configuration, the address of the jump is 0CC06H. This is the location that is called by transient programs when making system calls to DBOS, since it is independent of the actual location of BDOS. The address corresponding to the DBOS entry point is placed in this location during boot and is rewritten during each warm boot along with the warm boot vector at 0.

Locations 08H to 37H are not currently used by CP/M, but are reserved for use in later versions. The same is true of locations 3BH to 3FH and 50H to 5BH.

Locations 38H to 3AH represent the place the Z-80 will go to look for a vector address if a RESTART 7 instruction is encountered. This is the only RESTART instruction currently used by CP/M, and it is used by DDT, SID, ZSID, and other debuggers as a means of vectoring control back to themselves when breakpointing. Other than that, the operating system itself does not use any of the RESTART locations.

The area from 40H to 4FH is a sixteen-byte scratch area that is used in some implementations of the CP/M BIOS. Neither BDOS nor CCP use it, and not all custom BIOS implementations do. It is a good idea, however, not to attempt to use this area yourself if it is possible to avoid it.

Next, the locations 5CH through 7CH are the default File Control Block or FCB created by the CCP for use by transient programs. Under certain circumstances, more than one FCB may be placed in this same area by the CCP prior to turning control over to the transient program. In these cases the programmer must assume responsibility for separating them and creating his own separate FCBs for continued access.

The locations 7DH through 7FH are the optional default random record position in the file named in the preceding FCB. The entire subject of FCBs and file manipulation will also be covered in a future column in this series where we'll look closely at the structure of CP/M's file manipulation system and examine in detail the means of using these tools.

The final section of the workspace consists of the area from location 80H to 0FFH. This area is the optional 128-byte disk buffer used during disk file accesses. It is also used to store the command string that is being entered while the CCP is active. The CCP will preserve the command string for use by transient programs loaded with additional parameters, such as the command:

```
PIP A:TEMP.BAS=B:NOTAPROG.BAS
```

Because the command string is preserved, PIP can access the parameters after it becomes operational.

This completes our breakdown of the component parts of the workspace. It should be noted that, provided a program does not utilize any of the components, it is possible to overwrite this area and allow a program to begin at actual Z-80 location 0. If no other parts of the system are overwritten, and if the program preserves the warm boot jump vector address from locations 01 and 02, a simple warm boot at the end of the program will restore the necessary parts of this area. Otherwise, a complete cold start is required.

This completes our overall look at operating systems, specifically the CP/M. We have been able to go into considerably more depth this time than we could last year, and it is hoped that this revised discussion has been of value. In the coming months we will be taking the component parts and giving each one the same more thorough approach.

Your comments on this new series will be appreciated. Until next month. . . . ∎

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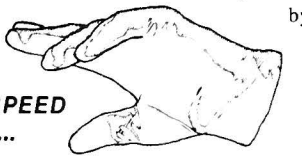


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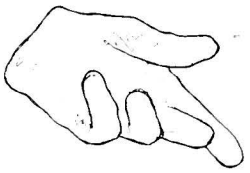
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Get 2-byte values	Print hex $	Store 2-byte values
Gosub to variable	Print string	Swap variables
Goto to variable	Print w/o word break	

These routines and more can be attached and accessed easily. For example, to allow typing of commas and colons in a response (not normally allowed in Applesoft), you simply attach the Input Anything routine and put this line in your program:

```
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```

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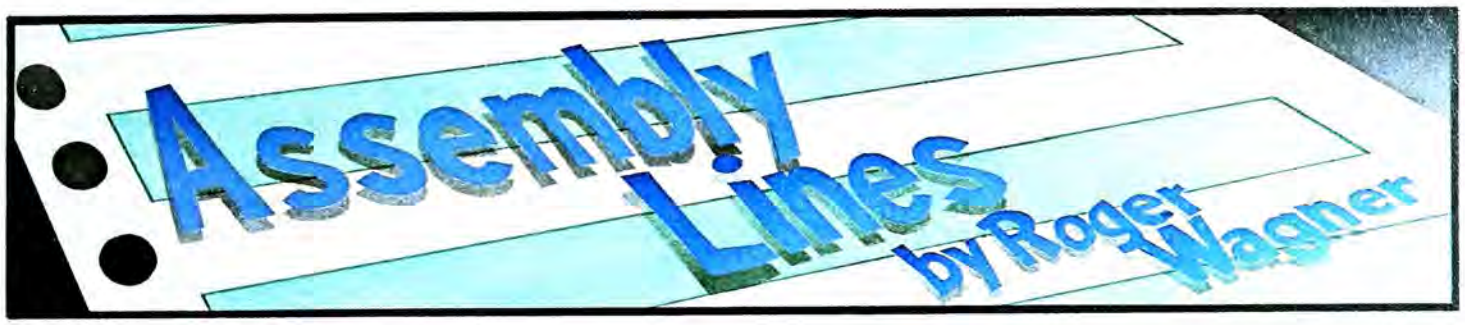
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Everyone's Guide to Assembly Language, Part 25

Last month we looked at the collision counter and at how it could be used in hi-res graphics programs in which collisions might have to be detected. This month we'll see some further examples of the collision counter, along with simple examples of how an explosion might be simulated. In a way, this installment could be considered a brief introduction to some special effects.

Explosions, Rays, and Other Things That Go Bump in the Night. Quite some time ago the basic principles behind writing simple tone routines in machine language were presented in this column. Interested readers may wish to refer to back issues for this information or read chapter 7 in *Assembly Lines: The Book* (a collection of the first eighteen months of this column).

As you'll recall, sound of any kind is generated by accessing memory location $C030. Each time this location is accessed by either a read or write operation (such as an LDA or STA command) the speaker clicks once. A tone or other noise is produced by doing a large number of very fast accesses.

Consider, for example, this sample listing:

```
                        1  ********************************************
                        2  *                                          *
                        3  *            SIMPLE NOISE ROUTINE          *
                        4  *                                          *
                        5  ********************************************
                        6  *
                        7          OBJ  $300
                        8          ORG  $300
                        9  *
                        10 DRTN    EQU  $06
                        11 NUM     EQU  $07
                        12 SPKR    EQU  $C030
                        13 *
                        14 COMBYTE EQU  $E74C
                        15 RND     EQU  $EFAE
                        16 FAC     EQU  $9D
                        17 *
0300: 20 4C E7          18 ENTRY   JSR  COMBYTE
0303: 86 06             19         STX  DRTN      ;SET LEN OF 'NOTES'
0305: 20 4C E7          20         JSR  COMBYTE
0308: 86 07             21         STX  NUM       ;SET # OF 'NOTES'
                        22 *
030A: 20 AE EF          23 LOOP    JSR  RND       ;CREATE A RND VALUE
030D: A6 06             24         LDX  DRTN      ;SET A COUNTER
030F: AD 30 C0          25 TICK    LDA  SPKR      ;TOGGLE SPEAKER
0312: A4 9F             26         LDY  FAC+2     ;PITCH = RANDOM VALUE
0314: 88                27 DELAY   DEY
0315: D0 FD             28         BNE  DELAY     ;WAIT AWHILE
0317: CA                29 CYCLE   DEX
0318: D0 F5             30         BNE  TICK      ;KEEP PLAYING
                        31 *
031A: C6 07             32 NUMBR   DEC  NUM
031C: D0 EC             33         BNE  LOOP      ;PLAY ANOTHER NOTE
031E: 60                34 EXIT    RTS
```

The routine just presented is intended to be called from Applesoft Basic by a program such as this one:

```
10 INPUT "D,N:";D,N
20 CALL 768,D,N
30 GOTO 10
```

When the routine is called, lines 18 through 21 use the routine COMBYTE ($E74C) in Applesoft to read the values being passed by the calling program and store these values in DRTN ($06) and NUM ($07).

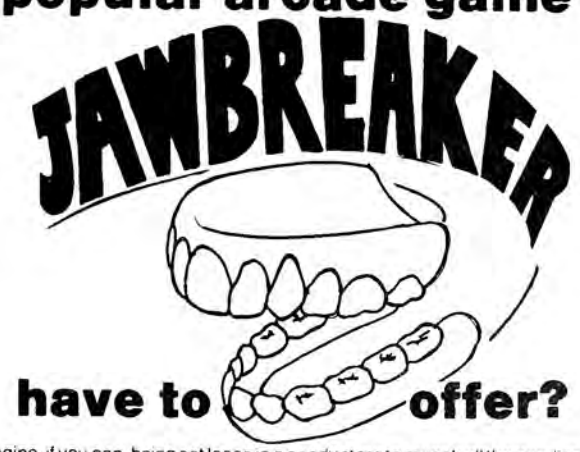
DRTN is then used to determine the length of a tone to be generated, and NUM determines how many tones will be played. You could think of this program as a random melody generator.

At line 23, a JSR is done to Applesoft's random number function. This fills the floating point accumulator (usually called FAC : $9D–$A2) with a random number in floating-point form. For our purposes, we need only a single byte, which we'll get from $9F. Very shortly we'll retrieve this byte from FAC for use in our routine. You might think that any of the six bytes in the FAC would be sufficiently random, but it turns out that the first two bytes, FAC and FAC+1 ($9D,$9E), don't vary sufficiently to generate good random numbers.

Line 24 retrieves the value for DRTN to prepare for entering the main tone service loop. TICK clicks the speaker once and then loads the Y register with our random value. Because this value is then used in the DELAY loop, the interval between clicks varies each time a new random number is used. This is equivalent to a different frequency tone being produced each time, and thus gives us randomly pitched notes.

CYCLE is a secondary loop that executes the TICK/DELAY loop a

13. What free health service does the popular arcade game



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certain number of times, determined in this case by the value given to DRTN by the calling program. The number of CYCLEs determines the overall apparent length of a particular tone unit.

NUMBR is a larger loop that determines how many notes the sound routine will generate, according to the value given for NUM.

Run the Applesoft program with this routine assembled at $300 and try different combinations for DRTN and NUM. If DRTN is a large value (greater than 20), a random melody of NUM notes is generated. As DRTN gets smaller, you have to increase NUM to get sounds that last equivalent lengths of time. The value pair 10,50 for DRTN and NUM creates sort of a ray gun sound, and the pair 3,20 produces a reasonable explosion effect. In the latter case the amount of time each note is played becomes so short that the notes tend to blend together into what's essentially just a random noise pattern.

A random tonal pattern is, in fact, the key to any definition of *noise*, and noise is what an explosion is all about. What we need is a way of generating a lot of high-speed random data for a good noise routine. The RND function helps us create the random data, but it takes so long to execute the routine for each note that there is a limit to the number of notes we can generate in a short period of time.

One technique we used earlier when speed was a problem was table look-ups. Let's apply this technique to sound generation and see what we can produce.

```
                                1  ********************************************
                                2  *                                          *
                                3  *            SIMPLE NOISE ROUTINE 2        *
                                4  *                                          *
                                5  ********************************************
                                6  *
                                7           OBJ  $300
                                8           ORG  $300
                                9  *
                               10  CTR      EQU  $06
                               11  DRTN     EQU  $07
                               12  PTCH     EQU  $08
                               13  SPKR     EQU  $C030
                               14  *
                               15  COMBYTE  EQU  $E74C
                               16  RND      EQU  $EFAE
                               17  FAC      EQU  $9D
                               18  *
0300: A9 00                    19  INIT     LDA  #$00
0302: 85 06                    20           STA  CTR
0304: 20 AE EF                 21  LOOP     JSR  RND
0307: A5 9F                    22           LDA  FAC+2
0309: A4 06                    23           LDY  CTR
030B: 99 00 10                 24           STA  $1000,Y
030E: E6 06                    25           INC  CTR
0310: D0 F2                    26           BNE  LOOP
0312: 60                       27  DONE     RTS
                               28  *
0313: 20 4C E7                 29  ENTRY    JSR  COMBYTE
0316: 86 08                    30           STX  PTCH
0318: 20 4C E7                 31           JSR  COMBYTE
031B: 86 07                    32           STX  DRTN
                               33  *
031D: A0 00                    34  READ     LDY  #$00
031F: B9 00 10                 35  BYTE     LDA  $1000,Y
0322: A2 08                    36           LDX  #$08
0324: 4A                       37  SHIFT    LSR
0325: 90 03                    38           BCC  NEXTBIT
0327: 8D 30 C0                 39  TICK     STA  SPKR
                               40  *
032A: CA                       41  NEXTBIT  DEX
032B: D0 F7                    42           BNE  SHIFT
032D: A6 08                    43           LDX  PTCH
032F: CA                       44  DELAY    DEX
0330: D0 FD                    45           BNE  DELAY
0332: C8                       46  NEXTBYTE INY
0333: D0 EA                    47           BNE  BYTE
0335: C6 07                    48           DEC  DRTN
0337: D0 E4                    49           BNE  READ
0339: 60                       50  EXIT     RTS
```

This routine has two *entry points*. This means that the routine has to be called twice. The first time, a call to $300 (768 decimal) generates the table of data to be used. This need be done only once. The noise pattern is generated by calling $313 (787) whenever a sound is desired. This routine is also designed to be called from an Applesoft Basic program that would look like this:

```
10  CALL 768: REM CREATE TABLE
20  INPUT "D,P";P,D
30  CALL 787,P,D : REM CALL NOISE ROUTINE
40  GOTO 20
```

In this case the two parameters passed to the noise routine are pitch (PTCH) and duration of the noise period (DRTN). At first thought, pitch may seem to be a contradictory notion when applied to noise, particularly in light of our previous definition of noise as a random mix of frequencies. The pitch, however, does not need to be an entirely homogeneous mixture of frequencies.

It's possible to favor either high or low frequencies in the mix and thus to influence the suggestive nature of the noise. High frequency mixes sound like rays or fast moving rockets. Low frequency mixes remind the listener of the low roar of a slow moving rocket or a garden variety explosion.

Examining the new routine, then, let's see how this noise generator works. The first call to INIT creates the table of random values. Lines 19 and 20 initialize to zero a counter we'll be using shortly. A call to the random function is then made to generate a random byte. Next, the Y register is loaded with the current value held in CTR. This value is used as an index to the location in the range from $1000 through $10FF where we will store the random byte. CTR is then incremented to the next position and LOOP is executed until CTR wraps back around to $00 after cycling 256 times.

You may wonder why this code was not used instead:

```
        LDY #$00
LOOP    JSR RND
        LDA FAC+2
        STA $1000,Y
        INY
        BNE LOOP
```

Although it's much shorter and more direct, the routine fails because RND scrambles the Y register, thus losing any running value for our position in the table being created. This fact necessitates the use of a *back-up* counter (CTR) to remember the current value that Y should be set to.

The INIT routine, then, will fill 256 bytes of memory starting at $1000 with a random pattern of bytes. More important, this also results in a random pattern of bits, which will be used very soon by the noise routine.

When $313 (787 decimal) is called, COMBYTE is used to read the values for PTCH and DRTN from the calling Applesoft program.

READ then starts the process of scanning the data table for the random data to be used in generating the noise pattern. The trick in this program comes in using the actual bit status of the data rather than entire bytes.

After each byte is loaded into the accumulator on line 35, a bit-shifting routine is executed eight times to determine the on or off status of each bit. Line 36 initializes the X register to act as our counter in this eight-step loop.

Line 37 uses the LSR command (Logical Shift Right) to move all the bits in the accumulator one position to the right. The end position bit, bit 0, falls into the carry.

Line 38 then tests the carry flag and, if the flag is clear (bit not set), skips the speaker-toggling step found at line 39.

NEXTBIT decrements our counter in the X register, and if X hasn't reached zero, loops back to SHIFT. If X has reached zero, X is reset with the PTCH value and a delay loop is entered.

When the delay loop is finished, the Y register is incremented in preparation for reading the next byte in the data table.

As it happens, reading each bit of 256 bytes does not take that long. Our sound would be over rather soon if we didn't do just one extra step. Although we could generate and read larger tables, another approach is to reread the table a set number of times. This is where the DRTN value is used, and the table is repeated the number of times specified by DRTN.

The main area of experimentation in this routine is with different values for PTCH. Smaller values produce higher-sounding noise patterns; larger values more of a roar.

A Little More Sophistication. This last routine probably sounds more like an explosion to you than the first one did. This is due to the higher noise content of the sound as compared to the more musical first

routine. Something is still missing, though. A classical explosion doesn't sound the same from start to finish. It usually starts at a higher or lower pitch and works its way up or down, depending on the nature of the explosion. What we need is a way to modulate the frequency mix as a function of time.

By linking the delay value to our position in the table, we can accomplish this goal. Here's the new listing:

```
                        1  ********************************************
                        2  *                                          *
                        3  *          SIMPLE RAMP NOISE ROUTINE       *
                        4  *                                          *
                        5  ********************************************
                        6  *
                        7          OBJ  $300
                        8          ORG  $300
                        9  *
                       10  CTR      EQU  $06
                       11  DRTN     EQU  $07
                       12  PTCH     EQU  $08
                       13  SPKR     EQU  $C030
                       14  *
                       15  COMBYTE  EQU  $E74C
                       16  RND      EQU  $EFAE
                       17  FAC      EQU  $9D
                       18  *
0300: A9 00            19  INIT     LDA  #$00
0302: 85 06            20           STA  CTR
0304: 20 AE EF         21  LOOP     JSR  RND
0307: A5 9F            22           LDA  FAC+2
0309: A4 06            23           LDY  CTR
030B: 99 00 10         24           STA  $1000,Y
030E: E6 06            25           INC  CTR
0310: D0 F2            26           BNE  LOOP
0312: 60               27  DONE     RTS
                       28  *
0313: 20 4C E7         29  ENTRY    JSR  COMBYTE
0316: 86 07            30           STX  DRTN
0318: A0 00            31  READ     LDY  #$00
031A: B9 00 10         32  BYTE     LDA  $1000,Y
031D: A2 08            33           LDX  #$08
031F: 4A               34  SHIFT    LSR
0320: 90 03            35           BCC  NEXTBIT
0322: 8D 30 C0         36  TICK     STA  SPKR
                       37  *
0325: CA               38  NEXTBIT  DEX
0326: D0 F7            39           BNE  SHIFT
0328: A6 07            40           LDX  DRTN
032A: CA               41  DELAY    DEX
032B: D0 FD            42           BNE  DELAY
032D: C8               43  NEXTBYTE INY
032E: D0 EA            44           BNE  BYTE
0330: C6 07            45           DEC  DRTN
0332: D0 E4            46           BNE  READ
0334: 60               47  EXIT     RTS
```

This program is designed to be called from an Applesoft program that looks like this:

```
10  CALL 768: REM GENERATE TABLE
20  INPUT "START?";S
30  CALL 787, S
40  GOTO 20
```

The main difference between this routine and the previous one is that just prior to the delay loop, the X register is loaded with the current DRTN counter value, as opposed to a user-defined pitch value. Thus, no PTCH is specified in the calling program, and you may only select a starting point on the *ramp*, as it is sometimes called.

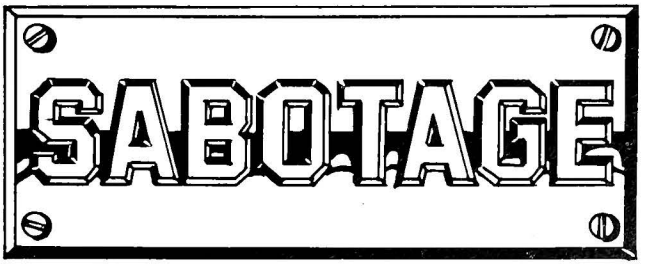
Entering a value of 255 results in the longest sound possible. It is rather interesting to have your Apple sound like a 727 ready to take off through your ceiling.

Putting It All Together. Now that we've got some sound effects to add to our knowledge of hi-res graphics, let's put everything together into a simple demonstration of how an explosion might be simulated in a game program.

Assemble the following listing and run it either with brun or *call 4096* (from Basic), or *1000G* (from the Monitor).

```
                        1  ********************************************
                        2  *                                          *
                        3  *          SIMPLE EXPLOSION ROUTINE        *
                        4  *                                          *
                        5  ********************************************
                        6  *
                        7          ORG  $1000
                        8  *
                        9  NUM      EQU  $06
                       10  SPKR     EQU  $C030
                       11  *
                       12  RND      EQU  $EFAE
                       13  FAC      EQU  $9D
                       14  KYBD     EQU  $C000
                       15  STROBE   EQU  $C010
                       16  *
                       17  HGR      EQU  $F3E2
                       18  HCOLOR   EQU  $F6F0
                       19  SHNUM    EQU  $F730
                       20  XDRAW    EQU  $F661
                       21  HPOSN    EQU  $F411
                       22  SHTBL    EQU  $E8
                       23  SCALE    EQU  $E7
                       24  *
1000: 4C 63 10         25  ENTRY    JMP  START
                       26  *
1003: 03 00 55         27  TABLE    HEX  0300550033000800
100B: 2C 24 2D         28           HEX  2C242D242DE4DB93
1013: 3E 36 37         29           HEX  3E36372E362D3635
101B: 36 2D C6         30           HEX  362DC6DBDB23272C
1023: 25 2C 3C         31           HEX  252C3C3F363F373E
102B: 36 40 C0         32           HEX  3640C040C028352E
1033: 35 2D 00         33           HEX  352D00243F3CBC12
103B: 0E 96 09         34           HEX  0E9609C04C493C2C
1043: 2C 2D 24         35           HEX  2C2D2494921A352D
104B: 36 EE DB         36           HEX  36EEDB233C27941B
1053: 3E 36 3F         37           HEX  3E363F06001B282D
105B: 2D F8 DB         38           HEX  2DF8DB636DE52300
                       39  *
1063: 20 E2 F3         40  START    JSR  HGR
1066: A2 03            41           LDX  #$03       ;WHITE
1068: 20 F0 F6         42           JSR  HCOLOR
106B: A9 03            43           LDA  #$03
106D: 85 E8            44           STA  SHTBL
106F: A9 10            45           LDA  #$10
1071: 85 E9            46           STA  SHTBL+1    ;TABLE @ $1003
1073: A9 01            47           LDA  #$01
1075: 85 E7            48           STA  SCALE      ;SCALE = 1
1077: A9 0A            49           LDA  #$0A
1079: 85 06            50           STA  NUM        ;# OF CYCLES
                       51  *
107B: A2 8C            52  SHIP     LDX  #$8C
107D: A0 00            53           LDY  #$00       ;X = 140
107F: A9 50            54           LDA  #$50       ;Y = 80
1081: 20 11 F4         55           JSR  HPOSN      ;POSITION 'CURSOR'
1084: A2 01            56           LDX  #$01       ;#1 = SHIP
1086: 20 30 F7         57           JSR  SHNUM
1089: A9 00            58           LDA  #$00       ;ROT = 0
108B: 20 61 F6         59           JSR  XDRAW
```


14. How many parachutes can fall before you are the victim of



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```
                        60  *
108E: AD 00 C0          61  KEY?    LDA  KYBD
1091: 10 FB             62          BPL  KEY?     ; NO KEYPRESS
1093: 8D 10 C0          63          STA  STROBE   ; CLEAR STROBE
                        64  *
1096: A2 8C             65  ERASE1  LDX  #$8C
1098: A0 00             66          LDY  #$00
109A: A9 50             67          LDA  #$50
109C: 20 11 F4          68          JSR  HPOSN
109F: A2 01             69          LDX  #$01
10A1: 20 30 F7          70          JSR  SHNUM
10A4: A9 00             71          LDA  #$00
10A6: 20 61 F6          72          JSR  XDRAW    ; ERASE SHIP
                        73  *
10A9: A2 8C             74  LOOP    LDX  #$8C
10AB: A0 00             75          LDY  #$00
10AD: A9 50             76          LDA  #$50
10AF: 20 11 F4          77          JSR  HPOSN
10B2: A2 02             78          LDX  #$02     ; 1ST EXPL SHAPE
10B4: A5 06             79          LDA  NUM
10B6: 6A                80          ROR
10B7: B0 01             81          BCS  SET      ; IF 'ODD'
10B9: E8                82          INX           ; 2ND EXPL SHAPE
10BA: 20 30 F7          83  SET     JSR  SHNUM
10BD: A9 00             84          LDA  #$00
10BF: 20 61 F6          85          JSR  XDRAW    ; DRAW EXPLOSION
                        86  *
10C2: 20 AE EF          87  GETPTCH JSR  RND
10C5: A2 10             88          LDX  #$10
10C7: AD 30 C0          89  TICK    LDA  SPKR     ; CLICK SPEAKER
10CA: A4 9F             90          LDY  FAC+2    ; PITCH = RND
10CC: 88                91  DELAY   DEY
10CD: D0 FD             92          BNE  DELAY
10CF: CA                93  CYCLE   DEX
10D0: D0 F5             94          BNE  TICK
                        95  *
10D2: A2 8C             96  ERASE2  LDX  #$8C
10D4: A0 00             97          LDY  #$00
10D6: A9 50             98          LDA  #$50
10D8: 20 11 F4          99          JSR  HPOSN
10DB: A2 02            100          LDX  #$02
10DD: A5 06            101          LDA  NUM
10DF: 6A               102          ROR
10E0: B0 01            103          BCS  SET2     ; IF 'ODD'
10E2: E8               104          INX           ; 2ND EXPLOSION FIG.
10E3: 20 30 F7         105  SET2    JSR  SHNUM
10E6: A9 00            106          LDA  #$00
10E8: 20 61 F6         107          JSR  XDRAW    ; ERASE FIGURE
                       108  *
10EB: C6 06            109  DRTN    DEC  NUM
10ED: D0 BA            110          BNE  LOOP
10EF: 60               111  EXIT    RTS
```

When the program is run, the hi-res screen should clear, and a flying-saucerlike ship should appear in the middle of the screen. Pressing any key will blow up the space ship. Let's see how this is done.

Lines 27 through 38 contain the data for a three-element shape table. This table is jumped over when the program is first run. START clears the hi-res screen in the usual manner and initializes the shape table pointers and the HCOLOR and SCALE values. Lines 49 and 50 set NUM to 10, to be used later as the number of cycles the explosion routine will go through.

SHIP draws the spaceship in the center of the screen. KEY? waits for a keypress. When a key is pressed, the code moves on to ERASE, which erases the ship prior to starting the explosion sequence.

The explosion sequence itself consists of a three-part loop. These parts consist of: (1) drawing one of two explosion shapes; (2) creating a little noise with the speaker; (3) erasing the explosion shape drawn in step 1.

This sequence is then repeated a number of times depending on how long you want the explosion to last. In detail, here's how this sequence is carried out.

Lines 74 through 77 position the hi-res cursor at the ship's old position. Lines 78 through 82 then select one of the two explosion shapes included in the table based on whether NUM (the current loop counter) is odd or even.

This is done by first loading the X register with what might be called a default value of #$02 for the first explosion shape (which is the second item in the table). NUM is then loaded into the accumulator and a ROR (ROtate Right) command is done to shift all the bits to the right one position. Bit 0 will then be forced into the carry, where we can test with the BCS (Branch Carry Set) command. (This is similar to the technique used earlier for the noise routine. In fact, the LSR command would have worked just as well here, but a little variety can sometimes be nice.)

If the carry was set, NUM was odd, and we'll go right to the next phase. If the carry was clear, NUM was even, and the INX (INcrement X) will be executed. Remember that the X register is always loaded with the shape number you want to DRAW or XDRAW prior to calling SHNUM. If the INX is done, X goes from #$02 to #$03, thus indicating shape number 3, which corresponds to the second explosion shape in the table.

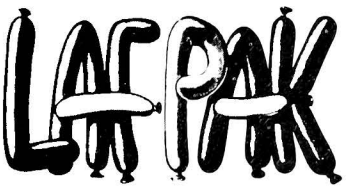
Once an explosion shape has been drawn, the first noise routine presented earlier is used to generate a short burst of quick random notes. This passes for some background noise for an explosion. After a few quick sounds, ERASE2 again XDRAWs the shape selected in LOOP. This has the effect of erasing the previous image. Finally, lines 109 and 110 check NUM to see if the loop is finished executing. As written, line 49 sets the loop counter to ten passes, but you may want to try different values to suit your own tastes.

Because all imaging is done with XDRAW, the HCOLOR setting is actually irrelevant, and this routine would work on any screen background. You may want to try clearing the screen to different backgrounds as described in the last issue and see how the routine given here behaves.

The Shooter Program. What we need now is some sort of collective example of how all this can be put together as it might be done in an actual game. Although not necessarily your definitive hi-res arcade game, the following is offered for your general interest and amusement.

```
1   ********************************************
2   *            SHOOTER PROGRAM               *
3   ********************************************
4   *
5   *
    *
6           ORG  $1000
7   *
8   FLAG    EQU  $E3
9   X       EQU  $E0
10  Y       EQU  $E2
11  X0      EQU  $06
12  Y0      EQU  $08
13  NUM     EQU  $0C
```


15. What shocking and terrible sound could you possibly hear in a game called



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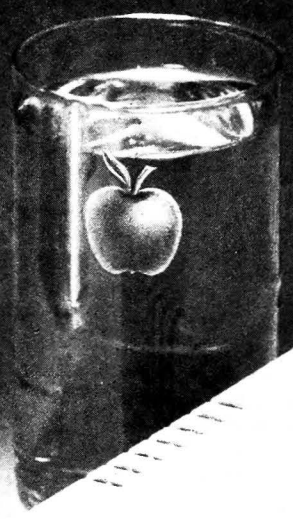
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Sept. 16–19—Minneapolis, Minn.

Peripheral Equipment & Software
Sept. 29–Oct. 1—Anaheim, Ca.

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Oct. 28–31—Houston, Tx.

Comdex
Nov. 8–11—Amsterdam, Netherlands

Applefest
Nov. 18–21—San Francisco, Ca.



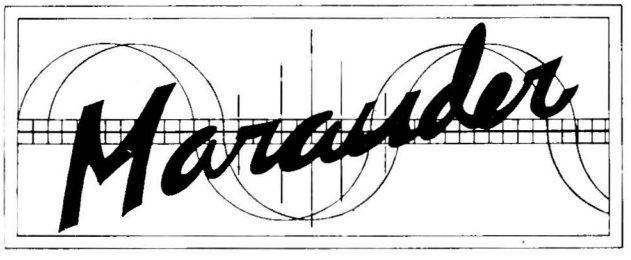


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```
                        14  *
                        15  PREAD    EQU  $FB1E
                        16  WAIT     EQU  $FCA8
                        17  PB0      EQU  $C061
                        18  HCOLQR   EQU  $F6F0
                        19  HGR      EQU  $F3E2
                        20  HPLOT    EQU  $F457
                        21  HPOSN    EQU  $F411
                        22  HLIN     EQU  $F53A
                        23  ROT      EQU  $F9
                        24  SCALE    EQU  $E7
                        25  SHNUM    EQU  $F730
                        26  DRAW     EQU  $F605
                        27  XDRAW    EQU  $F661
                        28  HFIND    EQU  $F5CB
                        29  CTR      EQU  $EA
                        30  PTR      EQU  $E8
                        31  SPKR     EQU  $C030
                        32  RND      EQU  $EFAE
                        33  FAC      EQU  $9D
                        34  *
1000: 4C 67 10          35  ENTRY    JMP  E2
                        36  *
1003: 04 00 59          37           HEX  0400590037000C00
100B: 0A 00 04          38           HEX  0A0004002C242D24
1013: 2D E4 DB          39           HEX  2DE4DB933E36372E
101B: 36 2D 36          40           HEX  362D3635362DC6DB
1023: DB 23 27          41           HEX  DB23272C252C3C3F
102B: 36 3F 37          42           HEX  363F373E3640C040
1033: C0 28 35          43           HEX  C028352E352D0024
103B: 3F 3C BC          44           HEX  3F3CBC120E9609C0
1043: 4C 49 3C          45           HEX  4C493C2C2C2D2494
104B: 92 1A 35          46           HEX  921A352D36EEDB23
1053: 3C 27 94          47           HEX  3C27941B3E363F06
105B: 00 1B 28          48           HEX  001B282D2DF8DB63
1063: 6D E5 23          49           HEX  6DE52300
                        50  *
1067: 20 E2 F3          51  E2       JSR  HGR        ; CLR SCRN
106A: A2 03             52           LDX  #$03       ; WHITE = 3
106C: 20 F0 F6          53           JSR  HCOLOR
                        54  *
106F: A2 00             55  WALL     LDX  #$00
1071: A0 00             56           LDY  #$00       ; X = 0
1073: A9 05             57           LDA  #$05       ; Y = 5
1075: 20 57 F4          58           JSR  HPLOT      ; PLOT 0,5
1078: A9 17             59           LDA  #23        ; 279 MOD 256
107A: A2 01             60           LDX  #01        ; 279 / 256
107C: A0 05             61           LDY  #$05       ; Y = 5
107E: 20 3A F5          62           JSR  HLIN       ; 0,5 TO 279,5
                        63  *
1081: A9 17             64           LDA  #$17
1083: A2 01             65           LDX  #$01       ; X = 279
1085: A0 06             66           LDY  #$06       ; Y = 6
1087: 20 3A F5          67           JSR  HLIN       ; 279,5 TO 279,6
                        68  *
108A: A9 00             69           LDA  #$00
108C: A2 00             70           LDX  #$00       ; X = 0
108E: A0 06             71           LDY  #$06       ; Y = 6
1090: 20 3A F5          72           JSR  HLIN       ; 279,6 TO 0,6
                        73  *
1093: A9 03             74  SET      LDA  #$03
1095: 85 E8             75           STA  PTR
1097: A9 10             76           LDA  #$10
1099: 85 E9             77           STA  PTR+1      ; SET TBL = $1003
109B: A9 01             78           LDA  #$01
109D: 85 E7             79           STA  SCALE
109F: 85 E3             80           STA  FLAG
10A1: A9 0A             81           LDA  #$0A
10A3: 85 0C             82           STA  NUM        ; # OF EXPLOSIONS
10A5: A2 8C             83  SHIP     LDX  #$8C
10A7: A0 00             84           LDY  #$00
10A9: A9 50             85           LDA  #$50
10AB: 20 11 F4          86           JSR  HPOSN
10AE: A2 01             87           LDX  #$01       ; #1 = SHIP
10B0: 20 30 F7          88           JSR  SHNUM
10B3: A9 00             89           LDA  #$00       ; ROT = 0
10B5: 20 05 F6          90           JSR  DRAW
                        91  *
10B8: A2 00             92  CALC     LDX  #$00
10BA: 20 1E FB          93           JSR  PREAD
10BD: 84 F9             94           STY  ROT
                        95  *
10BF: A9 48             96  PAUSE    LDA  #$48
10C1: 20 A8 FC          97           JSR  WAIT
                        98  *
10C4: AD 61 C0          99  SHOOT?   LDA  PB0
10C7: 30 03            100           BMI  YES
10C9: 4C B8 10         101           JMP  CALC       ; (NOPE)
                       102  *
10CC: A2 8C            103  YES      LDX  #$8C
10CE: A0 00            104           LDY  #$00
10D0: A9 4E            105           LDA  #$4E       ; Y = INSIDE SHIP
10D2: 20 11 F4         106           JSR  HPQSN
10D5: A2 04            107           LDX  #$04       ; #4 = SINGLE DOT
10D7: 20 30 F7         108           JSR  SHNUM
10DA: A5 F9            109           LDA  ROT
10DC: 20 61 F6         110           JSR  XDRAW      ; DRAW RAY
                       111  *
10DF: A2 05            112  SOUND    LDX  #$05       ; # OF CYCLES
10E1: AD 30 C0         113  TICK     LDA  SPKR
10E4: A4 E7            114           LDY  SCALE
10E6: 88               115  DELAY    DEY
10E7: D0 FD            116           BNE  DELAY
10E9: CA               117  CYCLE    DEX
10EA: D0 F5            118           BNE  TICK
                       119  *
10EC: A2 8C            120  ERASE1   LDX  #$8C
10EE: A0 00            121           LDY  #$00
10F0: A9 4E            122           LDA  #$4E
10F2: 20 11 F4         123           JSR  HPQSN
10F5: A2 04            124           LDX  #$04
10F7: 20 30 F7         125           JSR  SHNUM
10FA: A5 F9            126           LDA  ROT
10FC: 20 61 F6         127           JSR  XDRAW      ; ERASE RAY
10FF: A5 EA            128           LDA  CTR
1101: C9 02            129           CMP  #$02
1103: B0 0F            130           BCS  HIT
                       131  *
1105: E6 E7            132  NEXT     INC  SCALE
1107: E6 E7            133           INC  SCALE
1109: E6 E7            134           INC  SCALE
110B: A5 E7            135           LDA  SCALE
110D: C9 90            136           CMP  #$90
110F: 90 BB            137           BCC  YES
1111: 4C 77 11         138           JMP  MISS
                       139  *
1114: 20 CB F5         140  HIT      JSR  HFIND      ; RETRIEVE CURSOR POSN
1117: A5 E0            141           LDA  X
1119: 85 06            142           STA  X0
111B: A5 E1            143           LDA  X+1
111D: 85 07            144           STA  X0+1
111F: A5 E2            145           LDA  Y
1121: 85 08            146           STA  Y0         ; SAVE CURSOR POSN
1123: A9 01            147           LDA  #$01
1125: 85 E7            148           STA  SCALE      ; RESET SCALE
                       149  *
1127: A2 03            150  EXPLOS   LDX  #$03       ; WHITE
1129: 20 F0 F6         151           JSR  HCOLOR
112C: A6 06            152           LDX  X0
112E: A4 07            153           LDY  X0+1
1130: A5 08            154           LDA  Y0
1132: 20 11 F4         155           JSR  HPQSN
1135: A2 02            156           LDX  #$02       ; 1ST EXPL
1137: A5 0C            157           LDA  NUM
1139: 6A               158           ROR
113A: B0 01            159           BCS  BOOM       ; IF 'ODD'
113C: E8               160           INX             ; 2ND EXPL
113D: 20 30 F7         161  BOOM     JSR  SHNUM
1140: A9 00            162           LDA  #$00
1142: 20 05 F6         163           JSR  DRAW       ; DRAW 1ST EXPL
                       164  *
1145: 20 AE EF         165  GETPTCH   JSR  RND
1148: A2 10            166           LDX  #$10       ; # OF CYCLES
114A: AD 30 C0         167  TICK2    LDA  SPKR
```


16. How many men are in the spaceships of



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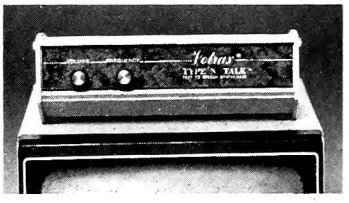
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```
114D: A4 9F      168          LDY  FAC+2     ; PITCH = RND
114F: 88         169 DELAY2   DEY
1150: D0 FD      170          BNE  DELAY2
1152: CA         171 CYCLE2   DEX
1153: D0 F5      172          BNE  TICK2
                 173 *
1155: A2 00      174 ERASE2   LDX  #$00       ; BLACK
1157: 20 F0 F6   175          JSR  HCOLOR
115A: A6 06      176          LDX  X0
115C: A4 07      177          LDY  X0+1
115E: A5 E2      178          LDA  Y
1160: 20 11 F4   179          JSR  HPOSN
1163: A2 02      180          LDX  #$02
1165: A5 0C      181          LDA  NUM
1167: 6A         182          ROR
1168: B0 01      183          BCS  BOOM2     ; IF 'ODD'
116A: E8         184          INX            ; 2ND EXPL
116B: 20 30 F7   185 BOOM2    JSR  SHNUM
116E: A9 00      186          LDA  #$00      ; ROT = 0
1170: 20 05 F6   187          JSR  DRAW      ; ERASE FIGURE
1173: C6 0C      188 DRTN     DEC  NUM
1175: D0 B0      189          BNE  EXPLOS
                 190 *
1177: A9 01      191 MISS     LDA  #$01
1179: 85 E7      192          STA  SCALE     ; RESET SCALE
117B: A9 0A      193          LDA  #$0A
117D: 85 0C      194          STA  NUM       ; RESET NUM
                 195 *
117F: 4C B8 10   196 AGAIN    JMP  CALC
                 197 *
```

This is an independent program that can be called from Applesoft Basic by typing in *call 4096* or from the Monitor by typing in *1000G*. The assembled object file can also be directly brun.

When the program is run, a spaceship-like form similar to the one drawn in the explosion routine is drawn in the center of the screen. At the top of the screen, a wall made up of two horizontal lines is also drawn. Turning paddle 0 and pressing the corresponding pushbutton will fire a ray from the ship. If the ray hits the wall, an explosion occurs, and the wall is left suitably damaged. You must press reset to terminate the program.

The program combines many of the techniques described in this and last month's articles. The program can be summarized as follows:

1. Initialize a shape table containing four shapes: a spaceship, two explosions, and a one-dot shape for the ray effect.
2. HPLOT a wall of two horizontal lines at top of screen.
3. DRAW shape 1 at center of screen (spaceship).
4. Read paddle 0. Store value in rotation register.
5. Pause to encourage paddle reliability.
6. Read pushbutton 0. If not pressed, go back to step 4.
7. Button pushed: Start fire sequence.
8. Draw dot shape starting inside ship. Rotation value set in step 4 determines angle of shot.
9. Make some noise with the simple noise routine.
10. Erase the dot shape.
11. Check the collision counter to see if anything was hit.
12. If nothing was hit, add 3 to the SCALE value. If it is still less than #$90, go back to step 8.
13. If no impact, restore SCALE to 1 and the explosion counter to #$0A. Then go back to step 4.
14. If something was hit, find the end of the ray by calling the Applesoft HFIND routine. Save this position value.
15. DRAW one of the explosion shapes in white.
16. Make some noise.
17. DRAW the same explosion shape in black to erase not only the shape, but the parts of the wall that were hit.
18. Go back to step 15 ten times for an exciting (?) explosion.
19. Restore SCALE and the explosion counter. Go back to step 4.

Because this program is made up of the various routines used earlier, this summary should be sufficient to explain the overall method of operation.

The use of the single dot shape to create the ray is similar to the technique used in last month's *Scanner* programs. The new things presented in *Shooter* are the incrementing by three (lines 132 through 134) to create a faster firing appearance and the use of HFIND if an impact is detected.

Remember that the HFIND (#$F5CB) routine in Applesoft is used after drawing any shape to find out where we've been left. We used HFIND in this program to determine where the impact occurred.

Also note that DRAW rather than XDRAW is used in this program to ensure that portions of the wall are destroyed by the impact. In contrast to the *explosion* program, this program cannot be run on any hi-res screen background without changing the colors used by the ray and the explosion routines.

