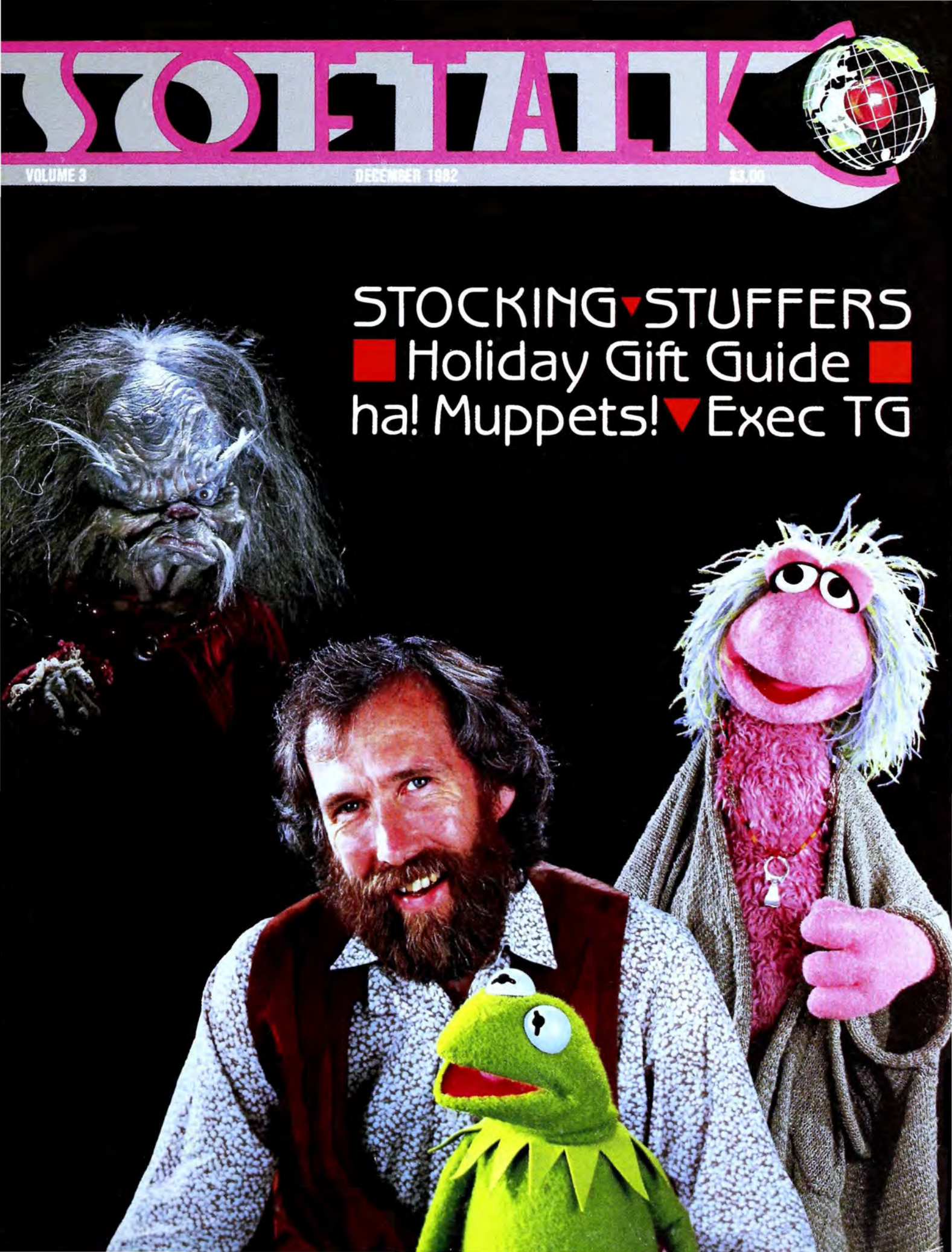
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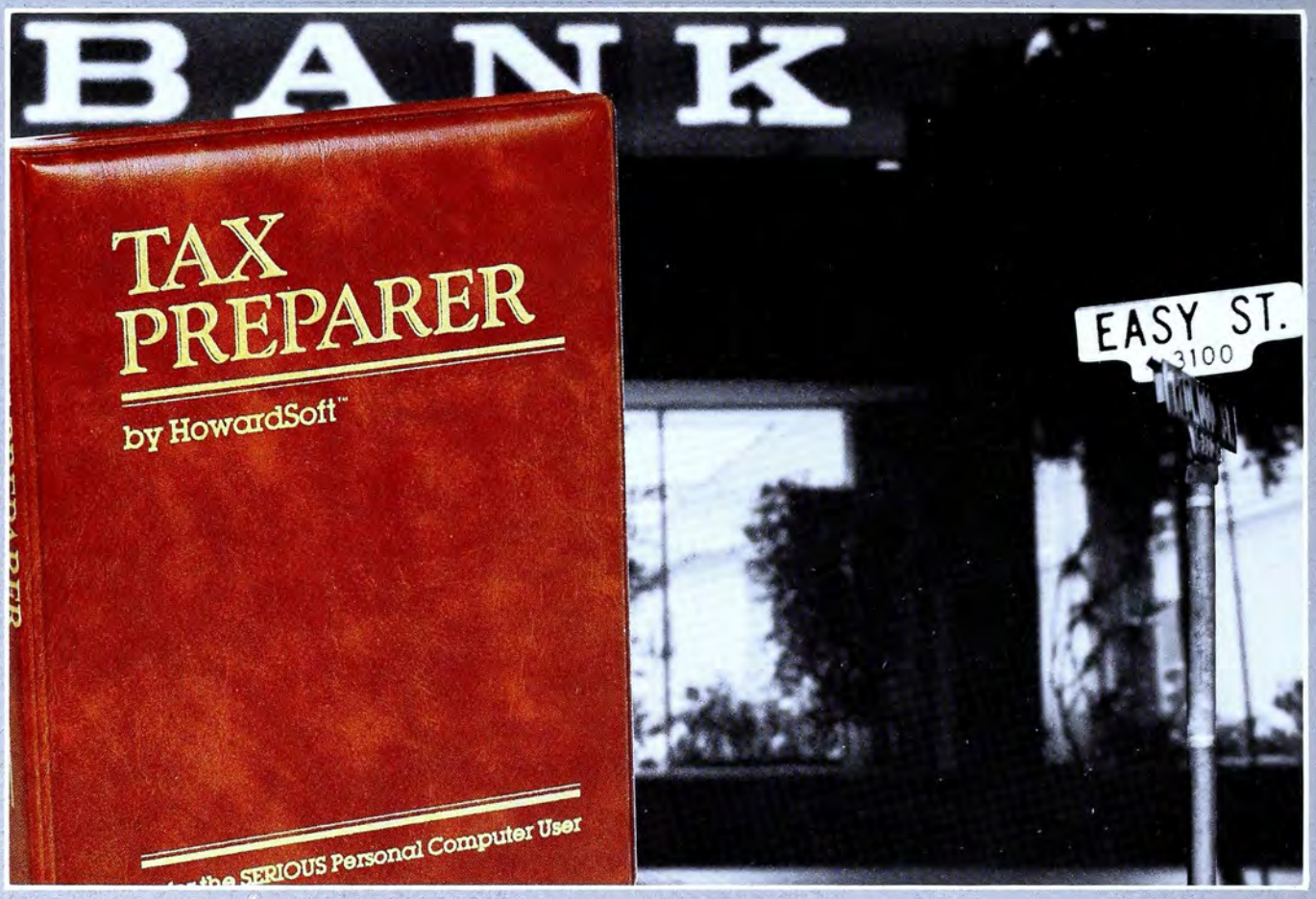
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STOCKING STUFFERS
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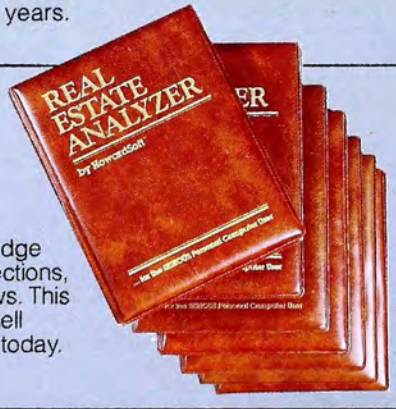
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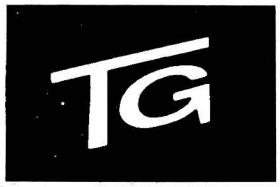
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Joltin' January . . . Pterodactyls Are Alive and Well in Watsonville . . . Exec: SubLogic . . . Modem Times: Telecommunications Comprehensive . . . Word Processing *Format II* . . . and more . . .

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CONTEST: ORACLE '83

You've all been waiting for it, and it's finally here—the monster contest to end all monster contests (for 1982, anyway). Yep, it's Oracle '83, the contest that awards six prizes throughout the year and one biggie at the beginning of 1984. But best of all, the grand prize winner will be named the *Softalk* Oracle of 1983, a title coveted by 16K and 128K users alike.

Whether you're a Basic bungler or a machine language maestro makes no difference—everyone has an equal chance at doing well or bombing.

For you newcomers in the gallery who don't know what's going on, sit back down and read the rules.

Rules: None.

There are no rules; they're too confining. Just look at what we want you to predict and do the best you can. Point values are listed to help you decide how much time to spend working on each one.

List your predictions on a sheet of paper and send them in to us postmarked before midnight of December 31, 1982. No exceptions! Don't forget to include your name, address, phone number, the name of your dealer, and your signature.

Prizes: Should you hit any of the predictions on the nose or come closer than anyone else, a good feeling of success should be enough. But, in case it isn't, we're going to award $100 worth of products made by *Softalk* advertisers to the winner of each part. Keep your eyes glued to these pages for announcements of winners.

The person who winds up the year with the highest cumulative score will win the "biggie" we mentioned earlier: Apple's next personal model computer. Not a II, not a III, but Apple's *next* personal computer, whatever it is, brand spanking new!

In addition to the prizes, you'll have bragging rights in all Appledom as the *Softalk* Oracle of 1983. So get going and have a blast!

The Oracle '83. Predict the following:

1. The day and month Apple will officially announce the release of a new personal model Apple computer, or predict that they won't. In case they should release more than one new model in 1983, only the first one counts. −1 point for every day off the mark; −365 if they announce one and you said they wouldn't (watch yourself).

2. The teams to make the Final Four in the NCAA Basketball Tournament. +5 points for each team; −5 for each wrong guess. +10 bonus points if you predict the winner of the tournament.

3. Who will win the Academy Awards in the categories of best actor, actress, and picture. +10 points for each; +20 bonus points for getting all three correct.

4. The sex, region of origin (East, Midwest, West, South, Foreign), and winning time of the winner of the Kentucky Derby. +1 point for a colt, +20 points if it's a filly, −10 points if you blow it; +5 points for region; −1 point for every 1/5-second off the time; +25 bonus points for naming the horse; +15 bonus points for naming the jockey (whew!).

5. Flags fly high on the Fourth of July. People and temperatures get high then, too. What do you predict the high temperature will be in San Jose, California, on July 4, 1983? −1 point for each degree Fahrenheit off the mark.

6. The earliest presidential candidacy declarations for Republican and Democratic parties made by September 30, 1983. +10 points per valid declarer; −5 points for everyone you name who doesn't declare by then.

7. The five companies that will appear most frequently in *Softalk*'s Top Thirty throughout 1983. +5 points per company; +20 bonus points for guessing the correct number of appearances of the top company.

List your predictions on a sheet of paper, and send them in with this coupon (filled out).

Name: _____

Address: _____

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Phone number: ( ) _____

My dealer: _____

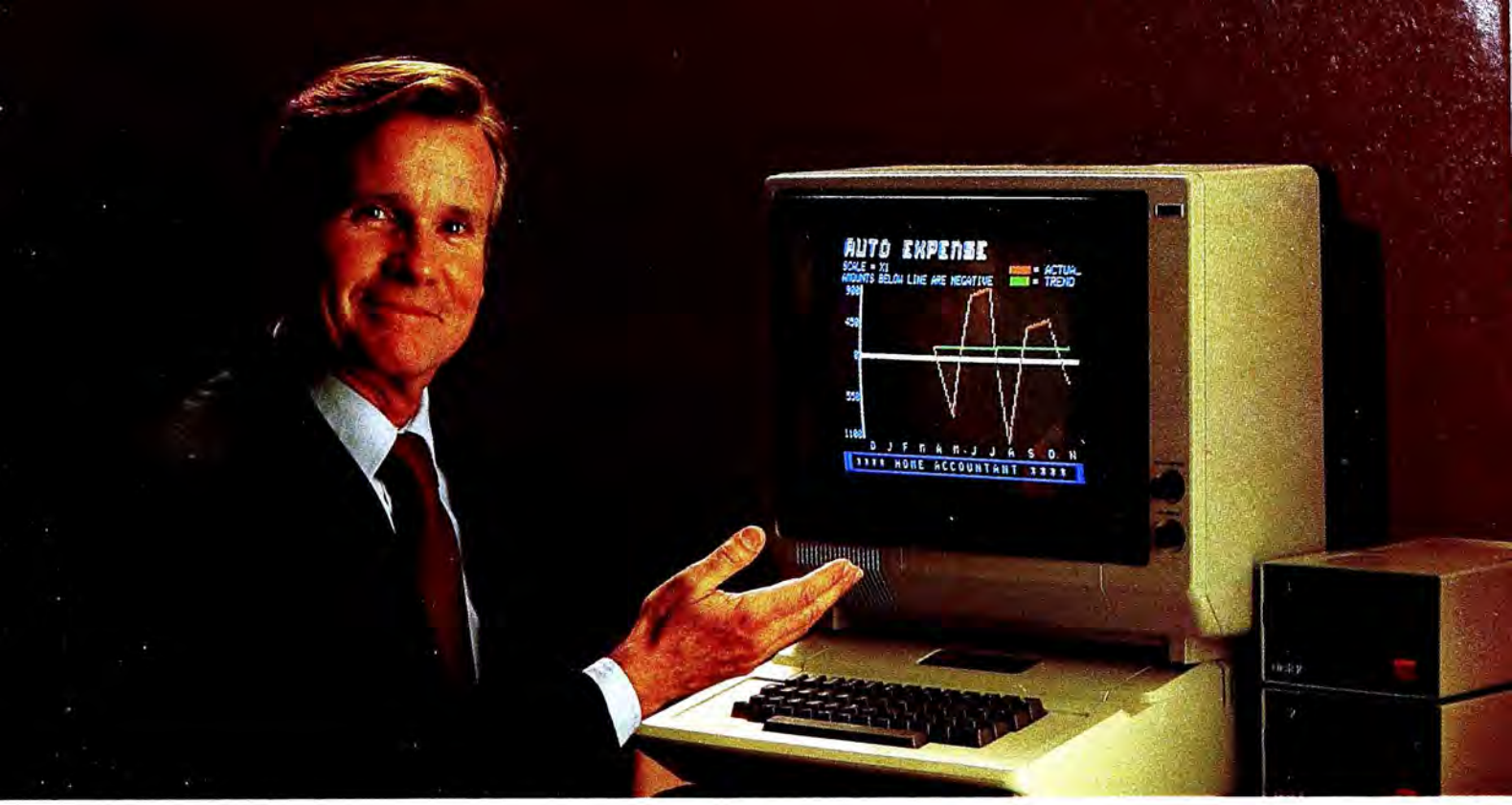
I predict that I would like: _____

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as my prize(s) if I should win any part(s) of the contest.

My signature: _____

Send in your Oracle '83 predictions with this coupon to *Softalk* Oracle '83, Box 60, North Hollywood, CA 91603, postmarked before December 31, 1982. ■



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Contest Winners:

Oracle Scores a No-Hitter

Shapes, Quotes, and Stuff

No-Hitter? No Can Do. "The date of the first no-hitter in the 1982 Major League baseball season" was what Oracle contestants had to predict in part three of this year-long contest. Aw, that's simple; find the worst-hitting team and the day they're scheduled to face the team with the best pitching staff and you have yourself $100 in goodies. It's *not* that simple. In predicting the first no-hitter, you'd probably have had just as much luck if you'd guessed.

Your chances would have been better if you'd predicted that there wouldn't be a no-hitter at all and hoped for the best. That's what forty of our contestants did—and they were right.

Of those who correctly predicted that major league pitchers would deliver a mediocre season, the RNG yanked out C. Engler of Nutley, New Jersey, as the winner. Engler will soon have a ventilated Apple, as she plans to pick up a Cool Stack from FMJ as her prize.

Next month, we'll see who most accurately predicted the breakdown in the United States Congress after the November elections.

That's a Quote. The Famous Apples in History contest that ran in June is finally over, and Susan C. West of Coolville, Ohio, is our winner. Her entry, *The Rave In* (#10 in the September finals and one of two citing Edgar Allan Poe's *The Raven*), was voted as the readers' favorite in the Quotes contest, earning it a spot in the *Softalk* Museum.

Strangely enough, West didn't even send in a vote for herself. "I really didn't think I'd win. So, I read all twelve entries to my husband and my sister; they told me they thought mine was the best." It was West's husband David who cast a ballot for the West household.

Collecting her prize will be an adventure for West. Coolville (population 500) is not exactly a metropolitan area. Her computer dealer is Micro Center in Columbus, a good two-hour drive away. But for West, visiting Micro Center is a regular trip. "We usually carpool down there and make a day of it."

Only one History finalist sent in a vote (you know who you are); the rest of you can't complain since you didn't vote for yourselves.

Naming all the famous people being quoted was another matter. Of all the ballots we received, only four persons correctly identified the sources of the quotes. The random number generator randomly generated Bryant D. Blansit of Augusta, Georgia, as the winner. For his literary proficiency, Blansit will go down to Micro-Graphics Systems in Augusta where he'll receive $50 worth of stuff for his Apple.

By the way, Blansit voted for finalist #4, the other *Raven*.

Nobody would have won if it weren't for all the nice people who took the time to send in their votes. And of all those nice people, the random number generator worked overtime and nicely selected James Kosmicki of Pasadena, California, to win $10 worth of goods, which he'll pick up at Computerland of Pasadena.

Another Poe fan, Kosmicki voted for West's entry, #10.

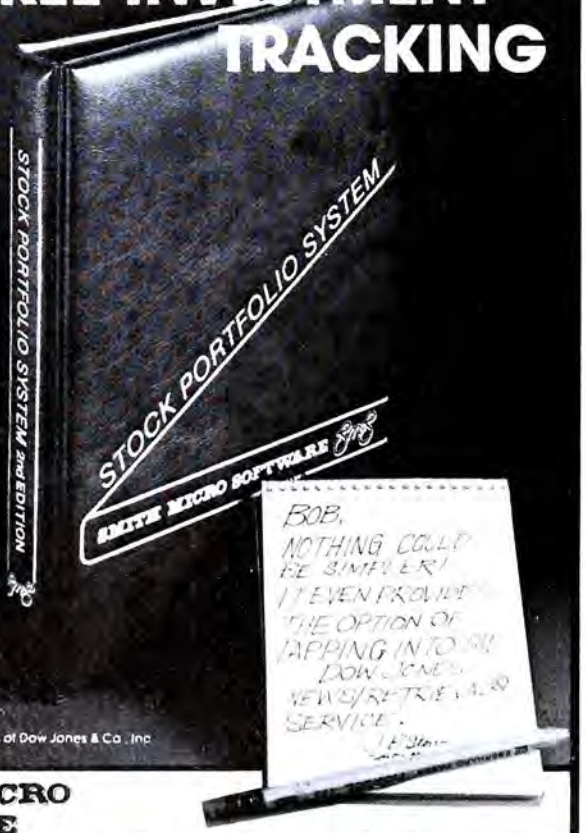
Here are the persons and works being quoted, for those who are still scratching their heads:

1. from *Gunga Din*, by Rudyard Kipling
2. Rosemary Woods, ex-president Richard Nixon's secretary
3. Ingrid Bergman or Humphrey Bogart in the movie, *Casablanca* (actually, it should have just been, "Boot it, Sam.")
4. from Edgar Allan Poe's poem, *The Raven*
5. Mr. Spock and Captain James T. Kirk, from the television series, *Star Trek*
6. Paul Revere on his midnight ride
7. from Henry Wadsworth Longfellow's *The Song of Hiawatha*
8. from one of Elizabeth Barrett Browning's love sonnets in *Sonnets from the Portuguese*
9. from Mark Twain's *Huckleberry Finn*
10. from Edgar Allan Poe's poem, *The Raven*
11. Sigmund Freud, Austrian founder of psychoanalysis
12. Diogenes, ancient Greek philosopher

Shapes Undraped. Boy, do we get contest entries! With the mountain of entries we received for the Name the Shapes contest, we knew there was no way we were going to look at them all. We disqualified one for a late post-

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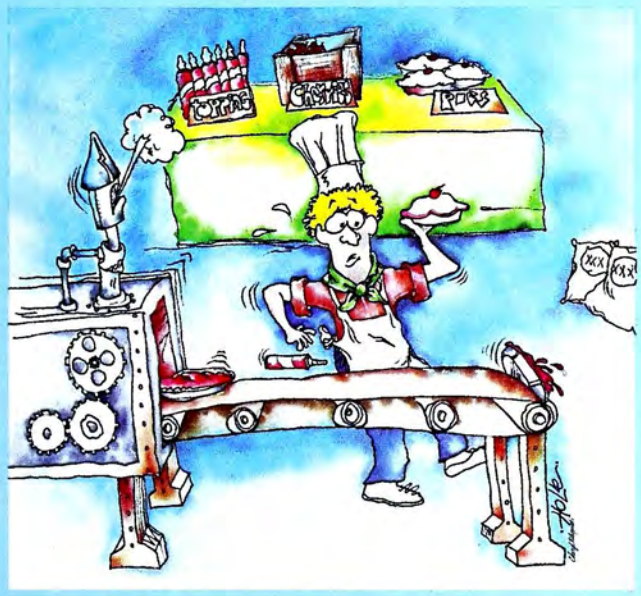
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SPY'S DEMISE

Arcade Action by Alan Zeldin



Somewhere on each floor of the Soviet diplomatic mission in Pyongyang are the nine parts of an encoded message. Your future is assured if you can just find those pieces and put them together, and then solve the puzzle. But to do so you must avoid the embassy guards who make frequent rounds at unscheduled intervals. They don't ask questions first, either.



PIE-MAN

by Eagle Berns and Michael Kosaka

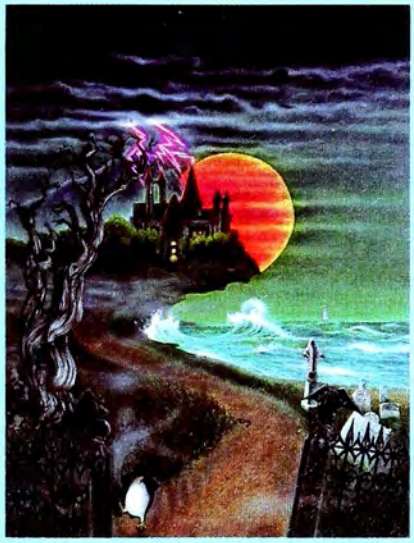
You got a late start looking for that summer job, and all you could find was a baker apprentice position at the Automated Bakery Company. Simple enough, since the pies are made by machine . . . all you have to do is add topping and put the pies away when they come out on the conveyor belt. Shouldn't be too difficult of a summer, you think to yourself . . .

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A High Resolution Graphic Adventure

Crafted by Antonio Antiochia

Transport yourself to the dark forests of Transylvania, where mystery lurks behind every towering tree, and venture to rescue a damsel in distress. Transylvania uses over one hundred colors and the finest graphics ever seen in a high resolution adventure to present a true challenge and hours of enjoyment to all adventurers.



Above games now available for the Apple computer. Arcade games work with keyboard, joystick, or Atari joystick. Graphics for all above created with the aid of The Graphics Magician

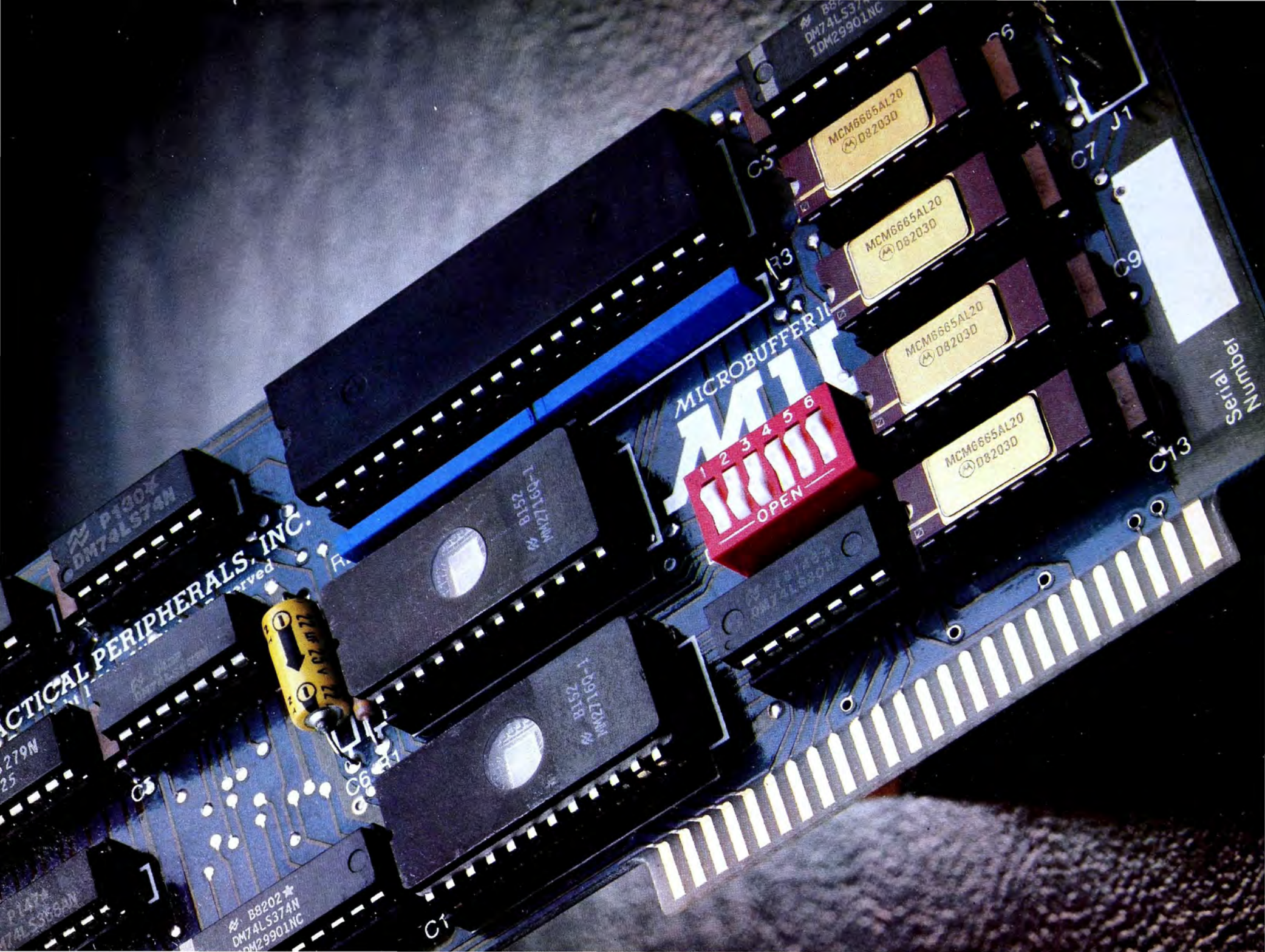


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mark and another for having misspelled *Softalk* three times. So, we managed to narrow the field by two.

The winner is John M. Morrison of Philadelphia, Pennsylvania, who missed only six of the possible ninety-two shapes. Morrison's entry looked like a cross between the Shapes and Oracle contests, because he seemed to know he was destined to win. "Okay!" wrote Morrison. "Here's a winner for the 'Name the Shapes' contest."

Such an accurate prediction doesn't win him anything in the Oracle contest, but in the Shapes contest it does earn him $100 worth of stocking stuffers (most probably his own stocking). John plans to splurge with it on the *Arcade Machine* and either *Sheila*, *Galactic Gladiators*, or *Prisoner 2*.

Most of the shapes were pretty easy (we wanted you all to feel real smart). If you already peeked at the answers and are crying, "Hey, no fair! I didn't know you wanted us to be that specific," rest assured, we gave everyone the benefit of the doubt where it was close.

Perhaps the trickiest ones were shapes #13 and #88. Only a handful of contestants were able to identify the ornithopter and island of Crete, respectively. But we did get some interesting answers (wild guesses) from desperate entrants. To some, the ornithopter looked like one of the following: city skyline, Medfly, squashed Apple computer, Chinese junk, dead horse, fly on a fly swatter, plane from *Cropduster*, abstract nothingness, Lego blocks, and "beats the H out of me."

Here are some last-ditch guesses for Crete: the floor after Rumpelstiltskin's name was guessed by the queen, God only knows, Statue of Liberty, rubber chicken, Loch Ness, dead bodies, Cuba, Israel, Ronald Reagan, foot measuring tool, @!?*#%$!, and Smurf action. But the most elaborate guess came from Mark Seybold (West Covina, CA). Seybold said shape #88 was,

"The fabled, long-lost island of Idunnowutitis, that sunk in the early 15000s B.C. before anybody had a chance to see what it looked like (except myself, who acquired the map of it from a descendant of one of the natives)."

Okay, enough general observation; let's award some nonprizes.

Good Catch. Joe Schwartz (Andover, NJ) was quick to point out that the computer punch card (#74) had the holes going the wrong way. And golly, he was right.

Schwartz isn't the only one with keen eyes. Jesse Spears (Azle, TX) noticed that the French horn (#73) had no mouthpiece and Randy Mita (Palos Verdes Estates, CA) was the only person to specify the film (#67) correctly as 70mm.

Those swinging ball bearings (#38) received as many different guesses as there were contestants. But Sean Walter (Kansas City, MO) called them "a series of pendulums used to show action and reaction. My grandparents have one, but I don't know the name of it. You can call them at (816) 555-0656." Well, we called collect (we said our name was "Sean"), and now Sean's grandparents have written him off their Christmas list.

Watch it, Lou "Cyclops" Sebok (Lorain, OH). You're apt to poke your eye out! Lou thought the hexagon (#2) was "a pencil, as seen looking from the point to the eraser."

We don't know why, but B. L. Sims (South Charleston, WV) used *VisiCalc* to format his entry. We assume that he purchased the program just to enter the contest, making his entry the most expensive *Softalk* contest entry in history.

The above-mentioned contestants would have won the coveted InvisiTabs, but we can't find any; they seem to have disappeared. Sorry.

But enough of this jocularity—let's move on to some contest losers.

Dropped Balls. The United Nations building (#62) seemed to confuse a lot of people. Patricia Hyland (Fayetteville, NC) and Darell Smith (Colorado Springs, CO) thought it looked like a breakfast setting with a box of cereal.

The Guggenheim Museum in New York City (#29) was mistaken by Kathie Roe (Woodbine, MD) to be Apple Computer Headquarters. Don't feel so bad, Kathie; Matt Bateman (Central Point, OR) thought it was Willy Wonka's Chocolate Factory.

But the nonprize in the category of Honesty at the Risk of Embarrassing Oneself goes to Judy Webb (Iowa Park, TX), who wrote, "I got the encyclopedia down and looked up Madison Square Garden, hoping it would be one of the buildings. It isn't. I don't travel much to the West Coast. . . . I believe they must come from there." That's very inductive, Judy. Come on out to California, and we'll show you where those buildings aren't.

Robert Huggins (Raleigh, NC) found a new way to spell "candelabra." C-A-N-D-L-E O-P-E-R-A. Larry Tentor (Schenectady, NY) couldn't spell "Rorschach," but he gave it an honest try: R-O-S-T-O-P-C-H-I-N. And Jonathan Scott (Myrtle Beach, SC) visited Florence, Italy, to see the statue of David (#51) by Donatello.

Did everybody get the Jefferson Memorial (#65)? Ken Hayden (Carpentersville, IL) entered, "Lincoln Memorial (seen from the side . . . sneaky!)." Ken also sneaked in a whole bunch of other wrong answers.

Henry Hsich (Erie, PA) looked at shape #40 and entered, "A jar of ink or nose drops." We gave you credit for the ink, Henry. Just don't get them mixed up the next time you're congested.

New Jersey (#5) isn't as prominent a state as its residents would like to believe. Warren Zane (Honolulu, HI) said it was Alaska, and Henry Schneider (San Rafael, CA) called it an inkblot.

Eric Wade (Jamez Springs, NM), if you had won, you would have won only $99.01 worth of goods instead of the usual $100 worth. Your entry arrived with nine cents postage due.

"I think I would like to have: *Accu-Shapes*, *Higher Graphics*, and *Marauder*, or a combination thereof," wrote Rick Anderson (Milwaukee, OR). "But don't quote me until I've lost!" Consider yourself quoted, Rick.

Poor Sirius Software. Although most people recognized Sirius's Grud (#54), other guesses included Dumbo the Elephant, Topo Gigio (from the Ed Sullivan Show), and E.T. But the most daring contestant of all was Jeff "So sue me" Neyhart (Kingston, NY), who had the audacity to identify the Grud as "the man from Broderbund's ads." Attorneys for either company can find Jeff (probably the only TRS-80 user subscribing to *Softalk*) on Saturdays rooting for his favorite college football team, the University of Michigan Buckeyes.

In case you're still wondering what the heck those shapes were, here are the answers:

1. tire iron or lug wrench
2. a hexagon (not a Rubik's cube!)
3. can and bottle opener or church key
4. wind-up alarm clock
5. state of New Jersey
6. digger from *Apple Panic*
7. sinking ship *Titanic*
8. cobra
9. Coca-Cola bottle
10. fleeing ghost from *Pac-Man*
11. milk (or beverage) carton
12. motorcycle
13. ornithopter (from Synergistic Software's *Apventure to Atlantis*
14. bota bag or wineskin
15. middle claw from BudgeCo's *Raster Blaster*
16. Menorah
17. tuning fork

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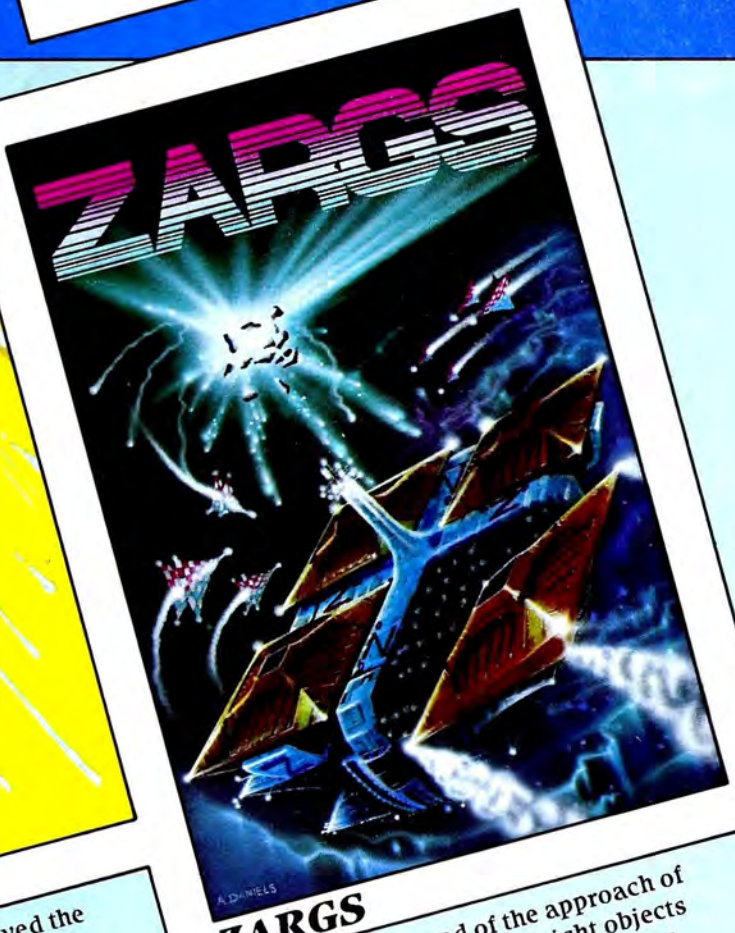


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18. pencil eraser
19. shuttlecock (badminton birdie)
20. telegraph transmitter
21. *Star Trek* phaser II
22. door seen edgewise
23. chess rook or castle
24. carrot
25. brontosaurus
26. 1955 Ford Thunderbird
27. kite
28. Bowie knife
29. Solomon R. Guggenheim Museum (New York City)
30. guard from Muse Software's *Castle Wolfenstein*
31. C clamp
32. hammer
33. mug
34. R2-D2 (Artoo-Deetoo) from *Star Wars*
35. Rorschach ink blot
36. jump rope (sedate state)
37. Ford Model T
38. executive pacifier, clacking balls, kinetic motion model, office toy deals, action-reaction model, whatever. Nobody missed this one.
39. Sierra On-Line's *Crossfire* alien at third stage of metamorphosis
40. (India) inkwell
41. basketball hoop with backboard
42. Apple II game controller
43. candle snuffer
44. Skylab (before crashing)
45. tennis, running, or track shoe
46. lyre
47. butt hinge
48. Saturn (Uranus also acceptable)
49. whale snacker from DataMost's *Snack Attack*
50. *Spirit of Saint Louis*, Charles Lindbergh's transatlantic solo flight plane
51. Michelangelo's statue *David*
52. postage stamp
53. jack
54. Sirius Software's Grud
55. hand blender or eggbeater
56. Ping-Pong paddle
57. hat for a magician, wizard, or gnome
58. clothespin
59. bottle-nosed dolphin (not porpoise)
60. bomb-spitting alien from Sirius Software's *Gorgon*
61. Batmobile
62. United Nations building
63. acoustic modem coupler with telephone handset
64. Yoda, the Jedi master from *The Empire Strikes Back*
65. Thomas Jefferson Memorial, Washington, DC
66. traffic signal (side view)
67. film (70mm)
68. Linotype matrix
69. light bulb
70. rolling pin
71. mailbox (with mail in it)
72. Scrabble tile holder with tile
73. French horn
74. Hollerith computer punch card
75. top (pump variety)
76. Hadron from Sirius Software's *Hadron*
77. key
78. opossum or possum (playing possum)
79. tambourine
80. top row alien from *Space Invaders*
81. BIC disposable lighter
82. metronome
83. robot from Muse's *Robot War*
84. pear
85. camera
86. adz
87. lantern
88. Crete
89. electric power drill with bit
90. space shuttle
91. Alfred Hitchcock (signature)
92. spark plug

It's Raining Apples

It keeps getting weirder and weirder around here. The things that happen at *Softalk* make the house in *Poltergeist* look like Disneyland. For example, the other day, an Apple computer came crashing through the ceiling with a small plastic bag and a note attached.

In the bag was a gnat mumbling something about his job in the Silicon Valley. The note read as follows:

"You humans really surprise us Bezardians. It seems your readers are still having trouble with the game part of the Contest That's Out of This World in the October *Softalk*. What's the matter, not enough incentive? We order you to extend the deadline and to offer this 6502 device as a new prize."

They're serious, folks. So, what we'll do is extend the deadline for the game part of the contest—that's where you have to translate the manual and screens of SDS's ☊☋☽☊☋☊—to January 15, 1983. That'll give you lots of time to help save the Silicon Valley from turning into a gnat farm. But the big news is that the prize for winning this contest is no longer a $100 gift certificate, but a brand-new Apple II Plus courtesy of Southwestern Data Systems!

So boot up the game, break out that Bezardian decoder ring, and win yourself a shiny new Apple II Plus. Send your entries in by January 15, 1983, to Softalk Aliens, Box 60, North Hollywood, CA 91603.

This just in off the *Softalk* wires: The Bezardians were last spotted (gnat converters and all) cruising down Bandley Drive.

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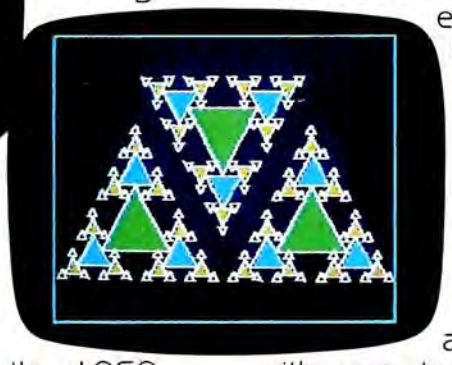
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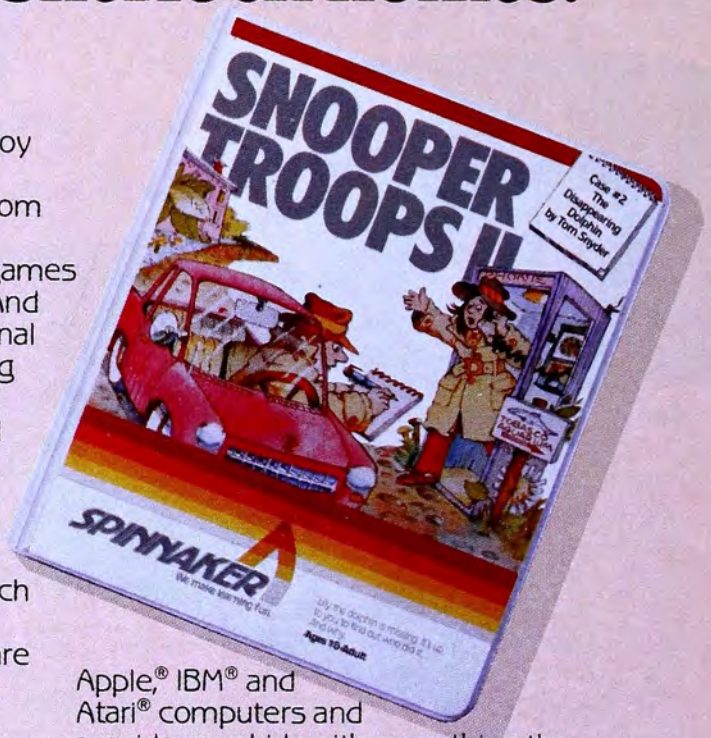
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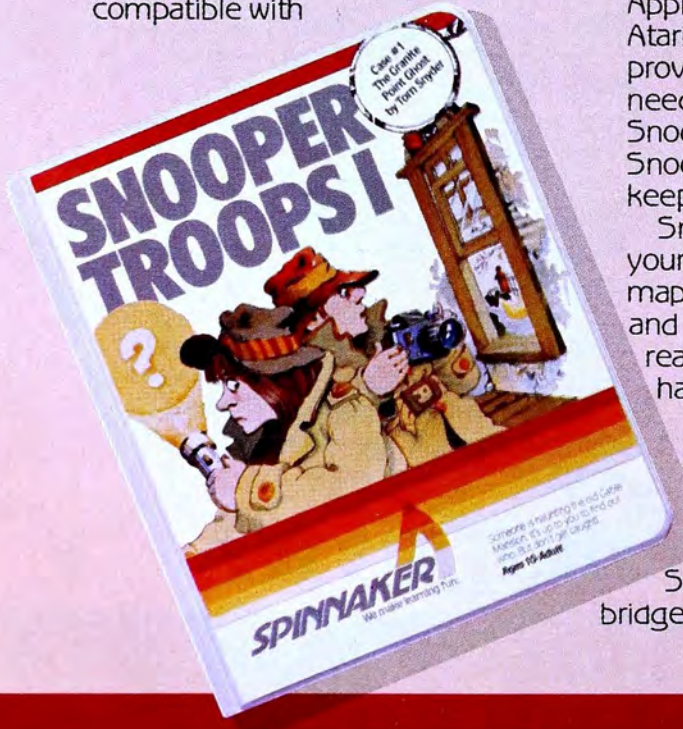
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FASTALK

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

Designation as a classic is 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.

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

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. *8/82.*

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

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

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

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. *11/82.*

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

- **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. *10/82.*

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

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. *11/82.*

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.*

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

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

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

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

Business

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

Apple II Business Graphics. Transform any numerical data into a wide range of easy-to-understand charts and graphs. Curve-fitting helps make forecasting a breeze. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

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 System. Popular five-module business package; programs also available separately. Includes general ledger (a bestseller), accounts receivable, accounts payable, payroll, inventory control, and job costing. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $395 each. Job costing: $595.

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.

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. 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.

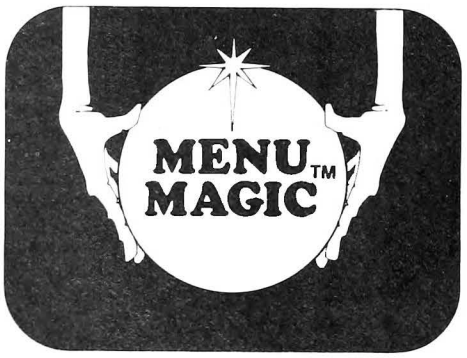
dBase II. Speedy relational database management system. Requires SoftCard. Ashton-Tate, 9929 Jefferson Blvd., Culver City, CA 90230. $700.

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.*

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 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.



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Inventory Manager. Inventory-only data management system. Thirteen categories; allows for retail-only sales. Synergistic, 830 N. Riverside Dr., Ste. 201, Renton, WA 98055. $149.95.

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

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.*

Multiplan. Easy-to-learn electronic work sheet using plain English commands. Powerful modeling and presentation capabilities. For use in analysis, forecasting, technical engineering, and the home. Microsoft, 400 108th Ave., Ste. 200, Bellevue, WA 98004. $275.

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, 25834 Narbonne Ave., Lomita, CA 90717. $275.

Payroll. Complete payroll system in run-time Pascal. Handles tax for all fifty states, fifteen divisions with up to 300 employees, and any mix of thirty deduction types. Broderbund, 1938 4th St., San Rafael, CA 94901. $395.

PFS:File. Page, Roberts. 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. $125; Apple III: $175.

PFS:Graph. Chin, Hill. Works alone or interfaces with files created with *PFS:File* and *VisiCalc.* Produces bar, line, and pie charts merging data from several sources. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125; Apple III: $175. *5/82.*

PFS:Report. Page. Powerful report generator designed for use with *PFS:File.* Sorts, calculates, totals, formats, and prints presentation-quality columnar reports. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $95; Apple III: $125. *6/81.*

State of the Art General Ledger and **Budget and Forecasting Module.** The ledger does twelve-period accounting, two-digit subaccounts; handles up to 470 accounts; enter 100 transactions before updating to permanent files. Budget module extends the account number to nine digits; custom designs reports; does previous-year comparisons and two, four, twelve, and thirteen period accounting. State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626. $495; budget module: $395.

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 Ave., Ontario, OR 97914. $1,495.

VC-Expand/80. Get 80-column *VisiCalc* display; works with Videx 80-column card; expands memory to 128K. Upgrade from previous *VC-Expand* for only $25. Saturn, Box 80505, Ann Arbor, MI 48107. $125.

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, 130 Foxcrost Rd., Pittsburgh, PA 15220. $65.

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

VersaPlot. Graph and chart maker that combines file handling, data editing, and graph plotting. Interfaces with *Statistics with Daisy* and *VisiCalc.* Spectrasoft, 350 Lantana St., Ste. 775, Camarillo, CA 93010. $99.50.

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

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

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

VisiCalc Formatting 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. *9/82.*

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.*

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

Communications

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

ASCII Express: The Professional. Greatly improved version of the original. Supports multiplicity of hardware and prints simultaneously. Southwestern Data, Box 582, Santee, CA 92071. $129.95.

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, Michi-





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It is late at night in a monster infested graveyard and you have been given the job of keeping the monsters in. All you have between you and complete chaos is a new Monster Masher System and quick reflexes.

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gan City, IN 46360. $99.

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

Micro/Terminal. Access and exchange information with mainframes and minis, databases like the Source, and other remote terminals and personal computers. Supports keyboard mapping, upper and lower case, and 80-column cards. Microcom, 1400A Providence Hwy., Norwood, MA 02062. $84.95.

P-Term: The Professional. Supports all Pascal-compatible interfaces, asynchronous serial cards, Apple-compatible modems, and baud rates up to 2,400. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95.

Super Smart. Terminal emulation package to capture, create, edit, print, and save data. Utilizes full capabilities of Hayes Micromodem II; supports full ASCII. Softspoken, Box 7000-863, Redondo Beach, CA 90277. $60.

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

VisiTerm. Well-planned, comprehensive. Hi-res 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.*

Z-Term: The Professional. More than an update. Compatible with a great variety of modems, interface cards, and screen modes. Simple file transfer with integrity. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $149.95.