A New Contest! During the preparation of this article, it became apparent that the creation of explosion routines is an artform in itself. Although the code for just the sound portion of an explosion is generally fairly short, a wide variety of results is possible, and the ideal explosion sound is very elusive indeed.

Recognizing this, we thought this would make a great challenge for a new programming contest for Assembly Lines. Our last one was some time ago, and this provides a good opportunity to have a lot of fun with relatively short routines.

The contest, then, is as follows:

1. Entries should be directed toward creating the most interesting and/or realistic explosion sounds possible. Routines may also include graphics effects for added points.
2. Although the length of the routine is not critical, shorter routines are always given points for elegance.
3. Routines should be submitted in source listing form. Please mention which assembler was used to generate the listing. Disks containing both source and object files in DOS 3.3 must be sent in a reasonable disk mailer and accompanied by a self-addressed label and return postage if they are to be returned.
4. Entries must be received by December 1, 1982, to be considered.
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17. What winged defense system emits a deathbolt of fire in

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The Bank Shot That Always Scores



Bob McElwaine, microcomputing guru at the Bank of Louisville, is captured sans pinstripes at the Jenny Wiley State Park following a site installation and training session for one of the bank's many Apple-leasing customers. For McElwaine, Apples have brought back to his work the excitement he felt twenty years ago when card-crunching mainframes were hot stuff.



BY DAVE FITZGERALD AND JIM SALMONS

When two small lending institutions in Kentucky merged to give birth to the Bank of Louisville in the late fifties, the new company suffered labor pains that wouldn't quit.

In the long run, the answer was Apples—hundreds of them.

And the Bank of Louisville became one of the most sophisticated, comprehensive, and effective users of microcomputers in the business world.

This is its story.

The Sound of Micro-Management. Many banks and other large business organizations see microcomputers only as supplemental tools in management decision making. As a visit to any Bank of Louisville office will reveal, B. W. Klein, president of the bank, sees their potential quite differently.

In the sixties, the Bank of Louisville's primary source of income was the collection of interest on consumer loans. Since the merging that formed the bank, problems in this area had persisted. Analyzing the procedures used by the installment loan division, then executive vice president of operations Klein identified the weak link as inefficient handling of the massive data required for processing loan applications. He decided that it was time to automate.

The information handling required comprised two separate tasks. First, information on the type and cost of loans needed to be passed along quickly to potential customers at the main bank office and at branch offices that served as loan sales offices. Second, the main office used the information for approving or denying loans. Klein believed that computers could help speed up the process.

In the bank's first introduction of computer technology, Klein tended to break the traditional mold. He knew that the Bank of Louisville's business was banking, not data processing, and believed it was essential that the bank data processors be expert in banking, since this knowledge would be required of them daily. Therefore, the new data processing department was staffed not by data processing people who would have had to learn banking but by the bank's own staff—beginning with an auditor and a teller—who learned data processing. Taking automation in-house boosted the employees' morale and helped them accept the change. Instead of fearing for their jobs as a result of the computerization, employees saw opportunities for advancement.

Perhaps underestimating the difficulty of the task, Klein believed that data processing consultants could teach his people all they needed to know about using the new tools. But the tools proved complex and communication problems developed. The teller and the auditor couldn't solve all the problems that were presented to them.

Meet Me in Louisville. When Klein turned to the computer suppliers for help, they sent him to another customer who had successfully implemented similar tasks. It was here that Klein first met Bob McElwaine, manager of a data processing firm that already worked with three banks in Indiana.

Klein's meetings with McElwaine convinced him that he needed a

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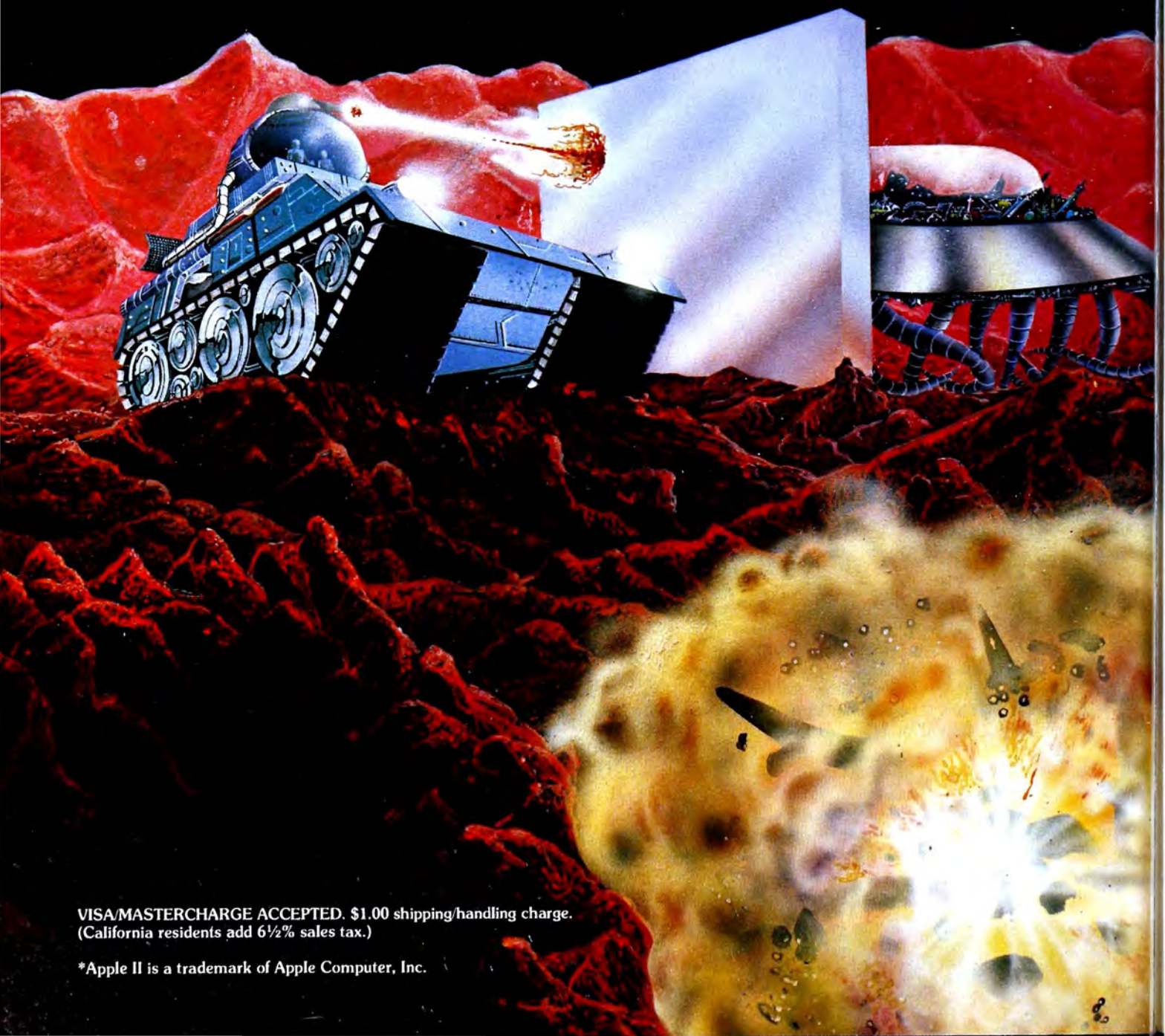
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full-time staff member literate in computer operations and familiar with bank management. Who better than McElwaine, who agreed to join Klein's staff and quickly became invaluable as his technology translator.

When news came of more flexible processing chips and other exotic gizmos, McElwaine explained what these technological breakthroughs meant to the bank. Klein was promoted to bank president, and McElwaine remained his tech translator.

The success of the collaboration between Klein and McElwaine was dramatic. Within a couple of years, the bank's staff had been reduced by one hundred positions with its $300 million in assets maintained. Yet no one was laid off as a result of automation; rather, staff reduction was left to attrition. Seven years later, the bank had doubled its assets to more than $600 million with no significant increase in staff.

As soon as microcomputers were introduced in 1977, McElwaine wanted to use them at the bank. His choices at that time were Commodore's Pet and Tandy's TRS-80. The Pet offered everything in a single package, but McElwaine didn't like the toylike keyboard. The TRS-80 had just enough memory, but McElwaine felt the system's expansion capabilities were inadequate. By 1978, he'd found a micro that met his requirements: the Apple II. It needed a separate monitor, so it wasn't the one-piece system he'd envisioned, but its keyboard and potential for expansion sold him.

Hello Folly. McElwaine's Apple retailer wouldn't even talk to him about using an Apple to control bank operations—no personal computer could handle the job, according to the prevailing view in those early days. But McElwaine's experience and determination told him otherwise. He found another dealer and made the first purchases in what was to become a million-dollar account.

McElwaine saw a potential in the Apple that most people didn't recognize then. After all, here was a microcomputer that was more powerful than the computers he'd cut his teeth on in the late fifties, computers that had required large rooms to house them and large support staffs to operate them.

While others equated large, useful memory with huge machinery, McElwaine had retained a clear perspective on what could be done with a few kilobytes of memory by a dedicated, or task-oriented, machine. Having run a $15 million payroll for an interstate firm on an IBM 1401 that had 4K of memory supplemented by punched cards, McElwaine knew that, if the dedicated task approach was followed, a machine with 48K of memory could certainly perform all the computing tasks he required.

That the Bank of Louisville began implementing microcomputers in operations at a time when the machines were of little interest to anyone except hobbyists is a powerful example of the bank's innovative thinking and risk taking.

Bob McElwaine's courage in recommending Apples shines even more brightly when you consider the extent of the application and the context of his 1978 decision.

In the late seventies, economic conditions forced banks to focus attention on reducing overhead and increasing cash flow. By moving more money at a smaller return, the bank could equal the performance of a lesser flow of money with a greater return. Because of the downturn in the economy, more and more individual consumers were seeking installment loans that would enable them to "buy now, pay later."

Gotta Dance. Bert Klein had clearly defined McElwaine's challenge: increase the cost effectiveness of the installment loan service by reducing the overhead, by increasing the volume of loans that could be processed, and by improving the quality of the information on which to base loan approval decisions.

Consider McElwaine's challenge from a general retailing perspective. An installment loan program is in the business of selling a product—money. The bank sells a pile of money to an individual and, in turn, the individual agrees to pay back a bigger pile of money, a bit at a time. Bank headquarters is the distributor, obtaining its inventory of money product through its own sources, such as account deposits and investment, as well as purchasing large quantities of product in the money market of institutional lending and investment. The bank's network of neighborhood branch offices is its chain of retail stores that sell the money product to individual consumers.

But these local stores can't sell to just anybody. The complex task of determining the probability of whether a potential customer will be able to pay back a loan requires a centralized decision-making process.

Decision making requires information gathering and analysis that leads to a course of action. In installment lending, the loan application is the vehicle for information gathering. Headquarters analysis can begin only after the local branch turns in this application. And only after headquarters makes a decision can the local branch take action. In Kentucky, where the branches are spread out over hundreds of miles, this information transfer is a big job.

Although by 1978 the computerization program had been going on at the Bank of Louisville for ten years, the loan processing procedures were still time-consuming and labor-intensive. Branch managers completed applications by hand, and, although telephone transmission of written data had replaced courier delivery, the communication process still took several minutes and the transmitted copies were often illegible.

Singing in the Mainframes. Although mainframe statistical analysis helped central management reach loan decisions, the same problems beset communication of these decisions back to the branches. And, once a decision had been received, branch personnel spent much time preparing neat and legally correct documentation of the transaction.

When McElwaine recommended using Apple computers to streamline this entire process, the Disk II had been announced but not delivered. There were no readily available modems, no hard disks, no interface cards, and no sophisticated software. Yet, McElwaine believed that such products would be forthcoming; he was willing to stake his career on it.

McElwaine set about assembling a microcomputing staff to develop custom task-oriented programs. Commercial software, still in its infancy, did not meet the bank's special needs.

The conventional wisdom held that computer science graduate

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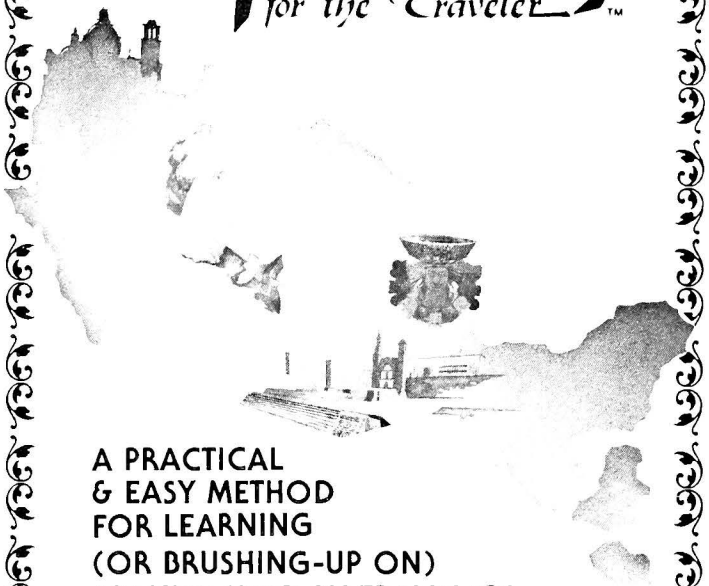
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schools were the best sources of data processing professionals. Bob McElwaine didn't go along with this view; neither did Bob Potts and Marcy Brown. With no sense of disadvantage because of their lack of data processing background, Potts and Brown welcomed the opportunities offered by the bank's shifting emphasis toward microcomputers.

Bob Potts was a branch manager when the bank made its first move toward automation through mainframes and programmable calculators. Potts embraced the new devices. Instead of being content with the bank's "need to know" level of training, Potts read technical manuals and talked to data processing professionals. He soon began programming his calculator beyond the levels of sophistication required by the bank.

Two-Side Story. Impressed by Potts's initiative, McElwaine had him transferred from field operations to headquarters technical management. Potts and McElwaine formed the core of a new department, charged with developing and implementing microcomputer operations. By comparison with the existing mainframe data processing staff, this two-man department was about as small as the computer it was beginning to use.

With the initial purchase of Apple IIs, McElwaine and Potts began development activity in earnest. Potts's involvement was thorough. Besides developing his programming skills, he learned much about the hardware and electronics of the Apple and its peripherals.

McElwaine and Potts weren't alone in those early days. Marcy Brown was a competent and strongly motivated secretary. When McElwaine saw that Brown's job was growing out of hand despite her outstanding abilities, he replaced the typewriter she had been using with an Apple II. He believed that the Apple's word processing capabilities would make easier and smoother the turning out of statistical management reports routinely required by Bert Klein and senior management.

Brown soon became so adept at using the Apple that there began to be too many hours in the day with too little work to fill them.

Instead of inventing more secretarial tasks for her, McElwaine gave Brown a set of Apple programming manuals to read. He hoped that familiarity with the program development terminology and process would give her a feeling of involvement that would sustain her interests until he could find ways to make her position more challenging.

McElwaine got more than he'd hoped for. Brown began turning out the department's statistical reports in record time. Upon complimenting her on the speed and accuracy with which she prepared the reports, McElwaine learned, to his amazement, that Brown had written a program to automate the tedious calculations and generate the reports from his raw data. He went directly to personnel and arranged for Brown's promotion to a programming position within the department.

Today, Potts and Brown are officers of the bank, Potts as a vice president and Brown as microcomputer programming manager. They are testimony to the opportunities that open up for people who take the initiative to develop microcomputing skills.

Damn Yapples. As time has told, the risk Bob McElwaine took by introducing Apples was a risk well taken.

Today, the simplest Apple configurations are found in the branch offices. Most branches have two complete systems, each consisting of a 48K Apple II Plus, two disk drives, and a monitor. One system has a letter quality printer; the other has a modem and a thermal printer.

In the branch offices, simplicity is the key to software applications. There are menu-driven, operator-prompting programs to handle vital steps in the loan processing procedure. Programs by McElwaine, Potts, and Brown make quoting rates and taking loan applications neat and simple.

Through the bank's micros, customers can ask "what if?" about their prospective loans instead of guessing and hoping what the bank management will decide. Once the details of the loan have been entered, the printer produces a hard copy of the loan quote. Upon the applicant's approval, the application is sent to headquarters via modem. A special program prepares and prints the entire documentation for each loan package.

McElwaine believes that the screen-oriented, interactive nature of his department's custom programs is responsible for the increased produc-

tivity of the branch offices. Many staff members can now take and process loan information—a procedure that used to require the branch manager.

Bank news has been computerized, too. McElwaine, Potts, and Brown have modified Software Sorcery's telecommunication bulletin board package to keep branch offices informed of the up-to-the-minute interest rate changes and related banking business news. The bulletin board also keeps track of staff meetings and various managerial deadlines. McElwaine cites the ABBS package as the most cost-effective enhancement of the system's capabilities to date.

On the Crown. The headquarters end of the branch office telecommunication network is a wall full of Apple II Pluses, with up to six disk drives each. Loan applications coming through the modems are time and date stamped by Thunderware clock cards prior to storage. The Apples are hooked into a Corvus Omninet system to accommodate more online data.

The absolute workhorse of the commercial software used by the Bank of Louisville is *DB Master.* Because data storage, transmission, and analysis are the bank's principal requirements, it's not surprising that a database management system is its most widely used program.

How the DBMS benefits the bank is evident in the changes in handling overage and shortage reports. These daily reports keep track of discrepancies between tellers' drawer returns and paper receipts. Before computers, the reports were derived from a hand-kept ledger.

Now, an Apple equipped with hard disk keeps a daily accounting of more than one hundred tellers' cash drawer records. Not only is the data accessible and easy to analyze, but it can be drawn on to determine the cumulative statistics for reconciliation of the bank's overall accounts. The same information can be transferred to the individual work histories kept by the personnel department.

Operational tasks such as these were once the exclusive territory of mainframe systems. Sophisticated software packages and hard disk storage capacities have enabled micros to do the job.

Word processing is an important capability used throughout the bank; the package used is *Apple Writer.* It's used in the corporate trust section in preparing complex legal documents and in the consumer credit (VISA) department in creating form letters. The branch offices use word processing in the installment loan program.

McElwaine's small but aggressive staff expands the Apple applications at the Bank of Louisville almost daily. Cost control has been improved by keeping a detailed record on the Apple of every expense check issued by the bank; the commercial loan area uses Apples for collateral control and processing repossessions. And happier Apples are used in the bank's leasing services for safe deposit box accounting.

All of these applications make user training critical. McElwaine and staff have developed one of the most extensive Apple training programs extant.

Coordinating and delivering the training properly meant expanding the microcomputing department. Naturally, the new micro department staff member was chosen from the greater bank staff and trained to become a computer professional. Wayne Carter was transferred from the credit card division.

Shall We Dance? As soon as McElwaine decides to move Apples into a department that hasn't had them, Carter develops a training program just for that department. First, he arranges for key people to become familiar with the Apple and with its potential applications within their department. Those people are then instrumental in developing the software to meet the department's needs. Parameter-driven commercial packages keep programming tasks to a minimum and, to solve problems, people need only become sophisticated users—not programmers.

Once a department has developed its own solution, the people in the department who'll be using the Apples begin three days of hands-on training—of a special sort. Besides learning simple use, they get to tear apart and put together Apples, printers, and peripherals—all in the name of demystification.

Any department may schedule refresher training or send a new employee for specific training within the ongoing educational sessions conducted by Carter.

The Bank of Louisville has never sought publicity or advertised its capabilities. Yet numerous inquiries led to an unexpected expansion of its income-producing capabilities.

In came requests for help from other banks in the state that wanted to automate their installment loan services. The Bank of Louisville responded by developing a microcomputer leasing program.

For a single monthly charge, a bank may lease the hardware and software needed to automate an installment loan program. The lease includes a hardware maintenance contract and provides for initial and ongoing staff training. A licensing agreement provides for full use of the proprietary software developed by McElwaine's department.

The Louisville Melody of 1982. Since the leasing program began almost two years ago, its growth has been dramatic. It isn't unusual for other banks' presidents to call, saying: "I need one of your Apple systems as soon as possible. Who do I talk to and how quickly can you deliver?"

Other banks are not the only beneficiaries of Louisville's experience. Representatives of police departments, government agencies, and universities have come to Louisville from as far away as England and South Africa to learn the Apple's business secrets via training sessions. For those requiring more in-depth assistance, on-site consultation from McElwaine and his staff is available.

So where is this increasing activity in microcomputers leading the Bank of Louisville? Well, it shouldn't come as a surprise that Klein and McElwaine are currently working out a way to turn the microcomputer services department into a separate holding company. Such an action would clear the way for intensive marketing of the applications and services that McElwaine and his dedicated staff have developed.

Should this happen, let's wish Klein, McElwaine, and company the greatest success. Because, as a result of their initiative and hard work, the Bank of Louisville has become a shining example of the potential of the microcomputer in serious business applications. ■

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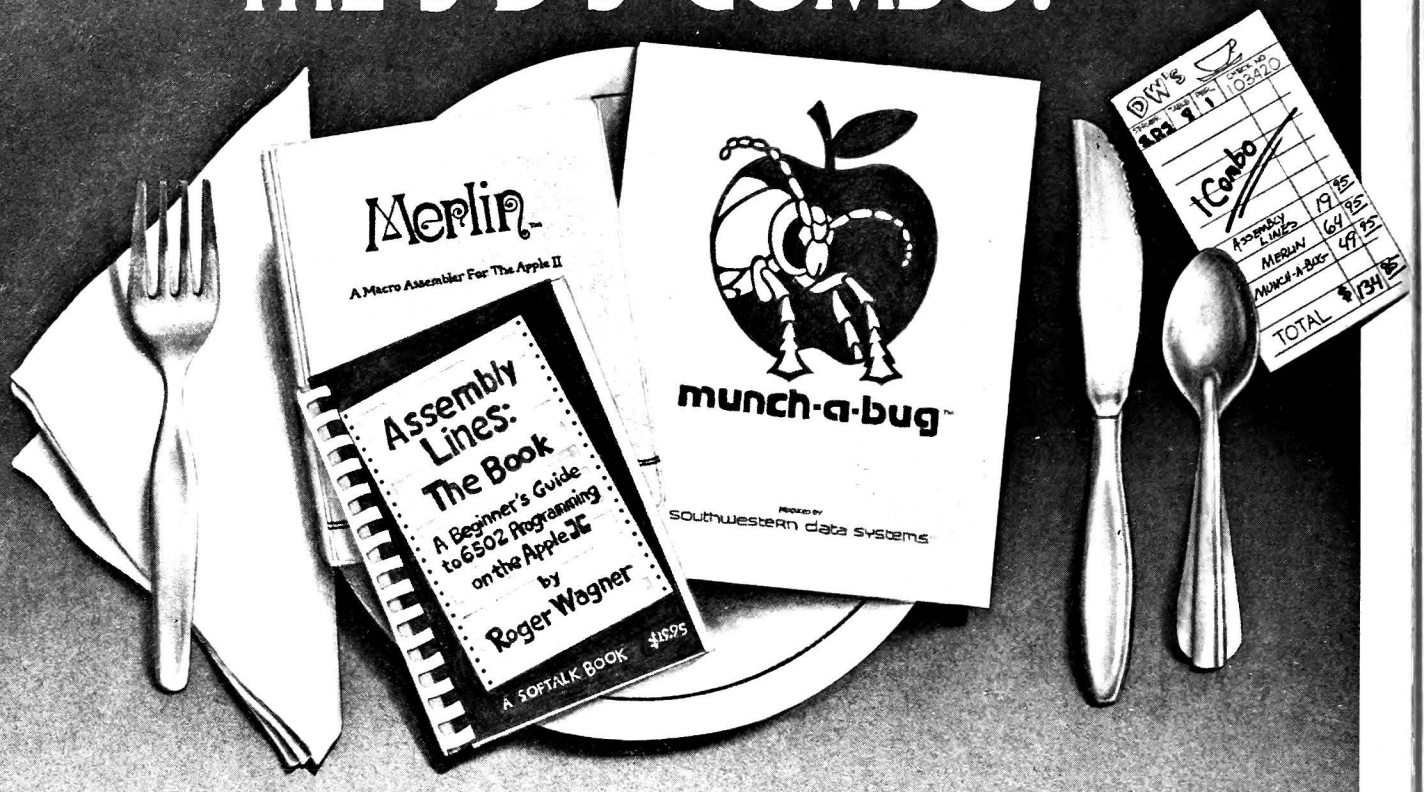
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By Wink Saville

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MARKETALK Reviews



from page 159

SampleCalc. By Richard Anderson. This is a highly useful utility for doing statistical analysis of people-oriented figures. The models are based on Jacob Cohen's acclaimed "Statistical Analysis for the Behavioral Sciences," published by Academic Press (New York, 1977). Included among the modes are *t*-test for means, *t*-test for proportions, sign test, correlation coefficient, multiple regression/correlation, and the ever-popular chi-square.

Some of the important concepts of error tolerance and statistical confidence are explained, enabling the user to develop a feel for the interaction of the figures and the determination of proper sample size. Remember, Nielsen uses much less than this for their ratings! RRA

SampleCalc, by Richard Anderson, ABT Microcomputer Software (55 Wheeler Street, Cambridge, MA 02138; 617-492-7100). $50.

The Animator. By Ray Balbes. As anybody at Disney will tell you, animation is a tedious process. A second of film animation requires eighteen frames. A minute requires over a thousand. As the movie *Tron* aptly demonstrates, computers are well suited to performing the repetitive tasks of animation. *The Animator* will do much of the repetitive work for you in creating your own moving pictures, but don't expect to come up with dazzling cinematic portrayals of "the world inside the computer," at least not on the first try.

The Animator is a set of programs for creating full screen, high speed animation routines that can be run from *The Animator* or your Basic programs. The black and white animation sequences it creates are quick and flickerfree. They are based entirely on lines and shapes.

Although creating anything complicated requires a certain amount of preplanning, the program is flexible and forgiving enough that you can learn the system and come up with some interesting first efforts by following the tutorials in the manual and diving right in. You first define the components (shapes and lines) of the animation steps in a table of format constants. This table tells the editor what shapes you intend to use, how many lines are involved, and how they are all connected.

Next you use the components defined to create a series of steps. A step is best defined as a key frame. As you define each step, you tell the computer how many frames to put between steps. The computer interpolates the path each line or shape must take to get from its position in the first step to its position in the next step.

Steps are defined in one of two ways. The more interesting way is with the visual mode, in which you use keyboard commands to move the lines and shapes around on the screen until they are in the right positions. For some setups, however, it may be more efficient to use numeric entry, in which you type in numbers for the screen coordinates of the lines and shapes.

Once you have created a series of steps for your animation to follow, you tell the computer to assemble the sequence into machine language. With more complicated animation, this process can take several minutes, giving you a chance to run out for popcorn. When it is done, you give the command to run and your microdrama unfolds. Watch it with a critical eye, because *The Animator* has a full range of options for expanding on what you have created.

The editing commands are somewhat reminiscent of a word processor, at least in the terminology they use. You can insert new steps (which have to be defined numerically, as there is no visual option in the editing routines), change ones that weren't quite right, or delete ones that didn't work at all. You can change the number of frames between various steps to speed up or slow down certain parts of the sequence. You can't add a new line or redefine how the components are connected. When you are satisfied with what you've got, reassemble it and see how it looks.

The shape maker included with *The Animator* has some features that aren't available on other shape makers (see "The Shape of Things," September *Softalk*). If you give it three points, it can create a curve in the shape to fit them. It will also make lines automatically, eliminating a lot of repetitive keystrokes. But overall, it's nothing to write home about.

The system as a whole makes it remarkably easy to create animated sequences, but in the final analysis, the usefulness of *The Animator* is limited. Once you have made an interesting sequence, there isn't much you can do with it. You can put it into an Applesoft program, but not in any interactive way. It won't give you animation under paddle control. Aside from making title sequences that move, the most impressive thing it does is make demo programs of itself. DD

The Animator, by Ray Balbes, BalbeSoftware Systems (#6 White Plains, Saint Louis, MO 63017; 314-532-5377). $49.95

Income Tax Data Recorder. By Gaynor C. Benson. *Income Tax Data Recorder* is an inexpensive system that's intended to replace the shoeboxes, notebooks, or kitchen drawers most of us use to keep track of the various invoices, receipts, and records we'll need when tax time rolls around.

This program won't do your taxes. Rather, it provides for you to store pertinent information in files named to correspond to the line numbers of the usual tax forms, including Form 1040 and schedules A and B. Most other forms have to be computed and entered just before the final printout is made.

At year's end, the program prints a list of all your entries, organized into groups that correspond to the lines on your tax form and group totals. You or your accountant have only to transfer the information and printouts to tax forms and do the computations.

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Program operation is simple. A few minutes a month entering data keeps them up to date. The program is menu driven and documented on the disk.

This is a nicely constructed program from a new company. Based on the evidence, we can look forward to their future releases. RJR

Income Tax Data Recorder, by Gaynor C. Benson, 8th Dimension Software (Box 62366, Sunnyvale, CA 94088). $29.50.

Kamikaze. By John Van Ryzin. This game will certainly be loved by those long-time fans of *Depth Charge* who had wished for an aerial version of the game. Once again you are commanding a surface ship, but this time your enemy is the IJA (Imperial Japanese Air Force). Besides the routine high and low bombers flying back and forth, periodically one of them suddenly turns sideways and becomes a kamikaze, diving straight down at your ship. To add to the fun and skill level, floating mines appear at random, limiting your horizontal movement. Every thousand points you get a new ship.

Hayden Software is promoting this game through a playing contest that will pay five thousand dollars to the top player. The top five contestants, via photo verification of scores, will be flown, all expenses paid, to San Francisco for the playoffs. Certainly it is time to adjust the trims on your joystick and wax the buttons! RRA

Kamikaze, by John Van Ryzin, Hayden Software (600 Suffolk Street, Lowell, MA 01854; 800-631-0856). $34.95.

The Executive Speller. By John Risken. Do you have a problem with spelling? When you finish a manuscript, do you have trouble spotting the typos and misspelled words? If so, this may be the very program you're looking for.

What it does is simple enough: it reads a text file from disk and compares each word against a master word list (provided with the program). Then it displays (or prints) the text, underlining each word it couldn't find in the master list. This permits you to proofread the text quickly, without having to concentrate on every word.

Of course, an unmatched word is not necessarily wrong. Numbers aren't in the word list, nor are most personal names; and the list is only ten thousand words long (as supplied), so a great many perfectly good words are left out. But that list is only a starting point: a disk can hold up to twenty thousand words of your choice.

The manual points out that every writer will have his own favorite set of words—so the system provides a number of options for making customized word lists. The master word list is copiable, and you are advised to make copies for both customizing and backup.

Or, if you prefer, you can start a list from scratch and simply pour a few of your old manuscripts into it! The system will read your manuscripts from disk in the usual way, adding every new word to the list being created and rejecting duplicates (this may take an hour or two). If you're sure that all the words in your manuscripts are spelled correctly, you can let the process run by itself, or the system will gather up the new words in bunches of thirty and ask you to approve them. It can handle word lists as well as manuscripts in this way; and it can be set to delete, instead of add, the words in an incoming document.

And there's even another way to add new words to the system. One of the proofreading modes allows you to add each underlined word to the word list as it's encountered. This is useful for a document with a lot of technical terms in it, since you can approve them as they come up and they will be accepted from then on.

All in all, *The Executive Speller* seems to offer all the options one could ask for, in a simple and friendly package (for example, if you goof, you can almost always back up safely to the previous menu by pressing escape—a reassuring feature shared by most of Mr. Risken's programs). If you find spelling to be a nuisance, this program could rid your life of considerable annoyance.

One limitation should be mentioned: the system is designed to work with documents (actually, text files on disk) produced by the company's *Executive Secretary*, a word processor. It may not work with files produced by other word processing systems. If in doubt, be sure to try it first. And if you already use *Executive Secretary*, you will be happy to note that hooks are built into both *Secretary* and *Speller* to allow you to switch back and forth between them easily. JR

The Executive Speller, by John Risken, Sof/Sys (4306 Upton Avenue South, Minneapolis, MN 55410; 612-929-7104). $75.

Doctor's Office Companion. By Mark T. Grennan. *Doctor's Office Companion* is designed to handle the patient billing and collection process for a medical office of up to five full-time doctors and as many as five additional personnel with billable time, such as physical therapists. Besides the normal billing functions, it generates reports on demand at any point of the billing cycle. Possible reports include guarantor list, CPT list, transaction analysis, monthly aging report, and history report.

The program is easy to customize and set up for any office. You need to enter only those clinical procedure terminology codes, descriptions, and fees that apply to the particular practice. When the daily patient transactions are entered, the operator enters only the CPT codes and the program prints the corresponding descriptions on the screen along with the default fee to be charged. When invoices are printed, they show the description rather than the CPT code.

The program can handle up to ten street accounts, such as walk-in trade and vacationers who normally will receive a single service, pay in full, and never be seen again. It is possible to designate as many as thirteen billing descriptions such as office visit, hospital visit, X-ray, and medications.

The program gives particular attention to the billing of insurance claims. It will automatically print out the HCFA 1500 Universal insurance form as well as forms required by the states that haven't yet approved the Universal form. Zero balance billing for Medicare is also available.

The manual is about sixty pages of well-organized information that will make even the newest computer recruit confident. The section on initially setting up the system is especially clear.

All in all, *Doctor's Office Companion* should receive serious consideration from any medical office that is ready to consider the computerization of their billing procedures. RJR

Doctor's Office Companion, by Mark T. Grennan, High Technology Software (2201 N.E. 63rd Street, Oklahoma City, OK 73113; 405-478-2105). $995.

Amazing Ninety Percent Discount! The database program *Wine Cellar* from WE Software (800 Greenwich Drive, Chico, CA 95926; 916-893-1162) is available for the modest and reasonable sum of $50; not—repeat *not*—$500.

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TDM/TPG Hardware Requirements

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IBM-PC w/ 128K memory, 2 disk drives or Corvus hard disk.

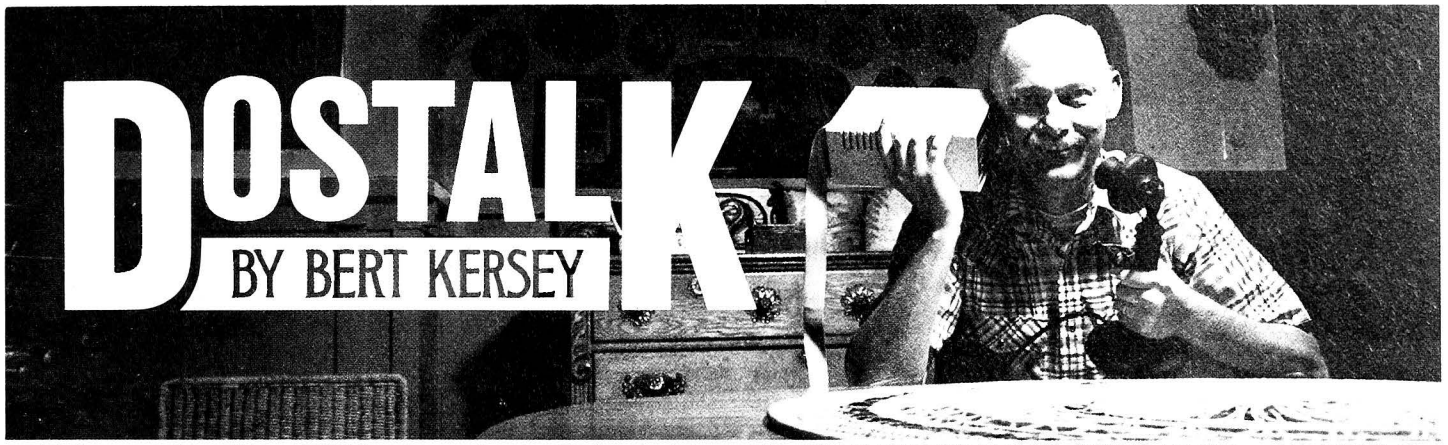
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PASCAL SYSTEMS



Under normal conditions, DOS lets you read and write data to disks in a very restricted manner with its keyboard commands: load, save, lock, rename, and so on. This month we're going to learn how to get some "raw data" off of and back onto our 3.3 disks. You should gain a better understanding of how your disk system works and pick up a couple of useful utilities, so pull up an Apple and type along.

To gain more control over your disk system, you need a way to read any one of a disk's 560 sectors into memory and then rewrite it, the way you want, back onto the disk. There are many reasons for doing this: "illegal" customization, disk repair, copy protection, and so on.

3.3 Disk Structure. Think of a floppy disk as magnetic recording tape in a new shape. A disk fresh out of the box is just that: a disk. It doesn't know an Apple from a Fruit-Loop until you initialize it. Apple's init function *formats* a disk into tracks and sectors and copies DOS from your Apple's memory (put there the last time you booted) onto the new disk.

A standard 3.3 disk is divided into thirty-five concentric *tracks* numbered in confusing (but efficient) computer style, 0 through 34. Each track is further divided into sixteen *sectors*, numbered 0 through 15 (the late DOS 3.2's thirty-five tracks had only thirteen sectors apiece, so a disk could hold only thirteen-sixteenths as much data). Each sector can store 256 *bytes*, numbered 0 through 255. Each byte can store a numerical value from 0 to 255. The byte is further divided into *bits*, but this is where we get off.

There are 560 sectors on a 3.3 disk (thirty-five tracks times sixteen sectors). DOS ties up three of the thirty-five tracks (tracks 0 through 2) and the directory (catalog) occupies one track (track 17), so essentially there are only 496 sectors (thirty-one tracks times sixteen sectors) available for data storage.

Track Allocation

Tracks 0–2:	DOS
Track 17:	Directory
Tracks 3–16, 18–34:	Data Storage

A Disk-Read Utility. With that disk structure in mind, let's write a utility that will read and display the 256 bytes from any sector of any track in decimal, hex, or ASCII format. If you don't have a disk zap type of utility, type this one in; you're likely to find it useful, and you can customize it to fit your needs.

Warning: One slip of a finger while typing the following program could easily bomb (ruin) a disk when the program is run. Don't Experiment with Nonexpendable Disks!

This program reads the selected sector (variable SEC) from track TRK, stores its 256 bytes in memory starting at location 10,000 (LOC), and dumps the whole thing to your screen or printer in the format you choose.

```
100  REM SECTOR-READER
110  TEXT : HOME :RW = 1: REM DANGER! RW=2 WRITES TO
     DISK!
120  PRINT "<RETURN> TO QUIT.": PRINT
130  INPUT "PRINTER ON? (Y/N):";A$: GOSUB 410: IF LEFT$ (A$,1)
     = "Y" THEN PRINT CHR$ (4);"PR#1": REM PRINTER SLOT#
140  PRINT : INPUT "READ TRACK #";TRK$: GOSUB 410:TRK =
     VAL (TRK$): IF TRK < 0 OR TRK > 34 THEN 140
150  INPUT "SECTOR #";SEC$: GOSUB 410:SEC = VAL (SEC$): IF
     SEC < 0 OR SEC > 15 THEN 150
160  POKE 47084,TRK: POKE 47085,SEC: POKE 47092,RW
170  POKE 47083,0: POKE 47091,0
180  LOC = 10000: POKE 47088,LOC - INT (LOC / 256) * 256:
     POKE 47089, INT (LOC / 256)
190  POKE 768,32: POKE 769,227: POKE 770,3: POKE 771,76:
     POKE 772,217: POKE 773,3
200  PRINT "HEX, DECIMAL, ASCII OR CATALOG DISPLAY$":
     INPUT "(H/D/A/C):";DSP$. GOSUB 410
210  CALL 768
220  IF DSP$ = "C" THEN 260
230  IF DSP$ = "D" THEN 360
240  IF DSP$ = "A" THEN 310
250  IF DSP$ = "H" THEN A$ = "2000.2OFF N D823G": FOR X = 1
     TO LEN (A$): POKE 511 + X, ASC ( MID$ (A$,X,1)) + 128: NEXT
     : POKE 72,0: CALL - 144: GOTO 380
260  PRINT LOC;"- ";: FOR J = LOC TO LOC + 10. GOSUB 300:
     NEXT : PRINT
270  FOR X = LOC + 11 TO LOC + 221 STEP 35: PRINT X;"- ";:
     FOR J = X TO X + 2: GOSUB 300: NEXT
280  FOR J = X + 3 TO X + 32: PRINT CHR$ ( PEEK (J));: NEXT :
     FOR J = X + 33 TO X + 34: GOSUB 300: NEXT : PRINT : NEXT
```

23. What's the reward for seeing a female frog home in

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```
290  GOTO 380
300  P = PEEK (J): PRINT SPC( (P < 100) + (P < 10));P;" ";:
     RETURN
310  FOR X = LOC TO LOC + 255: IF X - INT (X / 8) * 8 = 0 THEN
     PRINT : PRINT X;"-";
320  P =PEEK (X): IF P < 32 OR (P > 127 AND P < 160) THEN
     PRINT SPC( 1);"^"; CHR$ (P + 64);: GOTO 350
330  IF P = 160 OR P = 32 THEN PRINT SPC( 1); CHR$ (115); CHR$
     (112);: GOTO 350
340  PRINT SPC( 2); CHR$ (P);
350  NEXT : GOTO 380
360  FOR X = LOC TO LOC + 255: IF X - INT (X / 8) * 8 = 0 THEN
     PRINT : PRINT X;"-";
370  P = PEEK (X): PRINT SPC( 1 + (P < 100) + (P < 10));P;: NEXT
380  PRINT : PRINT CHR$ (4);"PR#0": PRINT : PRINT "(TRACK
     ";TRK;", SECTOR ";SEC;")"
390  PRINT : INPUT "READ ANOTHER SECTOR? (Y/N):";A$: IF
     LEFT$ (A$,1) = "Y" THEN RUN
400  GOTO 420
410  IF PEEK (512) THEN RETURN
420  PRINT : PRINT CHR$ (4);"PR#0": END
```

Here's what makes the program tick (and whir).

Line 110 contains the variable RW, which determines whether we're *reading* a sector (RW = 1) *from* the disk, or *writing* a sector (RW =2) *to* the disk. Setting RW=2 in this program would *write* whatever data is stored at locations LOC to LOC+255 (see line 180) onto the disk at track TRK, sector SEC. To change a byte in a sector, you would run the program, poke a new value at the appropriate location (10000–10255 or $2710–$280F), change the value of RW in line 110 to two, and run the program again. But hold on! Be sure you know what you are doing before you let RW=2.

Lines 140 and 150 get the track (variable TRK) and sector (SEC) you want to read. If you want to read an ancient 3.2 disk with only thirteen sectors, change the maximum allowable value for SEC in line 150 to twelve. You'll have to run this program under DOS 3.2 for it to read a thirteen-sector disk. Muffin or niffum it as you like.

Lines 160 and 170 poke DOS's *Input/Output Block* at locations 47083 through 47092 according to the table in figure 1.

Location	Value
47083	Volume number (0 means any volume is okay)
47084	Track number, 0–34
47085	Sector number, 0–15 for 3.3 DOS
47088–89	Two byte value of memory location
47091	Set at 0 to read an entire sector
47092	1=Read or 2=Write

Figure 1.

Line 180's variable LOC determines where in memory you want the disk data to be stored, and pokes the location into 47088–89 (see figure 1). We arbitrarily let LOC=10000 because of a fondness for zeros. You might want to let LOC = 24576 ($6000) if you are going to enlarge this program considerably. Don't set LOC too low, or the disk data will overwrite your program.

Line 190 pokes in a little machine language routine at 768 ($300) that looks like this:

```
300-  20 E3 03     JSR  $03E3
303-  4C D9 03     JMP  $03D9
```

These instructions cause a jump to DOS's built-in RWTS (read-write-track-sector) routine, the animal that actually reads the disk for us.

Line 200 asks for the format of your sector printout. Most zap utilities dump sectors in hex format, but, depending on which sector you're reading (or on the way your brain works), another format might make more sense.

Line 210's *call 768* does a jump to the routine we put in at location $300 and beyond (see line 190), causing the disk to spin and the selected sector to be read.

Line 250 is a tricky way of doing a hex dump from Basic. It is the equivalent of the commands:

```
Call -151      (Enter monitor.)
2000.20FF      (List locations $2000-20FF.)
823G           (Continue Basic program.)
```

Lines 270 to 300 create the mixed decimal/ASCII catalog printout that is used in the analysis given later in the article.

Lines 310 to 350 print the ASCII character for each byte in the sector. Control characters are preceded by a (^) thanks to line 320. Spaces are designated by a lower-case *sp*. If you don't have lower-case capabilities (or don't like the clutter of the *sps*), delete line 270.

Lines 360 and 370 perform the decimal option, printing eight bytes per line for comparison with the hex printout.

Line 410 is an input check to see if the return key (only) was pressed. If it was, the program ends.

Reading the Directory. Track 17 is where DOS stores pertinent information about the files on a disk. When you type *run Hello*, DOS searches this track from sector 15 to sector 1 for the word "hello" (plus its twenty-five trailing spaces). If it finds it, you're in business. If not, "File not found."

Run the *Sector-Reader* program and read track 17, sector 15, the first catalog sector. Make a hard-copy printout if you have a printer, using the format option C (mixed decimal/ASCII). Notice that your catalog's file names are printed with normal characters while other bytes are designated by numbers.

Let's look at track 17, sector 15, of a disk whose catalog is shown in figure 2.

Format option C will produce a printout that looks like that in figure 3. If you're without a printer, your layout won't be quite so tidy, because of forty-column wraparound, but it will still be readable and fit on the screen. A more accurate (but almost impossible to read) representa-

```
]CATALOG

DISK VOLUME 123
 A 002 HELLO
*A 002 LOCKED APPLESOFT FILE
 I 002 INTEGER FILE
*I 002 LOCKED INTEGER FILE
 T 005 TEXT FILE
*T 001 LOCKED TEXT FILE
 B 123 BINARY FILE
*B 123 LOCKED BINARY FILE
```

Figure 2.

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```
10000-   0  17  14   0  0  0  0  0  0  0  0
10011-  18  15   2  HELLO                    2  0
10046-  19  15 130  LOCKED APPLESOFT FILE    2  1
10081-  20  15   1  INTEGER FILE             2  0
10116-  21  15 129  LOCKED INTEGER FILE       2  0
10151-  22  15   0  TEXT FILE                5  0
10186-  23  15 128  LOCKED TEXT FILE         1  0
10221-  24  15   4  BINARY FILE            123  0
```

Figure 3.

Byte 0:	Unused (usually zero)
Bytes 1–2:	The next track and sector of the catalog (track 17, sector 14, in this example)
Bytes 3–10:	Unused (usually zeros)
Bytes 11–45:	File #1 information
Bytes 46–80:	File #2 information
Bytes 81–115:	File #3 information
Bytes 116–150:	File #4 information
Bytes 151–185:	File #5 information
Bytes 186–220:	File #6 information
Bytes 221–225:	File #7 information

Figure 4.

File Type	Code	Unlocked	Locked
Text	T	0 ($00)	128 ($80)
Integer	I	1 ($01)	129 ($81)
Applesoft	A	2 ($02)	130 ($82)
Binary	B	4 ($04)	132 ($84)
S-File	S	8 ($08)	136 ($88)
Relocatable	R	16 ($10)	144 ($90)

Figure 5.

tion of a sector may be obtained with the H (hex) option.

Figure 4 gives a byte-by-byte breakdown of our sample sector. Each of the directory's sectors, 1 through 15, is laid out in this form. Look at the first file, Hello, occupying thirty-five bytes, 11 through 45. The middle thirty bytes are the file name itself, the word *hello* plus twenty-five trailing spaces. If you had selected the D or H option, you would see each character in the file name represented by its ASCII value plus 128.

Bytes 11 and 12, the first two bytes for our file, tell DOS the track and sector where Hello's *Track-Sector List*, very essential information, is found. The first unused empty file name slot in the directory (and all slots that follow) will have a zero as its first byte. A deleted file name will have a 255 ($FF) as its first byte.

Byte 13, the third byte, reports Hello's file type and locked/unlocked status as in figure 5. Since Hello is an unlocked Applesoft file, byte 13 in our example has a value of two. Notice that 128 ($80) is added whenever a file is locked.

Bytes 44 and 45, the last two bytes, report a file's size in low/high format (multiply the second number by 256 and add it to the first number). The second number, byte 45, is usually zero. In our example, Locked Applesoft File is a whopper, occupying 258 sectors (2 + 1 * 256). The catalog, however, only reports the 2 (as "002") of byte 44.

Reading Other Sectors. With your *Sector-Reader* utility, you can read any sector of a normal DOS disk. The C option works best on track 17, sectors 1 through 15. The A option will be more rewarding on other sectors; take a look at track 1, sector 9, for instance. Near the middle, you will see your disk's greeting program name, the name you typed after init when you initialized the disk. DOS commands and error messages appear on track 1, sectors 7 and 8. Anything you see may be changed with pokes (examples next month), and may be rewritten back to the disk by letting RW equal 2.

File Swapper. When you save, bsave, or write a file to a disk, its file name will appear in the first file name slot available. If you delete file 1, the next file stored on the disk will show in position 1, whether you want it there or not. Here is a utility that will swap any two file names on a disk so you can organize your file names the way you want them.

Have fun, but *be careful* and practice first on a backup disk. If you do mess up a disk that's important, just remember, you read how to do it right here in *Nibble*. . . .

```
100 REM FILE SWAP
110 REM
120 REM
130 REM
135 TEXT : HOME : PRINT CHR$ (4);"CATALOG": PRINT
140 TRK = 17:RW = 1:LOC = 8192: REM $2000
150 POKE 768,32: POKE 769,227: POKE 770,3: POKE 771,76:
    POKE 772,217: POKE 773,3
160 POKE 47084,TRK: POKE 47083,0: POKE 47091,0: POKE
    47092,RW
170 PRINT "THIS PROGRAM WILL SWAP ANY TWO": PRINT "FILE
    NAMES IN YOUR CATALOG."
180 FOR SEC = 1 TO 15:LOC = LOC + 256: POKE 47085,SEC:
    POKE 47088,LOC - INT (LOC / 256) * 256: POKE 47089, INT
    (LOC / 256): CALL 768: NEXT : REM READ SECTORS 1-15
190 FOR F = 1 TO 2: PRINT : PRINT "FILE NAME #";F;: INPUT
    ";";FI$(F)
200 FOR I = 1 TO 30:FI$(F) = FI$(F) + " ": NEXT : REM
    ADD TRAILING SPACES
210 A$ = "": FOR X = 1 TO 30:A$ = A$ + CHR$ ( ASC ( MID$
    (FI$(F),X,1)) + 128): NEXT :FI$(F) = A$: NEXT F: REM
    ADD 128 TO EACH CHARACTER'S ASCII VALUE
220 FOR F = 1 TO 2: PRINT: PRINT "SEARCHING SECTOR:";
230 FOR SEC = 15 TO 1 STEP - 1: PRINT SEC;",";:LOC = 8192 +
    256 * SEC
240 FOR X = LOC + 14 TO LOC + 224 STEP 35: IF CHR$ ( PEEK
    (X)) <> LEFT$ (FI$(F),1) THEN 260: REM
    LOOK AT 1ST CHARACTER
250 FOR Y = X + 1 TO X + 29: IF CHR$ ( PEEK (Y)) = MID$
    (FI$(F),Y - X + 1,1) THEN NEXT : GOTO 280: REM
    FILE FOUND
260 NEXT X
270 NEXT SEC: PRINT : PRINT "FILE #";F; "NOT FOUND"; CHR$
    (7): PRINT : GOTO 190
280 PRINT : PRINT "FILE #";F;" FOUND IN SECTOR ";SEC:SEC(F)
    = SEC:LOC(F) = Y - 33
290 NEXT F: PRINT
300 LOC = 24576: FOR X = 0 TO 34: POKE LOC + X, PEEK (LOC(1)
    + X): POKE LOC(1) + X, PEEK (LOC(2) + X): POKE LOC(2) + X,
    PEEK (LOC +X): NEXT : REM SWAP FILENAMES
310 RW = 2: POKE 47092,RW: FOR F = 1 TO 2: POKE
    47085,SEC(F): POKE 47089, INT ((8192 + SEC(F) * 256) / 256):
    CALL 768: NEXT : REM WRITE SECTORS TO DISK
320 PRINT CHR$ (4);"CATALOG"
```


24. What kind of refreshments does mother give out in

THRESHOLD

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HARD TALK

BY JEFFREY MAZUR

Puzzle: If your Apple II has a RAM card or ROM card in slot 0, try this simple exercise: boot the System Master; type FP (return); and then type *print PDL(29)* (return). (Apple II Plus owners type *PDL(28)* instead.) Can you explain what happens?

On Joysticks and Paddles. April's column on joysticks and paddles brought lots of mail. Who says the Apple is becoming a serious business computer? Many readers were interested in more details on how the game I/O socket actually interfaces to the CPU; several wanted to know how to build their own game controllers or joysticks; and one reader even described an unusual problem which we'll diagnose and attempt to repair in this month's installment.

To begin, let's examine the various signals that appear on the game I/O connector (refer to figure 1). This "port" is quite versatile in that it contains four latched outputs and one pulsed output as well as three digital and four analog inputs. In gaming devices, ordinarily only the inputs are used—the digital inputs monitor the status of momentary pushbuttons and the analog circuits measure the variable resistance of a game paddle or joystick.

It is interesting to note that all of these inputs are multiplexed, along with the cassette input port, onto the high order bit of the data bus. This just means that whenever one of these inputs is read, the CPU receives a somewhat random number between 0 and 255. Only the highest order bit is significant, and it reflects the status of the desired input. Thus a number between 0 and 127 indicates a low input signal, while an input in the range of 128 to 255 represents a high input signal. Selecting which input to read is accomplished by decoding the lower three address lines, which results in eight consecutive locations for these inputs.

Figure 2 details the portion of the Apple that handles the game I/O connector. On the left side are two ICs that are part of the Apple's on-board address decoding logic. These are labeled F14 and F13. An "ac-

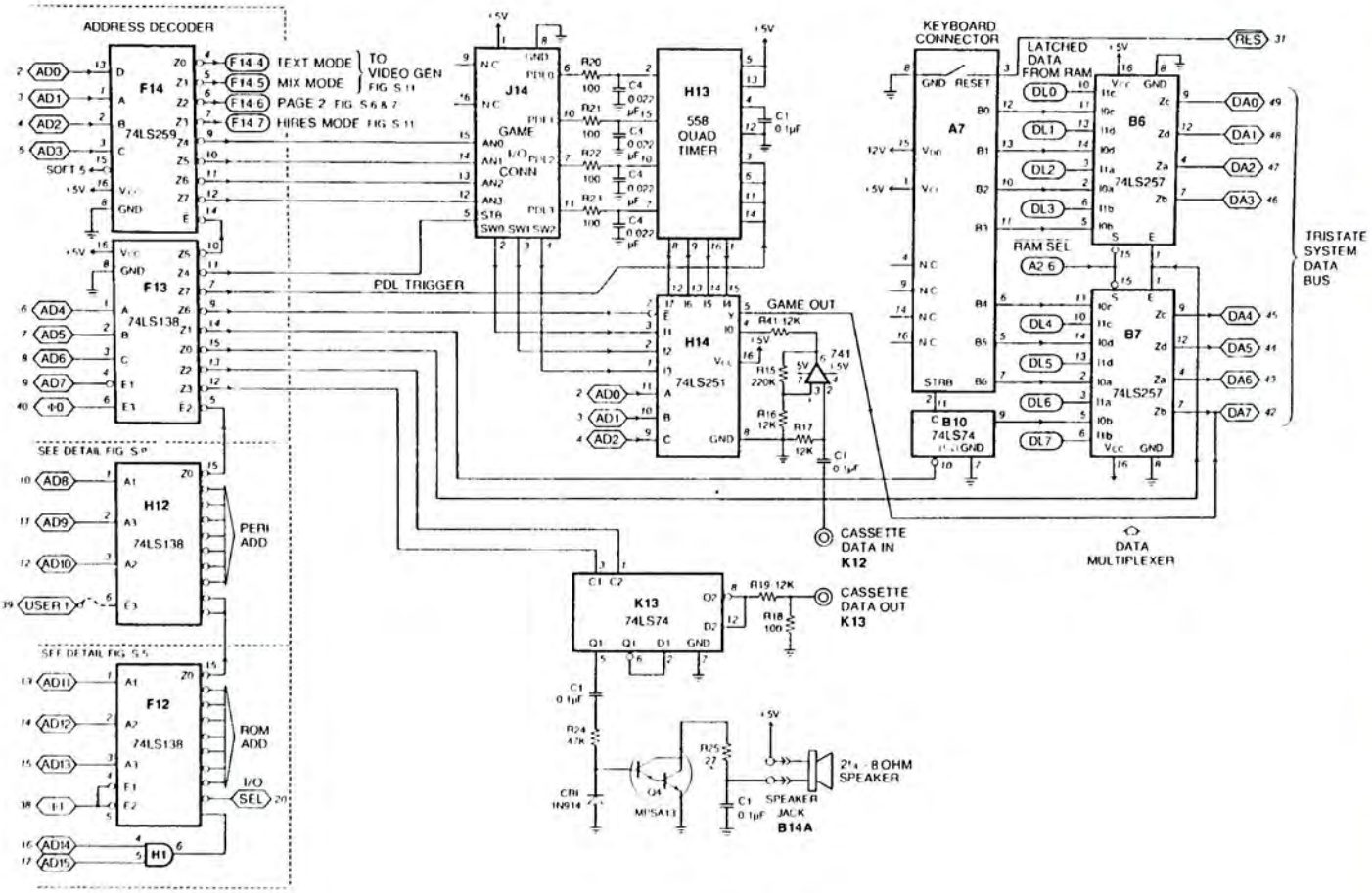
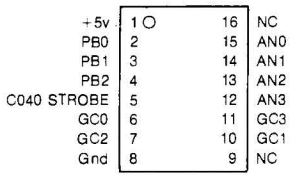


Figure 2. On-board I/O.



Pin:	Name:	Description:
1	+5v	+5 volt power supply. Total current drain on this pin must be less than 100mA.
2-4	PB0-PB2	Single-bit (pushbutton) inputs. These are standard 74LS series TTL inputs.
5	C040 STROBE	A general-purpose strobe. This line, normally high, goes low during ϕ0 of a read or write cycle to any address from $C040 through $C04F. This is a standard 74LS TTL output.
6,7,10,11	GC0-GC3	Game controller inputs. These should each be connected through a 150K ohm variable resistor to +5v.
8	Gnd	System electrical ground.
12-15	AN0-AN3	Annunciator outputs. These are standard 74LS series TTL outputs and must be buffered if used to drive other than TTL inputs.
9,16	NC	No internal connection.

Figure 1. Game I/O connector pinouts and game I/O connector signal descriptions.

tive" signal is generated by the higher order decoders H12 and F12 whenever an address starting with $C0 is accessed. This signal enters pin 5 of F13 and, with address lines 4, 5, 6, and 7 coming in on the left, creates eight "active" signals of its own. Figure 2 shows these signals coming out of the right side of F13, and each signal corresponds to one of the address ranges $C00X to $C07X (where X represents the undecoded portion of the address). For example, whenever the address $C060, $C061, or any address up to $C06F is accessed, the Z6 output of F13 (pin 9) is activated. This signal is connected to H14, pin 7, which is the enable control for this IC. While enabled, H14 places one bit of digital information on the CPU data bus (DA7). Furthermore, this data can come from one of eight inputs (10 through 17) and is selected by the lowest three bits of the address via AD0–AD2.

In case all these numbers have you spinning, let's try to work out the address of switch 2 on the game I/O connector by looking at the schematic. Working backward from the connector, we find that SW2 connects to the "3" input of H14, which is enabled by the "6" output of F13, which is, in turn, enabled by the "C0" output of H12/F12. Thus, the SW2 input must be located at the address $C063. A check of figure 3 confirms that this is correct. In case you weren't exactly sure what the term meant, that's *address decoding*.

	$0	$1	$2	$3	$4	$5	$6	$7	$8	$9	$A	$B	$C	$D	$E	$F
$C000	Keyboard Data Input															
$C010	Clear Keyboard Strobe															
$C020	Cassette Output Toggle															
$C030	Speaker Toggle															
$C040	Utility Strobe															
$C050	gr	tx	nomix	mix	pri	sec	lores	hires	an0		an1		an2		an3	
$C060	cin	pb1	pb2	pb3	gc0	gc1	gc2	gc3	repeat $C060-							
$C070	Game Controller Strobe															

Key to abbreviations:

gr	Set graphics mode	tx	Set text mode
nomix	Set all text or graphics	mix	Mix text and graphics
pri	Display primary page	sec	Display secondary page
lores	Display lo-res graphics	hires	Display hi-res graphics
an	Annunciator outputs	pb	Pushbutton inputs
gc	Game controller inputs	cin	Cassette input

Figure 3. Built-in I/O locations.

The switch inputs and annunciator outputs of the game I/O port are simple logic signals. The game controller inputs represent an analog signal (a variable resistance of from 0 to 150,000 ohms), which must be converted to digital form for the computer to use it. This is accomplished by the timer IC at H13 along with a small software routine in the monitor ROM.

Looking at the hardware side first, think of the 558 quad timer as four individual timers, similar to the more familiar 555. Each of these timers shares a common *strobe* input that, when triggered, causes the outputs to turn on and a timing cycle to begin. The length of time that any of the timers stays on is directly proportional to the resistance of its associated game controller. After this predetermined period, the timer's output goes low until the next strobe signal.

With this in mind, let's turn now to the software routine that can read the paddle inputs. This routine is located at $FB1E in the Monitor and is reproduced in figure 4. The entry point for PREAD assumes that the X register contains the number of the paddle to be read. This should be in the range of 0 through 3 but no check is made. (This should solve the puzzle posed at the beginning of this article.)

The first thing PREAD does is to trigger the timers by accessing location $C070. The Y register is used as a counter so it is first initialized to 00. The remainder of the routine consists of a loop around PREAD2

```
FB1E: AD 70 C0  PREAD   LDA  PTRIG     TRIGGER PADDLES
FB21: A0 00             LDY  #$00      INIT COUNT
FB23: EA                NOP            COMPENSATE FOR 1ST COUNT
FB24: EA                NOP
FB25: BD 64 C0  PREAD2  LDA  PADDL0,X  COUNT Y-REG EVERY
FB28: 10 04             BPL  RTS2D       12 USEC
FB2A: C8                INY
FB2B: D0 F8             BNE  PREAD2    EXIT AT 255 MAX
FB2D: 88                DEY
FB2E: 60        RTS2D   RTS
```

Figure 4.

25. What does a

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like to eat for lunch?

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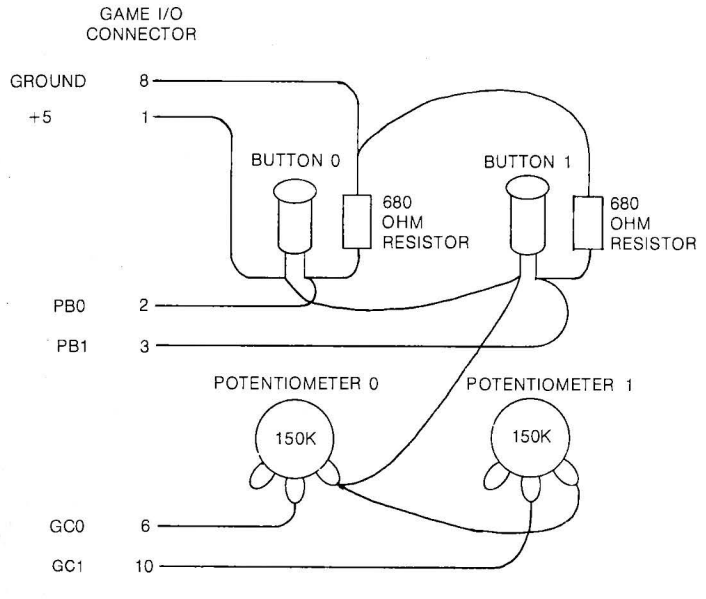
that keeps testing the output of the selected timer. As long as the timer output remains high, the loop continues to increment the Y register approximately every twelve microseconds. As soon as the timer goes low, the branch at $FB28 succeeds and the routine exits with a value between 0 and 255 in the Y register. This value is directly proportional to the paddle setting. Note also that if the timer does not "time out" before 255 passes through the loop, it still returns with the maximum value.

Thus, the Apple achieves its goal of analog to digital conversion: the analog position of a dial or joystick is first converted into a resistance and then into a small time interval. This time interval is then sampled by a software program loop that converts the analog period into a digital *number* of passes through the loop. This number can then be manipulated by a program to react to input from the controller. All that just to move a little figure around on the screen!

One drawback to the paddle circuit just described is that it can take up to 12 times 255 (or more than three thousand) microseconds just to read a paddle. This amounts to a considerable overhead when you're trying to write fast, animated graphics games. One solution used in many games is to bypass the Monitor PREAD routine and write a shorter loop that might return after no more than fifty passes. This definitely speeds things up but at the cost of resolution. This also accounts for why, in many games, the player figures reach their rightmost positions when the paddle is turned only one-third to one-half the way up.

In case you still haven't figured out the riddle, here's what was happening. When Applesoft attempts to read a paddle input, it simply calculates the appropriate address by adding the parameter (in parentheses) to the base address for paddle 0. Thus, when you ask for the value of PDL(29), Applesoft goes to the PREAD routine with 29 (hex $1D) in the X register. This causes the routine to access location $C064 + $1D = $C081. When a RAM or ROM board is located in slot 0, this has the effect of shutting the board off—placing the machine into Integer Basic. Unfortunately, this entry is not very graceful and the computer usually hangs up. For the Apple II Plus, the location accessed is $C080, which turns *on* the ROM/RAM board with the same results. Too bad Applesoft doesn't check for valid data on the PDL function—just be sure *your* programs do or you may find yourself fighting an elusive bug.

Constructive Suggestions. Now that we know how the game inputs work, let's see how to construct a set of game controllers or a joystick. This is shown in figure 5. Note that pull-down resistors are used on the pushbutton inputs. This is necessary in order to present a "low" level when the buttons are not pressed. An alternative approach is to use normally closed switches connected to ground; the former approach is preferred, however, and is more reliable.



NOTE: IF PADDLE ROTATION IS REVERSED, MOVE OUTER POTENTIOMETER CONNECTION TO OTHER LUG.

Figure 5.

Although the Apple requires 150K ohm variable resistors, or *potentiometers*, most joysticks use 100K parts. If you already own one, there's a way to make it work properly. This is achieved by adding a 0.008–0.01 MFD capacitor across the game controller input to ground. If possible, use a shielded and grounded cable to connect the controller; this will minimize any RF radiation from the computer that might cause interference to nearby radios and TVs.

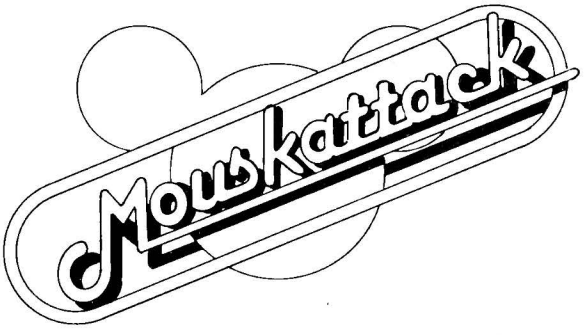
Ready for another puzzle? This one is a real problem related by Mark Adams of Salt Lake City, Utah. Here is what Adams wrote:

> I have had my Apple for about a year and a half. About three months ago I began to have problems with my paddles so I bought a set of paddles from the Keyboard Company. When I plugged them in, a strange thing happened. Whenever you push button 0, both paddle 0 and paddle 1 read 255; furthermore, both buttons read as if pushed! I'm sure that the paddles were plugged in correctly and I also tried another set of paddles and a joystick with the same results. The same paddles work on another Apple, so I guess something is wrong inside the computer. If anybody knows what is wrong, please tell me. I have to stick to playing keyboard controlled games until I find out.

Before you read the diagnosis, return to figure 2 and see if you can figure out what's happening. Normally, service technicians hate to receive letters describing a particular problem. Most of the time the writer doesn't give enough information for the technician to determine the problem. Many times the only description given is "it doesn't work." While this may be the appropriate perception to the user, it does not offer much help to the person trying to do the repair work, especially if the problem is not obvious or is intermittent.

Adams's letter, however, is concise, describes the problem fully, and even offers some valuable servicing clues. For example, he notes that the problem has just recently occurred in a machine that used to work cor-

26. What two things do the mice in



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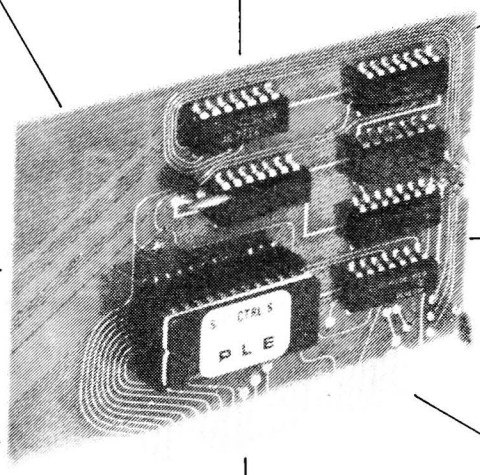
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rectly. This already provides some information about the problem. By checking several paddles and using another computer, Adams has come to the correct conclusion that the problem is within his machine.

Referring to the schematic, let's see what might cause this strange behavior. Several possible situations could cause the game I/O inputs to stop functioning. The key here is that button 0 is still working correctly. This rules out any obvious problem with the ground or +5V connections. It also indicates that part of H14 must be okay, but apparently the one-of-eight decoding portion is not.

It would seem that the output of H14 is stuck—always giving the status of its input 1 (SW0), regardless of which game I/O address is accessed. Therefore, reading any of the three switch inputs will probably give the status of switch 0. Likewise, when switch 0 is pushed (causing it to go high), it appears to the PREAD routine like a timer that doesn't time out. This causes the routine to return the maximum value, which is, of course, 255. Furthermore, if this diagnosis is correct, Adams will find that his cassette input port no longer functions either. (We assume he uses a disk and was unaware up to now of this other side effect.)

The obvious step to take at this point is to replace H14 with a new IC. This will probably fix things up in a jiffy. Let's hope Adams reports back that this was successful.

Another question often raised when talking about joysticks is whether it is possible to use the inexpensive Atari controllers. These sticks are based on an entirely different principle than those that are designed to work with the Apple, but there are ways to interface them to the Apple.

If you were to take one of these joysticks apart, you would find an array of five small switches instead of the linear potentiometers. Four of the switches are used to sense movements of the stick in the up, down, left, and right directions. The last switch is used as a fire button and is compatible with the switch closures used on Apple controllers. To convert the joystick operation from switch closures to an analog position, however, requires some modification. As with most things, this modification can be done in software, in hardware, or in a combination of both. Modifying software is usually easier, but getting into the code for most of the present games involves breaking their protection schemes as well as figuring out the programs themselves.

A totally hardware solution is also possible; this solution makes the Atari joystick appear to the Apple just like a regular analog joystick. There are several ways to accomplish this, but the tricky part is converting to the variable resistance that the Apple wants to see. This presents some complications and makes the design somewhat critical and hard to produce.

Several manufacturers have chosen an alternative approach that requires both hardware and software changes. Sirius Software takes this approach in its Joyport.

Joyport. The Joyport allows you to connect up to four controllers to the Apple. Two of these can be your normal paddle sets or joysticks; the other two must be Atari-type joysticks. All of these devices plug into the Joyport, which sits next to the Apple. A flat cable connects the Joyport to the Apple game I/O socket.

Two switches on the Joyport select which controllers are active. The first switch chooses between the Atari and Apple variety. The second switch enables either the left joystick or set of paddles, the right set, or both the left and the right sets of paddles. The "both" position is used for games that can handle two joysticks or four paddles. Since the game I/O connector cannot handle four pushbutton inputs, a multiplexing scheme is used to read all the buttons. More on this later.

Another possible use for the Joyport is for switching back and forth between a set of paddles and a joystick using the left/right switch. The controllers plug into the Joyport, so it is easy to change them without having to remove the top of the computer. A small, removable cover hides the conections within the Joyport.

The most obvious reason for getting a Joyport, however, is to be able to use the Atari joysticks. They are relatively inexpensive (around $10) and easy to find. They can even offer better control than Apple-compatible joysticks for some games that use simple directional input, such as *Pac-Man* and *Beer Run*.

As previously stated, Atari joysticks cannot simply be connected to the game I/O port. Each joystick contains five switches, so running a pair of these requires monitoring ten switch closures. Since the Apple's game port has only three switch inputs, some extra hardware must be added. The Joyport provides this hardware by multiplexing the ten switch closures onto the three pushbutton inputs of the computer. This is done in a fashion quite similar to the scheme we described for the IC H14 in the Apple. Here, the controller switches are the data inputs, and two of the annunciator lines are used as the select signals. Figure 6 shows how this is accomplished. Depending on the state of annunciators 0 and 1, every one of the switches on two Atari joysticks can be sampled.

Well, this obviously means that some extra software will also be required to read the joysticks. Instead of just calling the PREAD routine (or some equivalent) and returning with a value between 0 and 255, a more complex driver must be used. This driver must poll all of the controller switches sequentially. It does this by using the annunciators as a sort of two bit address, and reading back three bit data from the pushbutton inputs. After checking all the switches, it can then determine in which direction, if any, the joysticks are being pressed and whether the fire buttons are being activated.

Controller Select In Middle

Annunciator #0	Annunciator #1	Button 0 $C061 −16287	Button 1 $C062 −16286	Button 2 $C063 −16285
On	On	Fire-1	Up-1	Down-1
	Off	Fire-1	Left-1	Right-1
Off	On	Fire-2	Up-2	Down-2
	Off	Fire-2	Left-2	Right-2

Figure 6.

27. What is the secret password to begin

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- Built-in language card

PASCAL
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- User selectable Raat Valume and Number
- Daubles campilatian speed

VISICALC
- Expands matrix and warksheet up ta 252K
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- Campatible with SVA 8" drives

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Now that we have all of the relevant information from the controllers, we have to translate it into positional information for the game piece we are trying to move around. Since all we are getting is an up/down or a left/right signal from the joystick, the software must keep track of the current position of the piece at all times (it usually does this anyway). In most cases, this information is kept as an X,Y coordinate in memory.

When the joystick is pushed up, the controller-scanning routine senses it, and this causes a jump to the movement portion of the program. This, in turn, causes the Y coordinate of the piece to be increased (or decreased), effectively moving it up. The speed at which the piece moves is completely controlled by the program.

Although this technique is considerably different from that described for the Apple joystick, the effect is the same: the game piece moves up. Instead of a variable resistance controlling a timer that is monitored in a software loop, we now have a switch closure being detected by a software scanning loop and then being converted into a digital value by a software up/down counter routine. The only disadvantage of this approach is that the software must be written to work with either type of control. None of the early Apple games can use the Joyport with Atari sticks. However, since the introduction of the Joyport, almost everything from Sirius Software has been compatible with it. Furthermore, several older games have been modified for use with the Joyport and software authors are being encouraged to include the necessary driver routines. By the way, even though reading the Atari joysticks requires a more complicated routine, it actually takes less time than the average delay of PREAD (which, of course, varies with the setting of the controller).

Kraft Systems Joystick and Paddles. There are some new products on the market that weren't available when we did the last review of game controllers. Kraft Systems, well known in the radio control hobby market, has just turned its attention to computers. Among the company's initial products are two unique game controllers for the Apple.

The first is a very stylish and functional joystick. The two main features of this product are defeatable spring-return centering of the stick and excellent button placement. Rather than mounting the two switches side by side, Kraft chose to put only one switch on the top side of the box. The other is located slightly to the right but on the back side. This placement is ideal for right-handed users who hold the box in their left hand. It puts the buttons just under the left thumb and index finger where they can be easily activated. Left-handed users may not appreciate this arrangement as much but should still find it manageable.

The joystick itself is a spring-centered, gimbal type with electrical centering adjustments on both axes. Turning the unit over reveals two more controls on the bottom of the case. These are the spring-return defeat switches—one for each axis. Activating the switches requires pulling the stick to one corner. This raises the spring-return levers inside the joystick assembly. When the bottom switches are moved to the free position, they grab the return levers and hold them back. This prevents the lever from forcing the stick back to its center position. At any time, the switches can be thrown back to their centering position. This releases the levers and causes the stick to return instantly to the center position.

Having complete control over the stick's operation has proven to be a dream! On those games in which up/down/left/right control is desirable, the spring-returns are activated. The trimming controls can then be adjusted to null out any motion while the stick is centered. This gives a positive action that is easy to control—something like the action of the Atari joysticks. For single axis paddle games, one spring may be defeated for linear control within one plane. Other applications may dictate complete free-floating operation. Any way you like it—it's just a click away!

The Kraft joystick appears to be very well made. The components used are of high quality and rated at more than one million operations. A shielded cable with grounding clip is used for connecting to the computer with minimum RF interference, and the joystick's case matches the color and styling of the Apple. All in all, the Kraft joystick is a very fine product.

Kraft also sells a set of game paddles for the Apple. Each paddle is housed in a case similar to that used for their joystick. This may seem a bit cumbersome to anyone who is used to the more slender paddle shapes. It's not the most comfortable paddle to hold, but then it's not the worst either.

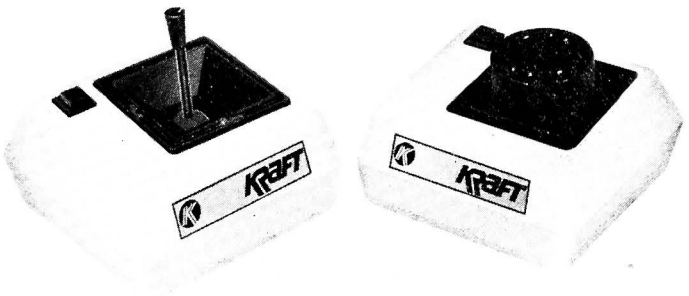


Photo 1.

The Kraft paddle sports a large knob that is easy to grab. You may be in for a shock the first time you turn it, however. Unlike the knobs on other paddles, this knob only turns a few degrees. You go from one end of the travel to the other with almost no wrist action. For playing games, this seems to be somewhat of an advantage. It may improve reaction time and reduce fatigue slightly. In some cases, however, the smaller travel distance means less resolution. Since a tiny movement of the knob represents a large change in value, it may be hard to reach an exact position. This will be most evident in graphics programs or in routines where the paddle position is referred to as a number between 0 and 255. Most of the time, any exact position can be reached; it just may take a little longer than with full travel controls. Other than this tradeoff, the Kraft paddle performs very well as a game controller for the Apple. Its color, styling, and cable are identical to those Kraft uses on its joystick. ◨

Kraft Systems, 450 West California Avenue, Vista, CA 92083; (714) 724-7146.
Sirius Software, 10364 Rockingham Drive, Sacramento, CA 95827; (916) 366-1195.

28. What password is hidden on the restroom wall in the adult text adventure

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BEGINNERS' CORNER

BY CHRISTOPHER U. LIGHT

You can just imagine what a nightmare programming would be if Applesoft didn't have error-handling routines. Think what would happen if, when you tried to load a program too large for available memory, Applesoft went ahead and ran as much of the program as it could instead of quitting and printing an "out of memory" message. Or if, instead of printing "undef'd statement" when the line number referred to in a *goto* command didn't exist, Applesoft simply went to the next line number or, perhaps worse, created the missing line and gave it some harmless command like *cont*? What if, instead of giving an overflow or division by zero message, Applesoft simply used the largest number it could handle?

If computers didn't have error-handling mechanisms, all kinds of horrifying things could happen. The computer that directs the Space Shuttle could load and execute the instructions for launching the shuttle without letting anyone know that it hadn't had room for the landing instructions. A *goto* command in an accounting program could jump to nonexistent line number 10000 instead of to line 1000, which the programmer had meant to type, causing the program to overlook a bunch of costs and blithely show sales and profits rising all the way to bankruptcy. Or the stresses on a new bridge across the Mississippi could be too low by a factor of twenty because, instead of generating an error, accidental division by zero simply created a very large number.

Portents of Disaster. Not all errors can be anticipated, and bridges have fallen occasionally because of design error, but it's essential that programming languages catch as many errors as possible. It's also very, very desirable for programs to print messages that help the programmer or user find and correct errors. If you're working with a program that has a thousand lines, the message "syntax error" isn't nearly as useful to you as "syntax error in line 2390."

The Apple has three kinds of error messages, each with its own prompt. When there's an error in an Applesoft program, the error message is preceded by a question mark; Integer Basic prints three asterisks preceding an error message; and DOS error messages have nothing in front of them. Because Applesoft and DOS error messages are the ones most Apple owners will encounter, we'll look only at them.

Boot DOS by having an initialized disk in your boot drive when you turn on your machine and then enter the following program.