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Fantasy

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

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

Curse of Ra. Expansion module to (and requires) *Temple of Apshai*. Find the magic treasure guarded by the demons of Ra; overcome the curse. 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., Ogdensburg, NY 13669. $34.95. *7/82.*

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

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

Ultima. British. Hi-res color adventure, progressing from Middle Ages to beyond the space age. A masterpiece. California Pacific, 1623 5th St., Davis, CA 95616. $39.95. *6/81.*

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

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

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

Graphics

Accu-Shapes. Generates Apple shape tables. Uses lo-res to shape and edit, displays in hi-res. Accent, 3750 Wright Pl., Palo Alto, CA 94306. $49.95. *9/82.*

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.

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. *10/82.*

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

Ceemac. Boering. Visual composition language. Compose-execute-compose swapping by single key commands. Interpreter released as *Fire Organ*. Vagabondo Enterprises, 1300 E. Algonquin, Ste. 3G, Schaumburg, IL 60195. $75.

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, 23192-D Verdugo Dr., Laguna Hills, CA 92653. $349. *10/82.*

The Poor Man's Graphics Tablet. Easy graphics utility that traces transparencies from the screen, drafts, edits shapes, and assembles scenes. More than 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

Alien Ambush. Basic shoot-'em-up with a difference: targets split when you hit them and you're in double trouble. Micro D, 17406 Mt. Cliffwood Circle,



A-tten-tion! All space cadettes in the Space Military Academy report immediately for training at the space battle simulator. New officers in the Space Patrol are urgently needed.

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- **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. *7/82.*

Bug Battle. Garden-variety shoot-'em-up that requires careful weeding and no fear of spiders. United Software of America, 750 3rd Ave., New York, NY 10017. $22.50.

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, avoiding interceptor jets, homing mines, and tanks. Challenging, realistic, and playful. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *7/82.*

Crazy Mazey. Skill and strategy needed in this auto-chase maze game. Not flashy but enduring fun; jazzy sound. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *10/82.*

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

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

- **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.*

Free Fall. Get down, get down! Float through a shower of needles, guns, and bombs on your way to the safety of the holes in the ground. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

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.*

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., 5676 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.

Kamikaze. A rain of planes falls mainly in this game — an aerial version of *Depth Charge.* Hayden, 600 Suffolk St., Lowell, MA 01854. $34.95. *10/82.*

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

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

Mars Cars. Fun little maze game — burn the levels as you play. Some easy; some hard. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *10/82.*

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

Microsoft Decathlon. 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.*

Microwave. Zimmermann, Nitchals. Brightly colored, highly addictive maze game featuring continuous Looney Tunes musical accompaniment. Cavalier, Box 2032, Del Mar, CA 92014. $34.95. *5/82.*

Ming's Challenge. Dear Flash: Conquer the universe by defeating the deathships, claymen and cyclops, and skirting the black hole. Thanks, Dale. Parameters of the game can be altered. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $34.95.

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. *9/82.*

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

Pig Pen. TMQ. Latest wrinkle in drop-the-dots, featuring hi-res swine and instant hams. DataMost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *9/82.*

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

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- **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.*

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

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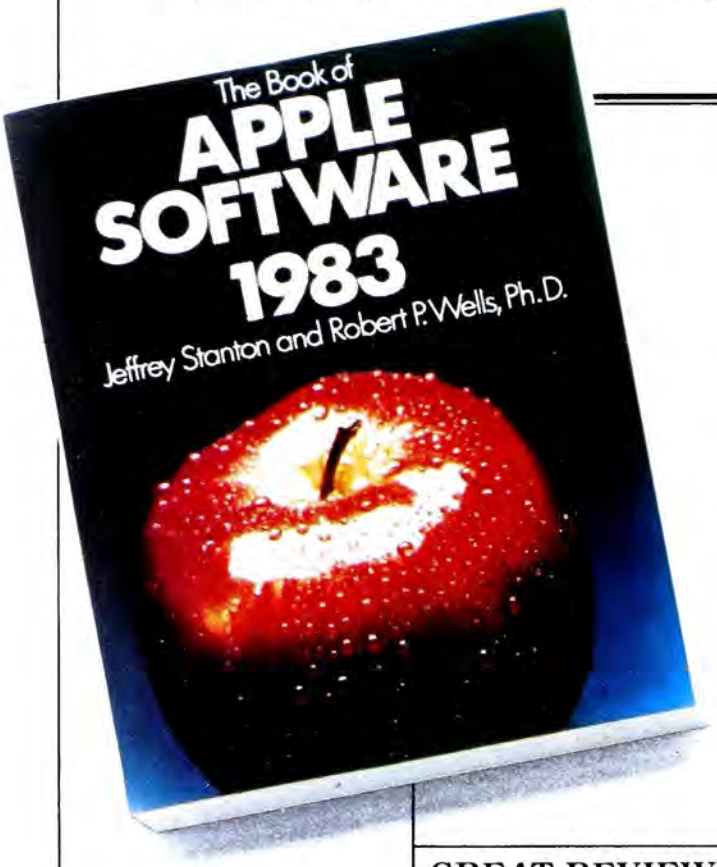
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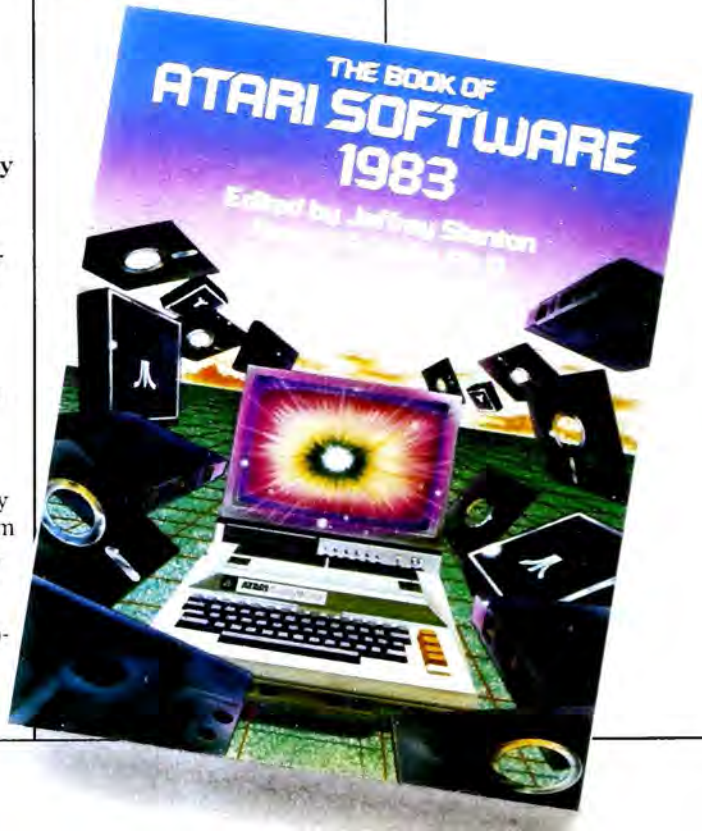
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Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *10/82.*

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.*

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.

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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. *10/82.*

● **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 07960. $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.*

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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.*

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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.

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DOS Boss. Kersey, Cassidy. 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.

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

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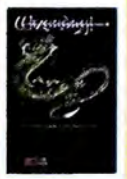
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tine. Apple/Special Delivery, 10260 Bandley Dr., Cupertino, CA 95014. $75. *11/81.*

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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.

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. *11/82.*

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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.

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, 347 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.*

Cosmic Balance. Design your own ships and create your own space fleet. Tactical space game that's fast and easy to play. Strategic Simulations, 465 Fairchild Dr., Ste. 108, Mountain View, CA 94043. $39.95. *11/82.*

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. Sub-Logic, 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. *8/82.*

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. *10/82.*

● **Microgammon II.** Competition program for learning, practice, and improvement of backgammon skills. Tournament play. Softape, 5547 Satsuma Ave., North Hollywood, CA 91601. $19.95. *2/81.*

Millionaire. Executive stock market simulation game played via reports, graphs, options, and volume indicators. Blue Chip, 19824 Ventura Blvd., Ste. 125, Woodland Hills, CA 91364. $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, 347 N. Charles St., Baltimore, MD 21201. $39.95. *1/81.*

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

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

Singles' Night at Molly's. Two basic hi-res solitaire games with variations. Set your own skill level and strategy; play alone or against others. Various scoring potentials (singles take note). Soft Images, 200 Route 17, Mahwah, NJ 07430. $29.95.

Space Pirates 3000. You're crafty and ruthless; which will you be—businessman or pirate? Purchase a space fleet, trade on various planets, or pirate other people's freighters. With space map and markers. C and C, 316 Nancy Lynn Cr., Ste. 26-B, Knoxville, TN 37919. $29.95.

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

Word Processing

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

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

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

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

Goodspell. Dictionary companion disk to *Apple Writ-*

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er 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. Formats any kind of page automatically (2, 3, or 4 column). 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. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $99.95.

Magic Window II. Get 40, 70 (in hi-res), or 80 columns in this expanded version. Compatible with Pascal 80-column. With user-tailored, fast menu; underlining; global search and replace. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95.

Magic Words. Proofreads files of word processors that use standard DOS and no character-encryption techniques for saving files. 14,000-word dictionary. Artsci, 5547 Satsuma Ave., 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. $125. *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. $125.

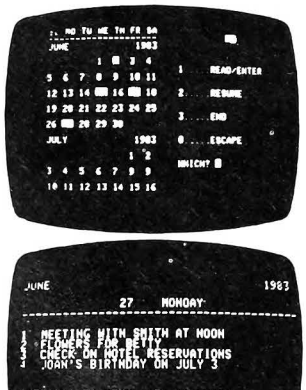
Super-Text 40/80. Zaron. Latest *Super-Text* update; letter documentation, footers and headers, expandable math mode, split screen. Muse, 347 N. Charles St., Baltimore, MD 21201. $175.

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

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

Zardax. Philips. Highly recommended. Single program includes all standard word processing features with considerable extras including communication by modem. Computer Solutions, Box 397, Mount Gravatt, Queensland, Australia. In the U.S.: Action-Research Northwest, 11442 Marine View Dr. S.W., Seattle, WA 98146. $295. *11/82.*

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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.

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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.

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

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. $125.

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, 14125 Capri Dr., Los Gatos, CA 95030. $495. *6/82.*

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.

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

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

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



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OPEN DISCUSSION



Santa's Pixels Work Overtime
Reader Harry Vertelney of Eclectic Electric in Palo Alto, California, used an Apple II Plus, Apple Graphics Tablet, and Designer's Toolkit *from Special Delivery Software in creating this hi-res holiday greeting to cheer the spirits of fellow* Softalk *readers.*

Open Discussion gives you the chance to air your views and concerns, to seek answers to questions, to offer solutions or helpful suggestions, and to develop a rapport with other readers. It's what you make it, so share your thoughts, typed or printed, and double-spaced (please), in Softalk*'s Open Discussion, Box 60, North Hollywood, CA 91603. To ensure the inclusion of as many contributions as possible, letters may be condensed and edited.*

Media for Your Computerette

I am finding it puzzling that so many authors of personal computer user documentation find it necessary to refer to the program disks as diskettes. I suspect this is not a word that the authors are comfortable using; in most of the manuals I have seen they forget to use the longer word and begin referring to the disk as a disk. I realize that disks come in many sizes, but that does not seem to warrant using two different words to describe them. In fact, I can't imagine a situation in which a user would not know which disk was being referred to.

If someone can convince me that there is a compelling reason to distinguish between sizes of disks by calling one a disk and one a diskette, I am willing to accept the two different words. But I am going to have some difficulty in using my diskettes. I don't have a diskette drive.
Carol J. Manley, Issaquah, WA

Going, Going, Gosub

I have been reading *Softalk* for a long time now and I just realized that I've missed many fine articles in the magazine because of a programming error in your editorial policy.

When an article is to be continued elsewhere in the magazine the command "Goto page such and such" is used. When I do that, everything is so interesting, even the ads, that I just keep on going. If you used, instead, the command "Gosub page such and such" and when the article finished used the command "Return to page such and such," I could get to read *all* the neat stuff you print!

Also, please tell Roger Wagner that his new Southwestern Data Systems program with the strange characters is the most exciting thing I've seen in *Softalk* since those hot tub ads. It just proves that learning assembly language has strange side effects indeed!
Paul Raymer, Las Vegas, NV

Go with the Pros

I'm writing about a subject that I'm sure will be familiar to many *Softalk* readers. It has to do with purchasing your first computer system and some of the unnerving experiences that can accompany this venture.

The first place I went shopping to was one of those fancy downtown places where all the salesmen wear fancy three-piece vested suits. A young man approached me with the original opener, "Are you interested in buying a computer?" A very direct approach indeed. When I talked technically, he immediately backed off, saying that he was "just a salesman." When I got into the subject of cost, he got downright cavalier. He informed me that if price was an important factor in choosing my Apple II configuration, then I was in the wrong place. However, he said, "Feel free to look around," and he left me so that he could approach another prospect. Isn't independence wonderful when you're in business?

My next stop took me to a place that was very price-competitive. I got an excellent quote. I asked the salesman to check out the system, using the word processor that came with it. (There is often incompatibility between word processors and certain printers.) I wanted to avoid this. I went to pick up my system with a certified check for $3,000. The system had never been checked out and the company refused to do so. They told me that when someone purchased a system from them, it was the customer's problem to make the interface work. I walked out with my $3,000.

Next I called the Comm Center in Laurel, Maryland. They had previously quoted a price that was only slightly higher than the one at the place that I had just left. Jerry Johnson, the manager, said that he would demonstrate my configuration. He said that the Comm Center had a policy not to sell a system without first checking it out. A half hour later, Jerry had the system configured and was demonstrating it to me. My fears were confirmed—there was an interface problem. Jerry Johnson stayed with me after hours patching DOS to finally get the system to work successfully. He also discovered a bug in the software that he reported to the company in California. Here is an example of a true computer professional marketing a system honestly, as opposed to a nonprofessional who knows very little about computers and couldn't care less about your successful implementation of the system.
Barry H. Gross, Potomac, MD

VisiFriend

I enjoy Open Discussion very much and I feel it is very helpful to read users' comments about their software experiences. As Apple software can run upward of $250 per program, the purchase of problem software can be quite depressing. Instead of telling of my software woes, I'd like to comment on what I consider to be my best purchase—*VisiFile*. To my recollection, *VisiFile* has received little ink in this column, and since it is such a good database, I feel it deserves some recognition.

Foremost, the program is extremely user-friendly. The documentation is straightforward, readable, and complete. Two disk drives are quite adequate for fast, efficient operation (48K and sixteen sector are required). The program is written in Applesoft and is modifiable to a degree, as each disk is quite full. It uses

DOS 3.3, so it's easy to utilize data files in custom programs.

Although *VisiFile*'s report/label printing abilities are nothing short of terrific, I have found the need to write my own printing routines to meet some of my quite specialized needs. The coauthor of the program, Colin Jameson, has been extremely helpful in this regard. He runs a *VisiFile* user group, publishes a newsletter, maintains a user hotline, and has been exceedingly helpful and responsive to my rookie programming questions.

Since I have had no problems with the program, I can't say very much about VisiCorp's customer support. I can say, though, that they provided a free set of backup disks and required only a $20 fee for the updated version that included two disks and a new manual. *VisiFile* really is a good program.
Jim Nogle, Savoy, IL

Encore! Encore!
It has been exactly twenty-four hours since I received my copy of SubLogic's *Night Mission Pinball* by Bruce Artwick. I have been left speechless. I brought it over to show a friend of mine who is a physicist at Bell Labs. His reaction was slightly more verbal: "What a fox-piece of programming!" I nodded my head in mute agreement while trying to keep three balls in play during "Cosmic Mode." All in all, this is truly a virtuoso piece of programming. Bravo, Mr. Artwick, bravo!
R. G. Pettengill, Jr., Monmouth Beach, NJ

Saturn Express
I would like to report some exceptional support from Saturn Systems. I have one of their 32K RAM boards. It developed a bad memory chip after several months of usage. I very much needed the board for the operation of a *VisiCalc* program that I have developed for a client and could not wait for the board to make a round trip to Saturn for repair.

Advised of my difficulties, one of Saturn's technical support persons, Brian, sent me a copy of Saturn's memory test program for the 32K board along with two replacement memory chips. There was no charge, even though my board is secondhand and not technically covered by their warranty. Even more helpful, Brian personally delivered the package to the Federal Express office at the airport on his way home so that I could get the replacement parts as soon as possible.
C. David Anderson, Los Angeles, CA

Tending the Relics
When purchasing software by mail, the rule of caveat emptor often prevails. When the purchase is made from a small software company, it really takes a good deal of trust on the buyer's part that the product will perform as stated in the ad.

How refreshing it is to find a software company that stands behind its product like RAM Enterprises. Their fantasy game, *Relics of the Empire*, had many bugs in it when it arrived at my Apple. I returned it, describing the bugs, and within a week the replacement copy arrived. Most of the bugs had been removed, but enough were left to detract from the game. Instead of replacing the disk this time, they sent a refund to all who had bought the game, and promised a free copy to take care of the aggravation and frustration of those who had spent hours trying to play the game!

I wish the bigger software companies would take note, and instead of charging the customer for a replacement, send the new copy free of charge.

Incidentally, the program bugs were due to copy-protection schemes, but that's another argument. *Relics of the Empire* has good concept and design. Once the bugs are disposed of, it should provide many hours of enjoyment.
Michael Ahle, Carmichael, CA

Exposure of Support
I think Continental Software should be commended for their excellent customer support program, and *Softalk* for an excellent Apple support program. Programs such as Continental's *Home Accountant*, Apple's *Controller*, VisiCorp's *VisiCalc*, and HowardSoft's *Tax Preparer* make this newcomer to computing think that personal computers and their software are the best thing to hit the beach since bikinis.
Henry D. McAvoy, Rome, ME

The Brunt of the Boot
The problem of copy-protected software is seemingly endless, and the release of new hardware-based copiers proves that point. My particular complaint is that the little guy is getting lost in the shuffle. As the owner of nonstandard, higher-capacity disk drives for the Apple II, I really get burned. Most commercial-type software is DOS-guarded, which effectively prevents my utilizing the added 15-plus percent disk space of my disk drives—especially critical on the standard 143K disk. What really burns me are the game manufacturers. It is at the point where 90 percent of all game disks cannot be booted on nonhalf-track drives.

The best example of copy-protected futility is *Bandits*, a recent excellent arcade-type game release. Sirius Software has achieved such an excellent protection scheme that even after buying the disk (which would not boot), the disk drive manufacturer could not produce a bootable full-track version. (They were nice enough to buy my copy, so I was not completely stuck.) Presently mail-order software dealers are selling *Bandits* for about twenty dollars. Not worth the price of copying, yet out of my reach at any price.

Considering the fact that the average disk game costs about two dollars to produce, and up to about ten dollars for a full-blown, highly advertised, arcade-type product, it would seem the small guy is getting shortchanged. I am caught in the middle. A new disk drive with controller to read half-track would cost about $300 to $600. Recent advertisements in my area listed used, full-sized arcade versions of *Galaxian* (the original *Bandits*-type) for $700!

In closing, when will it stop being the little guy who foots the bill? I would have been willing to pay fifty dollars for a bootable version of *Bandits* (or *Choplifter*, or whatever), but instead I can enjoy none. Maybe it is time the users joined the National Football League and went on strike!
Marc A. Ries, Whittier, CA

Seven-Day Wonder
Although I rarely write letters to magazines, I feel compelled to do so after two recent dealings with Sirius Software.

I purchased *Bandits* from a local software store and quickly became addicted to the game. After approximately four weeks, the disk would not boot properly and I decided to take advantage of Sirius's replacement offer. I sent them a check and the disk, expecting a four to six week wait.

Within one week I received a new copy of *Bandits* and they returned my check! That's terrific, but perhaps they found the disk defective and decided that I deserved a no-charge replacement. Along with the disk, they sent several full-color flyers advertising their software. One of these caught my eye. *Gorgon*, which I purchased almost a year ago, was now compatible with the joyport. I promptly sent my time-worn (but still perfectly functional) copy of *Gorgon* to Sirius, along with $39.95, for the newest version. Unbelievably, within ten days I received my same disk back with the new version of *Gorgon* recorded on it, and again—no charge!

This is incredible customer support. As far as I'm concerned I'll purchase any Sirius Software product with total assurance that they will back it up. Sirius is definitely number one.

While I'm on a roll I should also mention Penguin Software as another notable software supplier. I purchased their *Graphics Magician* program, and several weeks later I received a programming tutorial. It included helpful hints and a notice that the package had several revisions recently. I sent my $5 and the disk, and promptly received the latest version. Here is another example of excellent customer support.
Mark A. Pelletier, Griffith, IN

Honesty Confirmed, Games Protected
Another open letter from Penguin Software to Apple users:

Last February we announced that we were removing the copy protection from all our applications software. We'd like to thank all of you for the excellent response and for making this policy successful. Although we were a little apprehensive about the possible consequences in the beginning, it's now apparent that we not only made a decision we feel good about, but we won't be going out of business either. Our trust in the basic honesty of most of you out there has been confirmed.

In addition to our graphics utilities, we started publishing game software in September, and (gasp!) the games *are* copy-protected. We've talked to many of our customers over the phone and at shows, and so far they all have

agreed that games really are in quite a different category and that they should be protected. (Al Tommervik grumbled a little, but he practices at being difficult.)

Whereas with applications it is extremely useful (and recommended) to back up your disks, and nice to be able to access parts of the code, with games it is not as much of a traumatic experience if a disk goes bad and one has to wait a week for a replacement. Perhaps it's the fact that documentation is not as necessary with games, or that the perceived value is less than that of utilities, but games do seem much more prone to casual copying and trading.

We do guarantee our game disks for sixty days' free replacement if one fails, or $5 (basically our cost) for replacement afterward. That seems fair. We're not out to make extra money on something that's already been purchased, but we do need to cover our costs. I'm sure that the experts out there can break our protection; we're not really into the game of "This nibble copier can or can't," or whatever. But we hope that you'll all act with the same honesty and integrity with our games as you have with our applications products. And we hope you enjoy them.

Meanwhile, all our applications software, present and future, will definitely be on standard, unprotected disks. We thank you for making it work!
Mark Pelczarski, president,
Penguin Software, Geneva, IL

An Unbeatable Equation

I have always had the desire, and just recently the need, to connect my Apple II directly to a mainframe computer. In addition to the direct connect, I wanted to be able to capture and modify data files, print to my local printer, and have an eighty-column display on the monitor.

At first I thought it couldn't be done. However, after a few phone calls, I had the good fortune of contacting SSM Microcomputer Products. Not only did they say it could be done, but they said it would be easy. They were right!

For the hardware, I purchased SSM's AIO-II interface card. This is a real neat interface that allows me to have a serial input from the mainframe and a parallel output to my printer. A Videoterm card, manufactured by Videx, solved the eighty-column display problem. *Transend,* a data communications package also supplied by SSM, tied the whole package together. Yes, I did have some initial problems, but they were solved by the excellent technical support of both SSM and Videx.

Good products plus super support equals a more-than-satisfied user.
Peter F. Poranski, Houston, TX

Three Cheers for the II

I would like to respond to a letter that appeared in September *Softalk*. The letter was from Kevin FitzMaurice concerning the Apple III. Don't misinterpret my comments; I am very impressed by the machine as a whole. It has many features that I would love to have on my Apple II, but it isn't the ideal computer that Mr. FitzMaurice seems to believe it to be.

First, he made the right decision in choosing the Apple III over the IBM Personal Computer. What can you say about a machine with bugs so serious they render its double-precision real numbers unusable? And a company that says, "Well, don't use double-precision reals!" I must object to some of the things stated in that letter. I would like to know how he determined it would take sixteen slots to make the IBM perform as well as the III (and where the extra $2,000 comes from).

The business about the keyboard is highly suspicious, as many people who compare the two prefer the pc, especially the flexibility of its being detached. What good is having a different keyboard arrangement available when the contoured keycaps don't allow you to change what you have to look at? I would find it very confusing to see a character on a key only to press it and get a different character.