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```
10  FOR I = 1 TO 1000
20  X = I/2
30  PRINT X
40  NEXT I
```

Them's the Breaks. Run the program to make sure it's okay. You should get a rapidly scrolling column of numbers from .5 to 500 in increments of .5. When you've seen enough, hit control-C to stop the program. You'll see the message, "Break in *n*" (*n* being the line number the program happened to stop at). Even though you stopped the program on purpose, this break is technically an error. Applesoft treats it as a special one, though, and leaves out the question mark.

Now type *print X*, and you'll see that control-C does not affect the value of the variables. You can recover from control-C and continue running the program simply by typing *cont* (short for continue). Try it, then hit control-C again.

Now type *continue*. This time your message is "?syntax error" with no line number because the error came directly from the keyboard. Try to restart using *cont*. You get the message, "?Can't continue error." This is for your protection. When a running program is interrupted, you can start it up from that point again only if you have made no changes in the program while it was stopped (you could have changed the value of a variable) and only if no errors have occurred. Again, type *print X*; you'll see that errors also leave variables intact.

Run the program again and hit control-S. The program will stop, and will do so without printing "Break in *n*" to mess up that crucial report that's going to the chairman of the board.

It shouldn't have worked that way, should it? According to your Applesoft manuals, control-S stops only listings, not running programs, which stop only with control-C and its error message. Well, documented or not, it works.

To start the program again, hit any key except reset. If you're printing a report and need to stop the output to change the paper in the printer, control-S is the command to use if you want to avoid an error message on the report. Try it out (just don't bump the keyboard while you're stopped).

Finally, run the program and stop it with reset. The program will stop and, as when you use control-S, there will be no error message—until you try to start the program again. First, type *print X* to satisfy yourself that the variables are still intact and then type *cont*, which does work with reset, at least in theory. This time you should get the message, "Next without for in 40." There's no error in the program, but reset sets some of the pointers back to zero again so they're ready for the next program. In this case, the *for* portion of the loop has been cleared. Even though *cont* will work after reset, reset may have changed the program.

Finding Those Pesky Typos. Now add these lines to your program:

```
5   PRINT X
25  IF X = 100 GOTO 50
50  HIME
```

Run the program. The first number on the screen is now 0 because the command *run* sets all variables to zero as well as the stacks and pointers. After the printing of the number 100, the program will stop with the message, "?Syntax error in 50," where you typed *hime* instead of *home*. Type *cont*. As expected, you get the message, "?Can't continue error" because, as we saw above, Applesoft won't continue after an error.

Now begin again from the top, but this time start the program with *goto 5*. When you use the command *goto n* from the keyboard, the program begins running at that line, and if *n* happens to be the first line, it's almost the same as the command *run*—but not quite.

When the numbers start scrolling on your screen, stop them immediately with control-S. Notice that the first number displayed is 100. Like reset, errors clear certain pointers and stacks but do not zero the variables. If for any reason you want to start over with any command but *run*, be sure you *clear* the variables first, either from the keyboard or at the beginning of the program.

Although the result is basically the same, let's create a DOS error. Type:

```
50  D$ = CHR$(4)
60  PRINT D$ "LOAD SA,PLE"
```

Line 50 is fundamental to using disk commands in programs. It defines the string variable D$ as character number 4 in the official set of ASCII characters. This, as you can see from page 138 of your Applesoft programming manual, is control-D, which is Applesoft's way of notifying the Apple that the next command is a DOS command rather than one in Basic. Once D$ is defined as control-D, the instruction *print D$* in line 60 tells the computer to treat the command enclosed in quotes that follows as a DOS command, just as though it had been typed from the keyboard.

Line 60 does contain an error. Instead of calling for a file called Sample, we typed a comma in place of the M. Run the program and you should see "syntax error" (without a question mark) because of the illegal comma, followed by "break in 60." If you correct this error and run the program again, you should get a file not found error unless your disk contains a file named Sample. In both cases, type *print X* from the keyboard after the program stops and you'll see that DOS errors, like Applesoft errors, leave the variables intact. DOS errors also reset certain pointers and stacks, though.

There's no need to discuss all sixteen Applesoft and fifteen DOS error messages individually. They're well covered in the manuals, and the purpose of this lesson is to show what encountering an error can do to the rest of your program.

Error Handling with Care. Providing error traps in your programs will keep common, simple user errors such as mistyped keys from causing serious errors that make the programs crash. Error traps are one mark of careful, professional programming. Users simply aren't going to continue using a program that bombs every time they accidentally hit a wrong key.

Next month, we'll look at ways of trapping user errors made at the keyboard. In the meantime, here's a bit of not very useful information for the curious.

Under the section on the file type mismatch error message in the cur-

30. Describe one function that can do what no other Apple spelling verification system can do?

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rent DOS manual (page 121) is the sentence, "The program's file name, specified with init or *Update*, must refer to an Applesoft or Integer Basic program file."

Update? What command is that? It's not listed in the index of either the DOS manual or the Applesoft manual. If you try to use *Update* as a command the way you'd use *init*, you get ?syntax error. Despite the reference to it, *Update* is not a command. It's also no longer useful. *Update* is a machine language program on the old DOS 3.2 System Master that upgrades the DOS on a disk from 3.0, 3.1, or whatever to 3.2. It also converts a slave disk, which will boot only on a machine with the same amount of memory as the one that was used to initialize it, to a master disk, which will boot on any Apple with at least 16K of memory.

Fun with File Names. In the process, *Update* also changes the name of the greeting program. If you're not careful, you can end up with a disk whose files will load and run if DOS is already booted from another disk but will not boot successfully by itself. You can create the same difficulty on a 3.3 disk using the *rename* command. Although useless from the practical standpoint, it's worth doing once to learn a bit about how DOS works.

Take a blank disk and initialize it with some small greeting program by typing:

```
NEW
10  HOME
20  PRINT "HELLO"
30  END
INIT HELLO
```

When you've initialized the disk, type:

```
RENAME HELLO, GREETINGS
```

and check the catalog to make sure the name has been changed. Now the commands *load greetings* and *run greetings* work fine. But *pr#6* gives you a "file not found" message.

When you initialize a disk, your Apple copies the disk operating system onto it and enters into it the name of the Applesoft or Integer Basic program you have given it. When you later boot that disk, DOS searches the catalog for an Applesoft or Integer Basic file with that name and then runs that program. If a program with that name isn't there, the disk won't boot. If you have a friend you'd like to confound, send him or her a disk initialized with this program:

```
10  HOME
20  VTAB 5
30  PRINT "THE MIRROR, MIRROR ON THE WALL SAYS"
40  PRINT:PRINT " 'YOU ARE THE FAIREST OF THEM ALL' "
50  VTAB 20
60  PRINT "(LEAVE YOUR APPLE ON. IF YOU TOUCH A KEY,"
70  PRINT "YOU'LL NEVER SEE THIS MESSAGE AGAIN!)"; : GET
    A$: PRINT
80  D$ = CHR$(4)
90  PRINT D$; "RENAME HELLO,NEVER MORE"
100  PRINT D$; "RENAME TEMPORARY,HELLO"
110  PRINT D$; "DELETE NEVER MORE"
```

Initialize the disk with the name *Hello*. Then save on it the following program with the name *Temporary*:

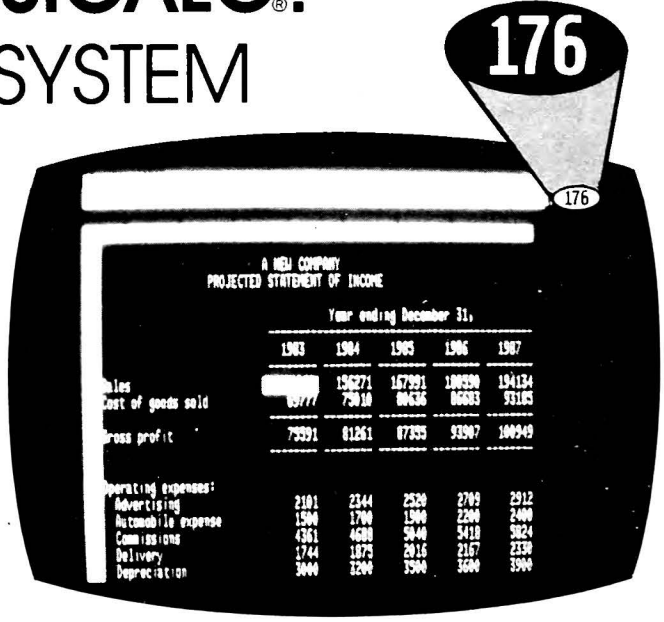
```
10  HOME
20  VTAB 10
30  PRINT "SORRY, YOU ONLY GET TO SEE IT ONCE."
```

What will happen when the disk is booted ought to be obvious from the program. If not, initialize two disks with the first program and then save the second program on both. Boot one disk to see for yourself.

Next month: Errors, part two—trapping users' mistakes. ∎

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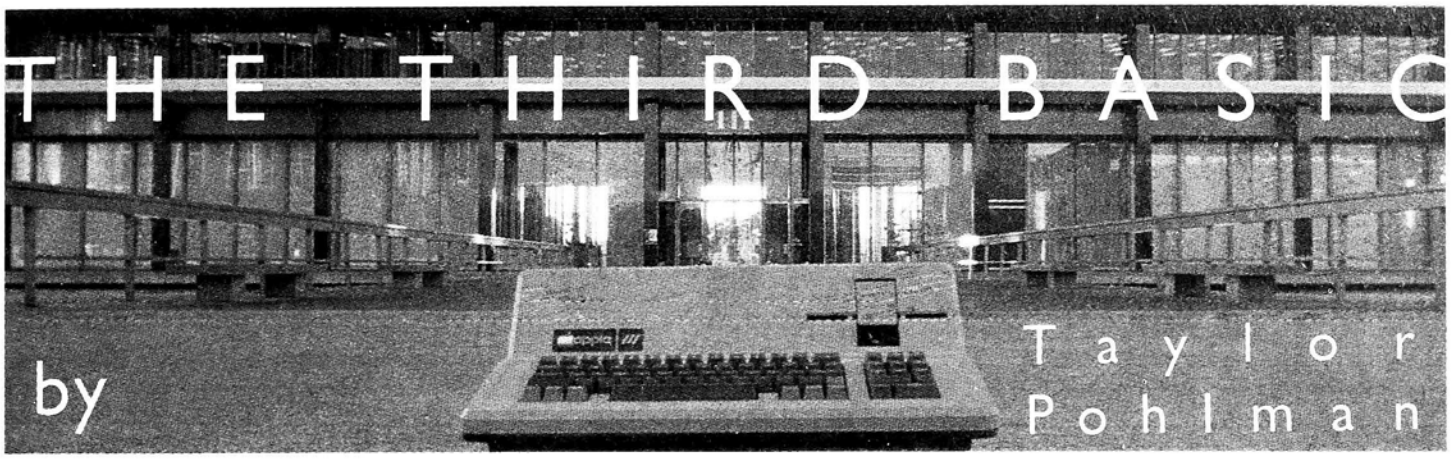


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Exploring Business Basic, Part 13

Last time we plunged as far as anyone seemed to dare into creating special screen functions. As is the usual pace in this column, we will now move swiftly from the sublime to the overly intense, and in the process answer last month's mystery question, "How can I tell the difference between the return and enter keys?" We asked this question, or something like it, last time when we delved into creating a data entry screen builder program. Rather than answer the question by inserting that capability into the data entry program, we'll provide a general-purpose keyboard read program that you can modify to any number of uses.

Two Bytes Are a Lot To Swallow. Before getting into the program, let's consider some possible solutions and their problems. We have agreed that the only difference between enter and return is that the enter key, along with the rest of the numeric pad and some other keys, is a special key within the SOS keyboard definition. That means that although a normal read to the console returns an ASCII value of 13 in both cases, a two-byte read will return a flag in the keyboard status byte that indicates whether or not a special key was pressed. The layout of the two bytes is shown in figure 1 (stolen from Appendix G of the *Standard Device Drivers Manual*).

Well, this looks deceptively simple. We learned in a previous episode that there is a control call to the console driver (using request.inv) which can put the keyboard into two-byte read mode. This is device control call number three. After calling it with a parameter of 128 (hex $80) the console will return two bytes for each keypress. Okay! Now all we have to do is perform the control call and input from the console, right? Unfortunately, ordinary reads don't work too well. They keep expecting the line terminator character (normally return) and when two bytes pop up, input gets confused. Okay, still keeping it simple, let's do a get, which doesn't require a terminator character. Oops again. Get expects to receive only one character, and, in fact, informs the console of this desire. The console keeps getting two characters each keypress, and for reasons too bizarre to discuss here, returns no characters to the get. Get, expecting always to receive a character as soon as one is typed, bravely returns a null string to the user, no matter what was typed. Interestingly enough, the ASC function interprets a null string as having an ASCII value of −1. You may have to try that one to believe it.

Byte One.

7	6	5	4	3	2	1	0
Open Apple	ASCII Character Code						

Byte Two.

7	6	5	4	3	2	1	0
Special Key	Kybd On	Closed Apple	Open Apple	Alpha Lock	Control Key	Shift Key	Any Key

Figure 1.

Note: The Keyboard On and Any Key bits will normally be 1 for any keypress. The other bits will be 1 only if that particular function is active.

Waiting for Baudot. Now that all that's clear, let's get back to the original question. How can you do it? The most plausible answer lies in yet another console capability, the little-known *no-wait read*. We want to read all the characters in the input buffer, anytime, without a termination character. Console control call number ten, with a parameter of 128, does just that. With that in mind, let's look at a program to monitor the keyboard and print out the two-byte code for whatever is typed.

```
 5  INVOKE"request.inv"
10  HOME
15  PRINT"Test two byte reads"
20  PRINT:PRINT"Input buffer contains: ":HPOS=0:VPOS= VPOS-2
25  OPEN#1,".console"
30  hex80$=CHR$(128):hex00$=
    CHR$(0):clearendvp$=CHR$(29)
35  device$=".console"
40  PERFORM control (%3,@hex80$) device$
45  PERFORM control (%10,@hex80$) device$
50  ON ERR GOTO 100
55  ON KBD GOTO 65
60  PRINT"/";:FOR j=1 TO 200:NEXT j:HPOS=HPOS-1:PRINT"\";
    :FOR j=1 TO 200:NEXT j:HPOS= HPOS-1:GOTO 60
```

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Line 5 invokes the request.inv module, which performs SOS calls. Then lines 10 through 35 set up the screen and initialize variables which will be used later. Line 40 performs the control call which puts the console into two-byte read mode. Line 45 puts the console into no-wait mode, so that read requests are immediately filled with whatever has been typed up to the point of the read. Line 50 is *very* important. It sets up a jump to a "back to normal" routine that we'll put in later. If for some reason your program terminates without setting everything back, Basic will become very confused, and you will have to reboot. This is because Basic, like everybody else, uses the console driver for input.

Sometimes It's Proper to Interrupt. Line 55 starts the interesting stuff. We could, of course, keep reading the console until something showed up (sometimes called *polling* the keyboard). A better, more efficient way is to use the keyboard interrupt as a trigger to go and look at what was typed. Between keypresses, line 60 keeps something interesting going on on the screen, to let you know that it's waiting. Obviously, the routine at line 60 could be expanded to do useful work (more on that later!).

When a key is pressed, the *on KBD* statement in line 55 sends the program leaping to line 65. That routine looks like this:

```
65  OFF KBD
70  INPUT#1;char$
75  PRINT:HPOS=24
77  FOR k = 1 TO LEN(char$):PRINT" ";MID$(HEX$(ASC(MID$
    (char$,k,1))),3,2);:NEXT k
79  PRINT clearendvp$:PRINT
80  IF char$=CHR$(9)+CHR$(199) THEN 100
85  HPOS=0:VPOS= VPOS-3
90  ON KBD GOTO 65
95  RETURN
```

Sometimes It Isn't. First, we turn off keyboard interrupts, and then perform a file input statement to get the accumulated characters. Using file input (*input#*) is unusual, since it is generally easier to use the value of *KBD*, the reserved value containing the ASCII value of the keypress that triggered *on KBD*. However, if you think that a two-byte read confuses get, it really blows *KBD*'s mind. Note that with no-wait on, an ordinary input statement only returns the first byte in the buffer (don't ask why!). Thus we use input#, and since no-wait is turned on, we'll get any characters currently in the buffer placed in the variable char$.

Line 77 scans through the string and prints out the hex codes of each character there. By scanning the entire length of the string, we take care of the case of any characters being entered while the previous set of characters were being processed. Don't let the somewhat complex print statement in line 77 throw you. It is simply taking each character, converting it to its ASCII equivalent, converting that to hexadecimal notation, and then extracting the rightmost two hex digits (since the value is always 255 or less—$FF in hex). Line 79 prints the console command to "clear to end of viewport" (CHR$(29)). This ensures that if the previous display contained multiple characters, the excess ones will be erased when the print occurs.

Line 80 gives us a way out of the program, by testing for a certain two-byte combination. Checking your keyboard chart should prove that the desired combination (read as an ASCII 9 followed by an ASCII 199) is a control–shift–tab. You can change the exit to any combination of keystrokes just by substituting the appropriate character codes in line 80. If the characters don't match, the routine resets the display location and returns to the little time waster in line 60.

Reality Revisited. In the event of a match (or an error), lines 100 through 125 clean things up and terminate the program. They look like this:

```
100  REM return to reality
105  PERFORM control (%3,@hex00$) device$
110  PERFORM control (%10,@hex00$) device$
115  PRINT:PRINT
120  CLOSE:INVOKE
125  END
```

Now that you've typed in this little jewel, you can try some interesting things. So far we've discovered ten different variations on the letter A, and there are bound to be more. Those who think the Apple III only has two function keys, think again! The combinations are practically endless.

When you are tired of trying out all the weird combinations (like Open-Apple,, Closed-Apple, Control, Shift, Alpha Lock A), then consider the more useful ones. Return is read as *0D 41*, which means carriage return with *keyboard on* and *any key* flags set. Enter, on the other hand, is read as *0D C1*, which means the carriage return with *keyboard on*, *any key*, and *special key* flags sets. Similarly, a 1 on the main keyboard is read as *31 41*, while 1 on the numeric pad is *31 C1*. That's how programs like *Word Juggler* can use the numeric pad as a special function key set. Another handy example is that control-H is *08 45*, while the backarrow key is *08 C1*. This allows a program to distinguish between an ASCII backspace and a cursor backspace. *Apple Writer III* uses control-backarrow (*08 C5*) for deleting a character and a simple backarrow (*08 C1*) for cursor movement. With single-byte reads, these two different combinations would be indistinguishable.

But Will It Play in Peoria? As usual, this column tells you more than you could possibly want to know about almost everything. Knowing all this stuff about two-byte reads, you'll probably be able to develop applications with the keypad and other keystroke combinations that really simplify things for the user. An added benefit, and possibly the subject of a full article one of these days, is the ability to do useful work within a program while waiting for the user to type something. For instance, your program could print out a disk file which it previously wrote. You could use the driver status calls to tell how many characters are left to be printed and occasionally output enough to keep the printer busy. In some circles, this is known as *spooling* and is considered really tricky. With SOS and the input routine mentioned earlier, it becomes relatively trivial. Good luck, and have fun!

P.S.: Next month's column is a long treatise on sorting techniques in Basic, including some routines that can sort a thousand items in a minute or so. Unbelievable? Watch this space! Until then, a final puzzle: What combination of keys creates the largest value for a two-byte read (considering both bytes as one sixteen-bit unsigned value)? Answer next time!

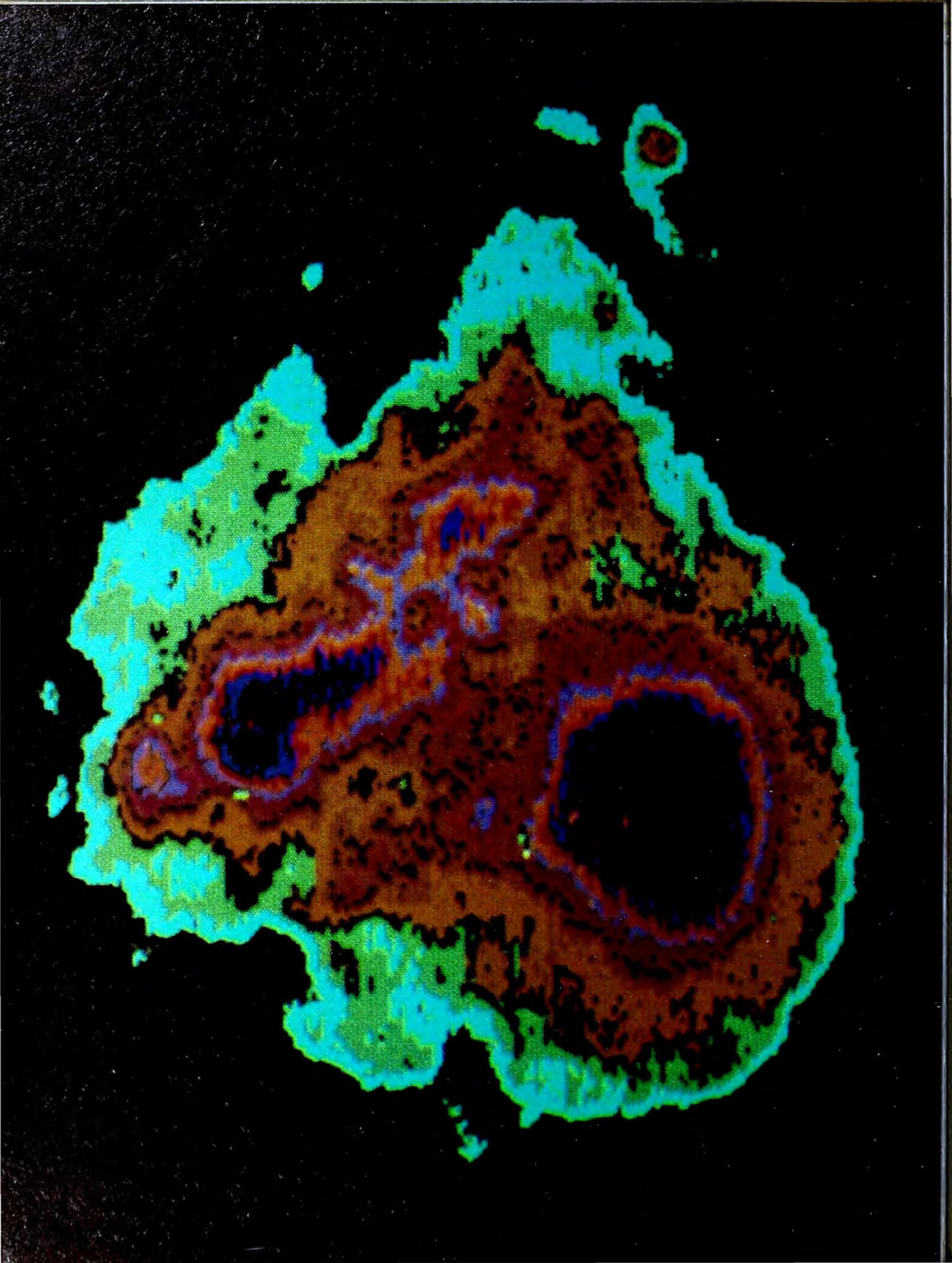
32. What name illustrates the best-selling arcade line from Sierra On-Line Inc.?

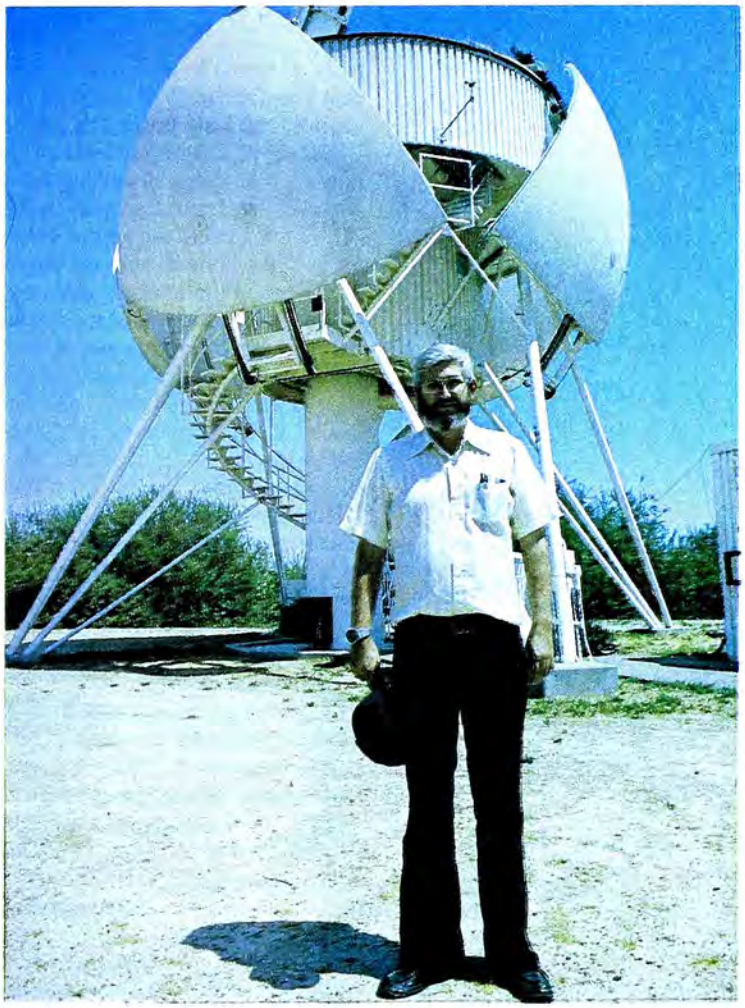
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Apples of the Sun

BY DAVID HUNTER

The launching on February 14, 1980, of the National Aeronautics and Space Administration's Solar Maximum Mission signified to solar astronomers the end of the Dark Ages. In September of that year, orbiting four hundred and ten miles above the earth, the satellite had provided the most incontestable evidence to date supporting a theory long held by some of the best minds in the field: The sun is a variable star.

Mira is a red-orange variable star in the equatorial constellation of Cetus. The total brightness of Mira varies from magnitude two to magnitude ten (a lower number of magnitude means greater brightness—magnitude six is the dimmest you can see with the naked eye). The complete cycle of Mira's brightening and dimming takes about three hundred and thirty days.

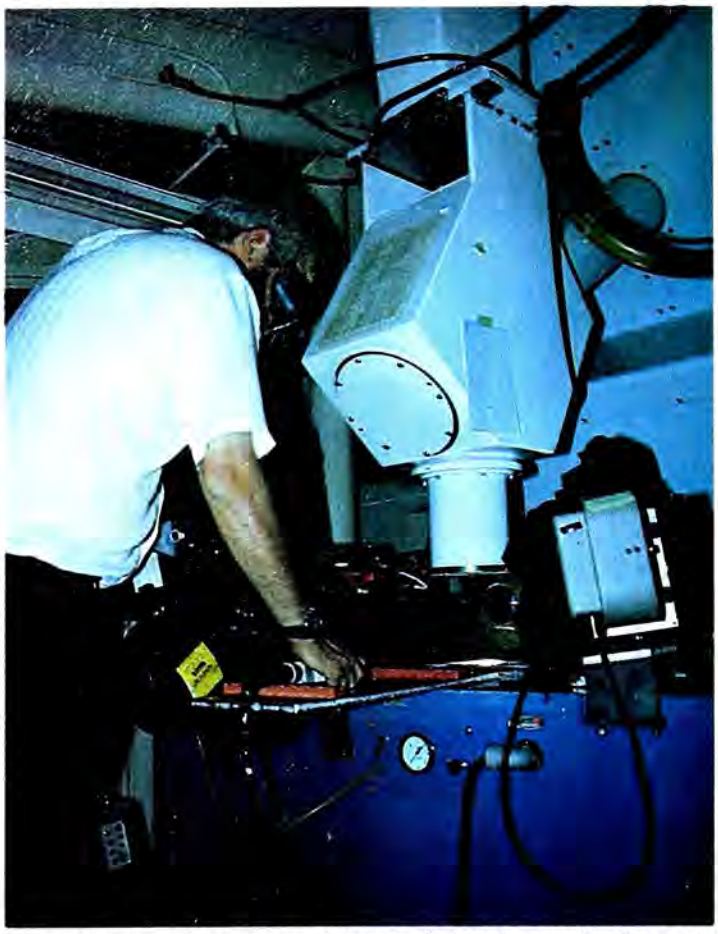
Buying real estate on a planet in the Mira system is not recommended. A difference of five magnitudes means a difference of one hundred in brightness. Eight magnitudes difference means Mira shines twenty-five hundred times brighter than its minimum every nine-tenths of an Earth year. One nice thing about variable stars is that they are regular—most of the time.

Our Exceptional Sun. Our local star, the sun, is not so regular. According to data gathered by NASA's SMM on the sun's total luminosity using the Active Cavity Radiometer Irradiance Monitor experiment, slight fluctuations occur almost daily. The amounts are usually small, about 0.05 percent, but dips in luminosity of 0.2 percent (one part in five hundred) have been recorded. The more dramatic dips have coincided with the appearance of large sunspots on the sun.

For the past few thousand years, humans have been trying to discov-

Above: Solar astronomer John Lawrence in front of the main telescope of the San Fernando Observatory. Opposite page: False color image of a large sunspot taken at the San Fernando Observatory. The penumbra is colored orange and green. The coolest portion of the sunspot, the umbra, is colored dark blue.

Sunspot photo, copyright San Fernando Observatory, Sylmar, California



Lawrence peers at the mysteries of the sun with help from the San Fernando Observatory's twenty-four inch vacuum telescope.

er what the sun is made of and how it works. We know the sun is about 864,000 miles in diameter and 93,000,000 miles from the earth. In tons, the sun's weight is 219 followed by twenty-five zeros. We know the sun is a giant sphere of gas, very hot in the center and relatively cool at the edges.

Furthermore, the sun is a giant fusion reactor rotating on its axis—every twenty-seven days at the equator (the closer toward the poles, the slower the rotation). In the dense central core, hydrogen atoms fuse into helium atoms in a three-step proton-proton reaction. The conversion of the missing mass from this reaction (the resulting helium nuclei have less mass than the original hydrogen atoms) powers the sun and brings light to our sky.

There's no doubt about it, the sun is a fascinating subject about which many questions remain unanswered. Why does the sun change its diameter sporadically? What causes sunspots? What are coronal holes? Where are the neutrinos? Each time a question is answered, ten new ones are generated.

The Lonely Seekers. Enter John Lawrence and Gary Chapman of the San Fernando Observatory in Sylmar, California. These solar astronomers, who double as professors at California State University at Northridge, both use Apples in research. They are but two of many thousands around the world studying our fiery and mysterious neighbor year-round.

Astronomers and observatories are a hearty lot. Lonely peaks in faraway places like Peru and Nepal are the poetic locales we've come to expect. The San Fernando Observatory in Sylmar used to reside on a tiny peninsula in the middle of the Los Angeles Reservoir. That was before the earthquake of 1971.

It didn't help matters at all that the observatory and reservoir were smack-dab on top of that quake. The reservoir developed such serious cracks that it had to be drained. The observatory's twenty-four inch vacuum telescope broke loose from its moorings; repairs took over a year. At least the telescope had a chance. The reservoir is still empty.

Let the Sunshine In. The importance of solar astronomy cannot be underestimated. The sun has very significant effects on the earth. It has been shown that prolonged droughts and ice ages can be caused by changes in the sun. Agriculture is the most important activity of our species, and its success depends on the cooperation of our fluctuating, unpredictable star.

John Lawrence may not wield the jawbone of an ass or rescue people from frozen rivers, but he's a hero nonetheless. Calmly and quietly he goes about the work of analyzing data from the sun. What others might consider tediously boring, he relishes.

Lawrence's latest contribution to understanding the sun is a paper finished this spring describing the spatial distribution of umbral dots and granules. Umbral dots are the bright features in the dark central area of a sunspot, called the umbra. Photospheric granules are brilliant bright spots in the photosphere, the luminous surface layer of the sun.

Two Czechoslovakian astronomers, V. Bumba and J. Suda, have posited that umbral dots are morphologically identical to granules, the only difference being the size of the two phenomena. From this they imply that the same convective processes underlie both.

Trashing Old Blinds. Lawrence is not the first to challenge this theory. R. E. Loughhead, R. J. Bray, and E. J. Tappere have cited differences between the sizes and spacings of umbral dots versus photospheric granules. Parisian astronomers A. Adjabshirzadeh and S. Koutchmy have noted the differences in size and shape between umbral dots and granules, in addition to pointing out that umbral dots do not become foreshortened near the solar limb as do granules. The conclusion reached by the naysayers is there are fundamental differences between the two phenomena, though some kind of convective process underlying umbral dots cannot be ruled out.

Lawrence's paper means to set the record straight. "We will compare the work of the . . . authors by means of a statistical study of the distribution of points in a plane," he writes. "Consider a collection of N points in an area A. The points may be randomly distributed, or some underlying mechanism may tend to cluster them together or cause them to be more evenly spaced than random."

Determining a value for the state of randomness is where the Apple comes in. Lawrence wrote his own program for generating random dots in a rectangular or square area. You have a choice as to the size of the area and how many dots. A machine language subroutine handles the point plotting. The program also generates the all-important nearest neighbor measurement and standard deviation.

"The main thing I learned from machine language is that I don't like it much," Lawrence muses. "I like a nice, easy, high-level language."

Each point in a sample must be measured for its nearest neighbor point. You then average this for the whole sample to find the average nearest neighbor distance, L. Much of Lawrence's case rests on this method, which he makes clear in his paper: "[L] is a precisely defined quantity and is more suitable for quantitative analysis than are the 'typical separations' or distances between 'adjacent' or 'neighboring' points referred to in umbral dot literature."

L is converted to a dimensionless, scale-invariant "structure parameter" by this equation,

$$P = NL^2/A = pL^2$$

where p is the average surface density of the points in the sample. A typical value, Po, is expected, on the average, for the number of points P will have in a randomly distributed sample. Points clustered by some nonrandom process are therefore represented by $0<P<Po$.

"P is maximized for regularly spaced points in hexagonal close-packed configuration," Lawrence writes with fervor. "In this case P = 1.155 (for points in a square lattice array, P = 1). Thus, for points with some even spacing mechanism we expect $Po<P<1.155$."

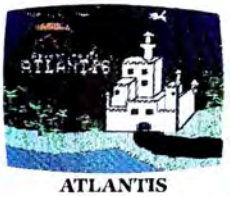
Lawrence determined the value of Po by repeated simulations on the Apple using his random point generating program. Next he empirically determined P for a number of samples related to umbral dots and granules. The idea was to find all the values for P using samples published by Adjabshirzadeh and Koutchmy and Bumba and Suda. Lawrence also tested the centroids of laboratory Benard convection cells and photographs taken at the San Fernando Observatory.

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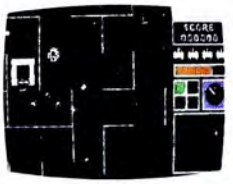
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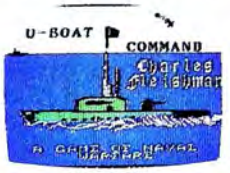
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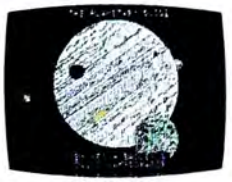


U-BOAT COMMAND

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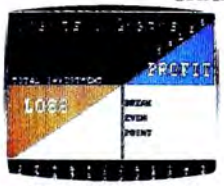
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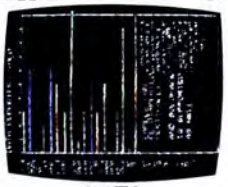

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Synergistic Software

Once he had the values of P, Lawrence used the Apple and elementary statistical methods (student's *t*-test) to reach conclusions about each sample. Lawrence found that Adjabshirzadeh and Koutchmy's umbral dots were more evenly spaced than random—P>Po.

According to Lawrence's research, the centroids of granule cells taken from the San Fernando Observatory photographs and the maps of Bumba and Suda are more evenly spaced than A and K's umbral dots. "Thus, whatever mechanism is regularizing the spacing of these umbral dots is weaker than that for the granules."

Expectedly, the laboratory Benard cells are indistinguishable from photospheric granules in their spacing. Furthermore, the umbral dots mapped by B and S are more evenly spaced than those mapped by A and K; "these maps, therefore, do not appear to represent the same phenomenon." Mysteries like this one warm the heart of your typical astronomer. For the moment, Lawrence is concerned about other things.

The results of Lawrence's paper "are in agreement with that of Adjabshirzadeh, who compared two-dimensional Fourier transforms of granule and umbral dot patterns and found differences at spatial frequencies corresponding to scales of 1 to 2 arc seconds. Our result, however, refers specifically to the distribution of granular and umbral dot features, while the Fourier transform method responds both to the feature distributions and sizes, which are already known to be different."

Who gives a hoot about umbral dots, photospheric granules, and all that? A quarter of the people who saw *E.T.*? The president of the United States? You? The answer in all cases is probably "nope." Wait! Before you skip over to DOStalk or Mind Your Business, take a good look at sunspots. It's enough to give you bad dreams.

Acquitting the Weather Predictors. Sunspots are areas of intense magnetic fields. Sunspots rise and fall in abundance during an eleven-year period. At the end of each eleven-year cycle, the sun's general magnetic field reverses polarity. Santa Claus is suddenly living at the South Pole. Thus you have a double sunspot cycle of twenty-two years.

Through the use of dendrochronology (establishing dates of events from tree-ring patterns) and other esoteric methods, astronomers have been able to trace sunspot activity back before the Romans. The eleven-year cycle has been remarkably steady despite slight deviations. Unfortunately, remarkably steady isn't good enough.

From roughly 1645 to 1715 the sun went through what is called the "Maunder Minimum." All traces of an eleven-year cycle disappeared. During this long period there was very little sunspot activity overall, and most of Europe was in the grips of what has been called the Little Ice Age.

There is no question that sunspots affect weather on the earth. The Great Plains area of the United States was hit by severe drought in 1815 through 1818, 1842 through 1847, 1866 through 1869, 1890 through 1892, 1912, 1934, 1953, 1976, and 1977. Every twenty-two years or so, in synchronization with the sun's magnetic twist, the West is pulverized by drought. Look for another bout around the turn of the century.

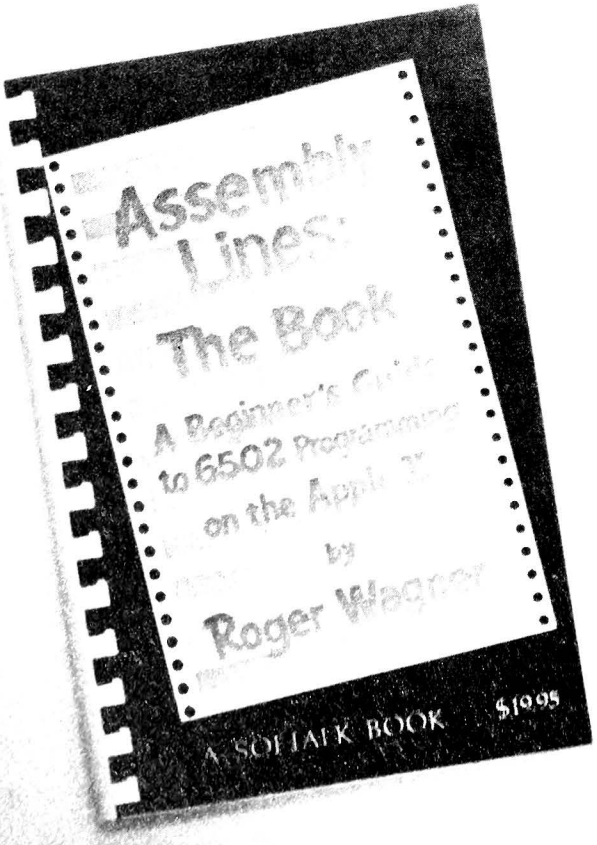
"It's hard to explain. No one knows what's going on," says solar astronomer Gary Chapman. "The sun goes through little fluctuations. Sunspots are a skin effect, but they seem to affect the sun's total energy output."

A solar astronomer since 1967, Chapman has been with the San Fernando Observatory for all but one year of its operational lifetime; long enough to see the facility change hands. Originally part of the Aerospace Company, the observatory (built in 1969) is now owned by California State University at Northridge.

"There are two theories," he continues. "One claims that sunspots are like volcanoes, sucking energy in and out, upward and downward. The other maintains that sunspots are blocking energy, so that it can't get to the sun's surface.

"We're studying the effects of sunspots on the sun's variability. They definitely change the total output in small amounts. Now we want to know what happens to the energy. Where does it go?"

Driving Old Sol. Chapman, like his colleague Lawrence, has to travel a long road to find the answers, and that means analyzing a lot of data. The information in question comes from the Jet Propulsion Laboratory in the form of solar radiance observations taken from the Solar Maxi-



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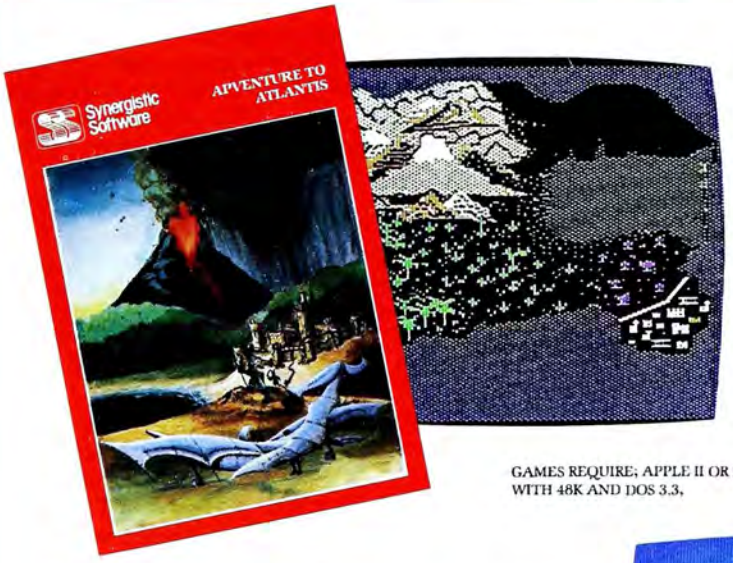
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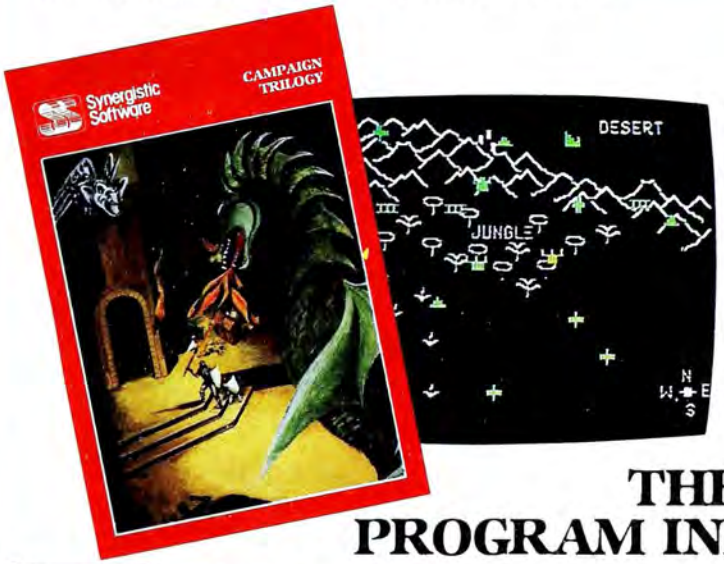
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mum Mission.

The key measurement here is watts per square meter. Chapman takes the observations from space and correlates them with theoretical models of sunspots. To do this he uses an Apple and the *HSD Regress* program from Human Systems Dynamics.

"I've got the minimum system at the moment—no disk drive and no printer," says Chapman. "When I want to work with *Regress*, I borrow my next door neighbor's disk drive. I look forward to the day when I can upgrade the system, though the cassette tape deck has worked just fine so far."

For both Chapman and Lawrence the Apple has been a godsend. Ask any engineer or scientist who works in a research facility with only large computer systems and you'll understand why.

At the San Fernando Observatory the computer system is more than ten years old and it's only suited for specific, sophisticated tasks, like image processing. Personal computers are small and easy to use, perfect for the research scientist who needs more than just large-scale number-crunching.

Lawrence and Chapman like their Apples so much that they want to make them a permanent fixture at the observatory. At the moment, the two solar astronomers have their Apples at home. The university definitely supports the use of Apples; the physics and astronomy departments share two dozen for instructing students.

Publishing on Sun Standard Time. Chapman's work concerning the effect of sunspots on the sun's variability will eventually become part of a paper. He's not announcing any conclusions at the moment, but that's not unusual. It's easy to look for something while doing research and then, once you've found it, stop looking. The dedicated researcher doesn't believe the sky is blue or rocks are hard until it's been verified six ways from Sunday.

At last word, Chapman's paper count was thirty-five. "I'm still planning to write a book on magnetic fields in the sun." He points to a pile of notes and charts for the half finished project.

"Once or twice a year I get a letter from this technical book publisher in Holland asking me, 'What about that book?' At this rate I'd need a six-month sabbatical, where I could hide away and work only on the book. My responsibilities at the observatory and university are a big drain in terms of time. I enjoy them, but my own projects get shoved aside."

Earth Interfering. A rigorous academic schedule weighs down some solar astronomers. On a completely different level, volcanoes can disrupt the work of astronomers in a whole hemisphere.

In March this year, the Mexican volcano El Chichon burst into action and within a week built to an explosive crescendo. On April 4 it launched a terrific stream of sulfur-rich ash and gas that reached as far as the stratosphere. Stuck there for a while, El Chichon's cloud is spreading and will eventually cover the entire Northern Hemisphere. It's making work difficult for many solar astronomers.

Regular clouds go away eventually. It rains, it snows, but next week it's clear again. El Chichon's cloud won't dissipate for at least a year. That it's blocking rays from the sun makes the cloud more than just a headache for solar astronomers. The cloud may lower the temperature between 0.1 degree centigrade and 0.3 degree centigrade. This is a fairly significant drop, though no one knows exactly what will happen. Mount Saint Helens's effect on the temperature was less than 0.1 degree centrigrade.

On the Sunny Side of the Street. Weather and volcanoes aside for the time being, Lawrence and Chapman are steadily whittling away at the unknowns of solar science. Both have done their own programming, but packaged software has come in handy. Lawrence and Chapman are grateful to Human Systems Dynamics. Chapman has nothing but praise for *Regress* and Lawrence used the *Stats* program extensively.

Actually, they didn't have far to go to find help. John Lawrence is married to Virginia Lawrence, founder of Human Systems Dynamics.

Meanwhile, the sun shines and humans go about their business. Someday we may all be swept away by a bigger than usual belch from the sun. We're probably the by-product of cosmic indigestion anyway. Pleasant dreams. ■

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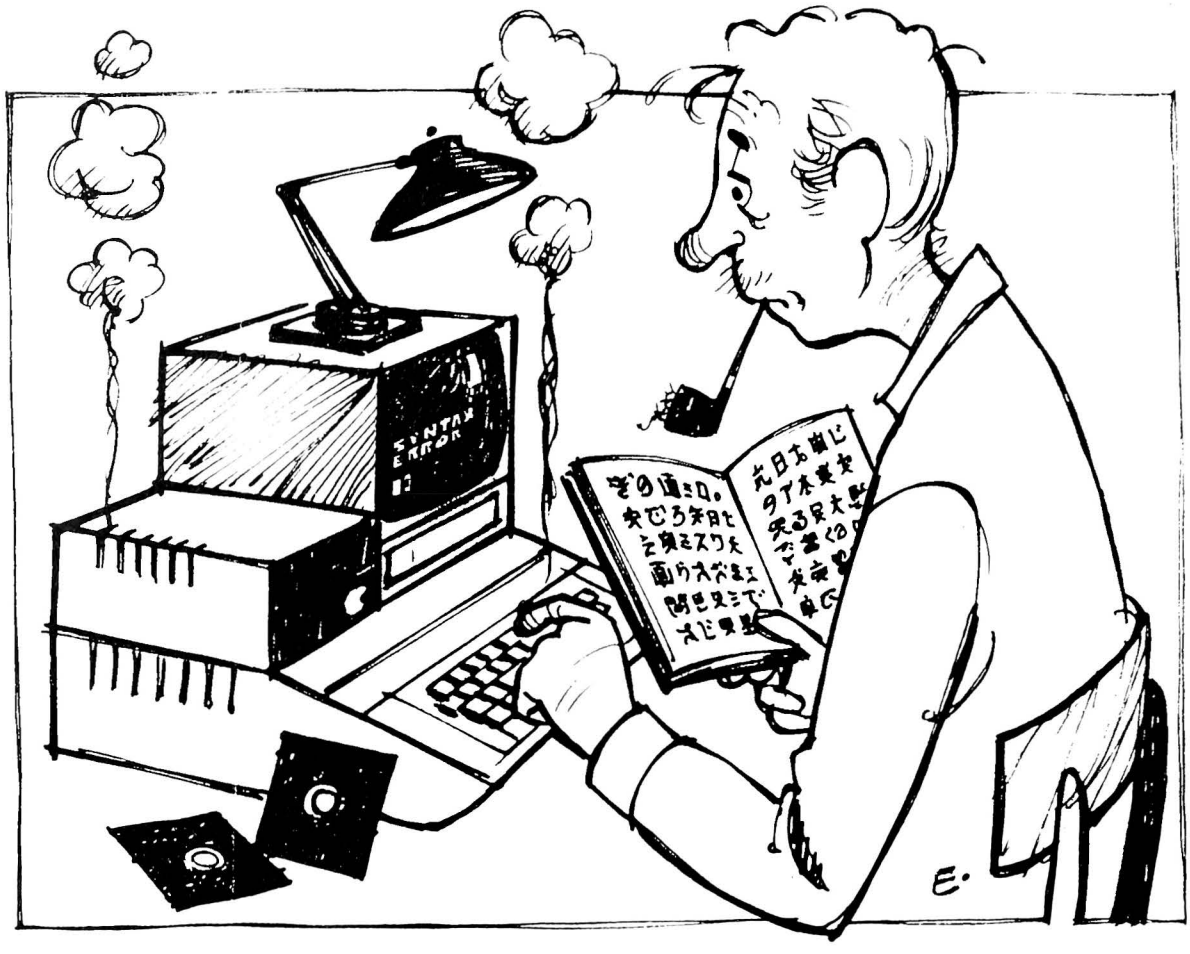
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A Nerd in the Orchard

BY K. O. ECKLAND

There's this fellow, you see, a little below me in things like creature smarts, spelling, wearing matching socks, and other things of consequence, but when it comes to computerese, my neck is getting stiff from always looking up at him. He is least interested in which side his hair looks best parted on, Marlboro Lights, form 1040s, Budweiser, *Rocky III*, how to fix a flat, who's in office with the city council or on third base with the Dodgers, and I get a distinct impression he recognizes the opposite sex because they're the ones that dance backward.

What he does care about is computers. His brain is pure Applesoft. It is a portable dumpster filled with singular jargon, miniature circuits, and schematics designed to fit on the head of a pin. He probably hasn't seen a syntax error in five years, poor soul, and he doesn't have to be reminded to close the disk drive door. His voice sounds a lot to me like machine language looks. He can not only read the *DB Master* manual but he understands it. His milieu is a little section in the back of the local Apple shop, impressive with its multicolored ribbon cables, humming test equipment, and the aroma of frying electronics. He's the product of an age. And he scares me.

Why? Because, simply stated, he is one of the thousands who set the pace. And they forget I've got this game leg.

He and his kind got into computers when they were passing out bottom rungs, and there's no way that I or my kind will ever catch up. They all talk funny, they spend their time in the front sections of the magazines, they wouldn't be caught dead playing *Snack Attack*, and they all have to be booted to get them going. Strangely enough, we have developed an odd sort of Archy and Mehitabel relationship, mainly because he probably feels the same way about me as I do about him. To him, I am a side dish he hadn't ordered. Perhaps, deep within his ROM circuits, he feels a bit of empathy—pity, at least—for me.

So, anyhow, in between repairing Apples and their umbilical accumulations, he dabbles in programs and assembling machine language in some understandable order. His latest creation is one that allows any nerd (me) to use a "pen" to draw harmless little squiggles or the *Mona Lisa* in hi-res graphics, to add type of any proportion I choose, and to wonder ultimately what I'm supposed to do with it all.

"I'll make a dupe of my program," he volunteered. "Take it home with you and play with it. Give me your thoughts on it." Handing a gun to an idiot.

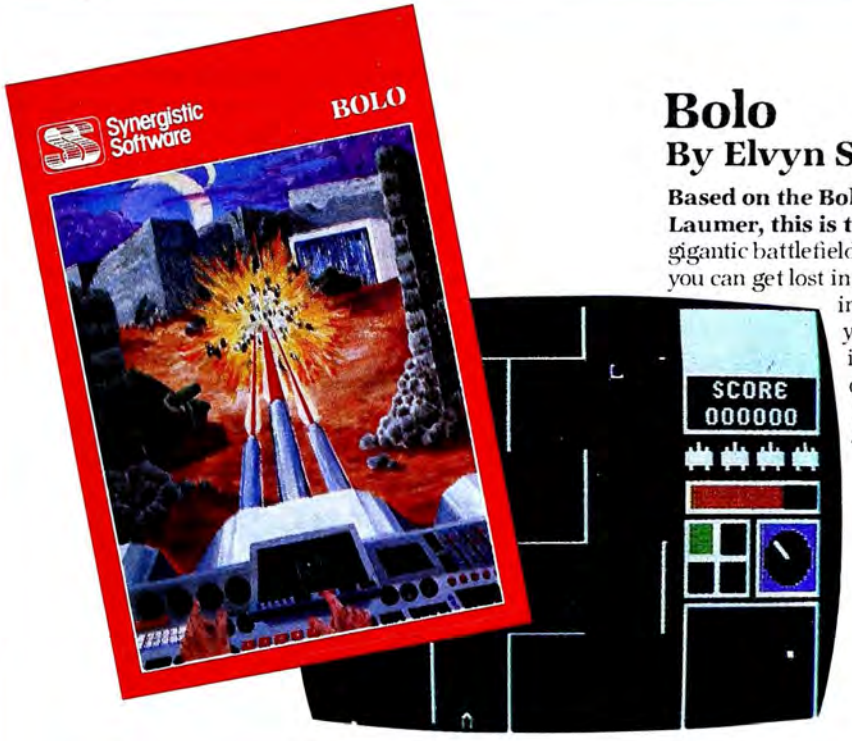
"Fine," I agreed. "But only on one condition. If you ever decide to release this for public consumption, I get to do the manual."

He looked almost relieved. So did I. We would have shaken on the pact except he had a small soldering iron in one hand and a peanut butter sandwich in the other and I didn't want either one leaving their mark on me.

This overt act of benevolence on my part was sort of self-defensive in context. I wish I could write all the manuals. That way, I would understand all the manuals—and now we arrive with a thud at the part with the meat in this treatise.

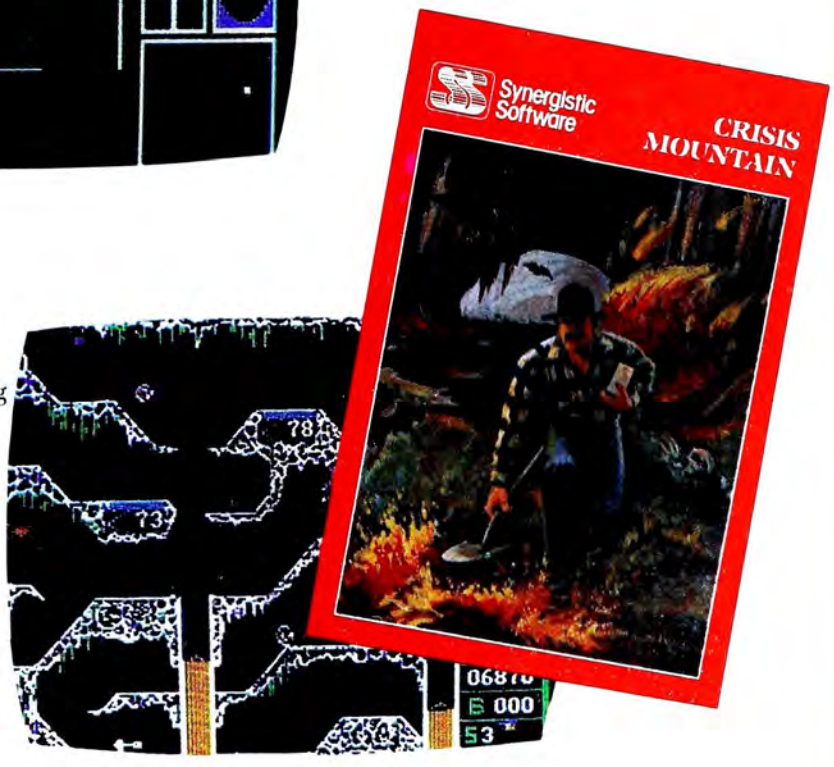
Divide the world of computerdom into two hemispheres—the nerds and the geniuses. Granted, there are subdivisions of this hypothesis but, for now, let's work on understandable terms. Who write the programs

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for this world? Right, the geniuses. Who sit in little rooms, devising the *Raster Blasters* and *DB Masters*? Right again. And who write the manuals for the aforementioned? You got it, pal.

Now, let's move across the border and put a glass on the guy who has a manual in his hand—the nerd. He has just spent the better part of his welfare check on a disk that will deliver whatever it promises in four colors on the package face, usually complete with half-dressed nymphets. The manual will be a bridge between the two continents, if the nerd can fathom anything past the page numbers. Chances are good he can't.

Again, why? Because the geniuses are communicating with their own kind. They haven't the vaguest idea how to deal with a computer intellect less than their belt size, even though this represents perhaps some three-quarters of their audience. I speak with authority because I have not only been there, I am there.

I have been the proud guardian of an Apple II for more than a year now and, although my talent and command of the art may impress one who is just now sticking a cautious toe in, I still dare not open my mouth around the local Apple shop for fear the real nerd will emerge in full color for all the geniuses to see. After a year, I am still befuddled by machine language—I must cop a plea that the principal use for my Apple is word processing—and the best I can produce from my *DB Master* is a few address labels disproportionate to the cost of the package.

A pity, really. I do want to understand the nuts and bolts more than I do but, short of signing up for an expensive course that will take me a bit further than I care to go, my expertise will be severely limited to articles such as this and some address labels. Oh, maybe I'll get the *Mona Lisa* done in hi-res color but damned if I know how to get my Epson to regard the work as more than a dry program listing. On the plus side, I have managed to *poke* around and alter a *Twinkle, Twinkle, Little Star* program to where I can get my Apple to perform a reedy Bach fugue. However, I would love to *poke* once on my own and not wonder if this is the one that's going to produce blue smoke from inside the Apple.

So, I am left quite alone in a world I never made—much less expected—faced with magazines, manuals, and advertising geared to the geniuses. I am pitted against game paddles bearing instructions like: "Be sure to insert game paddle IC with colored dot facing toward the back of computer." Simple? Boy, I hope to kiss a crippled cricket that's simple. Only they forgot to put on a colored dot, assuming everybody knows by now which way they go in, I guess.

I fastidiously copy a program from a magazine, devoting several hours of my life to what turns out to be in Integer Basic instead of Applesoft. How to modify it? No sweat—a summer course at MIT ought to take care of that dilemma.

I can dazzle friends by bringing up a real clock face on the screen but have yet to figure out how to get a CPS card to tell an Epson what time it is in print. Oh, it's in the manual, I know, I know, but it isn't in nerd-talk.

Perhaps the best example of a nerd-oriented chapbook is the one accompanying the basic TRS-80, my introduction to computers. This one should be a standard of the industry by now for lucidity in communication. By the time I was through the last chapter, I had, by God, mastered Basic and I even knew how to use loops and *data*. That someone had picked up on the idea was apparent with one other manual I got my hands on—it started out superfriendly:

"Well," it smiled warmly at me from the first page, "we're going to have fun together, aren't we?" And then, while I was still wagging my tail, it proceeded to tell me I'd better put such-and-such at A$2000 and set *himem*. Problem. I didn't have two thousand bucks handy and I didn't remember where I had left *himem* lying the last time I might have used it. End of manual. Back to the nerd world.

I see a few heads nodding out there, so I'm not alone. Perhaps all of us nodding nerds should get together and form a club, maybe offer to write all the manuals for the geniuses at a reduced rate. This way, we can honorably perpetuate our own species, maybe even gain an upper hand someday. I mean, can you picture what computers in everyday life would represent if everyone understood them? At least the handbooks?

Why, it's positively whelming. ◨

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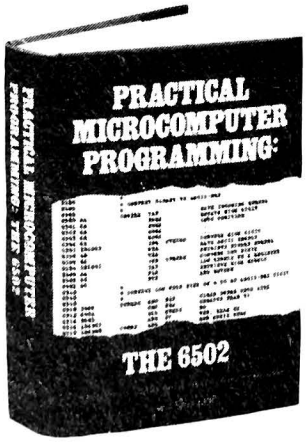
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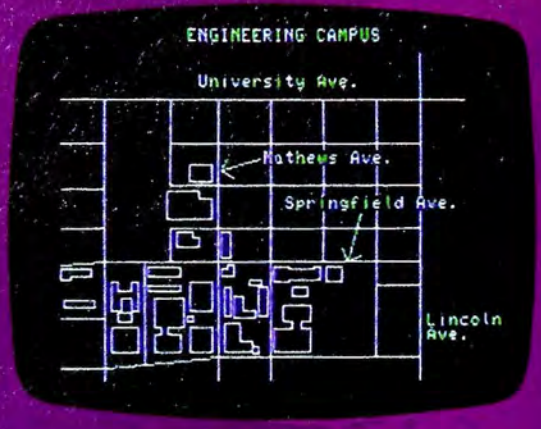
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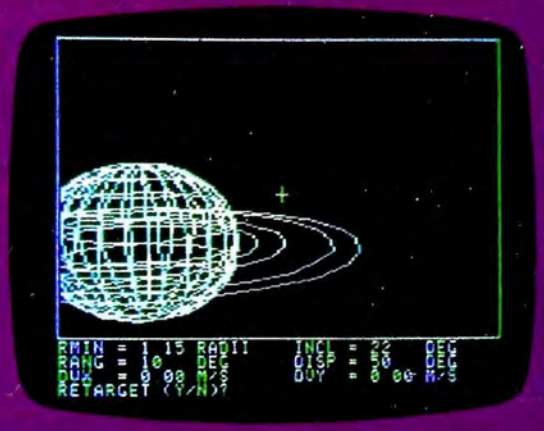
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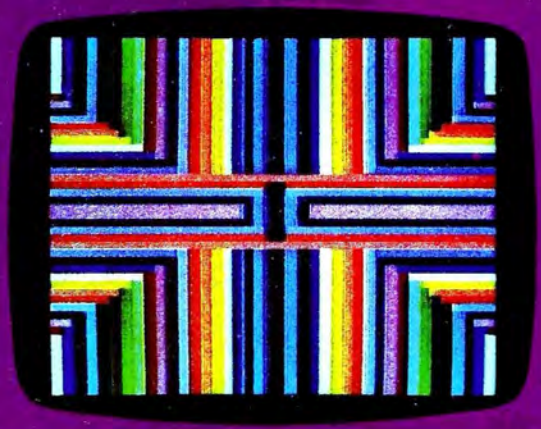
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OPEN DISCUSSION

from page 32

vertisement for the *Word Handler II*, written and distributed by Silicon Valley Systems. I saw the product in a retail store and found that *Word Handler II* provides more capabilities than *ScreenWriter II*, does not require additional hardware, and was less expensive. People without a computer background (like my wife) find it easy and fun to use.

And I want to tell other Apple owners about the excellent service provided by Silicon Valley Systems. They have been extremely responsive in clarifying product features and sincerely interested in feedback and suggestions for product enhancement. The value of my software investment is leveraged by their policy of free updates. Silicon Valley Systems has taken a novel approach in this industry; they back up their product with really first-rate customer service. *Word Handler II* is an excellent software product. I have found it to be easy to use and very reliable, incorporating most of the features of so-called professional word processors.
(Name withheld by request)

Right Over Write

In reply to the question of George Forde, Jr., in August Open Discussion regarding word processors: Switch to *ScreenWriter II*. *Apple Writer* was written by Paul Lutus, a brilliant and eccentric programmer. Unfortunately I don't believe he fully understood what someone using the Apple for word processing might require. On the other hand, *ScreenWriter II* is programmed for the professional or business writer but can be used by anyone willing to spend time learning its intricacies. Another choice (and it's my preference) is the new 40/56/70 version of *Super-Text*. Replying to Gary Griffis's complaint that *Super-Text* files can't be sent by modem, with this new version, they can be.
G. R. Brieger, Redmond, WA

Gift Horse Gripe—No Triple Crown

Just a few words about the most popular word processor for the unadulterated Apple II. Sierra On-Line has updated their popular *Super-Scribe II* and renamed it *ScreenWriter II*. The original program was as buggy as a Houston kitchen in the summer, but the new version has gotten rid of the worst of the old bugs and replaced them with some of its own. I am writing to inform your readers of a bug in the documentation. The solution to this problem cost me several hours and two calls to California.

The documentation speaks of *ScreenWriter II*'s supporting alternate character sets. They then give a couple of lines to be added to the program called *APP2*. The lines will not work unless one adds the same command again as line 9820. In other words, new lines should be added as 7820, 8820, and 9820, each reading: *print D$;"bload* (character set name), *A$C00"*. After the program *APP2* has been saved, the routine *Customize* must be run again. No new information is required in *Customize*, but it must be run again to cause the new version of the program to become a part of the loading cycle. If you are using character sets from the *DOS Tool Kit*, then the address given in the lines mentioned above must be changed to $D00. (This may be true of other character sets as well, but I have had no opportunity to try them.)

None of this information is in the documentation for the program and it requires considerable effort to find it out. Remember that the character set must be run through the program *Upside Down* before it is usable by *ScreenWriter II*. I would recommend copying the character set onto a separate disk and then running *Upside Down*, saving the new upside-down version of the character set to the extra disk and then using *FID* to copy it to the *ScreenWriter II* program disk, since the program disk is very full.

ScreenWriter II is a powerful but frustrating program providing most of the features of a dedicated word processor for the basic Apple II without additional hardware. It is annoying to have to make up a new name for a file each time you change a comma. It is equally annoying to have to run a dummy file just to be able to catalog the text file disk if you load the editor without checking the contents of the disk first. It is downright dangerous to have a program that will overwrite your output file in the process of saving it. There is even an error message to inform you that this has taken place, so it must have been something the authors took into account when they were working on the program. All this can be avoided if one is rich enough to have two disk drives and a 16K RAM card. The ostensibly economical *ScreenWriter II* should have been built to operate safely with the unimproved Apple II, as its advertising would have us believe.
Ed Haymes, Houston, TX

Accounting for the Heartland

The article on Apples on the farm was great. It's about time that farm users got a little recognition. There are a lot of us out here.

There was one serious omission in the software that you mentioned: Griffith Data Services's *FACS*. This is one of the best farm accounting packages on the market. It has features found only in systems that sell for five times its price. It has unlimited enterprise analysis, keeps track of weights and quantities (a

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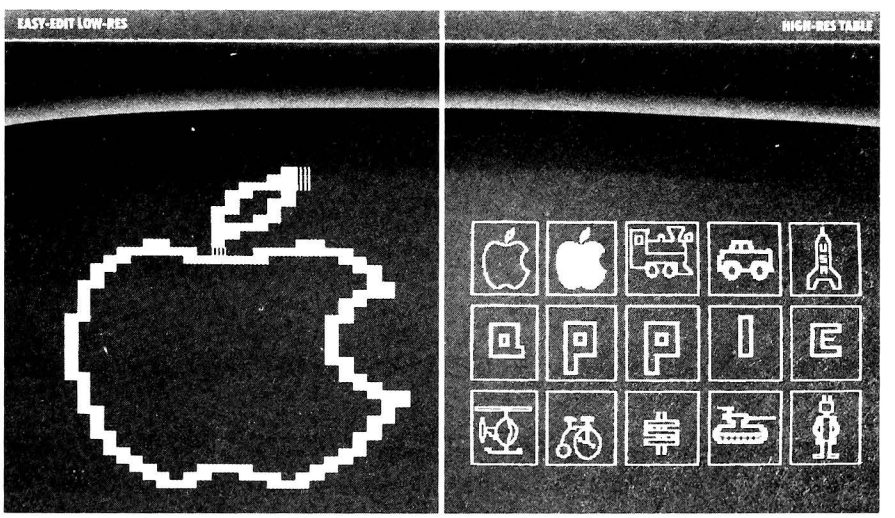
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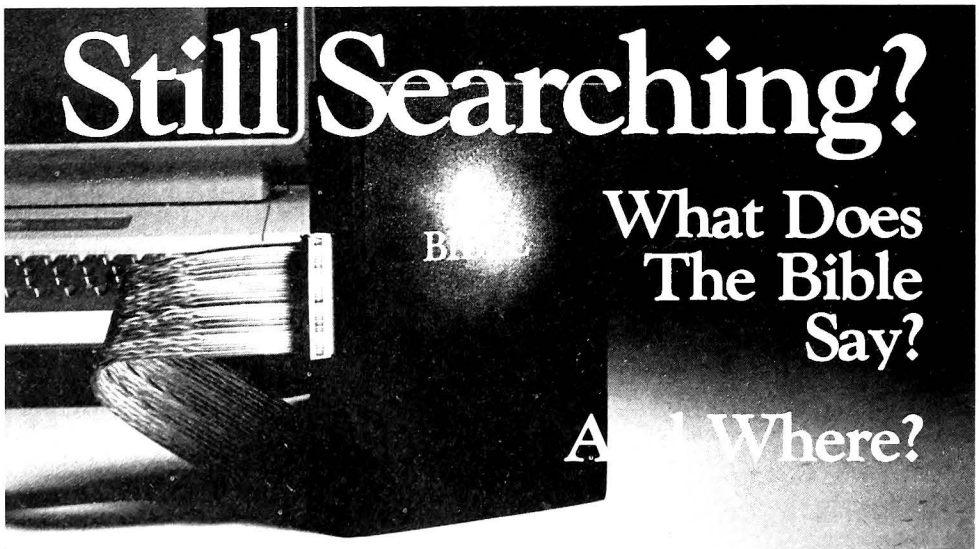
New-Breed Applers Hatching
Microcomputers are beginning to find their way into every walk of life. I moved from California about three years ago and bought a chicken farm. We raise breeding hens to provide hatching eggs to a hatchery for the purpose of providing baby chicks to the many broiler farms in the area. I prepare reports on my Apple that help me keep tabs on just what's happening with my flock. Each day I enter nineteen fields of data regarding the day's activities and use that data to create my reports. I wrote the program myself, and I'm attempting to start a small computer service for people in the area. In my spare time I write for *Nibble*. We also have a small herd (thirty-two head) of cows, but as yet they're not on my Apple.

The next time you put a farming article together, don't forget chickens. They're people too!
Bob Devine, Adona, AR

You may think it foul play, but we were saving poultry for Thanksgiving. Watch for your November Softalk.

Valid Comparisons?
The story on Apple's Apples (June *Softalk*) caught my eye. Such hyprocrisy! Super among the super software protectors, Apple people blatantly talk about how active they are when ripping off the copyrighted materials of any and all printed matter via the copy machine and modem. I suppose it depends upon whose ox is being gored. Maybe *Call-A.P.P.L.E.* and the rest should include in their copyright notice that their articles can only be read by *the* registered pair of bifocals, as do some software houses in their "licenses."
Milton Gussow, Lake Villa, IL

After reading that software companies cry over the practice of businesses purchasing only one copy of a program and making many additional copies for the use of their employees, I was struck by the practices at Apple Computer. It's no wonder computer users engage in piracy when it is practiced in the highest levels of computer companies themselves.
Jonathan Savell, Livermore, CA



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Presidential Pratfalls
To Jonathan Miller: In your article on word processing (June *Softalk*) you accused Jimmy Carter of putting his foot in his mouth (which he did on numerous occassions), but he is not guilty of the charge listed in your article. To my recollection, it was Gerald Ford who committed the faux pas, and the real culprit was the interpreter on his staff who was guilty of getting his tongue twisted around his teeth. You may be an expert in word processing, but history isn't your bag.
James H. Jacobs, Cincinnati, OH

Historical Corrections
A disturbing rewrite of history is appearing on the pages of several magazines lately. A recent example appeared in Phillip Good's article, "Fritz the Cat Has an Apple II," in your May issue. Mr. Good presents an interesting chronicle of the events and people that laid the groundwork for the personal computer revolution. He seems extraordinarily myopic, however, about simultaneous developments that weren't even over the horizon from Palo Alto. For his (and your readers') enlightenment, I recommend the June 1975 issue of *The Journal of Community Communications*. Two articles are of interest.

In the first I describe the Community Memory Project which in 1973 and 1974 produced a very powerful electronic bulletin board system (the first) and put a lot of computer power in the hands of total computer illiterates in several San Francisco and Berkeley storefront locations. We, and later Bob Albrecht's People's Computer Company, were the first to demonstrate that the average person might actually have a use for a computer.

The second article describes Lee Felsenstein's design for a convivial, intelligent terminal for Community Memory and electronic bulletin board use. The design predates even the Altair and the Imsai. Later it evolved into the first computer with an integrated keyboard and video output: the Processor Technology SOL, which was in full production when Apple was still just selling boards.

The Journal of Community Communications is slicker now, but still the only place to read consistently worthwhile articles on where all this is leading us. The Community Memory Project has written and just released *Sequitur*, probably the best database system for micros on the market. Both are still nonprofit, and still struggling, but doing good work, fighting the good fight. Now that Jobs and Wozniak have their billion, I hope they can finally relax and remember some of the things they learned at Midpeninsula Free University.
Ken Colstad, president, Village Design, Berkeley, CA

Teacher Seeks Pilot
As an Apple user and a computer education teacher, I was pleased to see the addition of Schoolhouse Apple by Jean Varven. I think that educational applications is an area that is at least as important as business or recreational software coverage in your magazine. An entirely new category should be added to Fastalk in which programs designed for educational use

would be listed and described. Quality programs such as *Magic Crossword, Apple Shell Games*, and the Apple Pilot family could be included.

Many educators find selecting software to be a difficult task, not because they do not know what they are looking for, but because it is difficult to find a reliable source for evaluation. Obviously, the best way to select software is to view and use it personally. This is not as easy to do as it sounds. Typically, local computer stores stock very little (if any) software for educational use. Other sources of information for software selection are advertisements, descriptions in software catalogs, and evaluation service books. I think that your evaluation and rating system offers greater reliability than other readable sources that I have described. How about it?

In August Mind Your Business, I read about the programs in the Apple Pilot family including *Co-Pilot*, *Apple Super Pilot*, and *Apple Super Pilot Log*. Why hasn't this software been released for sale? Apple has already provided promotional copies to various organizations for evaluation months ago. I could use the additions to the Apple Pilot family now. Where are they?
Robert Hofemann, San Jose, CA

These programs in the Apple Pilot family should be available for purchase by the time you read this.

One Considered Opinion
I am really appalled by the tortuous, overblown, and opaque writing style of Jim Salmons's June Exec article. Please have him read a style manual, or better, use other writers. I love your magazine and recommend it to many of my friends. Thank you for considering my opinion.
Michael Levy, Minneapolis, MN

Additions to the Deleter
I have made some improvements to the *Excess File Deleter* program that appeared in August *Softalk*:

First, it would be advantageous to be able to move the cursor to copy the file name when cataloguing the disk. I use control-A to catalog.

Now, if you are like me, you'll need something to remind you what the special commands are. Line 20 takes care of that.

The final change is a routine that handles the input of the file name following a catalog. The end result is that you don't have to type in every file name you wish to delete, but you still may do so if you desire.

```
10  REM EXCESS FILE DELETER
15  TEXT : HOME
20  PRINT : PRINT "TO CATALOG USE
    'CTRL-A'; TO EXIT USE 'CTRL-C' " :
    VTAB 10 : POKE 34,5 : PRINT : HOME
25  GOTO 100
30  PRINT "DELETE:"; : INPUT "";A$ :
    GOTO 190
150  IF A$ = CHR$(1) THEN PRINT D$;
    "CATALOG" : GOTO 30
```

These are the changes; all the other lines remain the same.
C. G. Ivey, Jr., Salt Lake City, UT

Exceptionally Exempt
In response to Terry Owen Permenter's letter in July's Open Discussion, let me say I have already had more than eight orders of software and accessories successfully filled fast and accurately by the following mail order outlets: Huntington Computing, Gold Disk, and Data Systems. These companies have provided excellent service to me and several of my friends. They are exempt from Mr. Permenter's criticisms.
William O'Brien, Baltimore, MD

Grappling with the Dip Switch
I have just purchased an Epson MX-100 printer and an Orange Micro Grappler interface for my Apple II. I am now in the market for a good word processor (I am using Apple Pascal to write this letter). Among the processors that I am considering is the *Super-Text II*. A friend has shown me how it works and I have tried it on my system. There are apparently two problems with the interface.

First, I have been unable to control the automatic line feed after carriage returns by software. I can set the dip switch in the Epson to get them, but this will foul up the works with Basic and Pascal. The instructions with my interface say to send a control-IA to get line feeds ap-



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pended. I have not been able to do this, even when I use the user-definable keys that are available in *Super-Text II*. Secondly, if I do flip the dip switch, the output on the printer has randomly placed large spaces inserted, really goofing up the right margin and the appearance. These blanks even may appear in the middle of words.

Is there an incompatibility of *Super-Text II* and the Grappler that prevents their common use? Clearly this is a problem that would have to be cleared up before I could purchase and use a copy of *Super-Text II*. I would appreciate any information I could get on this.
George D. Parker, Carbondale, IL

In One Era and out the Other



Last fall, I wrote *Softalk* a letter describing how I was using antique paper apple box labels to decorate my Apple den. I have finally quit procrastinating and took some photographs of the finished product showing my Apple II, oak rolltop desk, and the apple label background. They make an excellent and colorful background for my Apple as well as good conversation pieces. A future addition will be a 1905 red brass National cash register, model number 49¾. Nostalgia alongside modern technology: the best of two eras.
Robert L. Skell, East Wenatchee, WA

A Side Road on the Advancing Path

The value range error uncovered by E. R. Miller (July Open Discussion) can be a tremendous help in Pascal program development, but there is virtually no information about it in the various Apple manuals. Basically, this error message occurs when, during program execution, an attempt is made to assign a *value* to a variable that is outside a permissible *range* of values for that variable. This will happen whenever a program encounters an attempt to insert a value exceeding a variable's previously defined subrange. Here is a brief example:

```
Program Test;
  Var
    I : 1..10;
    Key : Integer;
  Begin
    ReadIn (Key);
    I := Key;
    WriteIn (I)
End.
```

Try this while inputting values between one and ten and everything is fine. But enter any other number and you get the value range error when the interpreter attempts to assign that number to I.

The beauty of this range checking scheme is that, by careful consideration of the possible values a given variable may assume and appropriate designation of subranges, the programmer can build into his or her program the means to easily detect some of the more subtle bugs that creep into program development. This can be especially useful when one is trying to determine the correct termination point for while loops and repeat loops. The more subtle program design message is that, once again, Pascal forces us to think out our programs before we write them.

In terms of actually finding the error point, I highly recommend the use of the compiler listing option (see *Apple Pascal Language Reference Manual*, pages 64 to 66), which will generate a "road map" to enable one to decipher the "S#, P#, I#" message. On single drive systems, large programs may be difficult to compile with this option because of limited disk space. The use of the *(*$L printer:*)* directive is recommended for those with printers.
R. Paul Miller, Sacramento, CA

Another reader clarifies further:

The value range error message indicates that a variable with a certain valid range of values has been asked to take on a value outside that range. In order to understand where in the program this is happening, you need to compile with the listing option on. Generally, either the printer or a file is used for the listing. For the printer, insert *(* $L printer: *)* as the first line of your program. For a listing to be produced on a file, insert *(* $L+ *)* or *(* $L filename.text *)* as the first line of the program; the first produces a listing as SYSTEM.LST.TEXT. An example of this is:

```
(* $L printer: *)
program Bomb;
var X: array[1..5] of integer;
    I: integer;
procedure BlowUp;
begin
for I := 1 to 6 do
  begin
  X[I] := I * I;
  writeln(' I = ',I:2,' X = ',X[I]:2)
  end
end;(*Blow Up*)
begin
BlowUp
end.
```

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This program produces this output:

```
Running . . .
I = 1 X =  1
I = 2 X =  4
I = 3 X =  9
I = 4 X = 16
I = 5 X = 25

Value range error
S#1, P#2, I#16
Type (space) to continue
```

The listing option produces the following listing on the printer:

```
 1  1  1:D   1  (*$L printer:*)
 2  1  1:D   1  program Bomb;
 3  1  1:D   3  var X: array[1..5] of
                   integer;
 4  1  1:D   8      I: integer;
 5  1  2:D   1  procedure BlowUp;
 6  1  2:0   0  begin
 7  1  2:1   0  for I := 1 to 6 do
 8  1  2:2  11    begin
 9  1  2:3  11    X[I] := I * I;
10  1  2:3  25    writeln(' I = ',I:2,' X =
                   ',X[I]:2)
11  1  2:2  98    end
12  1  2:0  98  end;(*BlowUp*)
13  1  1:0   0  begin
14  1  1:1   0  BlowUp
15  1  1:0   2  end.
```

The error message indicates segment #1, procedure #2, instruction #16. Looking at the listing, procedure is the third column from the left and #2 is the procedure BlowUp. Instruction #16 occurs after 11 and before 25 so it is in the statement *X[I] := I * I.* Instruction is the number just to the left of the actual program. The range error has occurred because an array that is only supposed to be 1 through 5 has been assigned the value 6.
Rich Hatcher, Plano, TX

Meeting Beasties on the Trail

I thought all the explanations of the value range error sent in by readers were great, and I'd like to amplify a couple of points that were made.

All expression values, even those of subranges, are computed as full integers. Only after an expression has been completely evaluated is subrange checking applied to it. You may think of the assignment operator as a sieve that allows datum values within range to pass through to a storage location, but catches and holds out-of-range values. This "watchdogging" does not come free; the compiler automatically emits p-code instructions for range checking which require time and space to do their job. The p-code versions of some programs might be much smaller, and could execute much more quickly, without the extra range-checking code. At the programmer's discretion range checking may be eliminated, but this is an exceedingly dangerous practice and is recommended only for master programmers who wish to optimize the execution of programs that they believe to be correct and robust. Those who wish to experiment with this aspect of the system, and who are not afraid of the system crashes that their tinkering might cause, may read how to defeat range checking in the *Apple Pascal Language Reference Manual* (page 67).

The *(*$L printer:*)* directive, mentioned by R. Paul Miller, is a specific instance of a compiler directive. Normally the compiler ignores comments, but comments that begin with a dollar sign are treated as instructions to the compiler. Apple's official documentation explains what compiler directives are and how they are used in some detail. The Pascal Path will also cover this topic in the months ahead; whether it is addressed sooner or later depends on reader demand.

The most frequent question I've ever been asked about compiler directives is, "What is $U−?" Unfortunately, the answer entails opening several large cans of worms that are better left undisturbed until the questioner is at least a journeyman programmer and completely familiar with both the elementary and the many advanced aspects of the Apple Pascal system. Judging from the letters I've seen, I expect that most followers of the Pascal Path are well on their way to this level of expertise; we should be able to look into the matter within the next few months. A deluge of mail might convince me to tackle the beast even sooner!
Jim Merritt, Cupertino, CA

On the Ledge

I would like to know if it is possible to use *VisiCalc* as a ledger sheet.
Marvin Yavitz, Creve Coeur, MO

Sans Parens

The formula for modulo in August Open Discussion sent in by David Stempnakowski contained one too many parentheses. It should have read

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

Apropos to this, here is a short program math teachers may enjoy:

```
500  REM APPLESOFT X MODULA A,
     THAT IS, THE REMAINDER AFTER X
     IS DIVIDED BY A
520  HOME
530  VTAB 10
540  INPUT "INPUT X/A, BY ENTERING X
     FIRST (RETURN KEY), THEN A ";X,A
545  PRINT : PRINT
550  IF A = 0 THEN PRINT "CAN'T DIVIDE
     BY ZERO": FOR TIME = 1 TO 2000:
     NEXT TIME: GOTO 500
560  IF A > X THEN PRINT "X>A TO HAVE
     REMAINDER, DO AGAIN": FOR TIME
     = 1 TO 2000: NEXT TIME: GOTO 500
600  XMODA = INT((X / A − INT (X / A)) * A
     + .05) * SGN (X / A)
650  HOME : VTAB 10
660  PRINT "THE REMAINDER AFTER ";X;"
     IS DIVIDED BY ";A;" IS ":XMOD A
670  PRINT : PRINT : PRINT "IN OTHER
     WORDS ";X;" MOD ";A;" = ";XMOD A
680  PRINT : PRINT : PRINT "DO YOU
     WISH TO DO ANOTHER ? Y/N ": GET
     ANS$
685  IF ANS$ <> "Y" AND ANS$ <> "N"
     THEN 680
690  IF ANS$ = "Y" THEN 500
700  END
```

G. Ray Meester, Denver, CO



Filedump Follies
Personal Finance Manager came with my system and it has one major flaw: I cannot read the data file with my Basic programs. *Filedump* utility (*Call-A.P.P.L.E.*) immediately gets an end-of-file indication and prints nothing. The length of the random-access text file is not documented. I filed an Apple user input report, and Apple said thanks but gave me no help on accessing my data. I find it legitimate for authors to protect their programs but unacceptable for them to lock up my data so that I cannot access it. *Softalk* reviews should indicate whether a user can access data files with their own programs. Vendors should be required to document the formats of the data files. After all, the data does belong to the user. Does anyone have a method for reading the *PFM* data file?
Ken Kashmarek, Eldridge, IA

Not So Goodspell
Can anyone help with the problem of saving the words one has added to *Goodspell* to one's own disk? Even if one has to load two disks, it is far better than retyping the additions by hand each time you write a letter. I cannot understand how a program with the severe limitations of *Goodspell* ever made the top ten in *Softalk*.
Charles Mills, Zellwood, FL

Roots
First, a note of thanks to Tom Hunt and Alan Ratzburg (June Open Discussion). I bought my Apple a little over two years ago. It has the 16K RAM configuration blocks (*Apple Reference Manual*, page 70), and it also has the piggyback encoder card with the reset protection switch on the keyboard. How can I tell what revision my computer is, as this is usually necessary information when ordering a lower-case adapter?
Sean Riddle, Oklahoma City, OK

Inside Operator
Where can I get more detailed information on the operating system, such as internal registers, than that which is provided in the reference manual?
Richard Wright, Austin, TX

Necessary Paperwork
Warren Michelsen's praise of Videx in July Open Discussion deserves to be echoed. I also have a Videoterm eighty-column board and the Enhancer II. This pair constitutes a very pleasant enhancement of the Apple Pascal system. The only minor difficulty is that it is hard to fit the Enhancer and the numeric keypad by The Keyboard Company into the same machine at the same time, although it can be done. I found that they actually abut one another, and must interfere with each other electronically (presumably by shorting circuits) unless one puts some sort of insulation between the two. Just a simple piece of paper was all that was required to make things work satisfactorily.

I also agree with the reader who commented that an editorial response would be nice, although his complaint that there is a three month lag between a letter being written and its appearance in the magazine is a little bit of an exaggeration.
Alexander Kleider, Sioux City, IA

Lo-Reser
The commercial drivers I have will dump onto a printer only hi-res graphics. Is there a commercially available driver that will print out lo-res graphics? Another problem encountered deals with keeping the lo-res page one image intact. If *text* is typed, the image is destroyed. Is there a way to get back to text mode without bombing lo-res page one graphics? I have an Apple II Plus with IDS-445G and Prism 80 printers. Can anyone help?
Ralph Cinque, Manchester, NH

Getting in Touch
I am sixteen years old and I want to go to a computer camp, but I haven't had much luck. If possible, I would like to be a counselor or assistant at a camp. I live in New Jersey and wouldn't mind going to New York, Pennsylvania, or even Connecticut. Can anyone please help me with some leads, suggestions, or advice?

Also, I read in August *Softalk* about the touch screen system used on Catalina Island. Who can I contact to get more information about this system?
Rizwan Ali, Hazlet, NJ

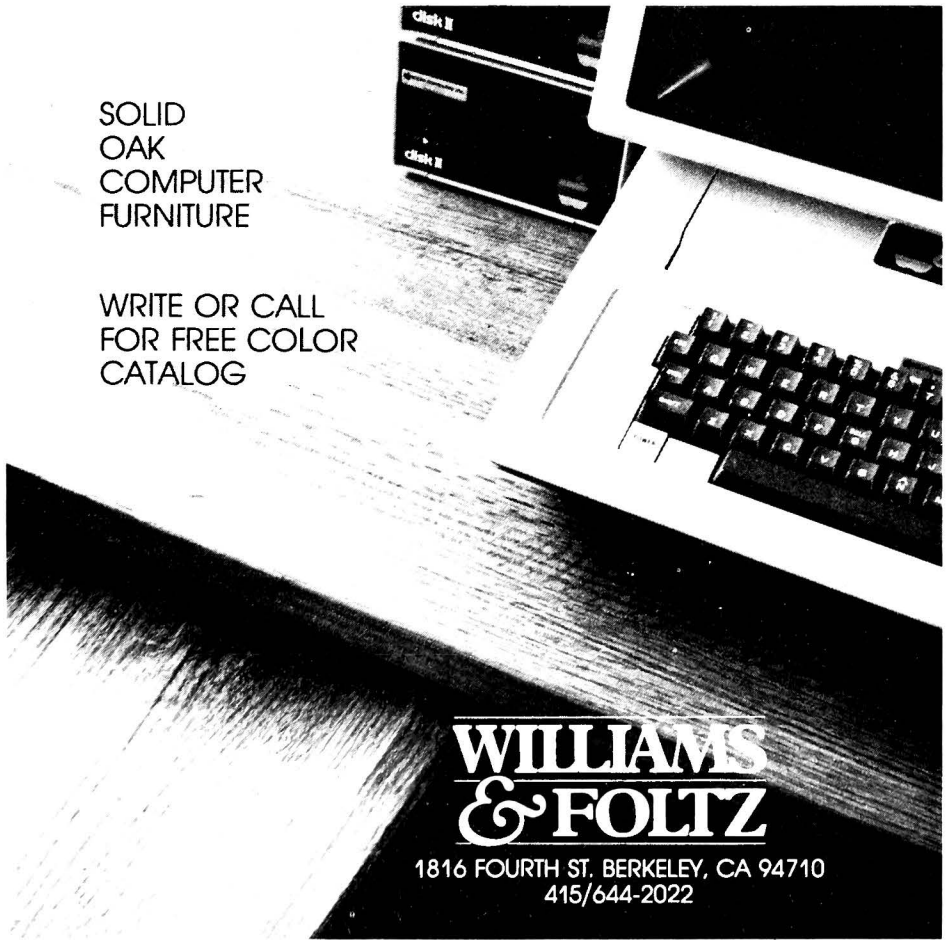
The Touch Screen is manufactured by Touch Technology, Number 3 Church Circle, Annapolis, MD 21401; their phone number is (301) 269-8838. Your best bet would be to contact them directly for specifics on the system.

All Alone and Stuck
A question on *Knight of Diamonds*: How do I get past the "One alone . . ." room? A little hint would be enough.
Mel Liu, Pasadena, CA

If you, too, are stuck, don't dismay—you are not alone! Hints may be had on all Wizardry *scenarios by sending your questions to Sir-tech, 6 Main Street, Ogdensburg, NY 13669.*

The Beginning of the End
I thought your readers might be interested in something that happened to me several weeks ago. In fact, some of them may even be able to offer suggestions in getting out of a rather peculiar dilemma I find myself in.

It all started when I was walking down Ventura Boulevard in the San Fernando Valley, Los Angeles, California. I came across a large computer store which had apparently just opened. The name of the place was Nesting(0) Computers. I couldn't make much out of the name but I did notice that they had a large banner in the window advertising a new computer game. I think it was called *Mad Venture* or *Sad Venture* or something like that.



Intrigued, I went inside and asked if it might be possible to try out the new game that was advertised so prominently in the window. The salesman said that he would be delighted to have me try out this amazing new program and immediately led me over to a very nice-looking computer system of a type I had never seen before. He had me sit down at the console and type *run Mad Venture* (or whatever), and then he went off to help some other customers.

The disk whirred and clicked for a few seconds and then the following text appeared on the screen:

> It's a beautiful Saturday in September, and you are out for a stroll on Ventura Boulevard. You are just walking along, minding your own business, when all of the sudden you spot a new computer store where just yesterday Fat Jack's Hamburgers stood.
>
> Enter command:

I typed *look store*, and the computer responded with:

> The name of the store is Nesting(1) Computers and there are advertisements plastered all over the window for some game called *Bad Venture*.

Well, there was something about that name that sounded familiar but I couldn't quite place it. Anyway, I figured I better go in so I typed *enter store*.

> You are inside the store. A salesman asks you if you want to try out the new game.

I typed *sure*.

> The salesman has you sit down at a computer and type *run Sad Venture* (or whatever), and then he goes off to help some other customers. The computer prints out:
>
> "It's a beautiful Saturday in September, and you are out for a stroll on Ventura Boulevard . . ."

By this time I was beginning to catch on to what was happening, but I also was getting a little bit confused.

Before I knew it, I was standing in front of Nesting(12) Computers. At this point I was really starting to get worried. I decided that I had had enough of this and that I had better change my tactics. I did go into Nesting(12) Computers, but when the salesman asked me if I would like to try out their new game I replied that I most definitely would not!

He looked a little hurt but maintained his friendly demeanor, asking me if there was anything else he could help me with. For a moment I couldn't think of just what to say and there was a brief, embarrassing silence. But then it hit me. I knew exactly what I had to do. With great enthusiasm I asked the salesman if he could possibly show me exactly how to end a game of *Sad Venture*.

"You mean *Bad Venture*?" he asked.

"Whatever."

"Well, look," he began, "first, why don't you just sit down here and let me show you how to start the game."

"No, no!" I interrupted. And I began trying to explain, as coherently as I could, that I was already playing the game in another computer store called Nesting(11) Computers. Actually, in several different stores, but, in any event, he was just a character in one of the games and . . .

During the ride to the hospital I was given a nice storybook to read, something about a tortoise and a university professor arguing the merits of New Wave music.

It had become clear to me at this point that there was no straightforward way of getting back to Nesting(0) Computers. During the next few days I even began to wonder if it was really all that important. Aside from the name of one particular computer store, everything in this world was pretty much the same as I remembered it.

Anyway, I decided to just play it cool and hope for the best. After I was released from the hospital I went back to work, and generally tried to immerse myself in the routine of everyday life. Still, I can't help wondering if there might be somebody out there who has gone through a similar experience. Possibly even someone who has found out a way to end the game.

Christopher West, Valencia, CA

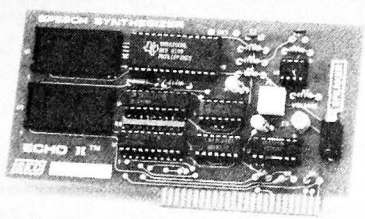
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THE SPIRIT OF THE GAME

BY DAVID HUNTER

Rubbing sleep from his eyes, Roy Hamilton recalled the little girl with the flower in *Singer of the Spheres*. Roy had played the computer game before, through several different characters; never had the little girl appeared. Very odd. He checked Arthur Singbold's inventory.

Sure enough. There was a white rose along with holy books, prayers, unholy spells, unholy books, weapons, and survival gear. Roy led Arthur Singbold up a wind-whipped, icy road through Croakinet Crevice on the way to King Xorba's castle.

It was a pitch-black night in the computer, a vulnerable situation for Arthur. Roy, expecting trouble, became wary and watched the monitor intensely, hands lightly poised on the keyboard.

The slowly moving picture on the screen showed Arthur's point of view as he walked in a cavernous forest. It was cold in the mountains. Arthur approached a fallen tree that was blocking the path. Roy tensed with anticipation, holding in mind at once the exact position of each weapon command.

Disturbed from sleeping peacefully on the tree, a Leapkit suddenly sprang up with an unnerving shriek. Illuminated for a moment by Arthur's helmet light, it bounded off into the moonless night. Leapkits are harmless forest creatures that usually mind their own business; they sleep heavily and awaken noisily as this one had. Killing one by reflex means being haunted by its spirit later in the game. Roy/Arthur held his fire.

Momentarily relieved, Roy leaned back. He directed Arthur to eat some food. The bright, sunlit room seemed to grow colder. Roy sensed something else was about to happen in the game. A cloud passed in front of the sun. Roy was totally absorbed in the computer world.

Singbold looked up from his hasty meal and saw two faint lights appear far off in the forest. They waved and dipped like fireflies. *But there are no fireflies in winter. This must be some faery apparition.*

Gradually the silence was broken by the computer's audio synthesizer whispering distant laughing and shouting. The faery lights were definitely getting closer and the laughter grew louder with them. Roy/Arthur activated his all-purpose personal protection field, good for one minute.

The faeries—Roy wasn't sure now just what they were—approached rapidly. Darting through the trees, they seemed to be racing each other. Roy thought they were flying, as most faeries are wont to do. When they zoomed by fifty feet from Singbold, he saw they were skiing. Two humanlike skiers with bright helmet torches. They didn't seem interested in Singbold.

Roy/Arthur switched off the force field and scratched his head. He could still hear faint shouting and laughing but couldn't make out any words. The phantom skiers dipped and disappeared. An uncontrollable shiver raced up Roy's spine to his crown. He looked wildly about the room. Arthur drew his hand laser.

In a moment, Roy/Arthur was calm again.

"Good Albion and Xorba's holy trousers!" they both whispered. *This game never gave me the shivers before.*

Roy paused by putting Singbold to sleep, protected by a light warning shield, and walked downstairs to the kitchen. Fear leads to hunger, he vowed to remember.

The rest of the day's playing was not so unusual. Singbold awakened to a new day and continued his journey, eventually getting through the tough part of the mountain pass with little incident.

But, in an abandoned cabin, Singbold met again the little girl who had given him the rose. This time she introduced herself as Susie and said she was just one of many, like her, that true singers will encounter. She gave him a photograph of herself. Susie smiled and then walked through the wooden wall.

Slightly bewildered from this encounter, Roy/Arthur searched for the best path down the mountain. Susie and the strange encounters faded from his consciousness as he concentrated on the terrain; but, once he found the right path, he discovered he was in a good mood. Roy directed Arthur to burst forth in a glorious song of love and youth. He entertained the mountains and the spirits therein.

That night Roy told his cousin Jeff about the skiers in the game.

"Skiing at night. Sounds like a stunt Jim and Eric would pull," Jeff said thoughtfully.

The computer game quickly passed away as a subject of conversation. Jeff and Roy decided to watch an old movie on the big living room monitor.

An ethereal force tugging at Roy's brain awakened him the next morning. The girl Susie and the phantom skiers were out of place in *Singer of the Spheres*. They were too ordinary. Roy couldn't find an explanation; you just didn't meet little girls who give you flowers and photos and talk in riddles. There were plenty of dwarves, elves, midgets, fish, squirrels, spirits, ghosts, and little boys to talk to, but no little girls. And the skiers were just too subtle an effect (though exquisitely executed) for even thirty megabytes of gaming world.

Almost from the moment he arrived at his uncle's house, Roy felt mysterious forces in the air. *Staying up here has never been quite like this before.*

Two days before Roy had been dropped off by his girl friend Melanie, who couldn't afford to take five days off from her job. For Roy this was supposed to be a much-needed rest after completing a rough spring quarter in college.

His uncle Martin and aunt Mary were lecturing overseas; Roy had been greeted by their youngest son Jeff. They had shaken hands. Unbidden memories had flashed through Roy's mind of countless other vacations with his three cousins.

Jeff had seemed genuinely glad to see Roy, but there was a moodiness to his manner that Roy hadn't seen before. For half an hour they had exchanged news and rumors. Roy had had much to relate about the latest computer products, but Jeff hadn't seemed interested.

Roy had marked well the pained look on Jeff's face when he sudden-

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ly grew morose and said: "Jim and Eric would probably be incredible compudesigners if they were still alive." After a moment, Jeff had excused himself to prepare for a night with his friends.

Left alone, Roy had wandered through the house and pondered the past. Ten years ago he had played with the three sons of Martin Hamilton all over the mountainside and this house. At one time all four shared a passion for small computers, playing and creating with them in the game room. *It's 1992. Seems like yesterday, but years have passed.*

The second day, sitting amid the soft sunlight in the bedroom once belonging to the oldest son Jim, looking occasionally away from the monitor through the big window that framed this wilderness wonderland, Roy had decided there was no better way to start a vacation. That he would begin a summer job next week made this time in the mountains doubly dear.

His uncle's house was equipped with four main computer stations networked with ample storage and big and little computing power. What had started as a single microcomputer more than fifteen years ago had turned into a large-scale hobby.

Computers figured very prominently in Roy's life. He was using them and studying them. Seaside College required word processing for all papers and other academic work. Roy owned his own microcomputer and a library of software programs.

Around noon that day he had decided to take a break. The super home computer's screen had seemed to welcome *Singer of the Spheres*—the newest mystical-science adventure game. The computer had hummed joyfully and Roy had plunged eagerly into the game's world; his goal in the game was to discover the secrets of heaven, go there, and return.

With a style somewhere between Tolkien and Jack Vance, *Singer of the Spheres* came complete with long stretches of real-time action and extremely lifelike and realistic characters, though on the whole it was out of this world. A terrific challenge, the game had its own mythology and rules. Death was not final.

It had happened when Roy was listening intently to an ill-mannered street dwarf, trying to find out what the Upper Angel said to King Xorba before the angel flew away to Albion. He had felt someone walk up behind him. On the screen, a sweet-faced urchin had come silently up to Roy's character and offered him a flower. Arthur Singbold took it. The muckish dwarf had run off with a snort. The girl had vanished.

Roy had turned to find Jeff looking over his shoulder with a smirk. And that had been the first encounter with Susie. These thoughts rumbled around in his mind as Roy got ready to play the game again.

Flipping a small red lever over an on/off label booted the Rosebud VI super home system. Roy inserted a blue packet about the size and shape of a small pocket watch in what looked like an overgrown coin slot on an arcade game machine. Once again the computer seemed to hum joyfully, as if the game had put it in a good mood.

Three hours later, Roy sat frozen in his seat. The air was warm in the room. He was dressed in Seaside College aqua shorts and a cut-off white T-shirt. It seemed like a skeleton's hand stroked his left leg. Every hair on his body stood on end. A thundering attack of the chills.

He could feel another presence in the room. It was like a soft breeze. There was no one else you could see. The air pressure changed and his ears popped.

On the screen, in the computer, Singbold was once again traveling at night, this time on a deserted street toward the center of the city Ram Stand. King Xorba's castle towered in the distance, illuminated by faery globes.

"This is crazy," Roy whispered to himself. *I don't like to be scared.*

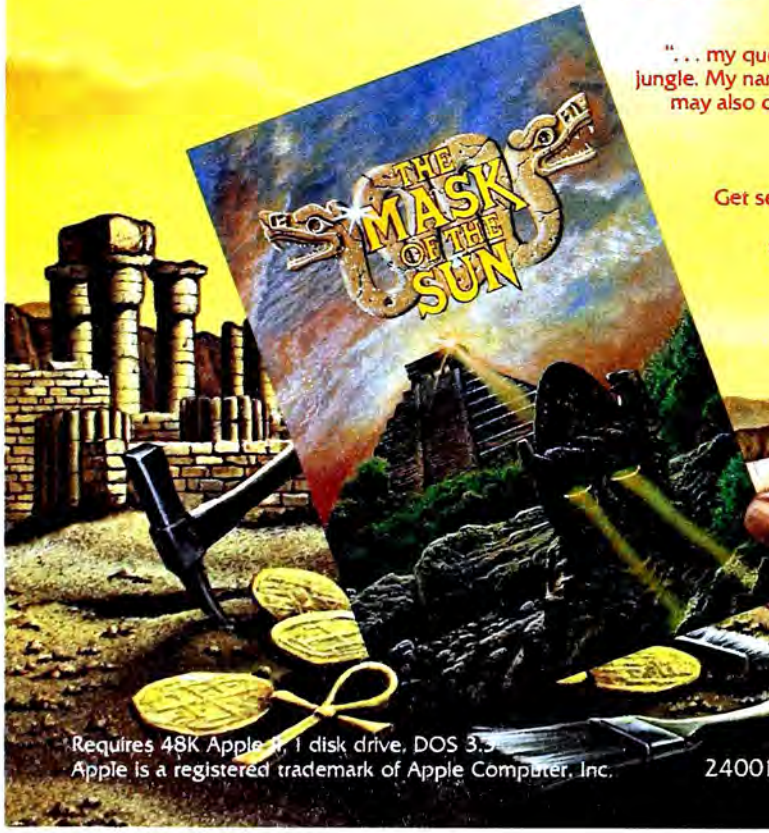
Roy/Singbold keyed/walked on warily. Singbold approached a sharp curve in the dark street. Roy had an absolute conviction that something unexpected and startling was around the corner.

As Singbold turned the corner a bright light flared up. Roy's hands shook.

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Roy's feeling that someone else was in the room peaked when Singbold saw two strangely dressed young men. One was holding an old-fashioned wood torch, which accounted for the bright light. They stopped walking upon seeing Singbold.

Roy didn't know what to do. He didn't even think about activating one of Arthur's shields. The two young men stood gaping at the silent Arthur.

Actually, Roy/Arthur was the one who should have been gaping. The strangers were dressed like honorable starship commanders. Roy remembered instantly and completely the evergreen afternoons of early adolescence, playing with Jim, Eric, and Jeff on the mountainsides. They had reached high and dreamt wildly. The characters from a movie were a foil for unbridled fantasy.

Roy tensed as the strangers in the road approached Arthur.

"Now, now, Arthur Singbold," said the one on the left, wearing a red shirted admiral's uniform, complete with shiny stars and red boots. Roy thought of Admiral Jason, the role Jim Hamilton had always assumed.

"Pretty authentic, aren't they?" the one on the right said, indicating his cobalt-blue Captain Sylvester uniform. Eric had liked variation, but this had always been his favorite role. Both the strangers smiled.

Roy felt like laughing. They didn't really look or sound at all like Jim and Eric. There was something wrong with the computer. *Something was inside it.*

"In this game we're playing, all those who die unnaturally remain on earth as spirits for a while." The mysterious admiral took a deep breath. "Well, a certain percentage. Right?"

Roy/Arthur was too dumbfounded to answer. The light shone weirdly on the captain and the admiral.

"You believe that people who are murdered haunt or otherwise spook their killers and enemies. You also believe that certain spirits are friendly and capable of helping the living. You believe spirits manifest themselves to the living frequently." The admiral paused.

Roy frantically keyed, "I don't believe in all that." Arthur said it.

"Come, come, Singbold," said the captain. "You don't believe in spirits? You shouldn't be in this game."

Roy/Arthur typed/said: "Yes, you're right. I do believe." Roy realized his mistake.

"Well, you're wrong," said the admiral. "There are many spirits all over. They rarely haunt the living and never contact those they knew when alive. The shock is too much. Rarely do spirits return to the place of death."

"You say rarely?" Roy/Arthur asked, not sure exactly what he was asking.

"We love this mountain," the captain whispered. "It is beautiful. It's been three years since we last saw it."

Roy was very confused. That was not the answer he expected.

"You are the ones who shouldn't be in this game," Singbold blurted.

"Who's to say. Perhaps you are the author?" asked the admiral.

Roy felt like he was being played a masterful joke. Maybe Jeff had programmed some interruption device that inserted these alien characters. There was no obvious conclusion Roy could derive.

"What are your names?" he asked suddenly.

The two costumed characters looked at each other and shrugged.

"I'm Captain Sylvester and this is Admiral Jason," said the blue uniformed one.

" 'Bye, now. We must be on our way and you have to see your good King Xorba," said the admiral. As they disappeared from his sight, Roy/Arthur heard the same laughter he'd heard in the mountain pass. The chills finally went away.

Roy parked Arthur at the closest inn and then quit the game. More than a little spooked, he took a long walk in the forest for the rest of the afternoon.

He spent the evening sitting on the back porch watching the light fade, listening to the forest sounds, sipping ale. Roy tried to sort out all the strange occurrences in the game of late and what they might mean. Instead, he found himself thinking mostly about Jeff.

Jeff had always been a follower. He had skied when Jim and Eric skied. He had run around on hot summer nights when the other two felt so inclined. And he had contracted war fever along with the others; but he had been too young to serve.



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Jeff was thoroughly shaken when his brothers died. Many of his boyhood dreams were brought to an early, irrevocable end. Both his brothers and his dreams survived now only as memories.

That day of the terrible ambush in a sandstorm, three years ago, Roy had known Jeff would never be the same. The two older brothers, Jim and Eric, had wanted to fight in the Great Desert War. This was something that Roy still couldn't understand.

And somehow, the computer game was bringing this all back. Maybe I'm going nuts, Roy thought.

"They were dressed just like the characters in *Arcturus Traders*. They reminded me of Jim and Eric, but they looked and sounded nothing like them," Roy told Jeff the next morning.

"And you say these characters have never appeared before?" Jeff asked while they both sat in front of the computer monitor. Roy nodded. He had convinced Jeff that something was dreadfully wrong with the expensive and elegant Rosebud system.

Roy entered the game with Jeff as counsel and witness. The sun shone brightly in the room.

Singbold was in King Xorba's castle. Once Roy/Arthur talked to the king, he'd be three quarters of the way toward understanding greater middle heaven. He would still have a long way to go to complete the game.

"Well, one thing is sure," said Jeff, "I haven't fooled around with programming and computer games for about two years. This is the kind of thing I might even try to pull. But . . ."

Jeff didn't have to complete the thought. Roy knew that Jeff would never make light of his two dead brothers.

"Do you believe in ghosts?" Roy asked.

"No."

"Then what's going on here?"

"Some supersophisticated part of the program."

Roy shrugged nervously. It could be. He swore to find out about this from the game's author. If it were true that all the baffling encounters were part of the original program, Roy would proclaim *Singer of the Spheres* the greatest experience since movies.

It wasn't over yet. Roy was glad to have Jeff there. The encounter on the street with Admiral Jason and Captain Sylvester had really shaken him up. It had given him bad dreams. Roy had never believed in the supernatural. He still didn't; but he was very confused.

On the monitor, Singbold walked proudly through a set of double doors into a low-ceilinged antechamber. From the synthesizer came sounds of a royal gathering going on behind the next set of double doors.

"Come here, Arthur Singbold."

Arthur turned to his right. Susie, the little girl, was beckoning him. Arthur walked toward her.

"By the big wide bend is a fallen tree. At the base you'll find it lightly covered up," she whispered very slowly and carefully.

"Find what?" Roy/Arthur keyed/asked.

" 'Bye, now." Susie turned and walked through the wall again. Roy and Jeff both felt some kind of cool breeze go through the room. The window was closed.

"That felt like a wayward blast from the air cooler. It's been broken for a month," Jeff said.

Arthur entered the massive and opulent throne room. King Xorba was seated atop a splendid wooden throne, holding court in all his feathered glory.

Near the king, still dressed in the mock uniforms, stood Admiral Jason and Captain Sylvester. They looked grim. Arthur saw them and at once Roy felt him shiver, but his recovery was instant.

"There they are," Roy said excitedly to Jeff. They both peered intensely at the monitor. Jeff seemed unusually calm and at ease. Roy was a wreck.

Arthur Singbold presented himself to the king. Captain Sylvester and Admiral Jason sat in finely carved oaken chairs next to the monarch.

"So you aspire to be a singer in the clouds?" the King asked.

"Yes, my lord. I want to know heaven in all its many levels while still among the living."

"You'd also like to find a mate?" asked the King.

"Of course, my Lord," Roy/Arthur keyed/replied.

This was a fairly normal conversation for the game.

"You do not know the whole riddle though. Only half, I think. You come to me for another piece?"

Arthur said nothing.

"I like you. You play the game well," said the King. "The Upper Angel said to me: 'Look in the hills and mountains. This is the way to the clouds.' Angels have always been fond of the outdoor life, at one time or another. I hope this helps you."

"Thank you, my King." Arthur fidgeted. Roy looked at Jeff. "My Lord, who are these gentlemen that sit next to you?"

King Xorba smiled. "They're ghosts living out their natural life span."

You Can't Tell the Players Without a Scorecard

Unfortunately, *Softalk* can't keep you up to date on all the pennant races. But in the great game of microcomputer journalism, we're trying to touch all the bases.

Each month *Softalk* will satisfy your personal computing needs, whether you're a rookie or an experienced Apple user. From the *Jeppson Disassembler for the Apple III* in the September issue to our new six part feature on graphics animation by Paul Lutus and Phil Thompson continuing in this issue, we're trying to bring you the best magazine possible devoted entirely to the Apple computers.

The best part is, it's free to new subscribers for a trial period. If you've never received *Softalk* and you own an Apple computer, send in your name, address, and Apple serial number. We'll start sending you *Softalk* free of charge. To do this, please use the enclosed postage paid card.

Those of you attending Applefest in Houston, October 28–31, are invited to visit with us for a spell. Come by the *Softalk* booth where there'll be copies of *Softdisk*, an interactive monthly magazine on disk, available for viewing and purchasing. You can also pick up Roger Wagner's major opus on assembly language programming at the beginner's level, *Assembly Lines: The Book*.

Softalk Circulation Box 60 North Hollywood, CA 91603

"I do not understand," Roy/Arthur typed/said.

"They met a bad end. They died young, and now they wander. At this moment they are visiting me in my castle. They tell me things."

The King frowned. "Now leave us, Singbold. There are more secrets to be told, not for your ears to hear. Secrets of war and death. You are young and have almost mastered the first great riddle. You're very fortunate."

Arthur withdrew. Admiral Jason and Captain Sylvester remained silent and grim, warlike. Roy felt defeated. It was like that red evening three years ago when he tried to convince Jim and Eric to give up the soldier's dream. They had gotten the war bug and couldn't be stopped. Little good it had done trying to talk them out of it.

Arthur left the king's castle and went east. He rented a boat and started down the Armgood River. Near a river island Arthur was attacked by vicious Oop birds. This was a common hazard of river travel and he handled it in the normal fashion; he obliterated one bird and the others scattered.

Roy and Jeff were tired by early evening.

"This is a really great game," Jeff said. "But I don't see anything all that unusual."

"Yeah, I know." Roy was exhausted and a little irritated with himself. *Some vacation. I've wasted it playing this dumb game.*

After dinner, Roy retired with little ceremony. He had trouble falling asleep. He kept wondering what the admiral and captain had meant about spirits returning to the site of death. In a dreamlike state of half consciousness, when bizarre and wonderful juxtapositions of thought occur, Roy almost made sense of it all. Almost.

"I hope you had a good time," Jeff said. He and Roy were sitting on the front porch waiting for Melanie to arrive. Roy's bags were packed and ready.

Returning from deep thought, Roy asked, "Have there been any car accidents around here in the last few years? Any where people died?"

Jeff thought it an offbeat question but racked his memory nonetheless. "No fatal ones. Cars are pretty safe these days."

Roy sank back and imagined Jim and Eric wandering the world in spirit form. How wonderful to be ethereal and free.

Jeff perked up. "There was a small plane crash three years ago. I remember it well, because it happened the same day as the ambush. Two teenage boys took a joy ride in their father's plane. They had one of the first Supra-ten crystal cameras. Just like the one Jim had."

Roy brightened. "Two teenage boys. They'd be a little older now."

"When the wreckage was found the camera was missing. It must have been thrown from the plane during the crash. Did I say two boys?" Jeff was silent for a few moments, thinking hard. "That's right. There was a little girl, too; their younger sister."

Roy felt a chill go up his spine. It was the victims of the plane crash that had invaded the computer. He said so to Jeff.

"How are dead people going to enter a computer program? Through the air holes? Come on, Roy, admit that the game stumped you. It's just better than you thought."

"I don't know. I'll talk to the programmer about it." Roy felt weak and tired like never before. Out of fight.

Melanie drove up in the big blue IM Electro V. Roy said a brief good-bye to Jeff.

Roy and Melanie were zipping down the curvy mountain road. They came to a wide bend and Roy spotted the fallen tree.

"Stop here for just a second," he asked Melanie. She obligingly braked and pulled up by the side of the road.

Without explaining, Roy went to the base of the fallen tree. After digging through needles and branches, he found the camera. It was in perfect shape, wrapped in its case.

Smiling strangely, Roy got back in the car.

"How did you know that was there?" Melanie asked about the camera clutched in Roy's hands.

He didn't answer. He just stared into the lens. A small window into the spirit world.

Soon they were back in the valley. ■

No Tricks, Just Treats.

Boy, oh boy, if you thought Halloween was going to be the high point of October, think again.

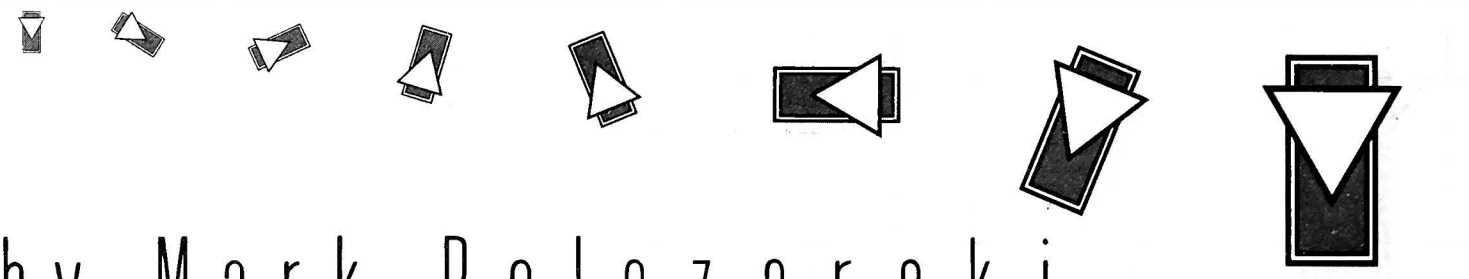
Yes, the rumors you've heard are true—*Softalk* will have a booth at the Houston Applefest on October 28–31. If you're hanging around the Houston Civic Center that weekend, drop what you're doing and drop by our booth. Loads of goodies will be available for the asking.

We'll have *Assembly Lines: The Book*, by Roger Wagner, for sale. We'll also have *Softdisk*, the floppy magazine chock-full of user information. And as if all this were not enough (and gosh darn, don't you think it ought to be?), you'll have the opportunity to meet the people behind Softalk Publishing.

More fun than Apple owners should be allowed to have? You betcha. But friendly fun is what *Softalk* is about, and that's why we'll be at the Applefest in Houston.

Come by and see what we mean.

GRAPHICALLY SPEAKING



by Mark Pelczarski

With the help of our readers, we're planning to devote an issue (maybe more) of this column to examples of graphics done with the Apple. We're looking for graphic creations done on Apples with various software packages (or with your own programming) and for various uses (serious, or just for fun). We don't have anything exact in mind; we don't want to stifle your creativity. We do want pictures done with the Apple, and you can send them on disk to Softalk Gallery, Box 60, North Hollywood, CA 91603.

Tell us about how the graphics were done so we can describe how you created them. If you are using graphics in a specific application, let us know about that, too. If we get a lot of interesting ideas we may run more than one issue describing them. Let no application seem too minor; we'd like to show the variety of ways that the graphics can be used, from games to sales charts. We need the sales charts as much as we need the art. Submission of disks will constitute approval to reproduce the pictures in *Softalk*. If you want any of the materials returned, include a self-addressed, stamped mailer appropriate for sending disks.

On With the Business at Hand. To create real fancy graphics as a programmer you have to acquaint yourself with the actual mapping of the Apple hi-res screen and with handling graphics on a byte and bit level. It's not very difficult once you learn a few tricks of the trade. The first is coping with the strange memory layout of the screen.

Figure 1 shows a small part of the upper-left corner of hi-res page 1. The full screen is 192 bytes tall and 40 bytes wide. The bytes are displayed horizontally, with seven bits (on/offs) displayed in each, so the 40-byte width results in 280 dots. The actual memory address of any byte on the screen can be computed by taking the Y address down the left side of figure 1 and adding the X value at the very top, from 0 to 39. The X offset is nice and simple, with 0 on the left, 39 on the right, and all the numbers running normally in between. The locations for the start of each line, based on the Y value, are quite a different story. At one point there must have been a good reason for the strange sequencing of addresses, but it remains an unusual puzzle for most beginning graphics programmers.

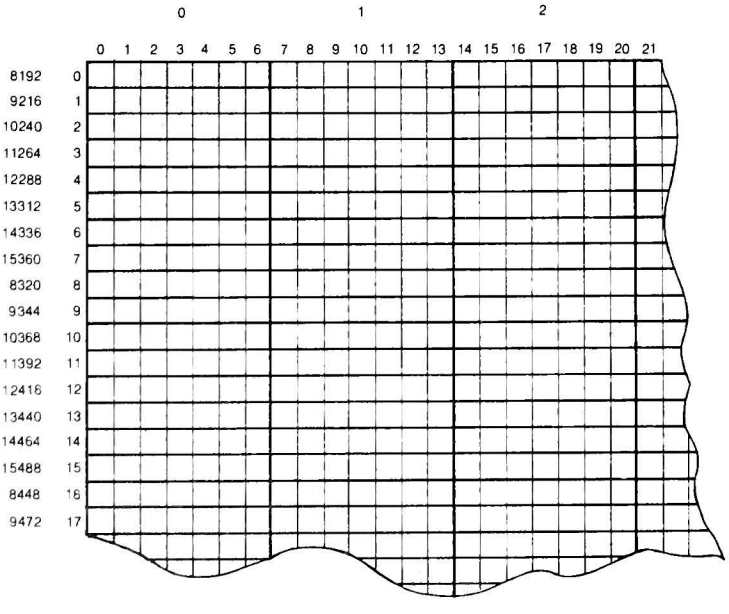


Figure 1. Cutaway of upper-left corner of hi-res screen.

There is a formula for computing the starting address of each line, given the Y value of that line. Listing 1 is a short program that contains that computation. It allows you to input a number for Y (from 0 to 191), and it prints the address of the start of that line. There's no need to go into the actual formula in this context; we'll just say it's there. To use hi-res page 2 instead of page 1, change 8192 to 16384 in line 40.

```
10  INPUT Y
20  Y1 = INT (Y / 8):YR = Y - Y1 * 8
30  Y2 = INT (Y1 / 8):YS = Y1 - Y2 * 8
40  L = 8192 + Y2 * 40 + YS * 128 + YR * 1024
50  PRINT L
60  GOTO 10
```

Listing 1.

```
10  HGR : VTAB 23
15  INPUT "X : ";X: IF X < 0 OR X > 39 THEN 15
16  INPUT "Y : ";Y: IF Y < 0 OR Y > 191 THEN 16
20  Y1 = INT (Y / 8):YR = Y - Y1 * 8
30  Y2 = INT (Y1 / 8):YS = Y1 - Y2 * 8
40  YL = 8192 + Y2 * 40 + YS * 128 + YR * 1024
50  L = YL + X
60  POKE L,255
70  GOTO 15
```

Listing 2.

Listing 2 contains a little more excitement. Using the same computation for the Y location, it allows you to enter values for X and Y. It computes the Y location (lines 20 through 40) and then adds the X value (line 50) to give a specific screen address. Then it pokes the number 255 into that address, setting all seven displayed points in that byte (the number 127 would have the same result).

Tricks of the Trade. Doing a three-line computation whenever you want to find a screen location takes a lot of time. Even in machine language, the time used to compute a Y address can make a difference when speed is an important factor (it usually is). To avoid using computations all the time, a trick that is often used is precomputing all the Y locations and storing them in a table. Then, when an address is needed, instead of computing, you just look for it in the table. This is most often done in machine language programs, but for explanation this month we'll do it in Basic. Next month, we'll convert.

Listing 3 has a program that works like the one in listing 2, except it repeats in a pattern around the screen. It uses a trick we've used before,

```
10  HGR
15  X = 0:Y = 0:XC = 1:YC = 1
20  Y1 = INT (Y / 8):YR = Y - Y1 * 8
30  Y2 = INT (Y1 / 8):YS = Y1 - Y2 * 8
40  YL = 8192 + Y2 * 40 + YS * 128 + YR * 1024
50  L = YL + X
60  POKE L,255
70  X = X + XC: IF X <1 OR X >38 THEN XC = - XC
80  Y = Y + YC: IF Y <1 OR Y >190 THEN YC = - YC
90  GOTO 20
```

Listing 3.

with initial values of X and Y set in line 15, along with increment values. In lines 70 and 80, X and Y are updated, and if they reach the edge of the screen the increments are reversed, giving the illusion of bouncing. Try it, and take notice of the speed. The Y value in this example is computed before each plot.

Listing 4 has the same program, but it uses a Y look-up table for the addresses. The subroutine starting at line 150 creates the table, computing each location for Y, from 0 to 191, and storing them in an array, YT(Y). The first thing that is done in the program is the gosub to the table creation routine (line 12), which means that for the rest of the program we'll have these precomputed addresses sitting in the array YT(Y). The rest of the program is exactly as before, except that the computation from lines 20 through 50 has been reduced to one short line 20, which takes the computed address in YT(Y) for whichever Y value you need, then adds the X offset. Note that it takes several seconds in Basic to create the look-up table when you run the program, but after the table is computed the graphics move much faster.

A Basic Character Generator. Once you have an idea of what bit/byte graphics are (poking values into screen memory), you are ready to start using them to put things on the hi-res page. What we've used before—shape tables—are known as *vector graphics*, in which objects are defined by plotting and moving in lines from a starting point. The move commands can be translated anywhere on the screen, so your shape can be plotted anywhere. The other type of graphics is called *bit-mapped graphics*, in which you define a set of dots to be on or off, store them as a sequence of bytes, then put those bytes wherever you want them in the

```
10  HGR
12  GOSUB 150
15  X = 0:Y = 0:XC = 1:YC = 1
20  L = YT(Y) + X
60  POKE L,255
70  X = X + XC: IF X < 1 OR X > 38 THEN XC = - XC
80  Y = Y + YC: IF Y < 1 OR Y > 190 THEN YC = - YC
90  GOTO 20
140 REM THIS SUBROUTINE CREATES A Y LOOK-UP TABLE, YT
150 DIM YT(191)
160 FOR Y = 0 TO 191
200 Y1 = INT (Y / 8):YR = Y - Y1 * 8
210 Y2 = INT (Y1 / 8):YS = Y1 - Y2 * 8
220 YL = 8192 + Y2 * 40 + YS * 128 + YR * 1024
230 YT(Y) = YL
240 NEXT Y
250 RETURN
```

Listing 4.

```
10  HGR : VTAB 23
12  GOSUB 150
15  INPUT "X : ";X: IF X   0 OR X   39 THEN 15
16  INPUT "Y : ";Y: IF Y   0 OR Y   184 THEN 16
20  FOR I = Y TO Y + 7
30  READ B
40  POKE YT(I) + X,B
50  NEXT I
60  RESTORE : GOTO 15
70  DATA 34,34,34,62,34,34,34,0
140 REM THIS SUBROUTINE CREATES A Y LOOK-UP TABLE, YT
150 DIM YT(191)
160 FOR Y = 0 TO 191
200 Y1 = INT (Y / 8):YR = Y - Y1 * 8
210 Y2 = INT (Y1 / 8):YS = Y1 - Y2 * 8
220 YL = 8192 + Y2 * 40 + YS * 128 + YR * 1024
230 YT(Y) = YL
240 NEXT Y
250 RETURN
```

Listing 5.



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screen memory area. That's what the programs in listings 2 through 4 do, with the bit map being the number 255 that we were poking into screen memory.

Listing 5 is similar again. It uses the look-up table to find the Y addresses. But instead of a single poke command, we've put in lines 20 through 70. Lines 20 through 60 form a loop that repeats eight times, incrementing the Y value and poking a number into the screen area each time. The result is that instead of putting one byte of information on the screen, it puts eight bytes, or a block of dots seven pixels wide and eight pixels tall. It reads the values for the eight bytes from the data statement in line 70. As it turns out, those numbers translate to the letter H when they're poked onto the screen.

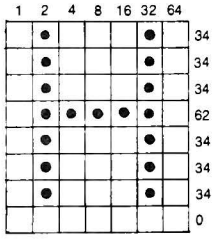
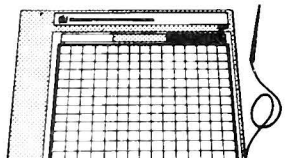


Figure 2.

To see how those numbers were determined, see figure 2. Each row of that grid represents one byte: eight rows, eight bytes. Each column represents bits within the bytes. Bits 0 through 6 are displayed as dots on the screen. Remember that bit 7 is used as a color flag. The decimal numbers associated with each bit are listed above each column. Note that bit 0 is displayed on the left; those of you who've worked with binary or machine language would expect the opposite.

To compute a number for each of the eight bytes, after marking each dot that you want set, go across each row and add the values from the top of each column that is marked. In figure 2 we've put those numbers at the right of each row. Notice that those numbers match the numbers used in the data statement in listing 5. You now have a hi-res character generator, if only for one character. Try using different values in the data statement; you can create all kinds of interesting graphics characters.

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```
 10  HGR : VTAB 23
 12  GOSUB 150: GOSUB 300
 15  INPUT "X : ";X: IF X < 0 OR X > 39 THEN 15
 16  INPUT "Y : ";Y: IF Y < 0 OR Y > 184 THEN 16
 18  GET A$:A = ASC (A$) - 65: IF A < 0 OR A > 2 THEN 18
 20  FOR I = 0 TO 7
 40  POKE YT(Y + I) + X,CT(A,I)
 50  NEXT I
 60  X = X + 1:IF X > 39 THEN X =0:Y = Y + 8: IF Y > 184 THEN
     Y = 0
 70  GOTO 18
140  REM THIS SUBROUTINE CREATES A Y LOOK-UP TABLE, YT.
150  DIM YT(191)
160  FOR Y = 0 TO 191
200  Y1 = INT (Y / 8): YR = Y - Y1 * 8
210  Y2 = INT (Y1 / 8):YS = Y1 - Y2 * 8
220  YL = 8192 + Y2 * 40 + YS * 128 + YR * 1024
230  YT(Y)=YL
240  NEXT Y
250  RETURN
290  REM THIS SUBROUTINE CREATES A CHARACTER
     DEFINITION TABLE, CT
300  DIM CT(2,7)
310  FOR I = 0 TO 2
320  FOR J = 0 TO 7
330  READ CT(I,J)
340  NEXT J: NEXT I: RETURN
350  DATA 8,20,34,34,62,34,34,0
360  DATA 30,34,34,30,34,34,30,0
370  DATA 28,34,2,2,2,34,28,0
```

Listing 6.