As for speed differences, whoever said the Apple III is 40 percent faster than the Apple II? Just because its processor runs just under two megahertz, compared to just over one megahertz for the II, doesn't mean it gets things done any faster. The fact that it fights its way through 40K of operating system slows things down considerably. I work at a computer store, and after having talked to many customers and fellow salesmen who have owned both machines, and having run numerous test programs on both machines (in Basic, Pascal, and machine language), we have decided that the III is consistently slower than the II. Its graphics are considerably slower, and its screen output is much slower. Apple even mentions in the manuals for the III that if you instruct the console driver to flush output it speeds execution by almost 30 percent. Its variable manipulations are noticeably slower (due undoubtedly to SOS's memory management), and its disk accesses are very slow. The hierarchy that SOS maintains is nice, limited in use on floppy disk, but it causes considerable delays in accessing information on the disk. I was quite shocked and disappointed the first time I sat down to use Pascal on the Apple III. It took nearly twice as long to enter the filer than on the Apple II. Inspection of the files on the disk shows that the file is not significantly larger in the Apple III's version. Put a print-using statement in a loop sometime if you really want to see slow.

SOS's powerful drivers are fine too, if you can get enough information to use them, or if you want to pay a lot of money to go to California to learn about the machine. SOS is actually a very powerful system, but I don't know that I would say it's user-friendly. Most Apple III systems we sell require a salesperson to install the necessary drivers because the users don't have the knowledge needed to do it themselves. Recall that Apple II device drivers are almost universally stored in firmware on the card itself.

FitzMaurice's assertion that SOS has no commands to learn is what is laughable. Does SOS read your mind? And the Apple III is the first RAM-based machine? Anybody remember Digital Group? They were making RAM-based machines before Jobs sold his van to get the capital to help build the first Apple.

I have to agree that IBM certainly chose an antique processor to put in its machine, and anybody knowing anything about the internals of the two knows that the Apple III is more of a sixteen-bit system than the pc is. I would really like to see the press release from Apple saying that the Apple IV will have a 6502B for I/O processing and can emulate an Apple III, or maybe see the person having that dream.

Actually, since my Apple II here has a buffered printer interface card (next best thing to spooling, which by the way, Apple didn't see fit to incorporate as part of SOS); an Enhancer II from Videx with keyboard-definable macros (not on the III), autorepeat on all keys (fast repeat with the repeat key), upper and lower case with shift key operation, alpha lock, caplock, and its own 6502 microprocessor; memory expansions as large as 512K commercially available (not on the III); 68000, Z-80, 8088, 8080, and 6809 processor cards available (not on the III); Fortran, Cobol, Lisp, APL, Logo, Pilot, Apex, and CP/M languages and operating systems available for maximum programming flexibility (not on the III); and the largest base of software, hardware, and user support for any computer, I don't think I'm ready to give up my II just yet.

The Apple III is an excellent machine, as is the II (IBM has a nice Basic), but they really don't compete at all. The Apple III makes a powerful, capable, business machine; the II, with such easy internal access, is extremely versatile for many applications—but the two should not be compared. They weren't designed to do the same job, so why compare Apples and oranges? Forgive the pun. Yes, do yourself a favor, check out the Apple III, but don't forget the Apple II is still alive and well and living everywhere.
Michael Gibbs, Denver, CO

Voice from the Cave

I have owned an Apple for about a year now, using it for balancing checks, magazine research, meal planning, typing lessons, and game playing. *Zork II* is the latest on my play list, achieving 380 points out of 400. I have one problem that fellow readers of Open Discussion might be able to give me a clue how to solve. Everything was okay up to 300 points, but I'm now in the repository after the cave has closed and can't figure out how to get out.
J. Esh, Balsam Lakes, WI

Help can be on the way. Just drop a line to the Zork Users Group, Box 20923, Milwaukee, WI 53220.

Accredited Questioner

I caught an advertisement for Lobo disk drives and the specifications were quite simple. The price was $385, with the drive delivered to my door by UPS. All I had to do was call their 800 number and give them my Visa card number. I said to myself, "Wow!" I picked up the phone and within a week the drive arrived. It was a

mirror image of the Apple drive without the Apple logo.

The drive worked beautifully for about a week. Then the Visa statement arrived. The drive started to give me I/O errors. Then I tried the 800 number. No satisfaction. I packed it up and wrote them a note to forget the whole deal, and that I wasn't paying the Visa bill.

In no time flat, I received a letter from the general manager of Lobo International. He asked that I forgive them, saying they were terribly sorry that I was inconvenienced. He also asked that I do them a favor and take another drive at the price of $250.

I swallowed, and agreed. I received another drive, and needless to say it was absolutely perfect. I still have Visa to straighten out though, and I expect that will take from six months to a year. I question whether I should have bought locally at a higher price and avoided the hassle that was involved with return of bad merchandise. Suppose it needed a repair job in two or three months? Would I have been smarter to buy from a local computer outlet with their own repair facilities? What is the answer?
Ralph P. Weiss, Tamarac, FL

Gold Bugged

I am writing concerning a software rental club, the Goldcoast Computer Club of Bremen, Kentucky.

I rented *ScreenWriter II* from them when it was *SuperScribe II*. It didn't bother me too much that the documentation was a copy (the disk seemed original), but I was unhappy that it was not the latest version advertised. Anyway, on the strength of the program received, I put in my order for *SuperScribe II*. I waited out Goldcoast's move to Kentucky from Florida, and the changeover from *SuperScribe II* to *ScreenWriter II*.

I finally received the program with a letter from Dan Perry saying that the program disk looked used because he had tried to copy it and could not. While away, I noticed a large supply of *ScreenWriter II* in a software store.

To make a long story short, I had been shorted my backup disk and the product warranty registration card. I called Goldcoast, and Dan Perry said that he had taken the liberty of keeping the extra disk, but would send it to me if I insisted. I insisted.

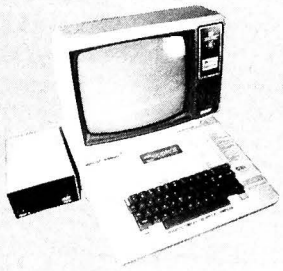
After failing to receive it I called again. Perry was very irritated, and said they were overworked and underpaid and would send the damn thing, and then he hung up on me. I called Sierra On-Line and they have agreed to send me a backup disk for the normal five dollar fee plus a warranty registration card.

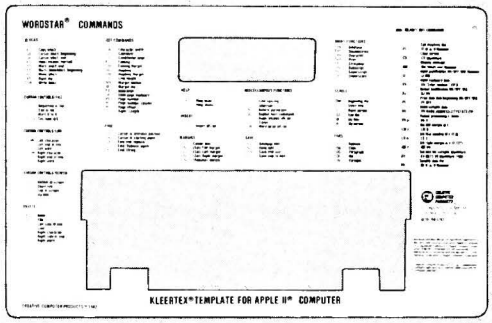
There is a need for a software rental service. It is the rare individual who can afford to keep purchasing programs until he finds one that fits his needs. In the case of Goldcoast Computer Club—you have been warned.
E. L. Mobley, Jr., Merritt Island, FL

Words about Nerds

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Charles M. Larson, Whittier, CA

Let's Make Peace

We were deeply upset and angered by the statement in October Marketalk News that our new *Spitfire Simulator* is for warmongers. This distasteful statement in no way properly reflects either our intentions or the nature of this flight simulator.

We developed certain flight simulator techniques and sought a suitable scenario for applying them. We thought immediately of the Spitfire airplane, the whole history of which is special. Its designer, Reginald Mitchell, dying of cancer, literally used his last remaining energy to complete the design of the Spitfire so that it might be used to defend Britain in the impending war with Nazi Germany. The airplane itself was one of the finest airplanes ever to exist, and is greatly admired by airplane fanciers everywhere. The Battle of Britain is a rare example of exceptional gallantry and heroism by a handful of men whose sole purpose was to defend their skies against aggressive invaders.

We tried hard in *Spitfire Simulator* to present a situation where the user can enjoy all the positive aspects of the situation without any emphasis on violence. Nowhere in our manual or program is there any reference to the taking of life. People who love airplanes, flying, and a challenge should be able to derive a great deal of rewarding enjoyment from *Spitfire Simulator*. Warmongers will not find what they seek.
Edward F. Kurtz, Jr., president, Mind Systems Corporation, Northampton, MA

Point taken.

On the other hand, no matter how well the package avoids mentioning "the taking of life," if a game simulates a war battle, then the simulated death of those battled against is implied.

We have no argument with the value of war games, nor certainly with the admirable heroism the battle arena brings out in real life. But in real life or in its simulation, if the pilot of a bomber feels any less responsible for the "taking of life" than the infantry soldier plunging the bayonet, we are flirting with real danger.

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Simplicity Ventured

Regarding October's Ventures with VisiCalc, I find that what is simple has been made complicated.

First, in the averaging of grades, why not use a formula that is not only simpler to write but also easier to understand and requires less memory. That formula would substitute @SUM(B3...B17,B7,B12,B17)/18 (in Integer format, /FI) for the more complex formula @INT(@SUM(B3...B17+@LOOKUP(5,A3...A17)+@LOOKUP(15,A3...A17)/18).

In addition to the complexity of the published program, the use of the @INT function will truncate the value rather than round, possibly causing a letter grade difference. In the example in figure 4 on page 85, the average calculated using Joe Shelton's formula resulted in a 90; the simpler formula results in a 91.

Also, the look-up table in figure 5 on page 86 need not be so complex. The @LOOKUP function was designed primarily with payroll withholding tables in mind. *VisiCalc* will interrogate the look-up files for an exact match. If an exact match is not found, it will pick up the next item lower in value.

My experience with *VisiCalc* has been very pleasing and I have found it rather simple to use. I believe that there is no reason to make *VisiCalc* more difficult to use. In addition, *VisiCalc*, with the right knowledge, can accomplish some rather complicated tasks. Some of these tasks that I have done include sorting and ranking, @LOOKUP based on four separate variables, and extensive calendar date calculations.
Steve Mehder, Greensboro, NC

A Rumble about the Ramble

I would like to take issue with Jonathan Miller's article *"Word Handler* Goes to the Movies" in the October *Softalk*. What it says about word processing is interesting—it's just that it doesn't say that much.

In the first place, there is absolutely no mention about how George Catanzano uses his Apple in film buying and booking, and very little about how he uses it in his community work. As a matter of fact, about the only part of the article directly relating to word processing is a favorable comment on *Word Handler* and a few notes on the IDS Prism Printer.

Rambling articles like this seem to be creeping more and more into *Softalk*. They'd be interesting if they focused more on applications. Unfortunately, they usually don't.
Art Cabot, Fort Myers, FL

Mad into Glad

I would like to offer some help to the Mad Scientist, whose letter appeared in the July Open Discussion, to all those whose intelligence seems to be above basic math, or to those who just plain need help.

Making *VisiCalc* more or less accurate is only a matter of employing the integer function and a simple formula that can expand as needed to obtain the required accuracy. For example:

```
@INT ((Cell) * x + .5) / x
```

An @INT ((Cell) + .5) produces a rounded integer; substituting 10 for *x* produces accuracy to one decimal place; 100 produces accuracy to two decimal places; and so forth. Increasing the figure substituted for *x* by another zero increases the accuracy by another decimal place. This can be done up to twelve zeros since the accuracy of *VisiCalc* is thirteen places.

One note: Make sure the column width is large enough to display the entire number of your answer. For example, the number 12345.7123 requires a column width of eleven in order to display the entire number. A column width of fewer than eleven will cause *VisiCalc* to display a number that is rounded down from the accuracy specified using the above formula, even though the number utilized in the calculation is at the accuracy specified.

VisiCalc will not display trailing zeros even in this defined accuracy format, but knowing that you have specified the accuracy should eliminate the question of precision. If column line-up is necessary, consider the /FL command. For values, this command will bring all numbers to the left side of the cell (minus one space), with the decimals trailing out to the right of the cell.
Michael C. Demyan, Allentown, PA

Excepting the Pass

I have to take exception to Ed Haymes's letter and another letter entitled Pass the Word (October Open Discussion) on the subject of *SuperScribe II*. I purchased a used Apple II about a year ago to use as a word processor for my master's thesis. I very quickly learned that *Magic Window*, which came with the machine, just wouldn't hack it. Unable to afford an eighty-column board, and not really knowing where to turn, I saw an ad for *Word Handler*. However, no one in New York had heard of the program and no one stocked it. I was offered instead *SuperScribe II*. Adapting it to my system was easy. I found only two bugs, both minor. My only quibble was the time it took to switch disks and reload the editor and runoff.

Now I have *ScreenWriter II*. The switch was made simple, thanks to the new customizer

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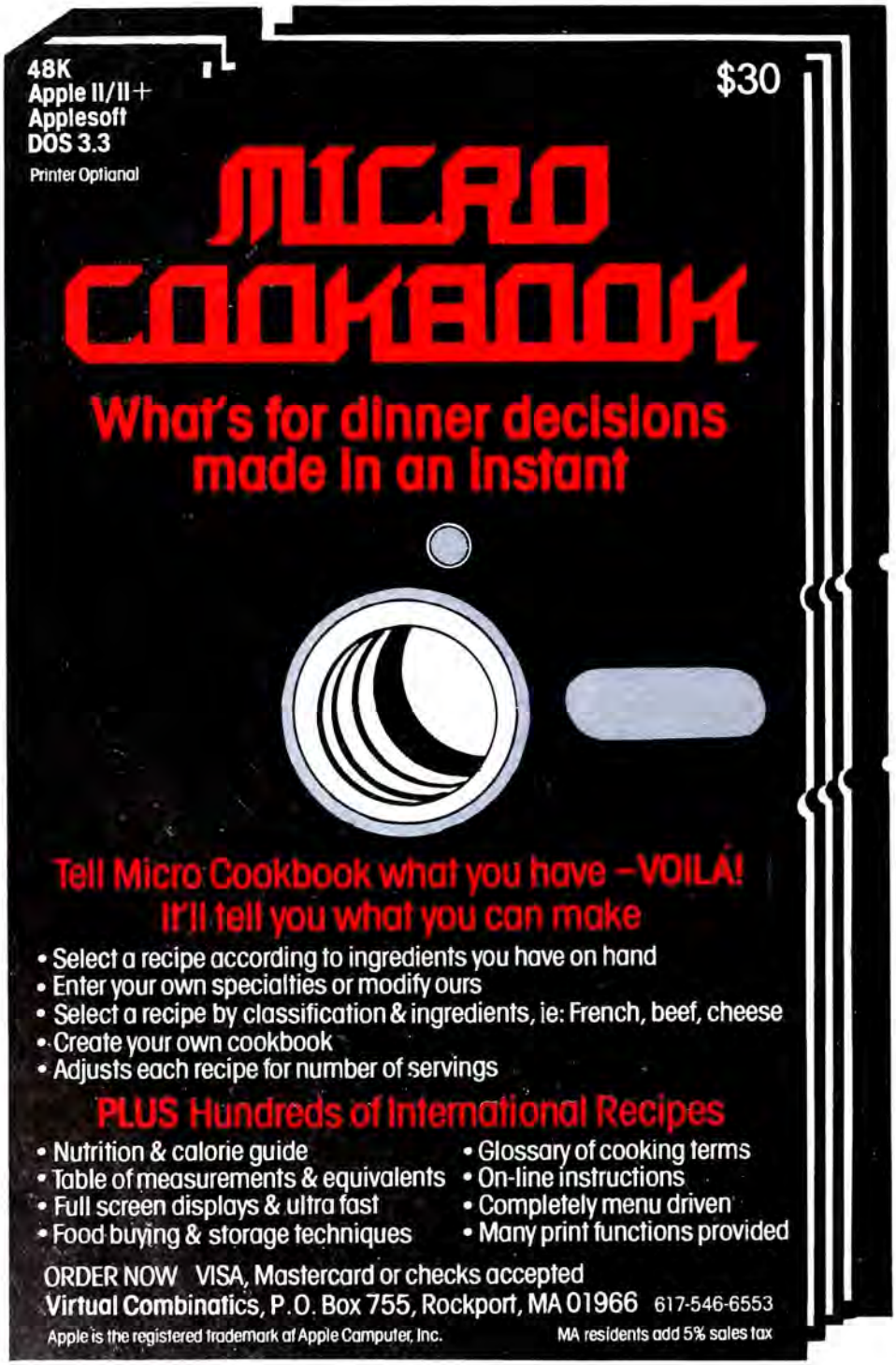
Sierra ON-LINE INC

module included. My two bugs have been fixed. I couldn't use the form-feed character with my MX-80, and justified hyphenation dropped the ends of words if the hyphenation occurred in the last word of a file. My other problem is printer-based and can only be solved with a new printer. (I need incremental spacing.)

The program *Fix Sector Count* has become one of my most-used utilities, and I use it to provide more storage space on my archive and text disks. I use the editor to prepare "help" files for on-line use, for electronic mail, and, of course, for word processing.

The new documentation is excellent, allowing even total computer idiots to use the program on the first time out. Customer support has also been helpful and quick. When my documentation did not arrive with my update package, it was then sent express mail and arrived the day after my call.

A few applications notes: One can exit the editor by typing *control-D FP* on the command line and then rebooting. The joystick "mouse" option makes the program ideal for use by the handicapped. Mr. Haymes obviously didn't read his manual. One can catalog the disk during editor loads by typing *control-D catalog* when asked for input or output file names. In fact, much of the power of *ScreenWriter II* comes from the ability to use all standard DOS commands (except init) from within the program. A final note: the easiest way to provide commands to the printer is just to string them out on the first line of the text using the control-X option to provide escape and control characters. *ScreenWriter II* is the only copy-protected program I use or would recommend.
David M. Bodenstein, New York, NY



Make the Switch to a Capital Idea

In the October Open Discussion two questions were asked that I might be able to answer.

Ralph Cinque wanted to know if there is a way to switch to text mode without bombing lores page one graphics. No, Ralph, there is no way, since the two modes use the same memory location: 1024 to 2047 ($400 to $7FF). However, just before switching to text, you could move the data from that range to any area where there is a free kilobyte of memory, such as the area from 7168 to 8191.

Here is one method of accomplishing this:

```
FOR X = 1024 TO 2047: POKE X+6144,
  PEEK(X): NEXT
```

When you want to switch back to graphics, use this:

```
FOR X = 1024 TO 2047: POKE X,
  PEEK(X+6144): NEXT: GR
```

This method is very slow, but I don't know of a faster way. Also, I have no idea if this section of memory is always free.

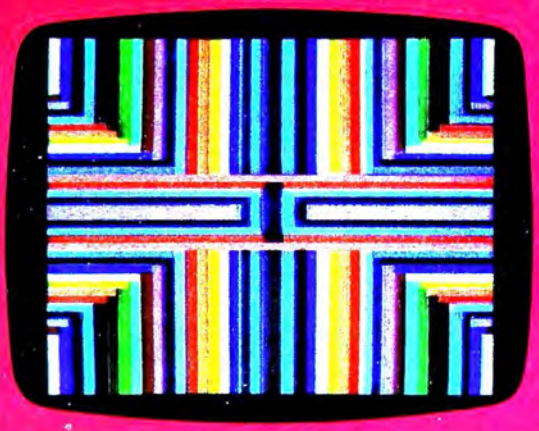
George D. Parker wanted to know why he cannot send a control-IA to his printer through his *Super-Text II*. I had the same problem with my *Magic Window* word processor. I suffered through it for several months until I got a lower-case chip and found out what I was doing wrong. Whereas I needed to send control-IA to the printer, I was actually sending it control-Ia, which does absolutely nothing! Check to see if you, too, have been using a lower-case "a" instead of a capital.
Tim Klein, Wilmington, NC

A Lobster to Crack

I have been frustrated with the Apple III in the emulation mode. I would get these nice messages from an Apple II disk, such as, "Would you like a hard copy?" When I typed "Yes," I would get graphic fonts. Not being a software type, and also being a bit lazy, I asked my trusty software friend, Eden Recor, to please explain, "Was ist los mit minem computer." Quick as a wink, Eden came over and announced that the "stupid computer" was forcing the most significant bit high when it was printing, thus giving me nothing but graphics characters.

The solution was quite simple; just force the most significant bit low when wanting to print. Easier said than done, as I could not find anything in the Apple III documentation that would help me. I had already been into the cable once to find out why I couldn't print at all, so I figured it would be easy, once and for all, to fix this Hummer (German word for lobster).

As a quick fix, I just disconnected the wire for the most significant bit from the printer end



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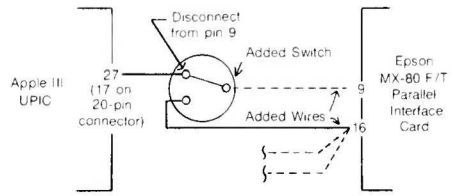
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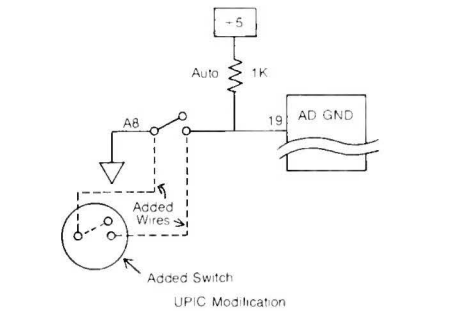
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of the cable and wired a ground to that input on the printer. Everything was great.



Computer/Printer Cable Modification

I had been toying with the possibility of modifying the Apple III Universal Parallel Interface Card (UPIC) in order to bring out the line feed control switch. Then I wouldn't have to open up the computer every time I wanted to utilize Apple II software, which was quite often.



UPIC Modification

So one night, when no one was looking, I took my handy dandy twenty-watt iron out of the workroom. I wired two switches into the system: one hanging off the cable between the computer and Epson MX-80 F/T printer, and the other parallel with the existing switch on the UPIC. If you leave the switch on the UPIC in the auto position the added switch will work just fine. I mounted the UPIC switch at the bottom of the UPIC's forty-pin connector. It works very well.

Thomas E. Linders, Bruckmuehl, West Germany

Unrectangled and Squared Away

I recently purchased the GraForth program for the Apple II. I just wanted to say how pleased I am with the whole package. The manual is excellent, the language is friendly yet very powerful, and the utilities included make it very easy to use. So many of its features operate just the way I would want them to. Since I program extensively as part of my job as an engineer, I can appreciate how difficult it is to put together such a superior software package.

One suggestion I have for the GraForth package relates to the turtle graphics commands. As supplied, if you give the appropriate commands to draw a square, it appears as a rectangle rather than as a square on the screen. This is due to the difference in scale of the X and Y axes on the Apple. A simple fix for this is to add a line that scales the Y axis in the source code of the word *turtle.walk* in the file *Turtle.* Here is the listing with the new line 90 added. With this simple correction, turtle graphics works great. I have been able to try many Logo-type experiments using these commands.

```
10   VARIABLE TURTLE.X
20   VARIABLE TURTLE.Y
30   VARIABLE TURTLE.ANG
40   VARIABLE TURTLE.PEN
50
60   : TURTLE.WALK
70   OVER OVER - > TURTLE.Y - >
     TURTLE.X
80   128 / SWAP 128 / SWAP
90   100 * 123 / ( SCALE Y BY 1.23 )
100  TURTLE.PEN IF LINE ELSE POSN
     THEN ;
110
120  : PENUP 0 - > TURTLE.PEN ;
130
140  : PENDOWN 1 - > TURTLE.PEN ;
150
160  : MOVETO
170  128 * 64 + SWAP
180  128 * 64 + SWAP
190  TURTLE.WALK ;
200
210  : MOVE
220  TURTLE.ANG 16 * 45 / PUSH
230  DUP I SIN * TURTLE.X + SWAP
240  1 32 + SIN * TURTLE.Y SWAP -
250  POP TURTLE.WALK ;
260
270  : TURNTO - > TURTLE.ANG ;
280
290  : TURN
300  TURTLE.ANG +
310  360 + 360 MOD TURNTO ;
320
330  : TURTLE
340  GR ERASE
350  0 40 20 24 WINDOW
360  3 COLOR PENUP
370  128 96 MOVETO
380  0 TURNTO
390  PENDOWN;
```

Steven Medwin, Wilmington, DE

The manufacturer clarifies:

The modification to the turtle graphics file that Steve Medwin describes does improve the symmetry of the images created with turtle graphics. As he mentions, this is due to the fact that the Apple hardware actually plots dots closer horizontally than vertically. With his change in scaling, the bottom of the screen is now at Y=235 rather than Y=191. Because of slight differences in TVs and monitors, the scaling may need to be adjusted a little to produce a perfect square. This can be done by changing the 123 in line 90 to a slightly higher or lower number.

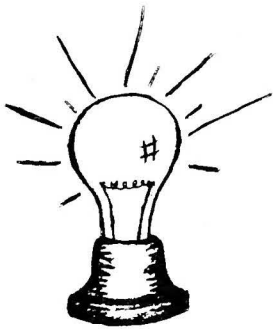
Phil Thompson, Insoft, Portland, OR

No Small Change

I read with interest the answer to dollar formatting from Albert Pinto (September Open Discussion). Immediately I keyed in the one line for formatting dollars with no negative numbers, line 61000. I then tried several values and all was well until I keyed in .995. To my dismay, it rounded off to 0.00, a whole dollar off. The problem comes from using two different numbers, one for the whole part and the other for the decimal part of the number. On occasion they will round off differently; hence the dollar error instead of one cent.

In the following listing the number is first converted to cents and then rounded off, and any error will only be one cent. The cents are

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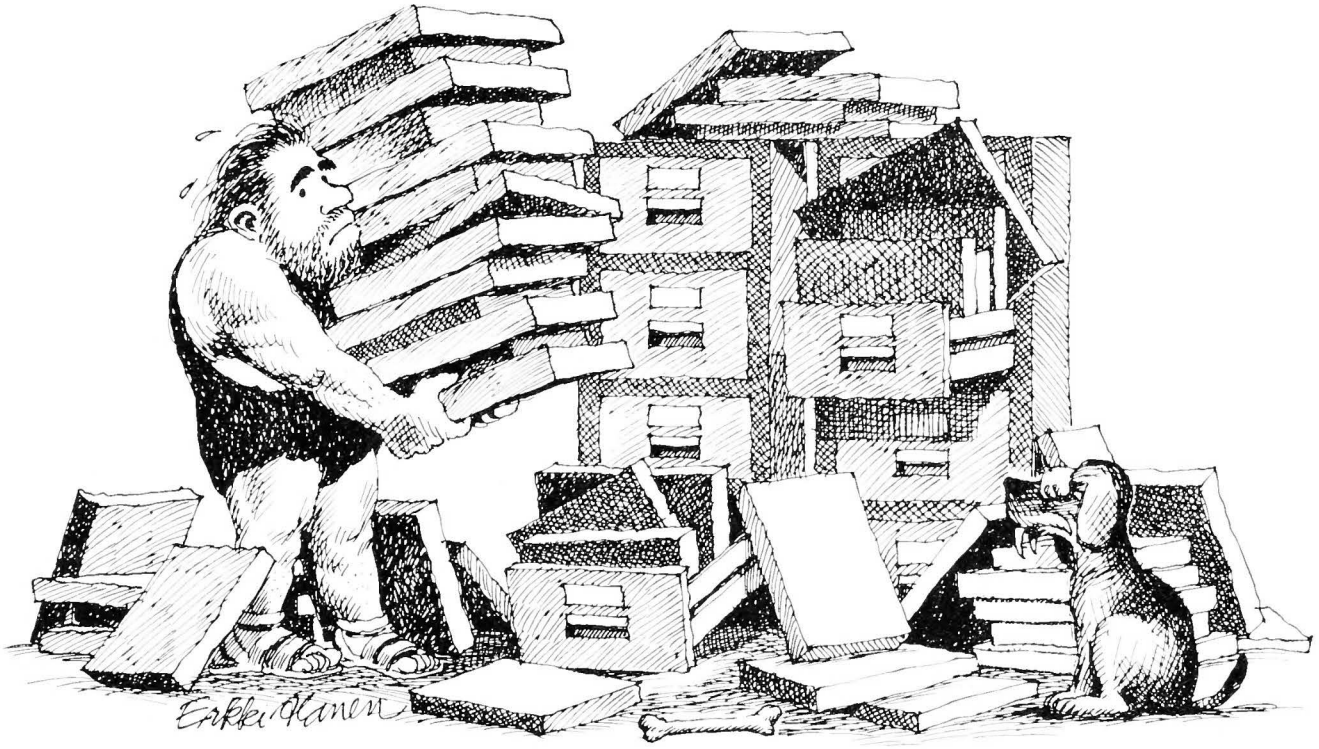
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converted to a string and then the decimal is placed two places from the right. The number can be right-hand justified by tabbing to a column minus the length of the string.

```
10   INPUT "NUMBER ";T
15   GOSUB 3000
18   L = LEN (PU$)
20   PRINT TAB( 20 - L);PU$: GOTO 10
3000  T =  INT ((T * 100) + .5)
3010  IF T  < 10 THEN PU$ = "0.0" +
      STR$ (T): RETURN
3020  IF T  < 100 THEN PU$ = "0." +
      STR$ (T): RETURN
3030  PU$ = LEFT$ ( STR$ (T), LEN
      ( STR$ (T)) - 2) + "." + RIGHT$
      ( STR$ (T),2): RETURN
```

Stanley Wilcox, Watertown, MA

Sharp Distinctions

Some time ago a letter appeared in Open Discussion from a person who was extremely pleased to find CP/M conversion boards for the Apple, as it saved him from the burdensome commands necessary to operate Apple DOS. This fueled my already present interest in this "other" system, and finally last week I had the pleasure of working with CP/M for the first time on a Zenith Z90. I was setting up the machine for a commercial establishment in an out-of-the-way location. The machine had been purchased from a local dealer who was untrained in computers, and I was called to the scene.

What greeted me was a practically incomprehensible manual for an almost hostile program. Apparently the CP/M producers thought it was insufficient merely to make an IBM-oriented program; they also copied the style of IBM manuals. I was indeed glad to return to my Apple and decided that anyone who thought CP/M was superior to Apple DOS must be a sales representative of Digital Research.

CP/M has three (count 'em, *three*) error messages for disk operations. Theoretically one of these is for finding a damaged sector on the disk, one is for selecting a nonexistent disk drive, and one is for read-only disks. Unfortunately, if an error message appears, the best one can really do is assume that there is a problem somewhere around the disk drive; this can range from leaving the door open to having peanut butter on the disk. I even got a bad-sector message when trying to write to a protected disk, one of the three theoretically possible error conditions. The manuals do not mention such problems, limiting themselves to the theoretical problems corresponding to each message. Actually, the manuals seem to tell very little in a comprehensible manner. The CP/M manual has neither an index nor a complete table of contents.

If anyone is still suffering from the cumbersomeness of the Apple DOS commands and the CHR$(4) or D$ constructions, I recommend including statements similar to the following in the variable initialization part of the program:

```
D$ =CHR$(4)
OP$ = CHR$(4) + "OPEN"
```

Then to open a file in the middle of a program, use the line:

```
PRINT OP$ + "(file name)"
```

Note that the plus sign can be replaced with a semicolon or left out entirely.

When I was finally able to get disks booted, I discovered that Microsoft Basic has some definite improvements over Applesoft. These include additional string functions, double precision variables, statements to format numeric output, and if-then-else, nested if, and while-wend statements. On the other hand, comparing Basic versions is rather like asking which dull knife is better for slicing bread. After the operation, the result is still a mangled lump.
David Davies, Pleasant Dale, NE

He'd Rather Be Bored

As a recent subscriber to *Softalk*, I have noticed an annoying feature that has to do with the machine language programs. Why do you print them in assembler form? I love assembly programming, but as of today I still don't have an assembler such as *LISA 2.5* or *Merlin*. Please write in machine code, for even though it is boring, it would save me a lot of time trying to decipher your assembler code.
Peter T. Clark, Sacramento, CA

Hi-Res Dumpster

Here is a hi-res screen dump for an Epson printer which you may include in Open Discussion. To escape the program before completion, hit the space bar. Control-C or reset will leave your printer amuck.

```
100  PR# 1
110  PRINT : PRINT : PRINT TAB(20);
120  PRINT CHR$ (9);"80N";
130  PRINT CHR$ (27);"A"; CHR$ (7);
140  REM FOR HGR2 CHANGE VALUES
     NEXT LINE TO 16423, 16384
150  FOR L1 = 8231 TO 8192 STEP - 1
160  POKE - 16368,0
170  X = PEEK ( - 16384): IF X = 32 THEN
     320
180  PRINT CHR$ (27);"K"; CHR$ (000);
     CHR$ (1);
190  FOR NL = L1 TO L1 + 80 STEP 40
200  FOR MP = NL TO NL + 896 STEP 128
210  FOR LA = MP TO MP + 7168 STEP
     1024
220  C1 = PEEK (LA)
230  IF C1 > 27 THEN C1 = C1 - 128:
     REM RID HIGH BIT
240  IF C1 = 13 THEN C1 = 5
250  IF C1 = 9 THEN C1 = 1
260  PRINT CHR$ (C1);
270  NEXT LA,MP,NL
280  FOR BK = 1 TO 64: PRINT CHR$ (0);:
     NEXT
290  PRINT : REM LINE FEED
300  PRINT TAB( 20);
310  NEXT L1
320  PRINT CHR$ (27);"<";: REM PRINT
     HEAD LEFT
330  PRINT CHR$ (27);"2": REM NORMAL
     LINE SPACE
340  PR# 0
```

Mike Schwartz, Reading, PA

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WRITE**	44.6 sec.	14.9 sec.

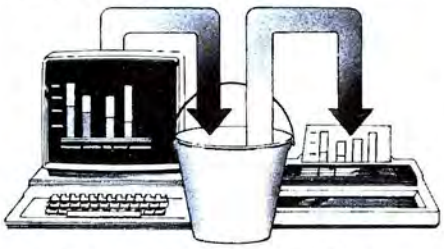
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mands will show you what's on the hi-res screen:

POKE – 16297,0:POKE – 16304,0

To display page two, type the following:

POKE –16299,0

Running this routine before the image you wish to print is displayed on the hi-res screen produces garbage.

Bargain Shopper

I'm interested in hearing about any less costly alternatives to the $150 serial boards for using a modem.

Robert Bauer, Eugene, OR

Out without a Route

For some time I have been looking for a program that could be used on my Apple II that would help me in routing buses for children's day camps and nursery schools. I thought we had found one in Vanlove's Directory, but we were advised that the software is no longer published because it didn't work. Our office assists Jewish Community Centers, YMHAs, YWHAs, and camps in developing computer technology to help them do a better job serving their members.

To anyone who might have a lead on a program for bus routing, or even truck routing that might be adaptable—we would really appreciate the lead, and so would the children who could get to school or to camp more quickly and safely.

George A. Korobkin, Phoenix, AZ

For Sailor Rent?

Does anyone know of a reputable place to rent software? I'm not sure if such a place exists, but being in the Navy and being at an isolated duty station, it's impossible to review software before buying. I usually rely upon *Softalk*'s reviews, but I still get programs that don't exactly fit my purposes. Sometimes I get arcade games that are not my type, or not what I expected, like *Tank Command* and *3-D Skiing*. In those, I expected more action and better animation. Now they just lie here on my table collecting dust. Any suggestions?

Dennis Heaton, Adak Island, AK

Thai Writer

I am a career missionary living in Bangkok, Thailand. My husband and I own an Apple II computer that we used for a myriad of personal uses. Recently, I've been exploring the possibility of using the Apple coupled with our Epson printer for word processing in Thai and several of the hill-tribe languages in northern Thailand. I would sincerely appreciate hearing from any readers who have had experience with alternate character set manipulation, foreign language programming, and graphic dumps to a printer.

I'm interested in hints, software, books, articles, anything that might help. I'd also like to correspond with others who are interested in this type of application. This is new territory for me; I want and need to learn all that I can.

Sue Kavli, Box 832, Bangkok, Thailand

The Emperor's New Tabs

Needless to say, I was speechless upon learning that I had won a prize in your Apples in History contest.

The InvisiTabs arrived in the mail today (postage due) and they are a sight for sore eyes. I opened the package and there they were, sitting like ducks in a row, all neat and shiny and on their clear plastic backing sheet. I immediately decided to use one on my copy of *VisiCrop*. (You wouldn't believe the arguments I've had with those people about the documentation of that program.) Anyway, this brings me to the point of my letter; while the quality of the InvisiTabs is beyond reproach, the backing material is not of the same quality. Small pieces of the backing stick to the tabs and prevent them from sticking to the disk. They *do* allow the tabs to stick to my fingers, the soles of my shoes, and sometimes to the print head of my dot-matrix printer.

Is there any possibility that this seemingly minor flaw in an otherwise unbeatable product could be corrected? If so, please send me some replacement tabs. I'm enclosing the old ones with this letter for your examination.

Thanks again for the prize and your continuing concern for both the novice and experienced computer hobbyist. As Vincent van Gogh, the nineteenth-century Dutch artist who cut off his ear for love, once said, "Huh?"

Robert C. Caplan, Chandler, AZ

For Apple II

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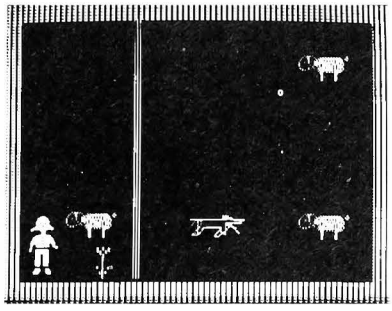
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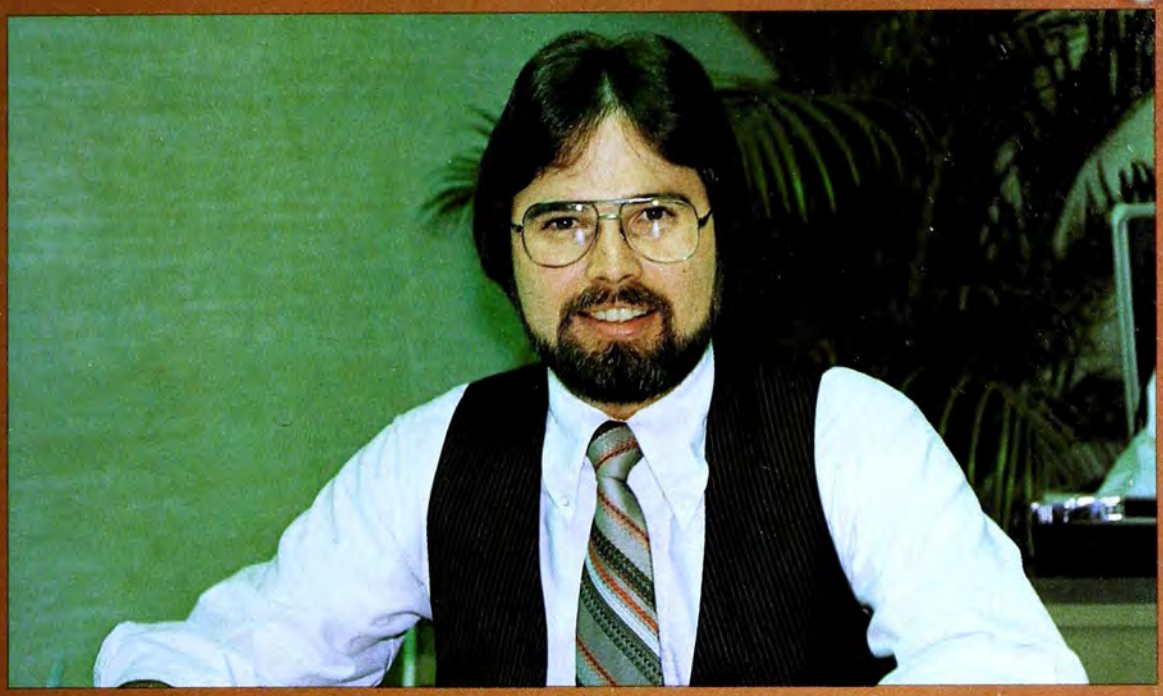
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Joy to the World!

Opposite page: Operations manager Terry Lewis, a friendly native Texan who doesn't mind working with a "Damn Yankee." Above: former magician, disc jockey, jazz musician, and programmer Ted Gillam, founder of TG Products.



Certain native Texans have two ways of describing you if you come from one of the forty-nine other United States. You're either a Yankee or a Damn Yankee, and they don't mean the Bronx Bombers. A Yankee comes to Texas for a visit. A Damn Yankee moves there.

Ted Gillam is a Damn Yankee. He's also the man behind the initials of TG Products.

There's a story to tell about the origin of the name TG Products. It has nothing to do with irate Texans, but it's a good introduction to one of the most respected and well-loved figures in the Apple world.

Gillam helped pay his way through college in a variety of colorful ways. At Ann Arbor, he was a disc jockey for the University of Michigan's radio station. It was the fashion in those days among DJs to use only initials. Gillam was known as "The Big TG."

Many years after college, on the day Gillam filled out the forms for his sales tax number, he was caught by surprise. To get the number, he was required to put something down for the title of his company. "The first thing that popped into my head was TG and that's what I put on the form."

The Lonely and the Brave. Everything in Texas is big. The hats are big. The cars are big. The airports are big. The talk is big. And most of the residents are big-hearted.

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The spirit of independence runs strong in Texas. Who knows? Even Gillam thinks it possible that someday Texas may secede from the rest of the country. Texans are reputed to be suspicious and fiercely loyal, but they are not against progress. In fact, progress, in the form of new technologies and new ideas, puts them in a better position to survive independently should they ever pull out and set up shop on their own.

Hard-earned independence is something that Ted Gillam can relate to. It's the goal for anyone who starts his own business, but continues to serve another master to pay the bills. It's the goal for anyone who is tied to responsibilities that suck away vital energy and time. It's the goal of the young and the suppressed. It's the story of humankind.

BY DAVID HUNTER

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How small you are when you step away from the larger entities makes no difference. In the case of TG Products, more than just one person is breaking free; a group can share the dream of independence just as well as any individual can. A lone star can be many bright spots gathered together in one glorious configuration of light.

Cautiously Gambling. For a man who says he is cautious, Ted Gillam sure doesn't carry it to an extreme. In fact, blessed with a pleasant temperament—cool, calculating, and confident—he seems to enjoy taking risks. A Yankee on the road.

Gillam came to the Dallas area in 1977, hired by Perkin-Elmer as regional manager of software services. Perkin-Elmer is a Fortune 500 company specializing in high technology items like the precision optics used in the space telescope. It's involved with many applications involving large number crunching, including a space shuttle simulator for the National Aeronautics and Space Administration.

For three and a half years, Gillam worked with programmers and system analysts, covering the tracks left by speedy, cut-rate salesmen. "They would always stretch the truth and we'd come in not knowing whether the application was possible." Gillam was regularly on the road, or in the air, four days a week.

Another part of Perkin-Elmer's operation is time-sharing. Gillam often took a terminal home to get in some extra hours of work. He'd also go into the office on the weekends and his son would come along. Father and son shared a passion for programming and the world of computers. At the ripe old age of eleven, Richard Gillam announced his desire to have a home computer. Toward the end of 1979, parent Ted realized that he too wanted a personal computer.

"I was becoming a technological dinosaur. In some growing companies, if you are good at what you do, they promote you to a higher position. I was a good programmer, but I also made a good manager. Suddenly programming was not a part of my job and I missed it. I decided to get an Apple so I could catch up and not lose touch with what was happening in computers." Around Christmas 1979, the Gillams got their Apple.

Ted Gillam's experience with programming and computers goes back a long way. He considers himself a programmer by trade, though he mainly programs for his own pleasure now. In his day, Gillam has programmed in Basic, Cobol, and Fortran. On the Apple, he has mostly written programs for his or his children's personal use. These include logic games and card games. He also wrote a "pretty good" disk utility when there weren't any available.

Now on the Air. It all started in his freshman year of college, when Gillam earned only a passing mark in a one-hour computer course. That didn't phase him.

"There were these bulletin boards around campus with notices advertising programming help. I put one up and charged double what the others were asking. My first customer was a professor and I managed to deliver what he wanted." Gillam went after computers with the same gusto with which he pursued other favorite pastimes.

Besides being a disc jockey and a freelance programmer in college, Gillam was a jazz musician. He played the drums in many local bars in the Detroit area. He also played in rock bands and big bands, but he mainly stuck to four or five player combos. He still has his drum set; and, after a particularly rough day in the office, he goes home and takes out his frustration by pounding out a mean rhythm.

During college Gillam also practiced magic, a hobby he's enjoyed since he was five. He's out of practice now; to be a good magician you have to practice at least an hour a day. Still, he can do sleight of hand card tricks that are beyond most people's range.

After college, Gillam went on to become an industrial engineer at General Motors in his home town of Detroit. There he worked in the data processing department, responsible for production control and inventory control. Next he did a stint at Xerox, first as a system programmer and later as district manager, a position similar to the one he would have at Perkin-Elmer. When he felt that Xerox was about to leave the computer field, Gillam went to work at Arthur Young and Company as a management consultant.

It was soon after getting his Apple that Gillam got the idea of making a joystick. "I figured that if I could sell one I could take the computer off my taxes as a business expense. I took my first working joystick to a local store, which agreed to take it on consignment."

After that initial success, Gillam decided to expand his market. He still traveled four days a week and decided to put the joystick in his suitcase and take it with him to show computer stores while on the road.

Cowboys, Tigers, and Indians. Early in March 1980, Computerland of Cleveland put in a purchase order for twenty-four joysticks. Then a store in Detroit ordered six. Suddenly he had sold thirty and was really in business. "Those early homemade joysticks were ugly, but they sold." Gillam took the grocery money and bought parts to fill the thirty orders.

TG Products was set up in the garage where Gillam built the joysticks by hand. Acting as his own marketing department, he traveled from city to city. He claims to have visited just about every computer store east of the Rockies. "There were not a lot of distributors at the time. You had to go out and do it yourself."

By Christmas 1980, the business was doing very well. In January 1981, Muse released *ABM*, an arcade game written with joystick control in mind. Orders for TG's joystick went through the roof. Joyce Gillam helped process and pack orders, while the kids assembled and tested each joystick. Son Richard wrote the program that was originally used for invoicing.

Finally, Gillam decided to hire the services of a couple of production companies for the actual assembly. He also thought the time was right to bring out a new set of game paddles for the Apple. Coincidentally, Apple decided to withdraw their own game paddles from the market. The timing couldn't have been better. TG sales went through the roof again, forever ending the days of a family/garage business.

Around this time, Gillam met Terry Lewis, who was in charge of production at one of the hired-out companies. Lewis, a native of Austin, Texas, worked for Southwestern Bell Telephone for eight years before going to work for his father. He eventually set up his own company with eight employees. They did the production of TG's joysticks and paddles.

Eventually, both Gillam and Lewis realized that economics dictated consolidating their efforts. TG Products was incorporated in August 1981. Lewis didn't feel that the change meant he was going to work for

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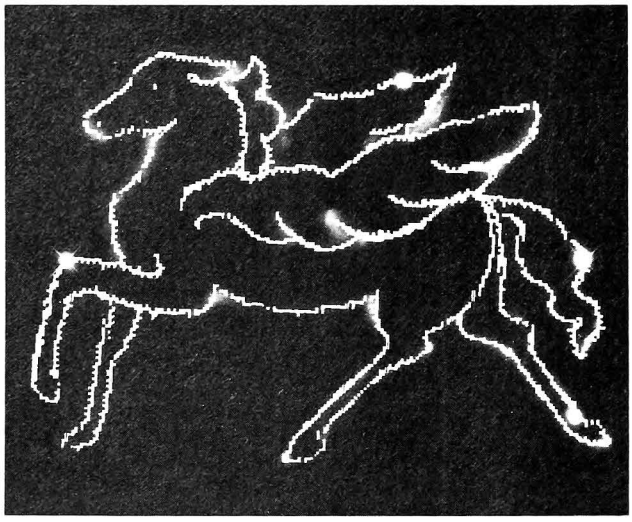
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someone else. Besides, he sees Gillam as one of the most easygoing people imaginable. Together, they put TG where it is today, a successful, continually growing company.

Looking To Get Out. At the same time that TG incorporated, Gillam's great escape finally happened. From working two full-time jobs, Gillam made that all important move. He left his normal, secure, well-paying job for the uncertainty and freedom of running his own business. Gillam started full time at TG on August 1, 1981. He handled the selling and the paperwork, while Lewis became the production manager.

Lewis has now been bumped up to the role of operations manager. He coordinates the day-to-day activity—purchasing of materials, distribution, and communicating with dealers. "When Ted gets an idea, it's usually up to me to figure out how to make it work. This is a small company and everyone wears a lot of different hats."