A Longer Basic Character Generator. Listing 6 has a more complete character generator capable of more than one character. It doesn't have the complete alphabet or anything like that, but it's got enough of a start that you could add all the data to get it.

Another subroutine has been added at line 300, which defines a character table. Another array is used, CT(I,J). This array is dimensioned 2,7 for three characters (0 to 2) of eight bytes each (0 to 7). The nested for–next loops read the table from data statements, with I counting through the characters, and J counting through the eight bytes for each character. The characters used in the data statements are A, B, and C, constructed as shown in figure 3.

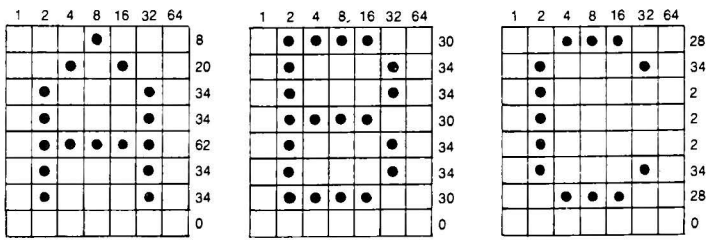


Figure 3.

Lines 18 and 60 are the only others that are significantly different from the previous programs. Line 18 gets a character from the keyboard; as soon as you press a key, that character is put in A$. The ASC function is then used to find the character's ASCII value (see the table in appendix K of your Applesoft manual, pages 138–139). This particular program will only recognize the keys A, B, and C, which have ASCII codes 65, 66, and 67, so after subtracting 65 we have a number that corresponds to the characters in our table. You can do a lot of fiddling with that limit and the length of the table. Line 60 increments X after each character (so the next one is printed one space over to the right), and if the right edge of the screen is reached, Y is incremented and X is set back to zero. When Y reaches the bottom of the screen, it is set back to the top.

Next month we'll put a bunch of this into machine language, which actually turns out rather simple once you have the idea of look-up tables. Without much computation, the machine language routines become more of a taking something from one place and putting them in another. The most difficult part will be coping with addresses in hexadecimal (base sixteen) instead of decimal. ■



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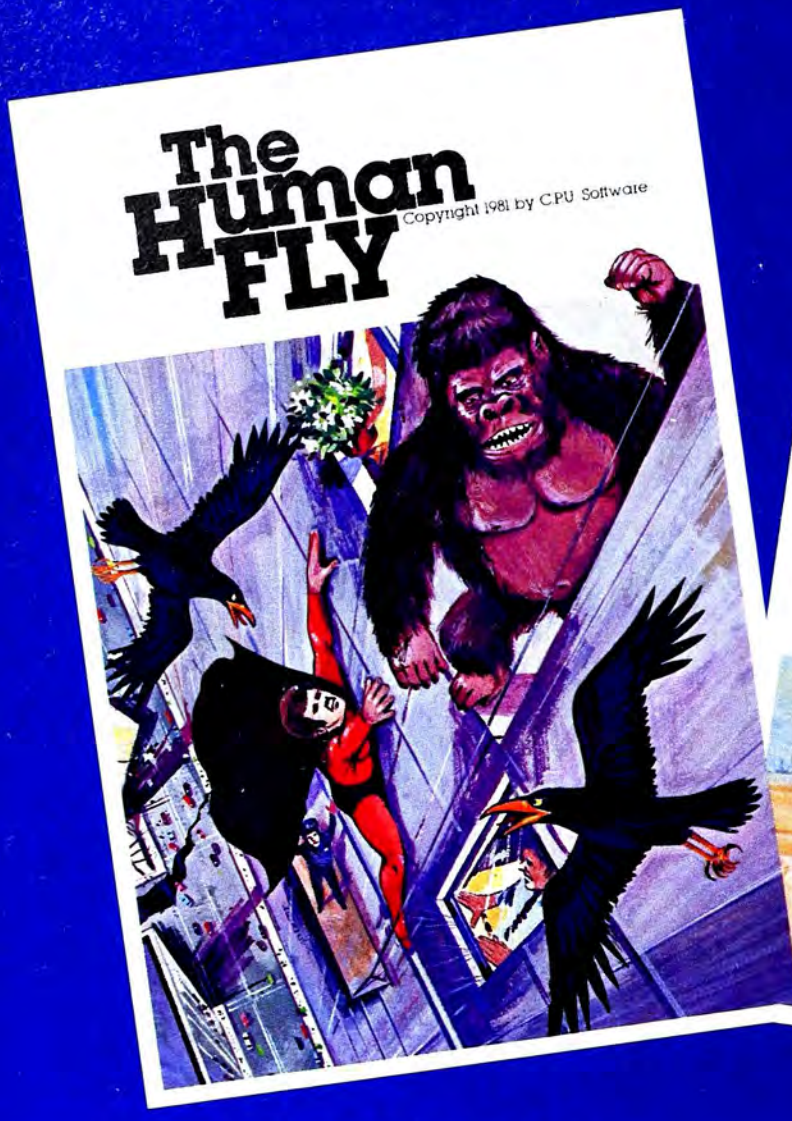
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*Featured front page Wall Street Journal — April 22, 1982.

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The Schoolhouse Apple

by Jean Varven

Now that the school year is underway, we're beginning to get news of what various people in education did during the summer vacation. For educators in Montana in particular, the summer months were a busy time. But, in truth, Montana's story began many months earlier.

What Montana Needs Now. In the autumn of last year, the Office of Public Instruction for the State of Montana conducted a needs assessment survey. According to state department communications specialist Betti J. Christie, some 81 percent of the teachers, principals, and district superintendents who responded identified "selection and utilization of computer technology" as their school's top concern.

The outcome of the survey helped spur State Superintendent of Schools Ed Argenbright to appoint sixteen highly qualified educators from around the state to a computers in education task force. The task force would work with Argenbright's office during the coming months, sharing their experience and expertise with other members of Montana's educational community and with all the state's eight hundred thousand citizens.

The group that met this past May in Helena consisted of two elementary school teachers, two junior high school teachers, two high school teachers, two college professors, and two school administrators, as well as six curriculum specialists from the state department. Two Plains, Montana, high school students also attended. Dan Dolan, the state department's computers and math specialist, chaired the group.

Task force members brought with them the benefit of many years' experience using microcomputers. In fact, the sixteen educators who met together in May had a combined total of sixty years of experience working with microcomputers in a classroom setting. They also brought a variety of perspectives and concerns, according to whether their experience had been working with younger or older learners, at a large or small school, at a school with only one computer to be shared among all students, or at one with several machines arranged in a computer center format.

Using computers in the classroom presents new challenges. Hardware selection, software evaluation, and teacher training all become matters of concern. So does the question of how computers should be used. And, as Argenbright pointed out to the task force group at the opening session, the very basic issue of "the real role of education in our society today" must be examined. The task force's primary goal was to devise some concrete ways of helping Montana's schools deal with these questions.

At the end of three long days, the group had hashed out a lot of issues. First, they reached agreement on three basic premises: computers should be integrated into regular classroom instruction, students should be provided with as many hands-on computer experiences as possible, and the main goal for using computers in the classroom should be problem solving. It was judged that emphasizing these things was the best way of preparing Montana's students to meet the demands of a future in which computer literacy will be so important.

Working within this framework, the group decided on the three projects they hope will make a real difference in how Montana adjusts to and makes use of computer technology. The first of these is a handbook entitled *Elements of Computer Education: A Complete Program.* Already, reports Betti Christie, educators from many states have expressed their eagerness to have copies of the handbook.

Scheduled for release later this fall, the publication offers information about how to establish a program for using computers in education. Guidelines for hardware and software evaluation and selection will be included, as will suggestions about program development, staff training, and telecommunications possibilities. The handbook will also contain information about ways to stay out of trouble. After all, knowing what not to do (what equipment you may not really need, for instance) can be a lifesaver, especially during these times when school budgets have been reduced so drastically.

Work is scheduled to begin soon on a professionally prepared videotape that will feature teachers, administrators, school board members, parents, and students from around the state. They'll talk about the successful experiences they've had using computers in education and about the problems they've encountered and how they solved them. The emphasis in the videotape presentation and in the handbook will be on practical hands-on suggestions and information designed to help educators move smoothly into the world of computers in education. The videotape will be made available for check-out through Montana's Office of Public Instruction.

According to Betti Christie, some 90 percent of Montana's schools are using at least a portion of this year's federal government block grant funds for the purchase of computers and computer-related materials. It seems particularly appropriate, then, that the task force's third project is the creation of a statewide staff development system. In collaboration with the Montana University System, the Office of Public Instruction plans to train experienced educators to teach others about computers.

As a result of this training, everything from awareness sessions of two to six hours duration to thirty-hour college courses will become available to interested educators. The goal is to establish a network of resources throughout the state so that when educators need information or additional training, they'll have a highly qualified local person they can turn to.

Clearly, the state of Montana is responding creatively to the new challenges that using computers in education presents.

A Review of Geology Search. With the aid of an Apple, you and the other members of your team are searching for oil on the continent Newlandia. These days, oil is selling for $4 per barrel. So far, your company has $950 and one oil well that's producing seven barrels of oil per week. You've just spent $30 on a core sam-

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ple that revealed fresh water microfossils in locations F20 and 21, land plant fossils in G20, and a large salt deposit in G21.

Based on the core-sample results, you and your colleagues have decided that it's worth spending $40 to do a seismic exploration of location G21. Setting off a dynamite charge will cause shock waves, and these shock waves will create echoes; the echo pattern that results will give you and your teammates more information about how to proceed.

By studying the echo pattern, you'll be able to evaluate how likely it is that an oil trap is buried far below the earth's crust in this location. Then you'll be prepared to decide whether it's best to look further in other locations or to spend $80 to drill a well at F20.

How did you and your colleagues become geology and oil drilling experts? By taking part in *Geology Search*, an outstanding Search Series simulation from McGraw-Hill and Computer Learning Connection. In the course of your adventure, you've found out what a geologist does, how oil is formed, and where oil is most likely to be found. You've learned about sedimentary rock, igneous rock, and fossils; learned how to read a coordinate system on a graph; and learned how to create a graph that charts your company's progress.

There are five Search Series packages in all; the other programs focus on geography, archeology, energy, and community. *Geology Search* was devised primarily for use in upper elementary and junior high school classrooms.

In a classroom setting, students are grouped into teams (or oil companies) that compete against each other. In the process of learning about density scans, gravimeters, and drilling rigs, students also develop their powers of observation, their communication skills, and their abilities to arrive at strategies that take relevant factors into account.

The workbook is clear, readable, entertaining, and informative, with illustrations that clarify and expand the material covered in the text. When a new word is used, it is printed in boldface and defined at the end of the chapter in which it appears. There are also questions at the ends of chapters to test searchers' understanding of the material presented so far.

The workbook is an integral part of the program, since it is here that you keep track of the current price of oil, how much money is available, which locations have been tested, and where wells have been drilled. It also contains the map of Newlandia, on which you can record information about areas you're in the process of exploring.

The accompanying teacher's manual is a genuine resource for teachers. It provides useful information about the skills and concepts *Geology Search* is designed to teach, as well as excellent ideas for supplementary classroom activities to increase students' understanding of the material.

Geology Search is an imaginative, well-thought-out program. It involves learners and makes very good use of the computer as an educational tool. In addition to providing students with opportunities to interact with the computer, the program challenges learners, calling on their abilities to read, write, keep records, make predictions, and solve problems. Because *Geology Search* requires only intermittent use of the computer, it is especially welcome in classroom situations where one computer must serve many students.

Geology Search, by Tom Snyder, Computer Learning Connection, McGraw-Hill Book Company (School Division, 1221 Avenue of the Americas, New York, NY 10020; 800-223-4180). $180.

A Review of Moptown. *Moptown* is the home of the Moppets—shy, friendly, brightly colored creatures who will entertain and educate learners of all ages.

Moptown has sixteen moppets in all, each one slightly different from all the rest. Through these sixteen creatures, players of *Moptown*'s eleven different games learn to distinguish height, girth, color, and type. And in the process of distinguishing between short and tall, fat and thin, red and blue, bibbitt and gribbit, learners develop the logic skills involved in identifying similarities, differences, and patterns, and also practice devising problem-solving strategies.

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Although *Moptown* has been on the market for some time now, it still stands out as a clearly conceived and truly educational program that's delightfully appealing as well. Happily, it is appropriate for both home and school use.

Intended for learners from age four on, *Moptown*'s eleven attribute games range in difficulty from easy to very challenging. In each game, learners can look forward to feedback in two forms, graphical and musical, and these features enhance the program rather than cluttering it up.

In the first game, *Make My Twin,* players are shown a moppet and asked to make a second one just like it. If they succeed in creating the moppet's twin, they are rewarded by a flashing frame surrounding their new creation and by an appealing sequence of sounds.

Game two, *Who's Different?*, can be played two ways. In the first version, players see four moppets and are asked to determine the one moppet who's different from the other three and to identify what trait makes it different. In the second version, all four moppets differ from one another and the learners' task is to determine which one differs most.

Game three asks, *What's the Same?* This time, players must identify what trait all four of the moppets shown have in common. And in game four, *Who Comes Next?*, learners must look closely at a row of moppets, determine the pattern the moppets' order demonstrates, and decide who logically comes next.

Moptown Parade presents the player with one moppet and the player chooses the other four members of the parade according to the rules that were set at the beginning of the game. Depending on which rule variation the player chooses, the moppets allowed in the parade can differ in one, two, three, or four ways. This extends the learner's understanding of what it means for something to be different. Different how and in how many ways, the learner must now determine.

In *Who's Next Door?*, two moppets are presented that differ from one another in one way. A third moppet appears and the learner must create a fourth one. The fourth moppet must differ from the third in the same way (and in no other) that the first differs from the second. In this way, players are introduced, ever so naturally, to the concept of analogy.

Finding one's *Secret Pal* requires the learner to remember attributes and to be able to make the appropriate connections between related bits of information. *Change Me* is another one about differences; this time, you can see the first and fourth moppets and must figure out how to make the second and third moppets different from each other (in either one or two ways) and different from moppets one and four. As you play this game, what it means to be different continues to take on new dimension and to be defined in more specific terms.

The last three games—*Clubhouse, Moptown Map,* and *Moptown Hotel*—involve discovering and following secret rules. All are quite challenging, even for adults. When you play *Clubhouse,* for example, only certain moppets can go in the clubhouse; they must fit the rule (or rules). In one playing of the game, the rule may say that only short moppets can enter; another time only tall blue moppets are allowed. The rules change, making each a new adventure.

In *Moptown Map,* the object of the game is to put each moppet in his house; doing so requires following the secret rules that govern which two traits each moppet in a particular row or column must have. It may sound easy, but wait till you try it.

The final game, *Moptown Hotel,* is likely to be a favorite among both young learners and older ones. It's a game for two players that involves applying two "difference rules" to determine which moppets should be placed where. The object is to earn money (points) for placing moppets in the appropriate rooms in the hotel, and players can score bonus points for cooperating with each other.

And so it goes. Each game builds on the one before and learners gain more and more confidence as they lay the foundation for a solid understanding not only of attributes, but of the thinking processes involved in solving problems.

The accompanying documentation booklet by The Learning Company's Teri Perl is clearly written and well organized, and its illustrations include helpful sample screens. But it may be a while before you read the booklet—the on-screen instructions are so clear that it's unlikely you'll need to refer to the manual for help. (Do read it anyway, though. You'll enjoy it.)

An especially nice feature of the program consists of "how to play" enactments that learners can watch whenever they want a refresher course on how a game is played.

Only single-keystroke input is required, making this a perfect program even for very young learners. Young learners may also appreciate the fact that the *Moptown* graphics were created by a young person, eleven-year-old Corrine Grimm, daughter of programmer Leslie Grimm. (You'd never guess it.)

Moptown requires a 48K Apple with one disk drive and works best with a color monitor, although it can be used with a black and white.

Moptown, by Leslie M. Grimm, The Learning Company, Apple Computer/Special Delivery Software, (20525 Mariani Avenue, Cupertino, CA 95014; 408-996-1010). $50.

Software Sources. Here are capsule views of five more companies that produce educational software for the Apple.

Educational Systems Software, 23720 El Toro Road, Suite C, Box E, El Toro, CA 92630; (714) 768-2916.

Established this summer, Educational Systems Software is a division of the Wabash Apple, an Apple retailer located in El Toro, California. The new company has just released *Class Records* and *Supermath,* two programs designed in an "interactive module format" that's intended to ease the record-keeping burdens of teachers. In addition, the modular format means that the programs are compatible with one another, as well as usable independently.

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Class Records is a classroom management system that enables teachers to maintain records of grades, attendance, and other pertinent information. If a printer is available, the system also allows teachers to generate a variety of reports.

Supermath is an enhanced version of an elementary math program written originally for Apple Computer by Ron Graff, director of Educational Systems Software. This exercise module (others are planned) can be used for drill and practice and for testing students' skills in addition, subtraction, multiplication, and division. The difficulty level of the problems changes automatically as students' responses indicate that they need simpler exercises or that they are ready to move ahead. Student scores are stored initially in the *Supermath* exercise module and can be easily transferred to *Class Records* later on.

In addition to producing more exercise modules, Educational Systems Software plans to create resource files containing useful information that can be used in conjunction with the modules. An editor program for composing text or for use with existing materials is also in the works.

George Earl, 1302 South General McMullen, San Antonio, TX 78237; (512) 434-3681.

Dr. George Earl first became interested in computers in the early seventies. Recognizing various ways that computers could be of help to him in his practice, Dr. Earl, a general practitioner, purchased one of the first Apple IIs.

It wasn't long before Dr. Earl, whose interests include world languages and cultures, started developing educational courseware. Current offerings include programs for elementary and junior high school students in languages, literature, and math.

Programs from George Earl include *The Spanish Hangman* and *The French Hangman,* two drill and practice programs based on the age-old game and intended for first and second year language students, and *Alicia,* a bilingual reader that allows students to learn by studying *Alice in Wonderland* in Spanish translation. Another of the company's products is *Lessons in Algebra,* a beginning algebra tutorial program for junior high school students that was written by a practicing algebra teacher. Future plans call for *Hangman* programs in German, Russian, Hebrew, and other languages.

The software George Earl markets is developed by a team of educators using microcomputers provided to them by the company. Dr. Earl meets regularly with the educators to discuss new ideas and techniques. In addition, volunteer work in various educational settings helps Dr. Earl keep in touch with what's going on in the schools and with the needs of students and their teachers.

Milliken Publishing Company, 1100 Research Boulevard, Saint Louis, MO 63132; (314) 991-4220.

Milliken Publishing Company was founded in 1960. If you're an educator, your first awareness of the company's existence may have come when you used filmstrips, color transparencies, or other audio-visual materials they published. In 1977, having created supplementary and resource materials for teachers for many years, the company began developing computer-based educational courseware.

In terms of educational courseware, Milliken is best known for its comprehensive school packages. These packages include *Milliken Math Sequences,* a drill and practice series for students in grades one through eight; *Milliken Language Arts,* a structured drill and practice for first through eighth graders that covers letter recognition and alphabetization skills; and *Reading Comprehension,* a skill-building program that covers some twenty-five different reading skills. Each of these series includes a manager program that enables the classroom teacher to monitor student progress and assign materials accordingly.

Other school-use programs include *Grammar Problems for Practice,* and *Writing Skills,* a new eighteen-lesson program that covers such things as the use of good and well, prepositional phrases, and describing words. A supplementary activities booklet provides information about off-line activities to reinforce the work students have done at the computer. *Writing Skills* has been described as somewhat more tutorial in its presentation than the company's other packages and features hi-res graphics.

With its soon-to-be available Edufun disks, Milliken enters the home education market for the first time. The first group of programs (twelve in all) focuses on math, while later pro-

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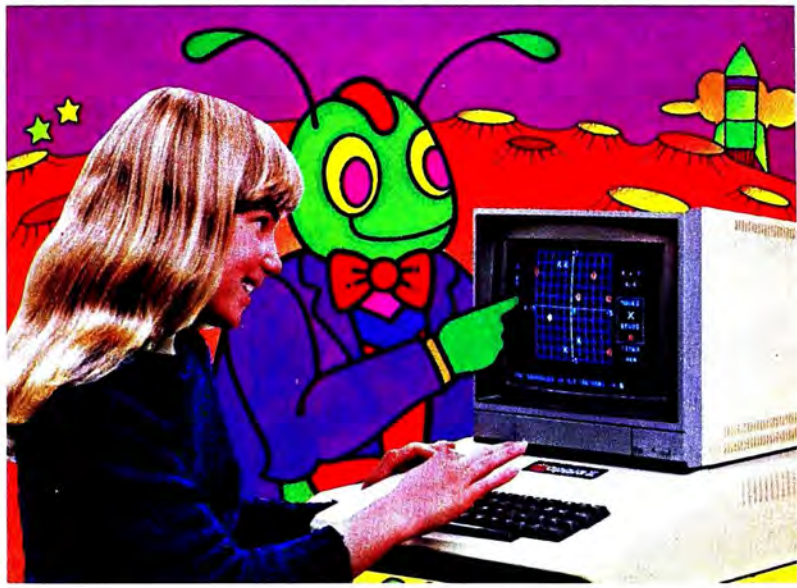
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grams will emphasize the language arts. The Mathfun games cover ten basic skill areas identified by the National Council of Supervisors of Mathematics and several have been extensively field-tested in elementary schools. The games use color, sound, graphics, and animation to motivate learners. According to the company, the programs stress mental skills rather than the manual skills emphasized in video games.

The home versions of Edufun packages will consist of the disk and a user guide that includes suggestions to parents of ways to extend math concepts into everyday situations, as well as flashcards, scorecards, and stickers to reward good performance. School packages will contain additional supplemental activities for reinforcement and extension of the material studied, along with a record-keeping program for teachers to use in keeping track of children's performance.

Reston Publishing Company, 11480 Sunset Hills Road, Reston, VA 22090; (703) 437-8900.

Founded in 1971, this Prentice-Hall subsidiary settled into Gulf Oil's planned community of Reston, Virginia. Primarily a publisher of college textbooks (with some eight hundred titles in print), Reston has recently moved into the educational software market.

Multiploy, the company's first program, is a math game that draws on arcade game principles to make learning addition, subtraction, multiplication, and division more fun and challenging. The game is especially intended for use by young people ages four to fourteen, although older learners can also enjoy playing it. The manual that comes with the program is clearly written and should be easy for inexperienced computer users to follow.

Reston recently issued a new book, *Kids and the Apple,* copublished with DataMost (Chatsworth, California). Especially designed to appeal to young people ages ten to fourteen, the book consists of thirty-three lessons containing Basic programs, explanations of Applesoft Basic commands and concepts, and review questions. The book can be used as a self-study tool or in a classroom setting. Each lesson is accompanied by Instructor Notes that tell what the lesson covers and suggest concepts to stress when teaching it. The answers to the programming exercises are included at the back of the book, along with a glossary of terms, index of topics, index of commands, information about error messages, and a listing of Applesoft's reserved words.

In the future, Reston plans to create software that makes educators' lives easier, as well as additional CAI programs. Meanwhile, the company is in the process of producing a 1983 computer calendar. The calendar will feature close-up photographs of micro chips, computer trivia, and other computer-related pictures and information.

Software Technology for Computers, Box 428, Belmont, MA 02178; (617) 923-4334.

In the course of his involvement with computers, Gary Haffer has developed mainframe programs for everything from launching the Apollo 10 space shot to diagnosing heart disease and bone cancer. In 1979, he and his company, Software Technology for Computers, took on a new challenge—creating comprehensive education and business programs for the Apple.

The company's most ambitious education project to date is the *Language/Reading Development Program,* described by Haffer as a "complete course in reading and perception." The system helps learners see relationships between words, rather than teaching reading and language arts by means of classical drill and practice methods.

Haffer came to the realization that many people don't understand a lot of what they read and have a tendency to stop at every word they don't know. He decided that in order to become faster, more efficient readers, people need to be able to recognize words, understand clearly what those words mean, and be able to spell them. This was the reasoning behind the creation of the *Language/Reading Development Program.*

The system consists of four disks: two on perception and word recognition, one on synonyms and antonyms, and one on analogies. Intended for use by both school-age learners and adults, it offers several levels of difficulty. Pacing that takes learners' responses into account has been incorporated into the program. In addition, users of the program (parents, teachers in a classroom situation, and others) can create their own supplemental files in order to test recognition and understanding of words they choose. The package includes supplementary worksheets, study guides, and lists of all the words the program employs.

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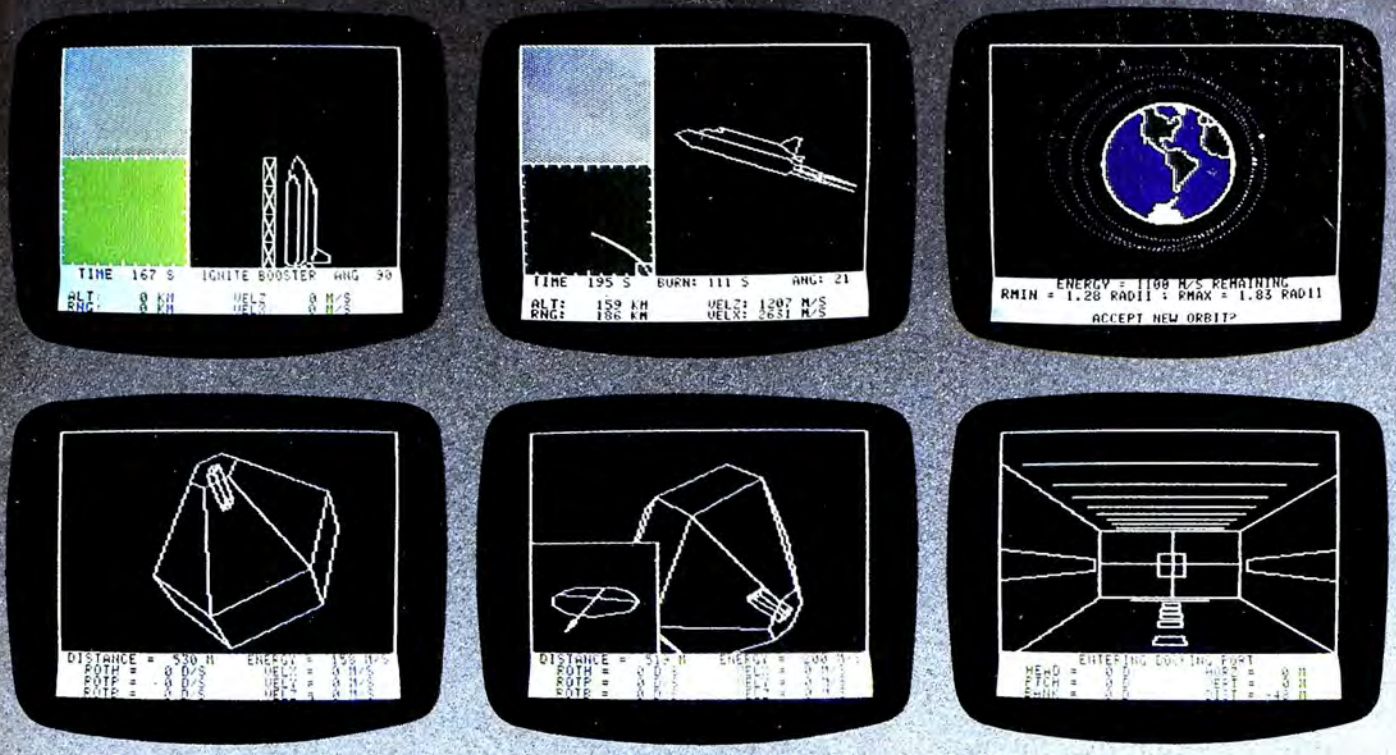
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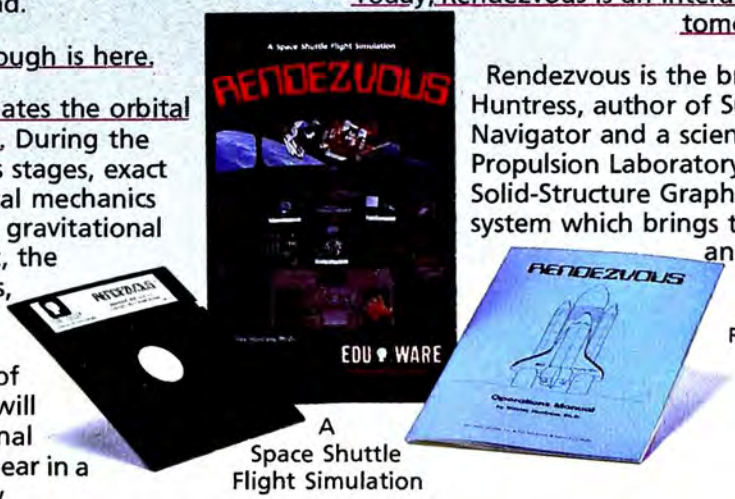
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Rendezvous is the brainchild of Wes Huntress, author of Sub Logic's Saturn Navigator and a scientist at NASA's Jet Propulsion Laboratory. Huntress created Solid-Structure Graphics™, a 3-D animation system which brings to life the massive bulk and solidity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

Recommended for individual players, 13 and over.

Applesoft, 48K, DOS 3.3

$39.95

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SHEILA is available for the Apple II, Apple III, or Franklin Ace 100.

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Written by Brian Fitzgerald

H.A.L. LABS

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challenge—of emulating the big kids. Several excellent procedures in all versions of Logo have been written for use by preschoolers. But judging by the experience of the Young Peoples' Logo Association, the most successful programs are those that offer young people of all ages the chance to explore turtle graphics both on and off the computer.

Using both on and off computer activities has a range of benefits. Classrooms and clubs are always faced with the very practical problem of where to get (and how to afford) the hardware to satisfy so many curious youngsters, all of whom are eager for their turn at the keyboard. Since the time of one computer per learner is a long way off, the question becomes, "What do we do with those people who are not working at the keyboard?"

Schools, classroom groups, clubs, and families can all enjoy a wide range of "off computer" turtle geometry activities. As an aid to visualizing what the turtle is doing on the screen, learners can walk through turtle exercises, moving FORWARD, BACK, LEFT, and RIGHT to form different geometric patterns on the floor. When children are working together in a group, one child can play the turtle while others "program" the turtle to walk through different geometric procedures.

A wide range of exercises can be done on graph paper and on large sheets of paper or cloth that have been spread out on the floor. Knotted string laid out in patterns can help youngsters visualize the trail the turtle must take on the screen. In addition, many arts and crafts activities, along with body geometry, can be used to demonstrate keyboard and screen functions. For example, ask four children to stand together forming a square. Kinetic activity like this goes a long way toward making geometry come alive for children.

A young child recently demonstrated the value of these kinds of exercises. Three-year-old Jeffrey was fascinated by the computer and enjoyed typing random letters and seeing them appear on the screen. He tried some of the procedures designed especially for preschoolers but, because they were not like those being used by his older brother and sister, he really wasn't that interested.

Working with the MIT version of Logo, wherein the shape of the turtle can be changed, Larry Muller of the YPLA Software Exchange developed single-keystroke procedures that allowed Jeffrey and others in his age group to draw, in effect, "just like the big kids."

With the aid of the shape editor, the shape of the traditional triangle-shaped turtle was changed to a more graphic representation of a small turtle. The new turtle now moved on command, changing direction as requested and drawing multicolored lines on a white background. Jeffrey found this fascinating and was soon putting squares and rectangles on the screen with ease, accurately describing the shape of each figure as the turtle made it appear.

How does a three-year-old know the difference between squares, rectangles, and triangles? It's tempting to cite this as an example of "genius at work." But it is more realistic to say that Jeffrey has found the key to enjoying the computer through a single-keystroke language that puts him in control so that he can "be like the big kids." Those who have watched him work—that is, when he lets people get anywhere near the computer—can't help wondering just how much of this Jeffrey understands. How much is instinctual learning?

One thing is obvious, however. Jeffrey is at that age where he wants to do everything himself. He even insists on holding his own hand—not his mother's—when he crosses the street. Having had the chance to live and feel turtle geometry through off-computer experiences, Jeffrey now seems to be able to translate the experiences into meaningful on-computer procedures. The result is that the computer has come alive for Jeffrey and for those around him.

The activities Jeffrey enjoyed, along with a number of other on and off computer activities, have been gathered together into *The Turtle Sourcebook*, a turtle graphics workbook for home and school scheduled for publication by the YPLA this month. Developed with the guidance and participation of Dr. Kathleen Martin of the University of Dallas, the programs in the book will be introduced at the Ed-Com '82 conference, which is being held October 21 through 24 in Los Angeles, California.

On-Computer Adventures. Once young people begin working at the computer, they can learn about turtle graphics and Logo through the building of procedures using basic geometric shapes. Not only are the circle, square, triangle, and rectangle very easy to draw, they are very common natural shapes that can be combined to form all sorts of more complex pictures. And it is this structuring of small elements into more complex procedures that is the power of Logo.

A fundamental procedure used to draw a shape is the POLY procedure:

```
TO POLYR :REPEAT :SIDE :ANGLE
REPEAT :REPEAT [FORWARD :SIDE
RIGHT :ANGLE]
END
```

To draw a polygon, you need only assign values to the variables REPEAT, SIDE, and ANGLE. For example, POLYR 4 50 90 draws a square with each side fifty turtle steps long. The turtle repeats that which is inside the brackets four times. In this case, it moves fifty steps and then turns right. The "R" in POLYR indicates that the figure will be drawn by the turtle making right turns. To have the turtle draw to the left, you need only change the direction.

Youngsters in various schools have been working with Logo for about a year, developing procedures for simple geometric shapes and then assembling the procedures into pictures. They have done elephants, cameras, churches, buildings, and all sorts of other objects.

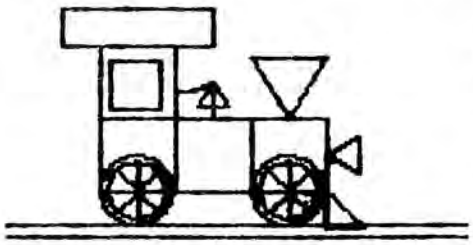
A Logo Challenge. Here's an example in which the POLYR and POLYL procedures are used to draw an old-time railroad engine. Called TRAIN, this procedure uses circles,



squares, triangles, and rectangles to form the picture.

But there's one problem.

Throughout the procedure, the variables



keep changing. Note that there are several places where the MAKE command is used to change the values of R, S, and A.

Here's the challenge!

Change this procedure so that only one set of variables is used. TRAIN would then become TO TRAIN :R :S :A. All other values within the procedure would then have to be related to the assigned values of Repeat, Side, and Angle. For example, if 4, 30, and 90 are the values assigned to R, S, and A, then all of the 90 degree turns within the procedure would be written as RIGHT :A or LEFT :A. A move of FORWARD 60 could be written as FORWARD :S * 2.

If you send us a working program on disk or tape, we'll send you a selection of Logo procedures.

Send program listings and disks to Softalk Train, Box 60, North Hollywood, CA 91603.

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In May, 1981, Blue Lakes started testing a new program that may very well revolutionize the way letters are written. Letters are first entered on forms from within a Super-Database program that was specifically designed to handle personal information. The Database can then be searched by up to 6 position searches simultaneously. It doesn't matter whether the searches are only part of a word, name, or code. The first name with a semicolon next to it is a built in feature that gives you perfect salutations for the most demanding situations. Spacing is automatically taken care of. Help screens throughout the program assure first time users and yet doesn't slow down experienced users. Learning seven commands will give you full power of the letter writing features of Mailmod.

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Requires a 64K Apple with 2 disk drives. Works many times faster on any hard disk supporting Apple Pascal. Apple III version is now available.

A Free conversion program that converts Pascal text files into Mailmod records is available if purchased before Oct. 31st, 1982.

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In the coming months, we'll bring you a variety of programs and challenges for people of all ages. You'll be introduced to multilingual turtles from South America and other parts of the world. Jeffrey and his preschool friends will continue to explore the computer. You'll also see how Logo can be used in the study of dynamics and two and three dimensional geometry, as well as what it can do as a general purpose language.

Note: Type a line that is indented as a continuation of the line above.

```
TO GRAPHICSDUMP
.PRINTER 1
TYPE CHAR 9 TYPE "G TYPE "R TYPE "E
    TYPE CHAR 13
.PRINTER 0
END

TO DUMP
.PRINTER 1
TYPE CHAR 27 TYPE "E
POPS
.PRINTER 0
END

TO CORD
LEFT 30
MAKE "R 15
MAKE "S 1
MAKE "A 2
POLYL :R :S :A
MAKE "S -1
POLYR :R :S :A
LEFT 30
END

TO RAILS
LEFT 45 BACK 15 LEFT 90 FORWARD 280
LEFT 90 PENUP FORWARD 5 PENDOWN
LEFT 90 FORWARD 280
END

TO CATCHER
LEFT 60 FORWARD :S * 2
RIGHT 90 FORWARD 15 RIGHT 135
    FORWARD 23
END

TO LIGHT
MAKE "S 15
LEFT 60 FORWARD :S
LEFT 90 FORWARD :S
SETH 240
POLYR :R :S :A
END

TO BOILER
MAKE "R 4
MAKE "S 30
MAKE "A 90
POLYR :R :S :A
POLYL :R :S :A
LEFT 90 FORWARD :S
POLYR :R :S :A
RIGHT 90
END

TO BELL
PENDOWN
RIGHT :A
FORWARD 15
RIGHT 150
MAKE "R 3
MAKE "S 12
MAKE "A 120
POLYR :R :S :A
CORD
MAKE "A 90
RIGHT :A FORWARD 15 RIGHT :A
END

TO STACK
MAKE "A 90
BACK :S + 30 RIGHT :A PENUP FORWARD
    :S
RIGHT :A
BELL
MAKE "S 30
FORWARD :S
SETHEADING 0 PENDOWN LEFT 30
MAKE "R 3
MAKE "A 120
POLYR :R :S :A
END

TO SPOKES
REPEAT 4 [FORWARD 12 BACK 24
    FORWARD 12 RIGHT 45]
LEFT 90 FORWARD 12 LEFT 90
END

TO WHEEL
MAKE "R 90
MAKE "S 1
MAKE "A 4
POLYL :R :S :A
LEFT 90 PENUP FORWARD 3
RIGHT 90 PENDOWN
MAKE "R 72
MAKE "A 5
POLYL :R :S :A
LEFT 90 FORWARD 12 RIGHT 90
SPOKES
END

TO POLYR :R :S :
REPEAT :R [FORWARD :S RIGHT :A]
END

TO POLYL :R :S :A
REPEAT :R [FORWARD :S LEFT :A]
END

TO CAB
MAKE "S 30
MAKE "R 4
MAKE "A 90
PENUP RIGHT 90 FORWARD 3 LEFT 90
PENDOWN FORWARD :S
POLYL :R :S :A
LEFT 45 PENUP FORWARD 6 RIGHT 45
    PENDOWN
POLYL :R :S - 10 :A
END

TO ROOF
PENUP
RIGHT 135 FORWARD 6 LEFT 135
    FORWARD :S
PENDOWN RIGHT 90 FORWARD 15
REPEAT 2 [LEFT 90 FORWARD 15 LEFT 90
    FORWARD :S * 2]
END

TO TRAIN
HT
BOILER
WHEEL
MAKE "S 30
LEFT 90 PENDOWN
BACK :S * 2 + 3 RIGHT 90
WHEEL
CAB
ROOF
STACK
LIGHT
CATCHER
RAILS
END
```

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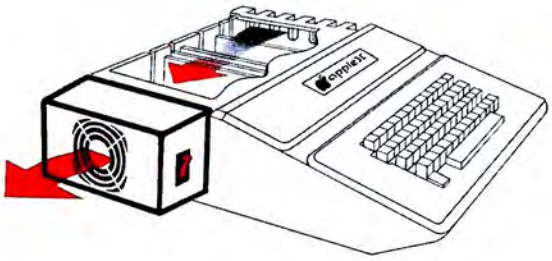


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As soon as you move to 64K RAM or 80 columns you need SYSTEM SAVER.

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.

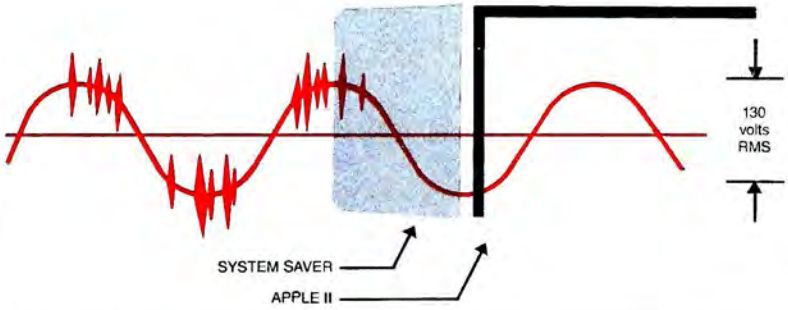
SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.



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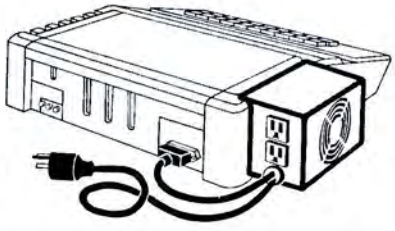
The SYSTEM SAVER provides essential protection to hardware and data from dangerous, power surges and spikes.

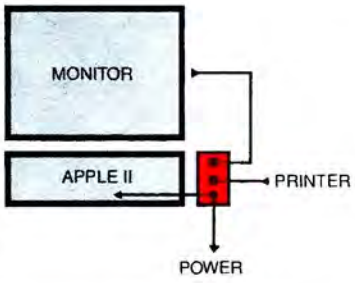
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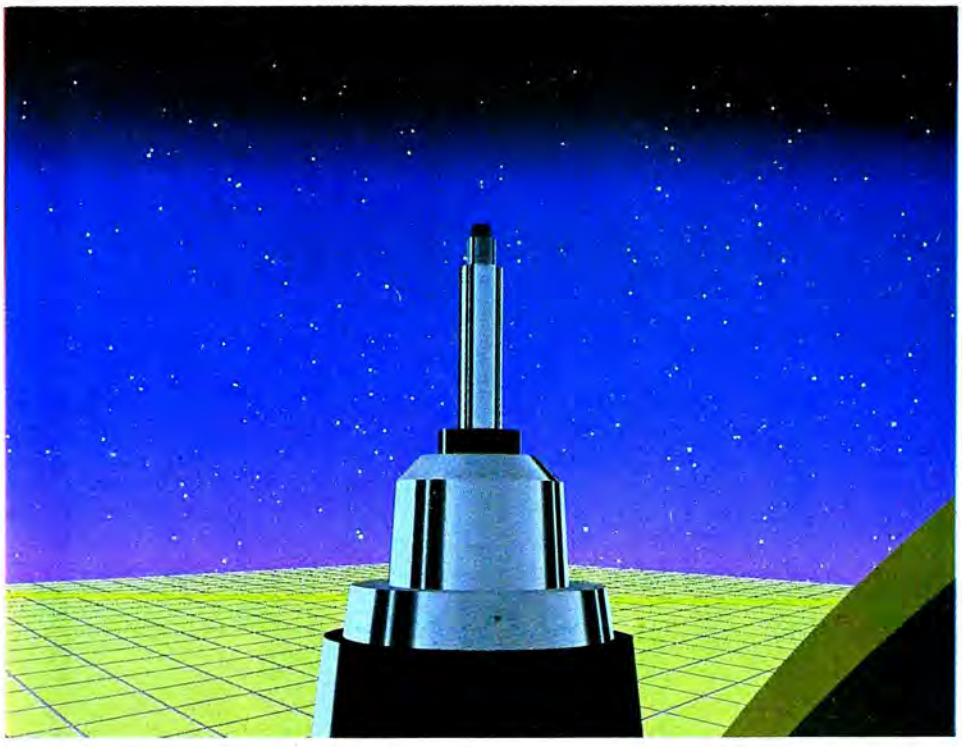
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☐ **What Hath Tron Wrought?** You are floating in outer space. Far in the distance is a triangular plane covered with some kind of gridwork. Then you are moving toward it at an incredible speed and the black, airless void turns bright blue as you make contact with its atmosphere. You perceive objects floating above the surface. They appear to be pillars and concave triangular solids which, as you approach within inches, can be seen to contain . . . Pentel pens.



That's the scenario of the first television commercial produced by Cineflex Pictures of Los Angeles, and it claims to be the first thirty-second spot consisting entirely of computer-generated imagery. Cineflex, the commercial film division of Pacific Electric, achieves its effects with 256 color selections, sixteen density types, and a nearly infinite number of available shapes—the same kind of solid geometry system used in the film *Tron.*

Producer Gary Rocklen and his "imagists" feed object descriptions into a computer, which then makes the digital-to-analog translation of the image to 35 millimeter film. The result is "pure" computer-simulated graphics, with no opticals or combinatory imagery. The specific system and process are tightly held trade secrets in this suddenly competitive field.

Cineflex's next commercial was for Twentieth Century-Fox video games, an assignment that required filling the screen with a close-up of a tiny lo-res video game figure. Cineflex created a graphics program that simulates the play of one of the Fox/Atari games. With 2,100 lines of resolution available in their filming system, the only problem, as Rocklen recalls, was not to misrepresent the product as looking better than it really does.

☐ **The Big Check-Out.** Taking books out of a public library is one of the last great free things in America—anyone can do it if their library credit's good. Nevertheless, many people have missed the spirit of the idea and are neglecting to return what they have borrowed.

Collecting fines and retrieving overdue or stolen books is a serious business. Library investigators in Los Angeles try to collect on more than one million dollars' worth of fines and materials each year. Failure to return books or pay fines can result in six months in jail or a $500 fine.

The downtown Los Angeles Central Library will soon be going on-line with CRTs hooked up to IBM mainframes at the City Hall Data Service Bureau, giving them access to patrons' overdue book files. Several branch libraries already have this system successfully in operation.

The L.A. Public Library system has been a leader in in-house library automation, according to Elizabeth Higbie, who oversees the system from the central library. "We've been handling acquisition of books, inventory, and the making up of book cards on the IBM for several years."

With the new patron file terminals, if someone owes money, their library cards are confiscated on the spot. This cuts down on repeat offenders and gives the library a front line to protect their books and audio-visual materials.

"The IBM terminal system is becoming a very valuable tool at more branches each year," says Higbie.

"Before this system, we had no way of dealing with it at all, except for looking up records on microfiche, which was very cumbersome."

The major stumbling block to equipping a library with electronics effectively has been the sheer size of the task. According to Higbie, "It's been very difficult to find a system to handle a public library as large as this one. It takes so much equipment. Whenever money is available, we start looking at new ways to automate."

Right now they are watching what the Chicago Public Library is doing with a newly installed Data Phase system with one hundred terminals. "We don't want to have to start from scratch again," says Higbie. "It's just too expensive." So they watch and wait patiently for expansion money to be budgeted their way. Meanwhile, the war against pilferage of books and audio-visual materials goes on.

Library offenders are offbeat thieves. They often stick to stealing only books on their favorite subjects. One man cleaned out all the Elvis records in several branches only hours after the star had died.

Although most people pay their fines when notified to do so by mail, the worst offenders hold out until they have to be hunted down. One man owes $2,200 in books and fines to eight San Fernando Valley branches. Several hundred borrowers owe more than a thousand dollars each.

☐ **Prisoners Pass Plato.** In Stillwater, Minnesota, at the State Penitentiary, they offer an escape from the dead end of serving time—computerized rehabilitation. Their slogan might be: "Go to prison—earn a bachelor degree in computer programming." Stillwater inmates have the option to learn basic and advanced computer skills through an educational alternative program called Insight, Inc.

The program was originally the dream of a Stillwater inmate, John P. Morgan, when he was in solitary confinement ten years ago. "I wanted to fill a void in prison education," says Morgan. "We had classes—some vocational training and the G.E.D. test (equivalent to a high school diploma)—but there were no sec-

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ondary courses offered. I wanted to create something for those who had the desire and mental equipment for college-level work."

Insight provides a challenging opportunity and is unquestionably popular. Nine inmates are presently enrolled. The curriculum includes 650 hours of instruction, equivalent to twenty-three lower-division credits at the University of Minnesota. The truly ambitious can earn bachelor and associate of arts degrees as computer technicians, systems analysts, or engineers.

The hardware for the Insight program is supplied by Control Data Corporation, based in Minneapolis. Much of the prisoners' curriculum emulates the courses offered by the Control Data Institutes across the country. Three of Control Data's Plato terminal systems link the inmates' classroom in Cellblock D via modem to the company's Supercomputer 176, located in a suburb of Saint Paul.

"Unique in the history of penology," says Morgan, "Insight is privately funded and inmate-run." There are seventeen classes available, and a 3.0 grade point average or better has been maintained. Insight has earned eighteen men bachelor degrees and has seen twenty-five men through their junior and senior years before they were paroled. Thirty-five men have obtained certificates of completion in computer programming and operations. Since 1975, there have been a total of 140 participants in the program.

Once trained in programming, an inmate is eligible to teach others through a contract with Control Data in a job preparation project called Homework. As instructors, they teach homebound and disabled students the basics of programming and computer operations.

Control Data is involved in prison reform at Stillwater even beyond the Insight program and Homework project.

According to Pat McKinnie, senior public relations consultant, Control Data also employs fifty-one inmates at the prison in assembling components for Control Data computers. To be accepted for the program, McKinnie says, "Applicants go through one of our programs called Fair Break that instructs them in basic spelling, math, and grammar skills using the Plato terminals. They also learn job-seeking and job-retention skills that can be used in and out of prison."

□ **Prognosis for Arcadia.** If you're an arcade video-game addict, you stand a 65 percent chance of developing arthritic conditions in your hands and wrists.

That's the bad news from Dr. Gary E. Myerson, a video-game addict and head of the three-man rheumatology team that conducted a study of 142 Atlanta video-game patrons. The good news is that preliminary findings suggest that better design of video games, not mere abstinence following injury, could do a lot to prevent potentially serious conditions from developing.

The standard arcade game is ideally suited to persons of statistically average height—namely, five feet, eight inches tall, says Myerson. People above and below that average show a marked tendency to develop temporary arthritic problems. These include neuralgic pain in the fingers, wrists, palms, and arms; tendonitis, causing local inflammation and redness, and finally, blisters and callouses.

In addition, standard playing consoles—sporting dials, buttons, and joysticks that must be pushed, punched, and twisted—tend to be improperly angled, putting additional strain on wrists and finger joints. Adjustable arcade seats, friction-free plastics for playing surfaces, and the use of playing gloves may be partial solutions. But only partial, Myerson adds, because the principal cause of injury is rapid repetition of one of four actions—pressing buttons, manipulating joysticks, rotating spheres, and twisting dials.

"Any of those motions performed at a rapid rate and at frequent intervals will be pain-provoking and joint-injuring," says Myerson, whose study evaluated fifteen popular arcade games. (Home computer games will be investigated in a subsequent study.) Thirteen of the arcade games required two-handed play, and all required at least two kinds of playing motion.

Myerson says no particular arcade game studied proved particularly problem-producing, but the investigation raised additional questions that he and his research team plan to explore in greater detail. On the drawing board, he says, is a more ambitious project calling for a long-term study of an entire high school class. Its focus will be twofold: to assess long-range

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HAYDEN **SOFTWARE**

benefits, such as improved hand-eye coordination; and to evaluate long-term susceptibilities of different kinds of players to chronic disorders, such as numbness or tingling sensations.

The study represents the first statistical approach to the subject according to the Atlanta rheumatologist. "This study disproves the notion that the problem is anecdotal. It's for real. Sixty-five percent of the people who play arcade games develop a problem."

The problems tend to go away within twenty-four hours if a player uses common sense and rests the sore or inflamed joint, says Myerson, but he recommends abstaining forty-eight hours to be on the safe side.

As for the researcher's sympathies, they are definitely those of a confirmed video-game addict. "Playing a game is a great way to release tension and go into what I call reversible mindlessness," says Myerson. "Once you start playing you're back to normal."

☐ **Two-Wheel Sensation.** Bicyclists in the California seaside community of Huntington Beach have good reason to believe the town is paving their way with good intentions. The city, boasting one hundred miles of bike lanes, is upgrading its Honeywell K-HMP 190 minicomputer traffic signal system to give pedal pushers a little vehicular respect.

A key new element, says traffic engineer Ralph Leyva, is improved amplification of road sensors that monitor bike lanes as well as auto traffic. Heavy activity in a sensored bike lane will activate the computerized signal, giving cyclists approximately a twelve second margin to break away.

In the past, cyclists had to dismount, hit a not-so-responsive "pedestrian button," and then wait for the thirty-second crossing signal. The new system, the first of its kind in Orange County, is designed primarily to increase traffic flow.

The improved amplifiers, in operation now for three months, were installed at a cost of $1,200 per intersection. Plans call for upgrading eleven more crossings this year.

☐ **Knocking Off Chips.** After designing and scrapping half a dozen versions of its 64K RAM chip, Intel introduced the finished product this year, months after Motorola and Texas Instruments put their respective versions on the market.

Intel's patience and expertise were rewarded early in September when International Business Machines contracted with the Santa Clara Valley firm for the design and process information of the component. IBM may use the technology to produce chips in the form of Intel's second-generation design, the 2164A, replacing IBM's own slower first-generation 64K component.

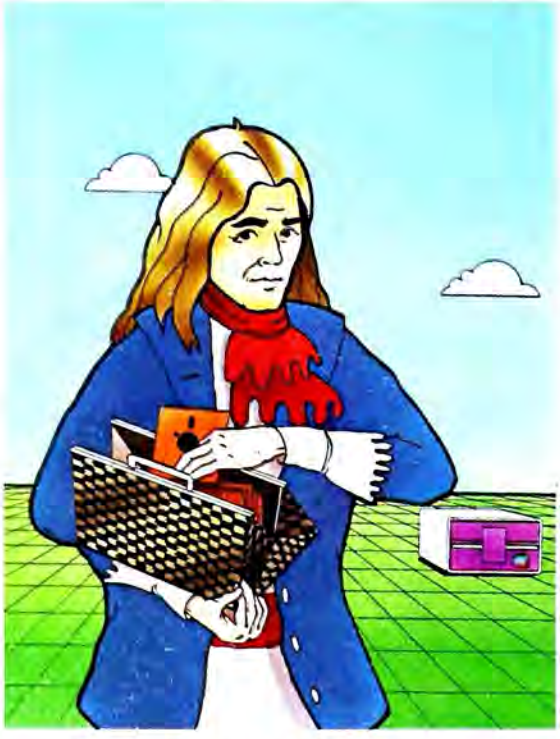
Intel has previously provided IBM with 16K chips and a microprocessor chip for the IBM Personal Computer.

☐ **North of the Border.** The Canadian government is studying the social impact of new office technologies and seeking means to help workers adjust to electronic office systems. To that end, the *Electronic File Cabinet*, a software product by Officesmiths Inc. of Ottawa, Canada, allowing access and retrieval of office documents and information on various microcomputers, will be field tested by the Canadian Ministry of Energy Mines and Resources.

Almost three quarters of a million dollars will be allocated over a period of two years to field test the software in the administrative branch of the finance and administration sector of EMR. The money will be spent under the Office Communications Systems program, established in 1980 to help Canadian companies develop the industrial capacity to supply the growing national and international markets for integrated electronic office products and services. The OCS program is a joint initiative of the Department of Industry, Trade, and Commerce, headed by Herb Gray, and the Department of Communications, ministered by Francis Fox.

The trial, to be conducted in three phases, will involve system design and definition of standards conforming to the needs of its users, implementation of a pilot automated system for administrative manuals, and introduction of an integrated system of administrative support information for use in regional offices across the country. Studies will also be undertaken on user satisfaction and administrative productivity, and a report entitled "What Happens to Your Office When Your Administrative Support System Is Automated" will be issued.

The trial will be implemented in consultation with affected workers, who will assist in the design of the system and development of training and education programs on a voluntary basis. ◨



More tips from the authors of Beneath Apple DOS . . .

Bag of Tricks™

By Don Worth and Pieter Lechner

Now there is more from the authors of the best selling book ***Beneath Apple DOS***—four comprehensive utility programs on diskette and **over 100 more pages** of valuable information about the Apple II's disk operating system.

BAG OF TRICKS is useful to beginners and experienced programmers alike. It includes many "hand holding" tutorials that assist you in repairing damaged diskettes and allow you to change sector ordering, reconstruct blown catalogs, etc. etc. etc. At the low price of $39.95, BAG OF TRICKS is one of the best software values ever.

The four programs and their functions are:

1. TRAX dumps and examines a raw track, either 13-sector or 16-sector, displays the internal Apple diskette formatting information, and flags exceptions to standard formats.
2. INIT will reformat one or more tracks, attempting to preserve the contents of undamaged sectors. It also allows you to change sector order. This can cut disk access times by 40% or more!
3. ZAP is a sector editor like no other! More than 50 commands are available to assist you to locate, compare, change, or print the data on your diskettes. ZAP is even programmable! Using powerful macros, it is possible to transfer and compare DOS, CP/M, or PASCAL files.
4. FIXCAT automates the process of repairing a damaged diskette catalog. It operates with or without user intervention, locating "lost" files and rebuilding the catalog—from scratch if necessary! DOS removal and VTOC repair are also possible.

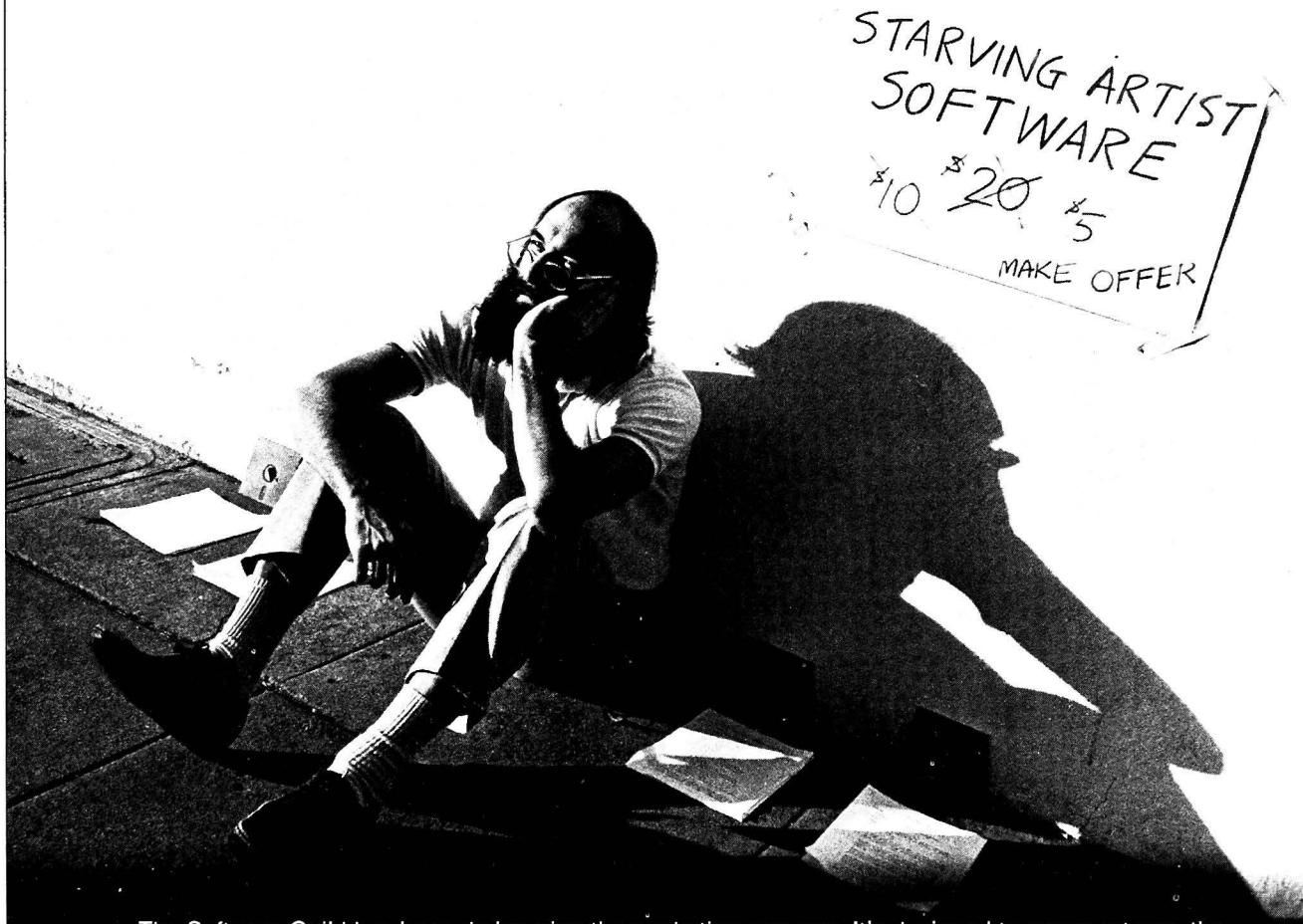
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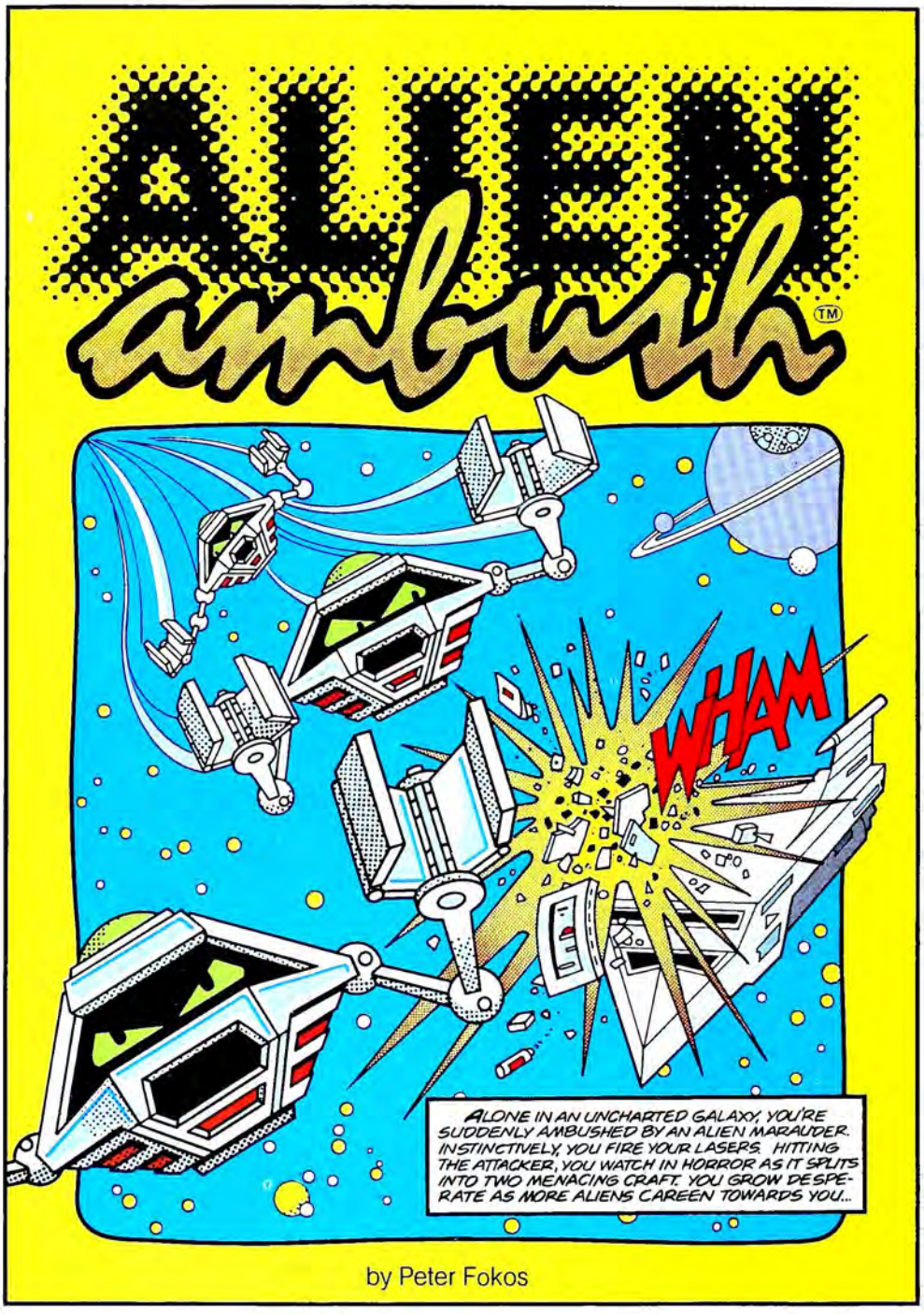
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So if you have access to a 48K Apple* with DOS 3.3, and you're hot for some new thrills, Alien Ambush was written for you. But be warned: It just got a lot tougher to survive in space.

Available at finer computer stores everywhere. *Apple is a trademark of Apple Computer, Inc.
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Softalk Presents The Bestsellers

In baseball, it's traditional to talk about the dog days of August. By that time the season's almost over, the heat is at its worst, and most of the teams have been effectively eliminated from the pennant races. It's then that it gets tough for a player to get motivated.

August is taking on similar negative meaning for purveyors of product in the Apple marketplace. In the previous two years, August represented the end of a slow summer period that extended from Memorial Day through Labor Day. But this year, August managed to stake out its own claim to infamy by being the worst month of all.

Systems sales held reasonably steady because of Apple's aggressive marketing, represented by the Family Pack for the Apple II and the Professional Solution for the Apple III. But software and peripherals tended to gather dust.

Particularly hard hit by the unexpected sales slump were games. Entertainment software has been holding its share of the market, even though the flood of different titles has spread the same dollars over more titles. But in August, entertainment sales were off considerably. It is not correct to assume that serious applications software benefited at the expense of games. Nationwide business software sales were flat; games were down.

Even in awful August, there were some things of interest. One was the resurgence of *Ultima*, which oddly enough reflects on the pulling power of *Wizardry*.

Wizardry remained fourth and held its own against the entertainment downturn. Its companion piece, *Knight of Diamonds*, did comparatively better than most games, slipping only one notch, from ninth to tenth. But the two Sir-tech products have fueled a demand for more fantasy role-playing games, and dealers have turned to *Ultima* to satisfy this demand. *Ultima*'s August sales equaled the sales of the prior two months and were enough to place Lord British's year-old program in a five-way tie for the lowest spot on the Top Thirty. It was the first Top Thirty showing in several months for the former bestselling game.

Also rising in sales in the face of the slowdown was *Escape from Rungistan*, Sirius Software's latest hi-res adventure. It now doubles the sales of any other adventure game in the Apple market. Another oldie-but-goodie, *The Wizard and the Princess* from Sierra On-Line, rose to second place in the Adventure 5, with Infocom capturing the remaining three places with *Deadline, Zork II,* and *Zork I.*

Also bullish in a bear market were two new products from Broderbund Software. *Serpentine* made twenty-sixth and the long-awaited *Arcade Machine* was among the programs tied with *Ultima* for twenty-seventh. The new products made August a banner month for the Broderbundians. *Choplifter* remained the runaway bestseller in the Apple market and *Star Blazer* maintained its eleventh rank in the Top Thirty.

The software most often carried out of the retail store in August, as in July, was *Apple Writer II.* Paul Lutus's word processor was bundled into the Family Pack, and more than twice as many as *Choplifter* were actually put into the hands of end users. *Apple Writer II* did well even after deducting those bundled with systems, ranking sixth overall and second among word processing programs.

Screen Writer II from Sierra On-Line continued as the most popular word processor. *WordStar* and *Word Handler* also made the Top Thirty, reflecting the increased use of the Apple II for word processing.

Apple III

This Month	Last Month	
1.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	**Apple Writer III,** Paul Lutus, Apple Computer
3.	3.	**Personal Filing System,** John Page and D. D. Roberts, Software Publishing Corporation
4.	4.	**PFS: Report,** John Page, Software Publishing Corporation
5.	5.	**Apple III Business Basic,** Apple Computer
6.	6.	**Apple III Business Graphics,** Apple Computer
7.	10.	**Access III,** Apple Computer
8.	8.	**Great Plains Hardisk Accounting Series,** Great Plains Software
9.	—	**VisiSchedule,** Michael Posehn, VisiCorp
10.	—	**VersaForm,** Joe Landau, Applied Software Technology

Word Processors 10

This Month	Last Month	
1.	1.	**Screen Writer II,** David Kidwell, Sierra On-Line
2.	2.	**Apple Writer II,** Paul Lutus, Apple Computer
3.	3.	**WordStar,** MicroPro
4.	4.	**Word Handler,** Leonard Elekman, Silicon Valley Systems
5.	7.	**Sensible Speller,** Sensible Software
6.	8.	**Magic Window,** Gary Shannon and Bill Depew, Artsci
7.	9.	**SuperText II,** Ed Zaron, Muse
8.	5.	**PIE Writer,** Softwest, Hayden
9.	—	**Dictionary,** Tom Cain, Sierra On-Line
10.	6.	**Executive Secretary,** John Risken, Sof/Sys

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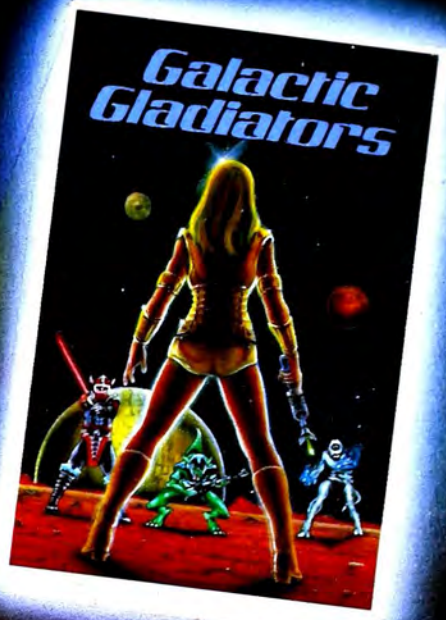
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If there are no convenient stores near you, VISA and M/C holders can order by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. To order by mail, send your check to: Strategic Simulations Inc., 465 Fairchild Dr., Suite 108, Mountain View, CA 94043. California residents add 6 5% sales tax. Each game is $39.95.

Few of the changes in the Top Thirty were of a dramatic nature, most reflecting the general sluggishness of the market. No new program was able to crack the top eleven positions. Within the Top Thirty, *MasterType* made the biggest move, going from twenty-first to twelfth. *MasterType* sugar-coats its educational intent with an arcade frosting and apparently is the forerunner of a new breed of educational software. Among other companies, the Learning Company and Spinnaker will be introducing products with a similar approach to education in the hopes of invigorating what has been a relatively moribund home educational market.

Because sales were slow, there were few changes in the speciality lists.

Strategy 5

This Month	Last Month	
1.	1.	**Castle Wolfenstein,** Silas Warner, Muse
2.	3.	**Rendezvous,** Wes Huntress, Edu-Ware Services
3.	2.	**Flight Simulator,** Bruce Artwick, SubLogic
4.	4.	**Sargon II,** Dan and Kathe Spracklen, Hayden
	—	**Cytron Masters,** Dan Bunten, Strategic Simulations

Adventure 5

This Month	Last Month	
1.	4.	**Escape from Rungistan,** Bob Blauschild, Sirius Software
2.	—	**Hi-Res Adventure #2: The Wizard and the Princess,** Ken and Roberta Williams, Sierra On-Line
3.	3.	**Deadline,** Infocom
4.	1.	**Zork II,** Infocom
5.	5.	**Zork I,** Infocom

Fantasy 5

This Month	Last Month	
1.	1.	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
2.	2.	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
3.	3.	**Ultima,** Lord British, California Pacific
4.	4.	**Apventure to Atlantis,** Bob Clardy, Synergistic Software
5.	5.	**Curse of Ra,** Tim Bird, Mark Madrid, and Andrew Martin, Epyx/Automated Simulations

VisiCalc was the number two program overall and remained atop the Business 10. *Personal Filing System* remained third overall and second in the Business 10. *DB Master* moved up to ninth overall while retaining third place among business programs. The only new entrant in the Business 10 was *dBase II*, recapturing the tenth position that it had held two months prior.

After the four word processors noted previously came *Sensible Speller* in the Word Processing 10. *Sensible Speller* continues to dominate the market for proofreading programs, but *The Dictionary* from Sierra On-Line made the list at ninth and may be ready to make a challenge. Other changes were mostly cosmetic, with *Magic Window* and *SuperText II* moving up and *PIE Writer* and *Executive Secretary* dropping—but all closely bunched and all clearly impacted by the wholesale distri-

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1st CLASS MAIL. By Bob Schoenburg and Steve Pollack. Here's a pair of authors who may be software's answer to Irving Wallace. Wallace is the bestselling author who hears the murmuring of general populace and caters to their desires. Bob Schoenburg and Steve Pollack seem to have the same trait.

Consider.

The pair brought out *Home Money Minder*, a perfectly respectable home finance package. Then they listened to the user feedback. The result was *Home Accountant*, one of the phenomenal success stories of the first half of 1982.

Around the same time *Home Money Minder* hit, the team also tested the market with *The Mailroom*. Mailroom never was the success of *HMM*, but the authors used the same technique – listen to the users and incorporate all the good ideas. The result is **1st CLASS MAIL** – a program that, incredibly enough, manages to live up to its double-entendre name.

All of the above is not to accuse Schoenburg and Pollack of putting out the programming equivalent of stalking-horses to do their market research for them. Their original efforts do stand on their own merit. They just pale next to the sequels.

1st CLASS MAIL is so well thought out and so easy to use that other publishers who call their programs "user friendly" should bow their heads in shame.

SOFTALK got an early release of the program sans documentation. Yet a rank computer illiterate was able to apply the program to two separate uses with relatively little trouble. This is high praise indeed: that a novice operator could use a powerful program with no more than the screen menus.

The program allows for twelve fields, clearly more than the traditional name and address of a mailing label. The implication is that the software can be put to other innovative uses as well. The built-in ability to sort and filter on any field or combination thereof enhances the chances that users will find multiple applications for the program.

Continental Software will actually be publishing four versions of the program.* The one already in release is for the Apple II using floppy disks. A hard-disk version will follow. Both versions are pending for Apple III as well, awaiting the development of a rapid binary sort subroutine.

1st CLASS MAIL is a first-rate program for specialized data base applications.

Reviewed by Al Tommervik, Publisher, Softalk.

***Available for: Apple II,™ Apple III™/III with Profile,™ IBM-PC™/IBM-PC with Tecmar™ hard disk/IBM-PC with Davong™ hard disk.**



Continental Software

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for the Apple



by Eagle Berns and
Michael Kosaka

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Home 10

This Month	Last Month	
1.	1.	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	2.	**MasterType,** Bruce Zweig, Lightning Software
3.	3.	**Transend,** Tim Dygert and Bob Kniskern, SSM
4.	5.	**Personal Finance Manager,** Jeffrey Gold, Apple Computer
5.	8.	**ASCII Express,** Bill Blue, Southwestern Data Systems
6.	4.	**Data Capture 4.0,** David Hughes and George McClelland, Southeastern Software
7.	6.	**Typing Tutor,** Image Producers, Microsoft
8.	10.	**VisiTerm,** Tom Keith, VisiCorp
9.	9.	**Apple Logo,** Apple Computer
10.	—	**Dow Jones Portfolio Evaluator,** Apple Computer

Hobby 10

This Month	Last Month	
1.	3.	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
2.	4.	**The Complete Graphics System,** Mark Pelczarski, Penguin Software
3.	1.	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
4.	5.	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
5.	2.	**Utility City,** Bert Kersey, Beagle Bros
6.	—	**DOS Tool Kit,** Apple Computer
7.	6.	**Zoom Grafix,** Dav Holle, Phoenix Software
8.	8.	**Special Effects,** Mark Pelczarski, Penguin Software
9.	9.	**Lisa 2.5,** Randy Hyde, Sierra On-Line
	7.	**Apple Mechanic,** Bert Kersey, Beagle Bros
	—	**TASC,** James M. Peak and Michael T. Howard, Microsoft

Business 10

This Month	Last Month	
1.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	**Personal Filing System,** John Page and D. D. Roberts, Software Publishing Corporation
3.	3.	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
4.	4.	**PFS: Report,** John Page, Software Publishing Corporation
5.	8.	**PFS: Graph,** Bessie Chin, Software Publishing Corporation
6.	6.	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
7.	5.	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
8.	7.	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp
9.	10.	**General Manager,** Brillig Systems/Paul Malachowski and Kevin Cooper, Sierra On-Line
10.	—	**dBase II,** Wayne Ratcliff, Ashton-Tate

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Infoworld magazine had this to say about Lightning Software's Hi-Res MasterType. "MasterType is an excellent instructional typing game. We had fun reviewing it, and we highly recommend it to those who want to learn typing in an unconventional but motivating way."

Infoworld also went on to rate MasterType as Excellent in all categories.

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bution of *Apple Writer II* to new system owners.

Home Accountant and *MasterType* continued atop the Home 10, but the big news is *Transend*, which remained third in the Home list while rising to seventeenth on the Top Thirty. SSM bundles a membership to the Source with its *Transend* packages, making it an attractive purchase for those interested in telecommunications through computer.

Personal Finance Manager from Apple jumped to fourth on the Home 10 and regained the Top Thirty in twenty-third place. The only newcomer to the Home list was the *Dow Jones Portfolio Evaluator.*

The Hobby 10 list continues to be dominated by the unprotected software published by Beagle Bros and Penguin. *DOS Boss* rose to first on the list and tied for twenty-seventh on the Top Thirty. Other Beagle Bros products on the list are *Utility City* and *Apple Mechanic.* Penguin's *Complete Graphics System* rose to second and was joined on the list by *Graphics Magician* and *Special Effects* from Penguin.

New this month to the Hobby list were *DOS Tool Kit* from Apple and the *TASC* compiler from Microsoft.

There were no changes in the Fantasy 5 list, but there was some shuffling in the Strategy 5 category.

Edu-Ware's *Rendezvous* gained a notch to second and Strategic Simulations's *Cytron Masters* tied for fourth. Hot among the newcomers but not yet on the Strategy 5 was *Spitfire Simulator* from Mind Systems and another SSI entry, *Galactic Gladiators.*

The Apple III market was also static, with the first six programs holding their respective ranks. *Apple Writer III* closed the ranks on *VisiCalc*, which was being bundled in the Professional Solution special, in the battle for the top spot.

New to the list were *VisiSchedule* from VisiCorp and *VersaForm* from Applied Software Technology.

Generally, August was a month best forgotten by most retailers and software publishers. But, as *Softalk* conducted its poll in early September, retailers were reporting an encouraging and significant uptick that bodes well for the market through year end. New product already introduced or on its way promises to make the Christmas season a monster one. It's just too bad Christmas isn't in the month after August. ◨

Apple-franchised retail stores representing approximately 5.4 percent of the sales of Apples and Apple-related products volunteered to participate in the poll.

Respondents were contacted early in September to ascertain their sales leaders for the month of August.

The only criterion for inclusion on the list was number of sales made—such other criteria as quality of product, profitability to the computer retailer, and personal preference of the individual respondents were not considered.

Respondents in September represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only for the month in which they are printed: readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus-or-minus 5.3 percent, which translates roughly into the theoretical possibility of a change of 4.03 points, plus or minus, in any index number.



The Top Thirty

This Month	Last Month	Index	
1.	1.	214.57	**Choplifter,** Dan Gorlin, Broderbund Software
2.	2.	150.49	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	3.	99.38	**Personal Filing System,** John Page and D. D. Roberts, Software Publishing Corporation
4.	4.	98.57	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
5.	5.	95.73	**Screen Writer II,** David Kidwell, Sierra On-Line
6.	8.	85.18	**Apple Writer II,** Paul Lutus, Apple Computer
7.	7.	66.52	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
8.	6.	60.44	**Snack Attack,** Dan Illowsky, DataMost
9.	10.	58.00	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
10.	9.	56.78	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
11.	11.	45.02	**Star Blazer,** Tony Suzuki, Broderbund Software
12.	21.	42.99	**MasterType,** Bruce Zweig, Lightning Software
13.	13.	41.78	**Cannonball Blitz,** Olaf Lubeck, Sierra On-Line
14.	—	39.35	**Escape from Rungistan,** Bob Blauschild, Sirius Software
15.	15.	35.29	**PFS: Report,** John Page, Software Publishing Corporation
16.	14.	33.26	**Castle Wolfenstein,** Silas Warner, Muse
17.	24.	27.58	**Transend,** Tim Dygert and Bob Kniskern, SSM
18.	23.	25.96	**WordStar,** MicroPro
19.	28.	23.93	**PFS: Graph,** Bessie Chin, Software Publishing Corporation
20.	18.	22.71	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
21.	17.	21.09	**Taxman,** Brian Fitzgerald, H.A.L. Labs
	20.	21.09	**Bandits,** Benny Ngo and Tony Ngo, Sirius Software
23.	—	20.28	**Personal Finance Manager,** Jeffrey Gold, Apple Computer
24.	29.	19.47	**Swashbuckler,** Paul Stephenson, DataMost
25.	16.	19.06	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
26.	—	17.04	**Serpentine,** David Snider, Broderbund Software
27.	30.	15.82	**Marauder,** Rorke Weigandt and Eric Hammond, Sierra On-Line
	—	15.82	**The Arcade Machine,** Chris Jochumson and Doug Carlston, Broderbund Software
	—	15.82	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
	26.	15.82	**Word Handler,** Leonard Elekman, Silicon Valley Systems
	—	15.82	**Ultima,** Lord British, California Pacific

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Three Grand Prize Winners
$500 Worth of Software

It's true! Be a WINNER ALL YEAR LONG and become eligible to be one of three GRAND PRIZE WINNERS in SIERRA ON-LINE'S WINNERS CONTEST! We at ON-LINE SYSTEMS are proud to announce our new name, SIERRA ON-LINE INC. Due to the rapid growth our company has experienced since its inception, it has come time to choose a name and symbol which represent our company's philosophy . . . STABILITY, QUALITY AND DEPENDABILITY. Now that you've been introduced to our new name, here's your chance to become better acquainted. Each one of our ads in this magazine asks an important question concerning that particular product. If you can correctly answer all thirty-two questions and return your entry by March 15, 1983 you could be one of three GRAND PRIZE WINNERS! Each Grand Prize Winner will select $500 worth of action-packed software from Sierra On-Line's vast product line! In addition to the three Grand Prize Winners, all entries will be eligible for our year-long drawing. Every time Sierra On-Line Inc. releases a new Apple product during the year 1983, TEN WINNERS will be randomly drawn to receive that product free. You need enter only once and you're eligible all year long, not to mention the chance to win $500 worth of software! Just pick up an entry form from your local computer store and correctly answer the thirty-two questions and return it to us by the given date and you could be a Grand Prize Winner! Join us in our continuing celebration of the new year and become a WINNER ALL YEAR LONG with quality Apple software products from Sierra On-Line, the leader in the field.

Just follow the rules listed below.

OFFICIAL CONTEST RULES:

All federal, state and local taxes are the sole responsibility of the winner. This game is void where prohibited, license required or taxed (other than a tax on prizes awarded).

Contest begins on JANUARY 18, 1983. All entries MUST be postmarked by MARCH 15, 1983.

WINNERS will be notified by mail. Public notice of WINNERS will be printed in this and other computer magazines.

Only ONE entry per person please, all duplicates will be discarded.

There will be TEN WINNERS each time a NEW Sierra On-Line product is released for the Apple computer.

Official Entry Forms are available at a dealer near you! Sorry, contest is limited to the United States of America and properties thereof.

Sierra ON-LINE INC

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