Lewis says that TG is currently adding four to five employees a month. People from a local sheltered workshop for the handicapped in Allen, Texas, do some of the assembly work. This arrangement enables TG to control costs very accurately. Other TG employees include local women who have small children and prefer to work at home. These workers come in each day for parts and work at their leisure.

Lewis is in agreement with Gillam on the company's moves to diversify and expand their markets. The first evidence shows in joysticks and paddles for the Apple III and the IBM Personal Computer. But the future may bring far more dramatic developments. "The industry is changing so fast that one can only speculate. In the case of peripherals, there are too many dollars lying out there for the big companies not to get involved." TG is just now seeing competition from much bigger, richer companies.

In an effort not to fall behind, TG is in the process of upgrading their joystick in a few key ways. First they're replacing the ribbon cable with a molded cable that is configured for the Apple. It'll be strain relieved with no stress points. There will also be versions of the joystick that are centering and noncentering. When you're using a joystick for producing graphics, it's annoying to have the joystick pop back to the straight-up position when you let go.

Ramsey/Shaver, TG's advertising agency, has developed new packaging that'll simplify the selling process for dealers. A handsome cardboard box with a plastic bubble displays the top of the product. Buyers can now have a look at what they're getting.

TG has always been insistent on maintaining the quality of their product and its long reliability. "I use the same buttons today that I used in the beginning. They're good for one million to two million cycles. I wanted a joystick that could position easily on an x and y grid and last. So I used potentiometers that have a long life of a million cycles," explains Gillam.

The Texas Hacksaw Massacre. The striving for quality has had its scary moments, though, particularly in the family/garage days. "There were some real tense moments when the custom-made potentiometer shafts were too long. There were five thousand of them and the bill was huge. I used a hacksaw to grind them down. With the shaft too long the potentiometer couldn't get to zero. It took a solid week in the garage, dining room, family room; everywhere I went around the house, I was sawing away. And Joyce saying to me: 'What are we going to do if these things don't work?' And me answering, 'Yes, I know.' "

Ever since the days when he used to travel most of the week and hit computer stores in the evenings, Gillam has considered the marketing end of TG Products weak. He was also TG's one-man advertising department until this year, when he finally farmed out that task to an agency.

The marketing problem is now solved by the arrival of Don Geyer as director of marketing. Recently of Gebelli Software, Geyer officially comes on board at TG this month. What with Trak Ball and the updated joysticks, he'll have his hands full.

One aspect of marketing that'll probably stay the same is Gillam's philosophy about trade shows. "They're awfully expensive for what you get out of them. I think most people going to a show are looking for a discount. I'd rather keep with institutional advertising and communicating with distributors. By far the best kind of marketing is good word of mouth from satisfied customers."



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8:37 AM. Your Apple receives mid-morning sales reports from the Apple in your New York office.

Transend 2 lets your Apple correspond over the phone with other Apples. Error detection features guarantee the accurate transmission of your valuable data.

1:52 PM. Your Apple displays current flight schedules and connects you to a ticket agent via The Source℠.

SSM's Transend 1 turns your Apple into an intelligent terminal connected to your corporate computer, a timeshare system, or any information service such as The Source. (In fact, all Transend software includes a subscription to The Source.)

You'll get business news, the most recent stock reports, advance UPI world news—even flight schedules—in moments. And new possibilities arise constantly.

11:53 PM. With the SSM Apple ModemCard™, your Apple is always ready to dial the phone.

SSM's 300 baud modem card fits conveniently inside your Apple. Advanced features include Auto-dial/Auto-answer for unattended operation, and Touch-Tone™ dialing (required for networks such as Sprint® or MCI Advantage™). The SSM ModemCard makes all other modems obsolete.

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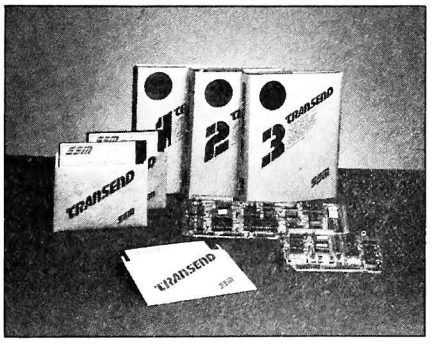
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TG's Trak Ball is a logical departure from previous graphic input devices, a product the company hopes will open the eyes of Apple game players and artists around the world.

A joystick has a swing of only sixty degrees. Trak Ball has a range of one and a half turns. It's more accurate, noncentering, and allows finer control. Modified, it could be used to move the cursor in a *VisiCalc* model as well as in games and graphics.

Gillam did not study about computer game peripherals in college. He does not have a master's in graphics control systems. He just has the knack for coming out with the right product at the right time. Trak Ball may not make a bigger splash than TG's joystick, but it's brand-new and no one has done it before.

Rough estimates have it that one-quarter of the Apples sold are equipped with one or more of TG's products. With the arrival of Trak Ball that figure may become one-third. Any way you look at it, TG has enjoyed enormous success; but the future is always uncertain.

The Big Broadcast of 1982. Ted Gillam is a dreamer—a philosophical entrepreneur caught in the world of big business. That's what the Apple market has become—big business, big bucks.

"There was a time when this industry was only small companies run by a few people who all knew each other. Now there are a lot of big corporations entering the market and all they care about is the bottom line, a profit. These companies that are a 'division of' really cause grief when they throw money around but don't add anything to the industry.

"It's tough for us little guys to compete with their marketing. I believe in putting out a good product and standing behind it. In the long run, word of mouth will kill an inferior product. But you have to wait out the marketing blitz and hope you survive."

Quality and service are two facets of business that keep the world from sinking into a puddle of mediocrity. Up to this time TG has had a ninety-day warranty on all their products, but they may soon change this to a year. Both Lewis and Gillam claim that no one has been charged more than five dollars for repairs or replacement. This has created terrific good will among customers and dealers, something that faceless big corporations can't ignore.

An industry observer, Gillam feels that the time has ended when one dimensional companies can survive in the Apple market without diversifying. Even a company like VisiCorp, with their monster seller *VisiCalc*, is feeling the pressure.

Gillam is very guarded about what plans he has for TG, but going into the software business is not unlikely. He can't always rely on a software publisher to back up his products, the way Muse did with the joystick version of *ABM*. Sure, there are many different machines that TG can make peripherals for, but the name of the game now seems to be related products as well. And that means software.

When all's said and done, the folks at TG Products have fun. The atmosphere is friendly and relaxed. Employees are encouraged to take breaks and play games on the computers. Every year, TG has two office parties, one celebrating Christmas and the other celebrating August 1, 1981, the day TG became a real company.

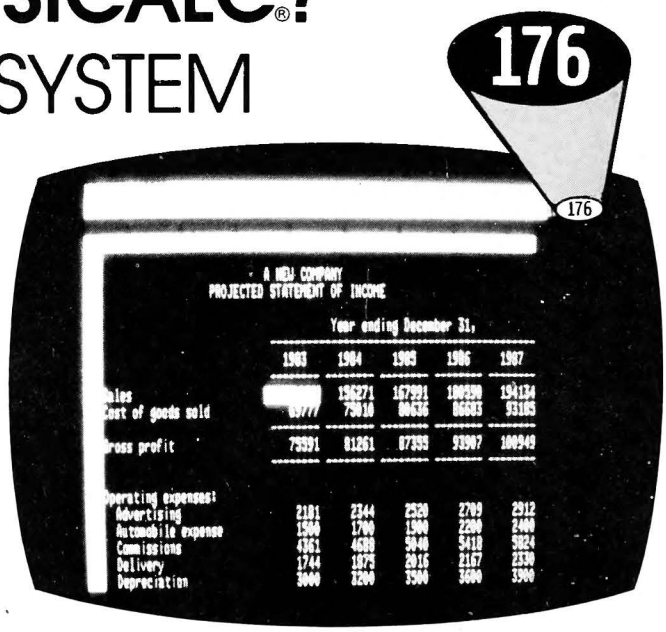
Gillam has a terrific rapport with the people who work for him and everyone appreciates his sense of humor and open mind. Lewis describes it best: "This is the first job I've had where I don't feel afraid to disagree. Ed and I have a very complementary relationship."

Deep in the Heart of Texas. The Big TG drives a Continental Mark VI with a digital dashboard ("I'm a gadget freak"). Every day before driving to work he gets up an hour early so he can read. An avid science fiction fan, his favorite authors are Heinlein and Larry Niven. And, of course, he plays a lot of games on the Apple. His current favorites include *ABM*, *Castle Wolfenstein*, *Teleport*, *Ceiling Zero*, *Marauder*, and *Thief*.

Deep down, Gillam would like someday to be a disc jockey again. But at the moment he's too wrapped up with paddles and joysticks to pursue that fantasy, so Apple owners can breathe a sigh of relief. If Gillam has his way, the market won't change entirely for the worse and the original spirit will live on, gloriously. ■

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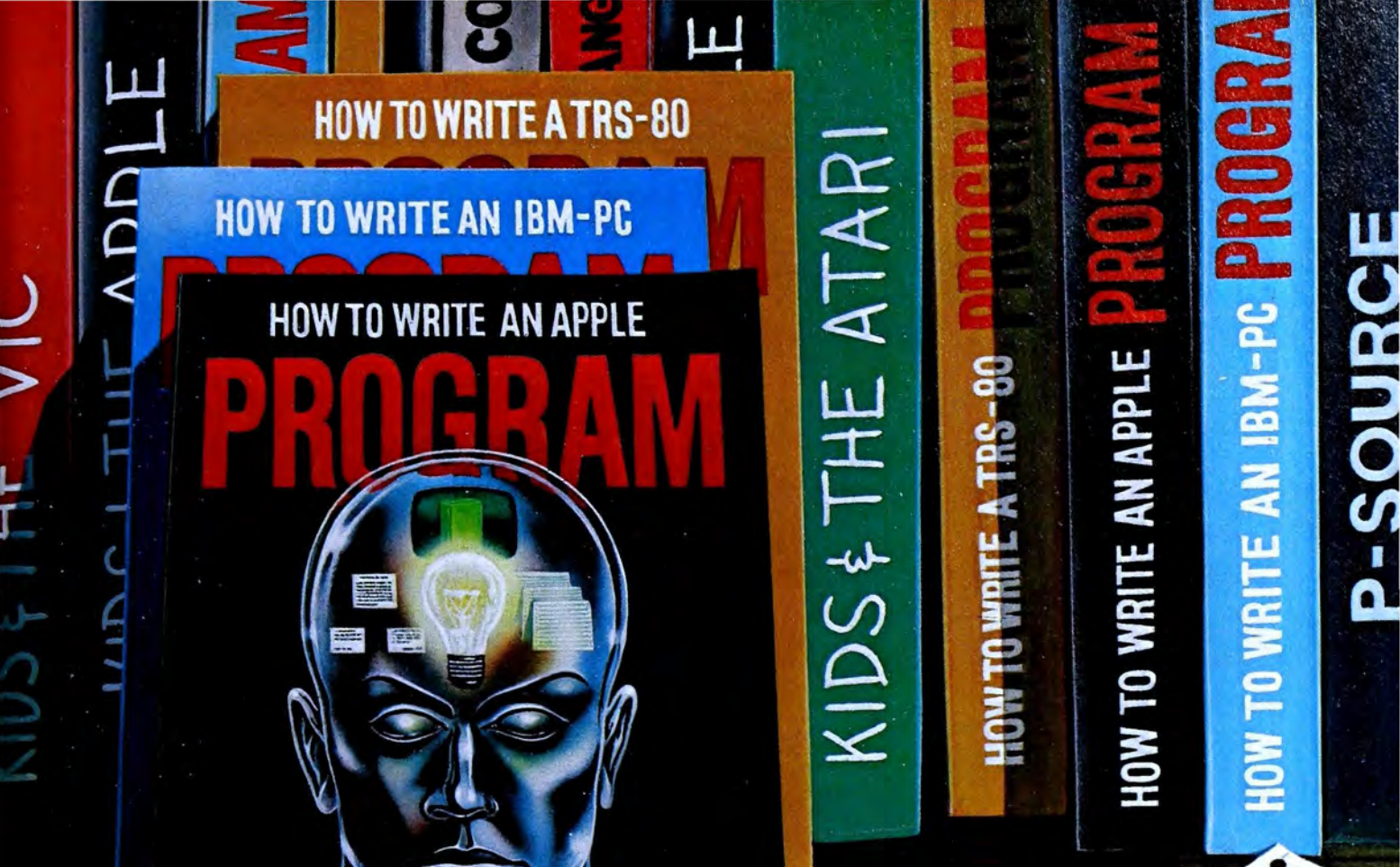


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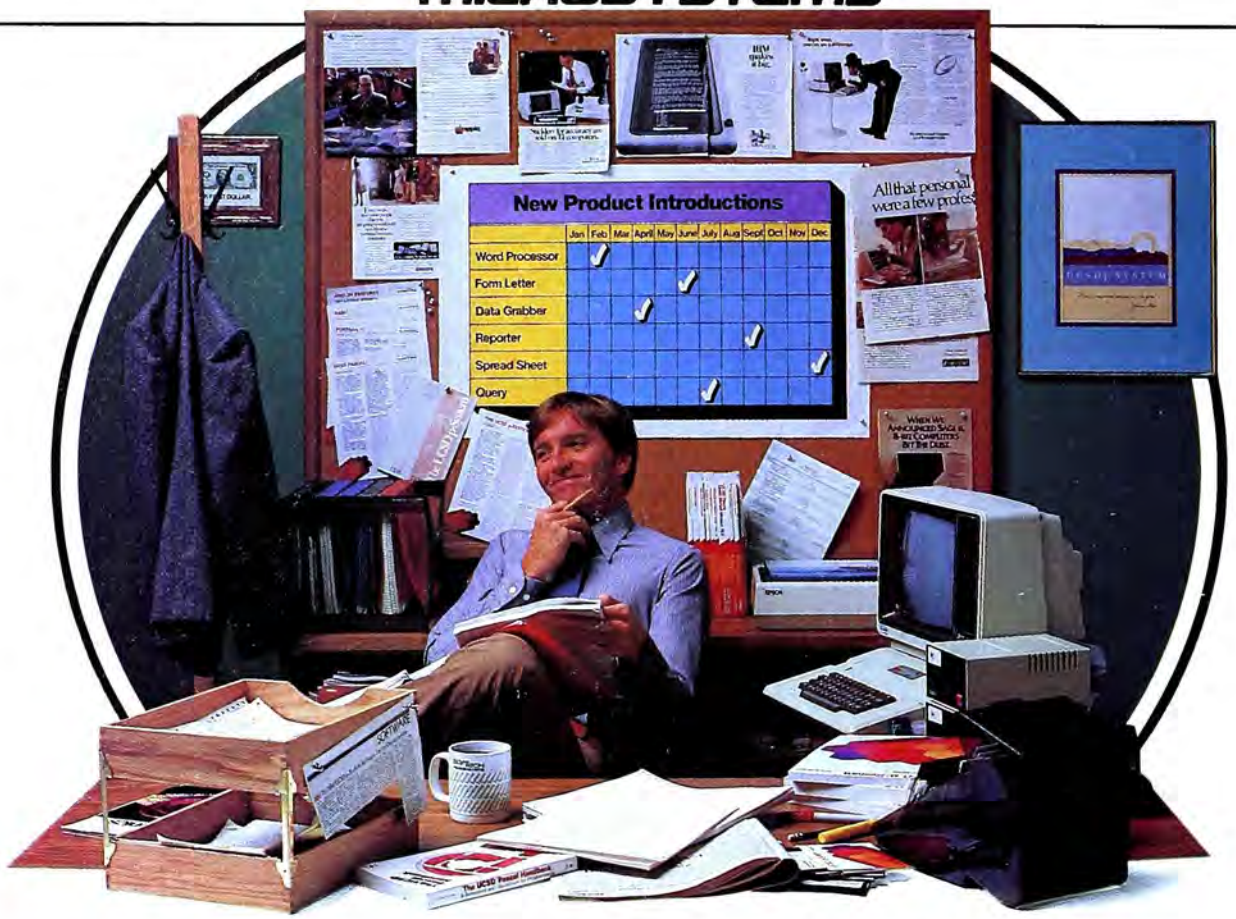
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THE BASIC Solution

By Wm. V. R. Smith

Computers are quickly beginning to invade the gambling casinos in Las Vegas and Atlantic City. Mechanical slot machines are being replaced with video monitors and microcomputers.

These new computer slot machines offer a lot more variety than the old-fashioned ones did. They can simulate all types of gambling games. Computerized versions of blackjack, keno, and poker are already visible in the casinos. Money is received and counted, odds are computed, visual effects are produced, and payoff is made—all under microprocessor control. Be assured about the accuracy of these computer slot machines; the gambling commissions review every aspect of a program to verify its correctness.

One of the most proper games is draw poker, in which the player is allowed to bet from one to seven coins per hand. The payoff odds are computed for all the possible winning poker hands and presented on the video display.

For those who aren't familiar with all the possible poker hands, table 1 gives their names and payoff odds.

In video poker, as in the standard game, five cards are dealt to the player. A flashing bar is moved from card to card with a push button. The player must select which of the five cards to keep. After making the selection, the player presses another button to draw new cards.

The final cards are dealt and the hand is then reviewed by the computer for payoff. If the hand is a winner, the proper hand description and corresponding payoff are shown in inverse lettering and the payoff is produced.

This month's Basic program exactly simulates the draw poker machines in the casinos. The only difference is that no money is required to play the Basic version.

If you're interested in card games, you'll enjoy reviewing the code. The computation of the hand in this program is very quick compared to other programs that have been made available in the marketplace.

Hand	Payoff Odds
Royal Flush	500:1
Straight Flush	100:1
Four of a Kind	40:1
Full House	10:1
Flush	7:1
Straight	5:1
Three of a Kind	3:1
Two Pair	2:1
Jacks or Better	1:1

Table 1.

To keep things simple we "drew" the cards using standard ASCII characters. You may wish to improve the card graphics. If you do create a better deck of cards, send them to Softalk Poker, Box 60, North Hollywood, CA 91603. If your cards are used, you'll receive a $10 credit at your local dealer.

And here's one final gift to those readers who have been requesting a fix to the print option limitation in *BasiCalc*. Briefly, the program sends only fifty rows to the printer. Changing one line and adding another will allow all rows to be printed.

```
6045 IF Y1 > 51 THEN Y1 = 51
6240 IF Y1 < 1 OR Y1 > 69 THEN X1 =
     0:Y1 = 0
```

The compiled versions of *BasiCalc* cannot be adjusted. If you have a compiler, however, you can compile your corrected, uncompiled version.

Draw Poker

```
10 REM ************
20 REM *  POKER  *
30 REM ************
40 ONERR GOTO 2010
50 DEF FN MD(A) = INT ((A / M -  INT (A /
   M)) * M + .05) * SGN (A / M)
60 GOSUB 1700
70 HOME
80 M1 = 0
90 DIM C(52),E(13),D(5)
100 DIM A(5),B(5)
110 FOR X = 0 TO 5:A(X) = 0:B(X) = 0:D(5)
    = 0: NEXT X
120 FOR X = 0 TO 13:E(X) = 0: NEXT X
130 BE = 1
140 FOR T = 0 TO 52:C(T) = 0: NEXT T
150 BE = 0
160 VTAB 19: HTAB 1: CALL  - 958
170 VTAB 1: HTAB 1
180 PRINT "ROYAL FLUSH";: HTAB 30:
    PRINT 500 * BE;"       "
190 PRINT "STRAIGHT FLUSH";: HTAB 30:
    PRINT 100 * BE;"       "
200 PRINT "FOUR OF A KIND";: HTAB 30:
    PRINT 40 * BE;"       "
210 PRINT "FULL HOUSE";: HTAB 30:
    PRINT 10 * BE;"       "
220 PRINT "FLUSH";: HTAB 30: PRINT 7 *
    BE;"       "
230 PRINT "STRAIGHT";: HTAB 30: PRINT
    5 * BE;"       "
240 PRINT "THREE OF A KIND";: HTAB 30:
    PRINT 3 * BE;"       "
250 PRINT "TWO PAIR";: HTAB 30: PRINT 2
    * BE;"       "
260 PRINT "JACKS OR BETTER";: HTAB
    30: PRINT BE
270 IF BE <   > 0 THEN 330
280 M1 = M1 + WIN:M2 =  ABS (M1)
290 VTAB 19: HTAB 1: IF M1 > 0 THEN
    PRINT "YOU HAVE WON ";M1;
    " DOLLARS          ";
300 IF M1 < 0 THEN PRINT "YOU HAVE
    LOST ";M2;" DOLLARS        ";
310 IF M1 = 0 THEN PRINT "        YOU
    ARE    EVEN        "
320 GOSUB 1500: GOTO 160
330 FOR T = 1 TO 5
340 X =  INT (52 * RND (1)): IF C(X)
    <   > 0 THEN 340
350 B(T - 1) = X
360 C(X) = T: NEXT T
370 GOSUB 800
380 INVERSE : GOSUB 1000: NORMAL
390 GOSUB 600
400 FOR T3 = 0 TO 4: IF A(T3) = 1 THEN
    450
410 X =  INT (52 *  RND (1)): IF C(X)
    <   > 0 THEN 410
420 B(T3) = X
430 C(X) = T3
440 VTAB 11:TA = (7 * (T3 + 1)) - 5:
    GOSUB 1980
```


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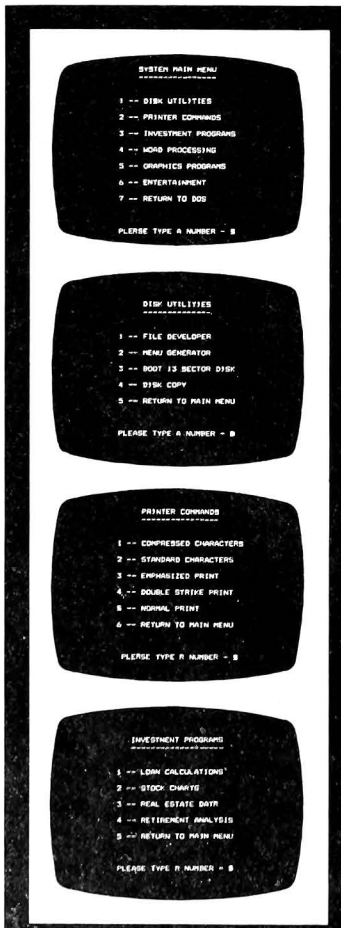
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```
450 NEXT T3
460 GOSUB 800
470 INVERSE : GOSUB 1000: NORMAL
480 VTAB 19: HTAB 1: CALL  - 958
490 VTAB 24: HTAB 6: PRINT "  PRESS
    SPACE BAR TO CONTINUE  ";: POKE
    - 16368,0
500 IF PEEK ( - 16384) < 128 THEN 500
510 POKE  - 16368,0: HTAB 6: PRINT
    "                    ";
520 FOR T1 = 1 TO 5: VTAB 11:TA = (7 *
    T1) - 5: GOSUB 1980: NEXT T1
530 GOTO 110
600 VTAB 21: HTAB 1: PRINT "H - HOLD
    CARD       C - CANCEL HOLDS":
    PRINT "ARROWS TO MOVE     RETURN
    TO DRAW"
610 P = 0
620 POKE  - 16368,0
630 I =  PEEK ( - 16384)
640 POKE  - 16368,0
650 IF I <  > 136 THEN 670
660 PRINT "          ";:M = 5:P =  FN
    MD(P - 1 + 5)
670 IF I <  > 149 THEN 690
680 PRINT "          ";:M = 5:P =  FN
    MD(P + 1)
690 IF I <  > 200 THEN 720
700 PRINT "          ";: VTAB 17: HTAB (7
    * (P + 1)) - 5
710 PRINT "HOLD":A(P) = 1:M = 5:P =
     FN MD(P + 1)
720 IF I <  > 195 THEN 750
730 FOR T4 = 0 TO 5:A(T4) = 0: NEXT T4
740 VTAB 17: HTAB 1: PRINT
    "                         ";:
    GOTO 770
750 IF I <  > 141 THEN 770
760 RETURN
770 VTAB 18: HTAB (7 * (P + 1)) - 5
780 PRINT "?????";: HTAB (7 * (P + 1)) - 5
790 GOTO 630
800 REM       DRAW CARDS
810 FOR Q = 0 TO 13:E(Q) = 0:M = 4:S1
    =  FN MD(Q):D(S1) = 0: NEXT Q:PAIR
    = 0:TRE = 0:FUR = 0
820 FOR T = 0 TO 4:T1 = B(T): GOSUB
    840: NEXT T
830 RETURN
840 VTAB 11:HT = (7 * (T + 1)) - 5: HTAB
    HT
850 M = 13:RANK =  FN MD(T1 + 1):M =
    4:SUIT =  FN MD(T1 + 1)
860 E(RANK) = E(RANK) + 1:D(SUIT) =
    D(SUIT) + 1
870 IF A(T) = 1 THEN 890
880 GOSUB 1900
890 FOR TI = 1 TO 100: NEXT TI
900 RETURN
1000 REM     B(0-4) HOLDS CARDS IN
     HAND
1010 REM     TEST THESE FOR SCORE
1020 FLUSH = 0:STRAIGHT = 0:F1 =
     0:PAIR = 0
1030 FOR Q = 0 TO 3: IF D(Q) <  > 5
     THEN 1060
1040 REM     FLUSH
1050 FLUSH = 1: GOTO 1150:
     REM       STRAIGHT
1060 NEXT Q
1070 FOR Q = 0 TO 12: IF E(Q) < 2 THEN
     1140
1080 IF E(Q) = 2 THEN PAIR = PAIR + 1
1090 IF E(Q) = 3 THEN TRE = TRE + 1
1100 IF E(Q) = 4 THEN FUR = FUR + 1
1110 IF E(Q) = 2 THEN CA = Q
1120 IF E(0) = 2 THEN CA = 13
1130 F1 = 1
1140 NEXT Q
1150 E(13) = E(0)
1160 IF F1 = 1 THEN 1210
1170 FOR Q = 0 TO 9
1180 Q2 = E(Q) + E(Q + 1) + E(Q + 2) +
     E(Q + 3) + E(Q + 4)
1190 IF Q2 = 5 THEN STRAIGHT = 1
1200 NEXT Q
1210 IF STRAIGHT <  > 1 THEN 1240
1220 IF FLUSH <  > 1 THEN 1240
1230 VTAB 2: HTAB 1: PRINT "STRAIGHT
     FLUSH";:WIN = 100 * BE: RETURN
1240 IF FUR = 1 THEN 1260
1250 GOTO 1270
1260 VTAB 3: HTAB 1: PRINT "FOUR OF A
     KIND";:WIN = 40 * BE: RETURN
1270 IF TRE <  > 1 THEN 1300
1280 IF PAIR <  > 1 THEN 1300
1290 VTAB 4: HTAB 1: PRINT "FULL
     HOUSE";:WIN = 10 * BE: RETURN
1300 IF FLUSH = 1 THEN 1320
1310 GOTO 1330
1320 VTAB 5: HTAB 1: PRINT
     "FLUSH";:WIN = 7 * BE: RETURN
1330 IF STRAIGHT = 1 THEN 1350
1340 GOTO 1360
1350 VTAB 6: HTAB 1: PRINT
     "STRAIGHT";:WIN = 5 * BE: RETURN
1360 IF TRE = 1 THEN 1380
1370 GOTO 1390
1380 VTAB 7: HTAB 1: PRINT "THREE OF A
     KIND";:WIN = 3 * BE: RETURN
1390 IF PAIR = 2 THEN 1410
1400 GOTO 1420
1410 VTAB 8: HTAB 1: PRINT "TWO
     PAIR";:WIN = 2 * BE: RETURN
1420 IF PAIR <  > 1 THEN 1450
1430 IF CA <  = 9 THEN 1450
1440 VTAB 9: HTAB 1: PRINT "JACKS OR
     BETTER";:WIN = 0: RETURN
1450 WIN =  - BE
1460 RETURN
1500 REM      BET
1510 T = 10
1520 VTAB 19: HTAB 30
1530 T =  - T
1540 IF T < 0 THEN 1560
1550 PRINT " BET 0-7": GOTO 1570
1560 PRINT "          ": GOTO 1570
1570 BE =  PEEK ( - 16384)
1580 BE = BE - 176
1590 IF BE < 0 THEN 1520
1600 IF BE > 7 THEN 1520
1610 POKE  - 16368,0
1620 IF BE = 0 THEN 2000
1630 VTAB 19: HTAB 30: PRINT "BET =
     $";BE;
1640 POKE  - 16368,0
1650 RETURN
1700 HOME
1710 VTAB 10: HTAB 9: PRINT "***
     SOLITAIRE POKER ***"
1720 DIM RN$(12)
1730 FOR I = 0 TO 12: READ RN$(I): NEXT
1740 FOR I = 0 TO 3: READ SU$(I): NEXT
1750 FOR I = 1 TO 1000: NEXT
1760 RETURN
1770 DATA      "A ","2 ","3 ","4 ","5 "
1780 DATA      "6 ","7 ","8 ","9 ","10"
1790 DATA      "J ","Q ","K "
1800 DATA "D ""C ","H ","S "
1900 REM      DEW DRAW CARDS
1910 HTAB HT: PRINT " -----"
1920 HTAB HT: PRINT
     "!";RN$(RANK);"     !"
1930 HTAB HT: PRINT "!      !"
1940 HTAB HT: PRINT "! ";SU$(SUIT);" !"
1950 HTAB HT: PRINT "!      !"
1960 HTAB HT: PRINT " ----"
1970 RETURN
1980 NORMAL : FOR I = 0 TO 7: HTAB TA:
     PRINT "          ": NEXT I: RETURN
2000 TEXT : HOME : END
2010 IF PEEK (222) = 255 THEN 2000
2020 RESUME
```

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APPLESOFT MAKES A LEVEL

BY DAVID DURKEE

Pity the poor Basic programmer. Politely condescended to by aficionados of Pascal, left in the silicon dust of super-serious assembler jockeys, the humble computer monoglot quietly makes do with a language that's easy to learn, but slow, unstructured, and, on the Apple, not even all there.

In some of its mainframe manifestations, even Basic has certain amenities built in. But such useful constructions as print using and if–then–else never made it into Applesoft. The Apple also lacks a full-blown editor, substituting for one its own ingenious escape-key editing features. Apple's editing is a simple, elegant, and memory-efficient approach, but it's not always the most convenient.

These are indeed shortcomings, ones that have actually caused some programmers to turn to other microcomputers. Fortunately, some of the most talented programmers around were attracted to the Apple for its other fine qualities. These folks, having been brought to a boil and then simmered over low heat for a few years, have produced an amazing array of software for the Apple, some of which is geared to overcoming just those shortcomings that prompted their less farsighted program brethren to look elsewhere.

Three types of program package have been designed to fill in the various gaps and limitations in Applesoft Basic. *Basic'* (pronounced "Basic prime") from Delta Micro Systems and *Symbolic Basic Translator* from Powersoft attempt in different ways to improve the structure of the language. *GPLE* from Synergistic Software and *Macro-Sced* from Computer Stations approach the problem of Apple's limited editor. Finally, *The Routine Machine* from Southwestern Data Systems gives Basic back its missing commands—with a few more thrown in that you won't even find on the mainframes.

Basic'. *Basic'* actually extends Basic syntax, borrowing some conventions from Pascal and contributing a few innovations. You write your program on an editor named Editor' and then send it to a processor to be translated into Applesoft.

The commands that this package adds to Basic are very powerful control statements. Control statements are those commands that tell the computer where in the program to go next: for example, some of Applesoft's control statements are for–next, goto, gosub–return, and if–then. To begin with, *Basic'* eliminates goto entirely, for good or ill, and introduces a number of new statements to fill the void.

Basic' uses no line numbers in its source code. Instead, the processor reads indentations in the source to determine where loops and subroutines end, eliminating the need for next, resume, and return. For is still used in the same format, except that there is an optional *until* condition that allows you to exit the loop be-

APPLESOFT BASIC

ROUTINE MACHINE

GPLE

MACRO-SCED

basic'

SYMBOLIC BASIC TRANSLATOR

fore its normal completion. For instance, if *until X>22* is encountered in a loop, and the condition is true, control moves to the next line that is one level of indentation to the left of the until line.

Another kind of loop that *Basic'* introduces is initiated by the *repeat* command. This in itself is an unconditional loop and will continue indefinitely if not terminated by some other control statement, most commonly until.

The if statement has undergone a few changes. In *Basic'* it is followed by an indented routine, eliminating the need for a then. The else option, a convention common to most Basics that never made it to Applesoft, is included in *Basic'*. Normally, if the condition in an if statement is false, control is passed to the next line. An else, which follows the commands executed by the if, allows you to enter another command or series of commands in the event of a false condition.

In the absence of line numbers, you use procedure names defined with the *proc* command. You can call on these procedures via the *do* command, which acts the same as gosub. When a line with the next level of indentation to the left is encountered in the subroutine, control is passed back to the next command after the do.

Perhaps the most powerful statement that *Basic'* introduces is *case*, which is used in this format:

```
CASE A$
 #"YES"
  DO SOMETHING
 #"NO"
  DO NOTHING
 #"MAYBE"
  DO ASK-AGAIN
```

In this example. if A$ = "Yes" the program will go to the procedure named Something. "No" will send it to the procedure Nothing, and "maybe" will send it to Ask-Again. Any number of conditions can be set up with case, which can also be used with numeric variables. Else can be used with this construction as well.

If you want any procedure to be assigned a particular line number when the program is translated to Applesoft, you can use the command *equ* followed by the procedure name and the line number desired; this must be placed at the beginning of your program.

Editor' is a good example of how a dedicated program editor can be better in some ways than a text editor for entering program code and, in other ways, worse. For instance, because *Editor'* recognizes that you are entering code, it assists in implementing the *Basic'* indentation conventions. If you are in a loop or loops, it automatically indents two spaces per nested level. To indicate to the editor to end a loop, you hit the back arrow key and the cursor moves two spaces to the left. Remember, it's very important to indent correctly, because an end of indentation takes the place of the return, next, and resume statements.

There are a few other features in the editor's favor. It fully supports a two-disk system but doesn't require one. With one or two drives, it gives excellent disk prompting. When you're loading or saving files, the editor will give the last name you used as a default whenever possible. It also automatically heads any printout with the file name and the date.

A disadvantage of *Editor'* is its inability to display any line beneath the one currently being edited or inserted. Another drawback is that the scrolling is slow enough to cause real problems when you're editing a large program.

When you've finished editing a file, you then go to *Basic'* and process it. The processor provides a formatted listing of the source file, with comments that are in command lines moved to the right margin and comments on their own lines left where they were. Provisions are also made for centering important comments and surrounding them with equal signs that extend across the width of the page. Finally, the program translates the file to an Applesoft program and saves it to disk.

For all of the "powerful" commands that *Basic'* adds to Applesoft, it will not ultimately produce faster running or more efficient programs, because it has to translate the new commands into Applesoft in order to run them. It may make a program easier to write, once you become accustomed to the new syntax. To be as powerful a language as it could be, given its extended features, *Basic'* should really have either its own interpreter, like Basic, or a compiler, like Pascal.

Symbolic Basic Translator. This package is designed to eliminate the need for line numbering and to allow the programmer to use variable names of more than two characters. While Applesoft allows more than two characters in a variable name, it only allows two significant characters. In other words, *month* will be read as the same variable as *mother. Symbolic Basic Translator* allows you to use meaningful variable names without the possibility of confusion. *Symbolic Basic Translator*'s system also allows you to use names that contain parsed words, names like *tomorrow*, which Applesoft would throw out because it contains to and or. Anything that begins with an at-sign(@)will be intepreted as a variable.

Applesoft's line number convention is replaced by a label convention in *Symbolic Basic Translator*. Simply stated, any place you would need a line number, you use a label instead. A label must be preceded by a number sign (#) character. Naturally, most lines don't require a label, just the ones that are accessed by goto, gosub, or if–then. In addition, you can tell the translator which comments in the source code you want passed on to the object code. Simply use REM at the beginning of a comment you want to keep and delimit a comment you want only in the source by using parentheses and asterisks, like so:

```
(* THIS IS A COMMENT *)
```

Symbolic Basic Translator has three optimization levels to choose from when translating. This means that you can generate a code that is easy to read and edit, a code that is crushed to run faster and use less memory space, or one that's somewhere in between.

Unlike *Basic'*, *Symbolic Basic Translator* does nothing to extend the syntax of Basic. What it does do is allow you to write somewhat more understandable programs through the use of labels, meaningful variable names, and selective indentation. Don't expect much more than that.

A bit of high-tech *caveat emptor* here. Before you run out to buy *Symbolic Basic Translator*, be advised that it does not come with an editor. You would not discover this until you read the manual, however, because neither the advertising brochure nor the outside of the package advises you of this. From the entry in the table of contents, "The Editor," you might assume that the program has one, but the page referred to merely explains that it doesn't, and that you have to use your own. If you have an editor that's compatible, there's no problem; you won't have to learn a new set of editor commands. If not, you'll have to buy one in order to use this program. Most text editors are compatible, but it's best to be sure yours is before you leave the store.

When considering any of these products, keep in mind that there is probably a tradeoff involved. The Applesoft Basic editor and interpreter may be lacking in a few areas, but they have the advantage of being extremely convenient. At the root of this convenience is the fact that the editor and the interpreter are both ROM-based and completely interactive. This

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allows you to write a piece of code and test it on the spot, without having to save to disk, load and run a processing program, and retrieve the object code from disk.

Basic' and *Symbolic Basic Translator* remove this type-and-run convenience from Basic. They also make error-handling less convenient than it is in unmodified Applesoft. Normally, error messages give the line number where the break occurred. You can immediately go back and change the line in a listing you are familiar with. If you used one of these processors and have an error, you have two choices: either go to the object code generated by your source code and fix the problem there, which means that the same error will occur the next time you process the source code, or go back to the source code and try to find the error in an unnumbered listing. *Basic'* at least gives you a cross-referenced listing when it interprets the source code. *Symbolic Basic Translator* doesn't.

In selecting any package that claims to make programming easier by extending Applesoft Basic, you have to consider the tradeoff. What are the disadvantages? What aspects are being presented as advantages? Is what you're going to be getting more important to you than what you might be giving up?

Cooperative Editing. *GPLE*, the Global Program Line Editor from Synergistic Software, and *Macro-Sced* from Computer Stations are editors that work *with* Applesoft instead of going around it. Once you've booted either of these packages up, you can then move on to something like standard programming; that is, standard in that you can type and run as usual, but there is a difference. The added features don't jump out at you and announce their presence with prompts and menu options, but they are there nonetheless. Both of these packages give you—drum roll, please—extra editing options.

Given the problem of the limited Apple editor, these programs approach the solution in very similar ways. Through a series of control characters, they offer enhanced editing options, allowing sophisticated functions such as insert, delete, search, and replace to be performed with far greater ease and speed than similar operations done with Apple's escape editing. Also, both programs provide keyboard macros. These are usually two-key sequences—escape followed by one other character—that take the place of much longer commands and sets of commands. Each package offers a library of predefined macros and a facility for creating your own sets.

Despite similarities in concept, there are many differences in the ways these two programs treat the general theme. Let's examine each of the programs in more detail.

Macro-Sced. The Computer Station editing package seems to have been designed with two main concerns in mind. The first is memory. *Macro-Sced*'s editor and macro tables together occupy only one-and-a-half kilobytes of RAM. By making extensive use of calls to Monitor subroutines, this small program accomplishes the work of a much greater amount of code.

The second consideration, related to the first, is an apparent desire to build this editor on the conventions of the Apple. The basic premise behind line editing with *Macro-Sced* is listing the line to the screen and copying the parts you want into the input buffer, at the same time getting rid of undesired parts or adding new ones.

As you probably know, the Apple uses a similar approach, except that instead of physically deleting the parts you don't want, you move the cursor over them without copying (via escape-K), or type spaces over them—provided they weren't in quotes, a data statement, or a remark. Inserting is somewhat more difficult; you can't just type something in without overwriting something else. So you must move the cursor up a few lines, type in the insertion, and move the cursor back down to the middle of the line and continue. This looks exceedingly messy on the screen. Or you can throw up your hands in despair and just retype the whole line, as many have.

The editing features of *Macro-Sced* allow you to perform insertions and deletions more elegantly without changing Apple's basic editing method. Cursor movement is achieved through the control key and a diamond comprising the letters W, A, S, and X. Insertions are accomplished by moving the cursor to the desired location in the line and typing control-I. This splits the line at that point, scrolling everything before the cursor up one line. You can then type whatever you want in the space provided.

Other features allow you to tab the cursor in various ways, save and restore cursor positions, delete a character at the cursor, and so on.

As you can see, *Macro-Sced* is very cursor-oriented. One unique feature is control-L, which starts moving the cursor toward the end of the line. Any key will stop the cursor wherever it is, and all characters the cursor has moved over will have been copied into the input buffer. Using the macro escape control-L, you can vary the speed of the copy to suit your taste. This feature can also be used to copy long file names when loading programs; in any case, it's a big improvement over using the right arrow key and repeat.

The macros included on the *Macro-Sced* disk are of varying usefulness. Some of them are frequently used Basic commands that might be handy to have "at your fingertips." Escape C, for instance, is catalog, a command that most programmers use more frequently than they bathe. On the other hand, most people probably won't find much use for escape control-D, which prints out "Master Diskette."

The whole idea behind macros, however, is that they are programmable. Thus, if you do a lot of complicated graphics programming and are forever looking up the pokes in appendix J of the Applesoft manual, you might want to set up macros for the ones you use the most. Or you could define a macro as *print CHR$(4);"* for those ubiquitous DOS commands.

Defining a macro is really quite easy. You simply use the *Macro-Builder* program on the

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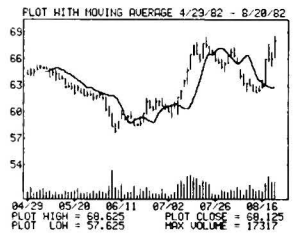
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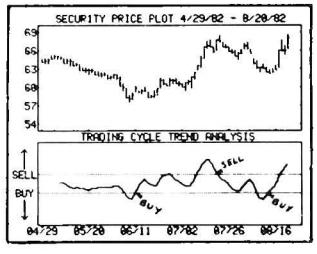
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Editing a Line of Basic

GPLE and Macro-Sced: Head to Head

Suppose you are editing a Basic program. You have the line below, which is an input that asks you to select from one of two options.

```
                  (A)          (B)
                   |            |
610  PRINT "LEFT (1) OR RIGHT (2)?";:
     GET T$:T = VAL (T$): IF T<1 OR T>2
     THEN 605
                                 |
                                (C)
```

The line includes checks to ensure that an illegal response from the user doesn't crash the program. Now you wish to add a third option, *center*. This requires you to delete from point A, insert at point B, and replace a character at point C, making the line read:

```
610  PRINT "LEFT (1) RIGHT (2) OR CENTER
     (3)?";: GET T$:T = VAL (T$): IF T <1 OR T
     <3 THEN 605
```

Macro-Sced. Using *Macro-Sced,* the editing process would go like this:

Escape *W 610* return—This lists line 610 in thirty-three column mode, which eliminates the spaces between lines on the screen. It's necessary to do this because *Macro-Sced*, like Applesoft escape editing requires that the line be copied by moving the cursor over it, and we don't want to copy extra spaces into printed output. The same effect can be achieved from Basic by typing *poke 33,33* before listing the line.

Five *control-W*s and *control-A*—This sequence moves the cursor to the beginning of the line number without copying anything. It is the equivalent of Applesoft's escape I I I I I J. *Macro-Sced* uses the W-A-S-Z diamond with the control key in place of the escape I-J-K-M diamond.

Control-L and any key—When control-L is hit, the cursor begins to move along the line, copying it into the input buffer, and stops when any key is hit. In this case you'll want to stop at position A.

Three *control-N*s—This sequence will delete "OR" from the line, moving the rest of the line back to fill the gap.

Right arrow key with repeat—This is the easiest way to move the cursor the short distance to position B.

Control-I—The line will split at the position of the cursor. The cursor and everything before it will scroll up one line, allowing space for more characters to be inserted.

OR CENTER (3)—This is the text to be inserted.

Control-T—The cursor tabs to the next nonspace character without copying. This eliminates the extra spaces that control-I inserted.

Control-L and any key—Again, this moves the cursor over the line, which is copied until the cursor is at position C, where you hit a key to stop it. If you miss the exact position desired, by the way, the arrow keys allow you to move to the right place.

3—Overwrites the "2" at position C with the desired "3."

Control-Y return—This copies the remainder of the line into the input buffer and enters the corrected line.

TEXT return—Finally, you'll want to return to normal forty-column mode to list or run the program.

GPLE. If you want to make the same changes using *GPLE*, you would follow this sequence:

Control-E 610 return—"Edit 610" will be printed to the screen, followed by the line, with the cursor at the beginning after the line number. In *GPLE* you needn't copy the line, so you don't have to move the cursor over the line number or over sections of the line you don't wish to change.

Control-F O—The control-F command means find; this command finds the first occurrence of the character "O," which happens to be position A. If you wanted to move to the second "O" in the line, you would have entered control-F O O.

Three *control-D*s—"OR " will be deleted.

Control-F ?—Moves the cursor to the first "?" character, which is position B, where you want to make an insertion.

Control-I—You are now in insert mode. *GPLE*'s insert mode works in the same way as the insert mode on most word processors. The text typed is placed at the cursor position, and the rest of the line moves out of the way to make room. Insert is exited by entering any other *GPLE* control command.

OR CENTER (3)—The insertion.

Control-F 2—The cursor moves to position C.

3—The character "3" is typed over the character "2."

Return—The line is entered into the program as it appears on the screen.

As this example illustrates, *GPLE*'s editor is somewhat easier to use than *Macro-Sced*'s. It requires fewer keystrokes and a smaller command vocabulary; and it's faster as well. ■

disk. You can list the current macros, decide which ones you can do without, and replace them with your own. The program keeps you informed about how much memory remains. Special characters for chaining macros are constantly displayed, and the manual describes how to include the return character and escape as well as those ASCII characters that aren't normally available from the keyboard.

Macro-Builder is in Applesoft, which means that when you run it, any program you're working on will be lost. If you want to change a macro while programming without the hassle of having to save your program first, there is also a machine language program called *Macro-Patcher* that edits macro tables without clobbering your program.

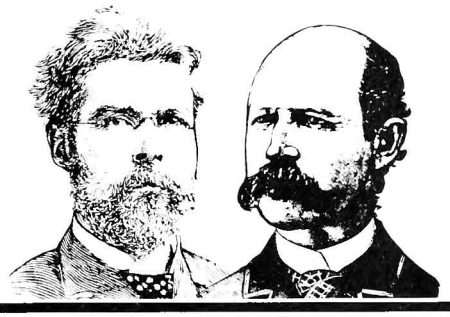
GPLE. Where the author of *Macro-Sced* attempted to improve on the Apple escape editing concept, *GPLE*'s author has borrowed conventions from other computers' editors to make a more usable editing system. In fact, about five of *GPLE*'s commands justify the purchase of the entire system.

Designed with memory considerations at a lower priority than in *Macro-Sced, GPLE,* with editor and macro table, occupies more than five kilobytes of memory. With the 48K minimum required memory, 5K will hardly be noticed. If your programs are already hitting the upper reaches of memory, a RAM card wouldn't be a bad investment, and *GPLE* can help the investment attain its full potential by moving DOS up, freeing the 8K it normally occupies for program use.

Anyway, the extra memory *GPLE* occupies is put to good use. Its six easily remembered control commands make program editing easy. Typing control-E and a line number puts you in edit mode and calls the line to the screen. Control-F followed by any character finds the first occurrence of that character and moves the cursor there. Repeating the character finds the next place the character appears. Any other character breaks you out of this find mode. This is the easiest way to move to the desired location in a long line, but it is not the only way. The arrows still work, of course, and control-B and control-N go to the beginning and end of the line, respectively.

Deleting a character works the same way in *GPLE* as it does in *Macro-Sced,* except that a different key is used. In *GPLE,* a control-D removes the character at the cursor and moves everything after the cursor back to fill in the space. Inserting in *GPLE* is much more sophisticated, however. Hitting control-I puts you in insert mode, in which anything you type in is placed at the cursor position, everything to the right of the cursor moves over, and the cursor position advances so you can insert another character. Any control command exits insert mode. For a detailed comparison of editing with *GPLE* and *Macro-Sced,* see the sidebar to this story, "Editing a Line of Basic."

An option that is very useful and has no counterpart in *Macro-Sced* is the global search and replace. This is an extension of the control-E command. Instead of typing a single line



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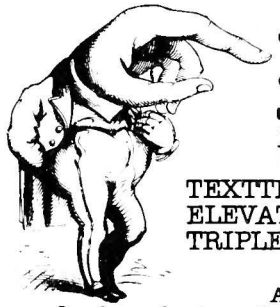
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number after control-E, you type a pair of line numbers defining a range, followed by a pair of strings. This searches the range for all occurrences of the first string and replaces them with the second string. If you leave out the line numbers, it searches the whole program. If you omit the replacement string, it allows you to edit all lines that contain the search string. The larger the programs you work with, the more essential this option becomes.

GPLE calls its macros *escape functions,* but they work in exactly the same way. Each is a two-key sequence that takes the place of a command or a number of commands. Because *GPLE* allots more than twice as much memory to macros than *Macro-Sced* does, the macros on the *GPLE* disk tend to be more powerful and useful. Escape 1 and escape 2 catalog drives one and two. Escape with 4, 5, or 6 selects the corresponding slot for a catalog. Among the more sophisticated macros offered are one to append one program (Applesoft or Integer) to another, one to print the number of free sectors on the last disk cataloged, and one to print the starting address and length of the last bloaded binary file.

Like *Macro-Sced, GPLE* allows you to define your own macros and save them to disk. But *GPLE*'s macro-editing function is part of its regular editor, meaning it is constantly resident in memory; this eliminates the nuisance of extra disk access. A macro, just like a line of Basic, is edited by typing control-E followed by escape and the macro name.

The Routine Machine. A very recent addition to the better Basic sweepstakes is *Routine Machine* from Southwestern Data Systems, which actually adds commands you thought you'd never be able to get on your Apple. A library of thirty new commands is included with the *Routine Machine* disk, and SDS is also marketing a series of Ampersoft Program Library disks that contain even more commands to add to Basic.

With Applesoft in ROM on most Apple II computers, the program's creators couldn't just append the extra commands onto the Applesoft interpreter, so they did the next best thing. Commands are called with the ampersand hook, the name of the command, and a set of parameters.

There are probably dozens of software packages available that use that technique to add extended sorting, graphics, or whatever routines to Basic, so you're probably wondering what makes this one so special. Well, the fact is that no other program offers such a wide variety of routines with such flexibility. Some packages give you a comprehensive library of extra commands, but they're all or nothing propositions that occupy huge amounts of memory. With other packages, if you have an ampersand sorting routine in memory, you can't have an ampersand graphics routine in at the same time. With *Routine Machine* you can.

To use any of the available modules in one of your Basic programs, you first boot *Routine Machine* and select the modules you want. Thirty or more routines would take up a rather large amount of memory, so with *Routine Machine* you load only the routines you need for any given job. When you exit to Basic, the modules you chose are there in memory at the beginning of your program. You won't be able to see them, but when you save the program they'll save right along with it. When you load the program later on, you won't have to run *Routine Machine* again. The commands are there, ready for you to use.

This makes these additional commands about as easy to implement as you could ask for. In addition, the *Routine Machine* program is capable of adding new modules to or removing unused ones from an already complete program. If you can't remember what commands you added to a program you can take advantage of a report feature that tells you which modules have been appended and a memory map that shows how much space they occupy.

The commands you can add are varied. One is the *print using* command. This command is common to a number of Basics but never made it to Applesoft. It allows highly sophisticated printout formatting. Numbers can be printed in columns, and commas can be added to large numbers to make them more readable. Spaces or asterisks can be concatenated onto the left side of the number. A number can be made to print out in time format (6:30), date format (12/25/82), or money format ($25,000.00).

There is a bubble sort function for alphabetizing the elements of a single-dimensional string array. While it would be nice to be able to sort numerical or multidimensional arrays, a single-dimensional string array can be set up as an index to either of these, serving the same purpose. The manual gives suggestions for making the best possible use of this very fast sort.

There are two sound routines offered. One simply generates musical notes of a given pitch and duration. The other operates on the parameters pitch and shape and is used for making varied and interesting sound effects.

In the category of graphics there is a program called *Shape Gobbler* that compiles standard Apple shape tables into faster running machine language routines that can be accessed by *Routine Machine.* There is also a turtle graphics module that provides complete turtle graphics capabilities from Basic.

This is just a sampling of some of the most interesting of the routines available. Others are somewhat more specialized toward various programming functions. Whatever your programming needs, this package is definitely worth looking into. ■

Basic', Delta Micro Systems (Box 15951, 1022 Harmony Street, New Orleans, LA 70175; 504-895-1481). $129. *GPLE,* by Neil Konzen, Synergistic Software (830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216). $64.95. *Macro-Sced,* by David Chi, Computer Station (11610 Page Service Drive, Saint Louis, MO 63141; 314-432-7019). $49.95; $74.95 in ROM. *The Routine Machine,* by Peter Meyer, Southwestern Data Systems (10761-E Woodside Avenue, Santee, CA 92071; 714-562-3670). $64.95. *Symbolic Basic Translator,* by Josh Miller, Powersoft (Box 157, Pitman, NJ 08071; 609-589-5500). $79.95.





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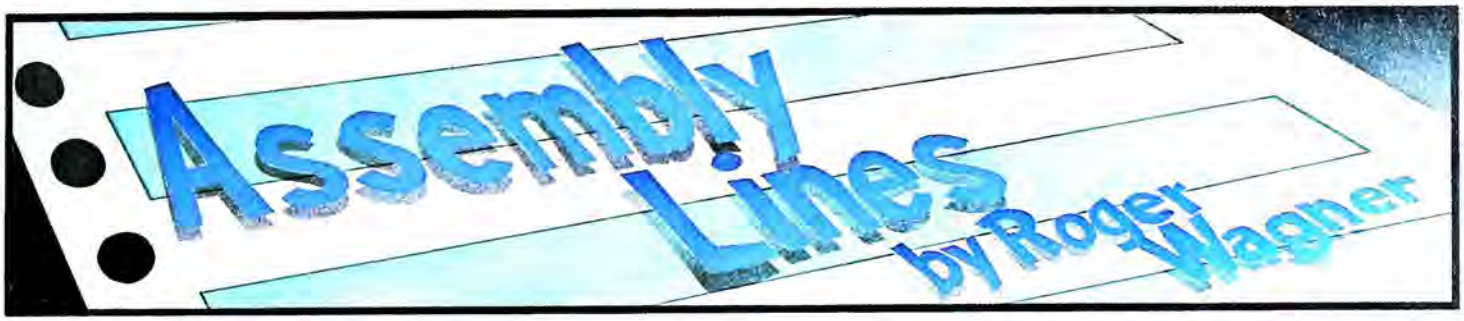
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Everyone's Guide to Assembly Language, Part 27

In this month's column, we'll continue with our discussion of floating point number operations, begun last month. In November's article, we looked at how Applesoft uses the floating point accumulator (FAC) as the main register for most of its numeric operations. Routines were presented that demonstrated how data can be passed back and forth between a running Applesoft program and a machine language subroutine and also how numeric data can be moved in and out of block memory storage.

Using this foundation, we can now examine how to use Applesoft's routines for such basic math functions as addition, subtraction, multiplication, and division.

A word of advice is in order, however, before proceeding. Your first inclination may be to think that the routines given here will enable you to do simple math operations with greater speed in an Applesoft program. As it happens, this will not directly produce the speed increase you want. Remember, Applesoft is already using these very same routines, and given that, no speed increase should be expected for such simple operations as X = 5 * 10.

Our new syntax will be:

```
CALL 768,5,10,X
```

and as such involves just about as much overhead in the calling of the routine and the passing of data as would be involved in Applesoft.

You may ask then, "Why use a machine language call for these operations?"

There are a number of reasons, two of the more important of which follow.

First, when dealing with programs that require a high degree of accuracy, integer data may not be sufficient.

Suppose, for example, you have a program that simulates the motion of an object traveling in an elliptical (or other mathematically complex) path.

If the current position of the object is continually maintained by using integer coordinates in the range of the normal screen coordinates, errors will begin to creep in with successive recalculations of position. This might be evidenced by the figure failing to retrace itself. Although in theory the object should always return to its starting point when following an elliptical path, multiple rounding errors may cause the object to "miss" its original starting point by a few screen units.

A more reliable approach would be to maintain the current position in a true floating point format and round the number to the nearest integer prior to each plot.

Secondly, calculations dealing with a large number of variables, or more specifically, with arrays of real variables, will be executed faster by a machine language routine.

If, for example, you wanted to multiply an entire array by 5, it would in fact be faster to employ a routine that used this syntax:

```
CALL 768,A(0),5
```

than to use:

```
FOR I=1 TO 100: A(I) = A(I) * 5: NEXT I
```

These ideas and others are put to use in a number of commercial software products for the Apple. Many programs that require both speed and a high degree of accuracy use floating point representations of numbers in machine language routines. Another common technique is to use the BCD (for "Binary Coded Decimal") format for the data.

There are also programming utilities that provide machine language routines to be called directly from Applesoft. *Routine Machine*, *Amper-Magic*, *Amperware*, *Apple Spice*, and *The Linker* (published by Southwestern Data Systems, Anthro-Digital Software, Scientific Software Products, Adventure International, and Micro Lab, respectively) are all designed to allow the programmer access to useful routines written entirely in machine language. One product in particular, *Ampersoft Program Library Vol. 1* (a *Routine Machine*-related package), deals almost entirely with array-related routines that use the advantages of the second principle mentioned to speed up array-related programs.

In general, all these products are based on making use of the ampersand vector to call specialized routines, the way we've discussed over the last year. And regardless of which package you prefer, it's safe to say that the overall idea of a user-selectable library of prewritten machine language routines easily called from Basic is one of the most powerful and exciting ideas to come along in Applesoft programming in the last few years. In fact, virtually all the routines presented over the last year are compatible with many of these ampersand utility packages.

As a matter of reference, it should also be noted that techniques are available for faster numeric operations without having to call Applesoft routines. These range from arithmetic processor boards, such as those manufactured by California Computer Systems and others, to software subsystems such as *Speed/ASM* (currently published by Sierra On-Line). A combination of both hardware and software is also available from Applied Analytics, in the form of *Micro-Speed*, a Forth-like language combined with an arithmetic processor board. ALF Products offers an 8088 processor card that includes software that speeds up Applesoft math functions. It also allows the calling of dedication math functions from a recurring machine language program, independent of Applesoft.

More Applesoft Internals. Well, then, just how does a person use the existing routines in Applesoft? As with most things we've covered, the important thing to know is the addresses of the entry points to the Applesoft routines for the basic math operations we're interested in. We also need to revive the discussion of the ARG (for "Argument") register, which we mentioned briefly last time.

The ARG register is identical in format to the FAC and is used to hold the second number in floating point format when doing two-value functions such as addition, subtraction, multiplication, and division. The ARG register uses bytes $A5 through $AA.

To see how ARG is used, consider these important entry points to Applesoft math routines:

	ARG (fn) FAC		MEM (fn) FAC	
FUNCTION	LABEL	ADDRESS	LABEL	ADDRESS
Addition:	FADDT	$E7C1	FADD	$E7BE
Subtraction:	FSUBT	$E7AA	FSUB	$E7A7
Multiplication:	FMULTT	$E982	FMULT	$E97F
Division:	FDIVT	$EA69	FDIV	$EA66

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For the first column of labels, the addresses given show the entry point for the routines that will perform the given function between the ARG register and the FAC. For example, a call to FSUBT ($E7AA) would subtract the contents of the FAC from the contents of the ARG. The result would be left in the FAC.

Prior to calling any of these four routines, the accumulator must be loaded with the exponent value of the FAC (FACEXP = $9D). This also serves to condition the zero flag. For example, to multiply FAC times ARG, the following code could be used:

```
LDA $9D
JSR $E982
```

The second column of labels refers to the routines used to perform the indicated function between the FAC and data stored in memory (such as in a real variable) or in a data block set up by the programmer.

To use these, the Y register and accumulator must be set up with the address of the memory location holding the numeric data (Y,A = high byte, low byte). When a routine is called, the data pointed to by Y,A will then be transferred into ARG and the direct function routine (first column) then called.

An Example That Doesn't Work. You may wonder why a sample listing that doesn't work is included here. The reason is that this listing does present, in a clear way, an overall example of what we've been discussing in this issue and the previous one. It will also help you understand the changes we'll be making later on in order to create a routine that does work!

From Applesoft, the routine would be called from a program like this:

```
10  INPUT"X1,X2:";X1,X2
20  CALL 768,X1,X2,RSLT
30  PRINT X1;" + ";X2;" = ";RSLT
```

Where X1 and X2 are the two arguments for the addition routine, that routine will be called. The result of the calculation will be sent back to the Applesoft program into the variable RSLT.

Here's the listing for the addition routine:

```
                                 1  ********************************************
                                 2  *                                          *
                                 3  *          M.L. ADDITION SUBROUTINE        *
                                 4  *            (DOESN'T WORK)                *
                                 5  *                                          *
                                 6  *       SYNTAX: CALL 768,X1,X2,RSLT        *
                                 7  *               RSLT = X1 + X2             *
                                 8  ********************************************
                                 9  *
                                10          OBJ  $300
                                11          ORG  $300
                                12  *
                                13  CHKCOM EQU  $DEBE
                                14  PTRGET  EQU  $DFE3
                                15  FRMNUM  EQU  $DD67
                                16  FACEXP  EQU  $9D
                                17  MOVMF   EQU  $EB2B
                                18  MOVAF   EQU  $EB63
                                19  FADDT   EQU  $E7C1
                                20  *
0300: 20 BE DE                  21  ENTRY   JSR  CHKCOM
0303: 20 67 DD                  22  X1      JSR  FRMNUM   ;FP->FAC
0306: 20 63 EB                  23          JSR  MOVAF    ;FAC->ARG
                                24  *
0309: 20 BE DE                  25  X2      JSR  CHKCOM
030C: 20 67 DD                  26          JSR  FRMNUM   ;FP->FAC
                                27  *
030F: A5 9D                     28  ADD     LDA  FACEXP
0311: 20 C1 E7                  29          JSR  FADDT    ;X1+X2
                                30  *
0314: 20 BE DE                  31  RSLT    JSR  CHKCOM
0317: 20 E3 DF                  32          JSR  PTRGET
031A: AA                        33          TAX           ;MOVE LO BYTE TO X
031B: 20 2B EB                  34          JSR  MOVMF    ;FAC->FP
                                35  *
031E: 60                        36          RTS
```

Line 21 begins the routine by first taking care of the comma following the '768' in the CALL statement. FRMNUM ($DD67) is then used to evaluate the first expression. FRMNUM conveniently leaves the re-

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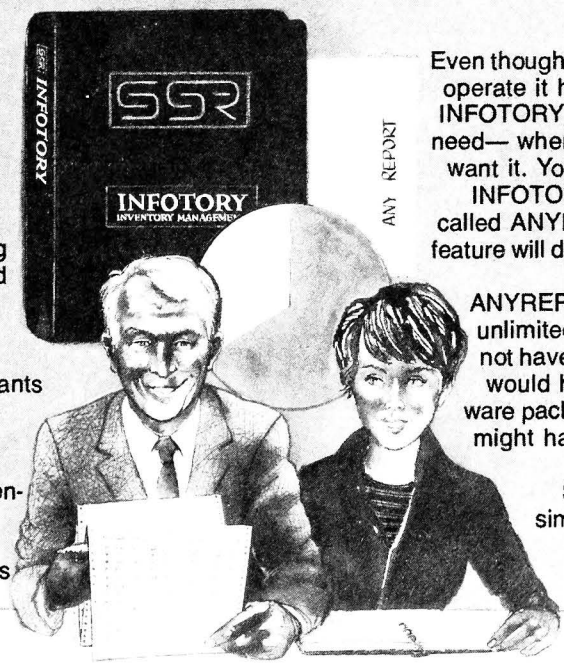
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sult in the FAC. Since we will want the first argument in the ARG register, MOVAF ($EB63 = "Move to ARG from FAC") is then used to move the data.

Line 25 again calls CHKCOM to "gobble" the next comma, after which FRMNUM is again used to evaluate the next value and place it in the FAC.

We would now expect the result to be in the FAC. Line 31 takes care of the third comma, after which PTRGET ($DFE3) finds (or creates) the variable in which we want the result returned.

At this point, everything has been properly placed for the use of the FADDT routine to add the FAC and ARG registers together. Line 28 loads the accumulator with FACEXP ($9D) as the entry requirement for the next instruction, which is the actual execution of the FADDT routine.

The TAX on line 33 is used after PTRGET to move the low-order byte of the variable data address into the X register, after which MOVMF ($EB2B = "Move to Memory from FAC") is used to complete the data transfer.

Note: If you're unfamiliar with the fundamental move routines, you may wish to go back to November's column, which covered these supporting routines.

The nice part about this routine is how easily the setup for the addition routine was accomplished. With a little thought, though, you may realize this is to be expected. After all, the internal routines were created in the first place to process data easily within an Applesoft program.

Why It Doesn't Work. The routine fails because of FRMNUM. Although it was mentioned that FRMNUM leaves its result in FAC, what you weren't let in on was the fact that it also uses ARG during its calculations. This means that when we call FRMNUM a second time on line 26, we are unknowingly destroying the value we set up in ARG in lines 22 and 23.

The solution, then, is to save the FAC contents from the first value calculation in memory at a place other than ARG.

There are two alternatives. The first is to use some of Applesoft's own temporary numeric registers, which are called, cleverly enough, TEMP1 ($93–97), TEMP2 ($98–9C), and TEMP3 ($8A–8E). The only risk here is in the destruction of data later on by other temporary calculations by FRMNUM and FRMEVL ($DD7B).

Another possibility would be to set aside our own temporary storage area. For this next example, we'll do that, using the last half of the input buffer, $280–284.

Here's the revised listing, called using the same Applesoft program as before:

```
                      1  ****************************************
                      2  *                                      *
                      3  *       M.L. ADDITION SUBROUTINE       *
                      4  *                                      *
                      5  *       SYNTAX: CALL 768,X1,X2,RSLT    *
                      6  *            RSLT = X1 + X2            *
                      7  ****************************************
                      8  *
                      9          OBJ  $300
                     10          ORG  $300
                     11  *
                     12  CHKCOM EQU  $DEBE
                     13  PTRGET  EQU  $DFE3
                     14  FRMNUM  EQU  $DD67
                     15  FACEXP  EQU  $9D
                     16  MOVMF   EQU  $EB2B
                     17  CONUPK  EQU  $E9E3
                     18  FADDT   EQU  $E7C1
                     19  *
0300: 20 BE DE       20  ENTRY   JSR  CHKCOM
0303: 20 67 DD       21  X1      JSR  FRMNUM   ;FP->FAC
                     22  *
0306: A0 02          23          LDY  #$02
0308: A2 80          24          LDX  #$80     ;$280
030A: 20 2B EB       25          JSR  MOVMF    ;FAC->MEM
                     26  *
030D: 20 BE DE       27  X2      JSR  CHKCOM
0310: 20 67 DD       28          JSR  FRMNUM   ;FP->FAC
                     29  *
0313: A0 02          30  ADD     LDY  #$02
0315: A9 80          31          LDA  #$80     ;$280
0317: 20 E3 E9       32          JSR  CONUPK   ;MEM->ARG
031A: A5 9D          33          LDA  FACEXP
031C: 20 C1 E7       34          JSR  FADDT    ;X1+X2
                     35  *
031F: 20 BE DE       36  RSLT    JSR  CHKCOM
0322: 20 E3 DF       37          JSR  PTRGET
0325: AA             38          TAX           ;MOVE LO BYTE TO X
0326: 20 2B EB       39          JSR  MOVMF    ;FAC->FP
                     40  *
0329: 60             41          RTS
```

You'll notice in this listing that lines 23 and 24 set up the Y and X registers for the subsequent call to MOVMF. This stores the data for the first value safely in memory.

The word "safely" is used with certain caveats. The input buffer is a useful area in which to store temporary data, but you should be aware of the kinds of conditions that will overwrite data placed there. DOS commands and input statements are the most likely threats. Also, commands executed from the immediate mode can overwrite the input buffer. This is in fact why we used $280–284 for the temporary register. This allows you to try the routine from the immediate mode, since you are unlikely to use more than 127 characters as your command line when testing the routine.

Once the data is stored off in memory, line 28 evaluates the next value, leaving the result in the FAC. At this point we use another routine, CONUPK ($E9E3), to move the data from $280–284 back to ARG. Remember, this is necessary because FRMNUM on line 28 makes it impossible to store the value for X1 in ARG.

After CONUPK puts the data back in ARG, FADDT ($E7C1) is used to do the addition of FAC and ARG.

A Little More Finesse. In the chart showing the various math routine entry points, you'll remember that there was a set of routines that allow for dealing with data in memory directly. We can use these to create a slightly smaller version of the previous program, which will eliminate our having to load ARG directly prior to calling FADDT.

Here's the improved listing:

```
                      1  ****************************************
                      2  *                                      *
                      3  *       M.L. ADDITION SUBROUTINE       *
                      4  *                                      *
                      5  *       SYNTAX: CALL 768,X1,X2,RSLT    *
                      6  *            RSLT = X1 + X2            *
                      7  ****************************************
                      8  *
                      9          OBJ  $300
                     10          ORG  $300
                     11  *
                     12  CHKCOM EQU  $DEBE
                     13  PTRGET  EQU  $DFE3
                     14  FRMNUM  EQU  $DD67
                     15  FACEXP  EQU  $9D
                     16  MOVMF   EQU  $EB2B
                     17  CONUPK  EQU  $E9E3
                     18  FADD    EQU  $E7BE
                     19  *
0300: 20 BE DE       20  ENTRY   JSR  CHKCOM
0303: 20 67 DD       21  X1      JSR  FRMNUM   ;FP->FAC
                     22  *
0306: A0 02          23          LDY  #$02
0308: A2 80          24          LDX  #$80     ;$280
030A: 20 2B EB       25          JSR  MOVMF    ;FAC->MEM
                     26  *
030D: 20 BE DE       27  X2      JSR  CHKCOM
0310: 20 67 DD       28          JSR  FRMNUM   ;FP->FAC
                     29  *
0313: A0 02          30  ADD     LDY  #$02
0315: A9 80          31          LDA  #$80     ;$280
0317: 20 BE E7       32          JSR  FADD     ;X1+X2
                     33  *
031A: 20 BE DE       34  RSLT    JSR  CHKCOM
031D: 20 E3 DF       35          JSR  PTRGET
0320: AA             36          TAX           ;MOVE LO BYTE TO X
0321: 20 2B EB       37          JSR  MOVMF    ;FAC->FP
```

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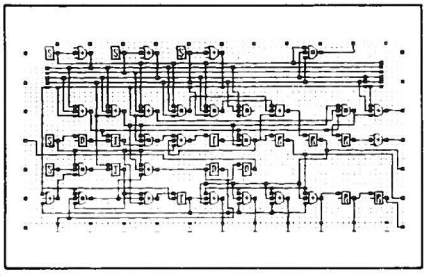
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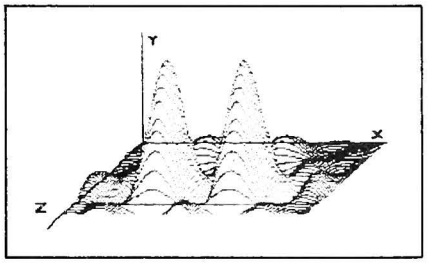
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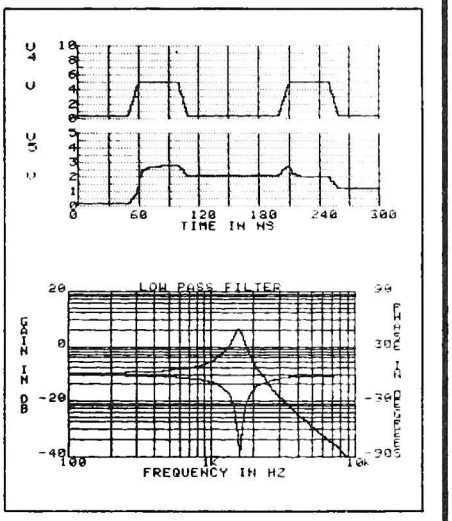


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```
                38 *
0324: 60        39          RTS
```

The only difference between this routine and the previous one is that line 30 now sets up the Y and A registers for a direct call to FADD ($E7BE). This entry point automatically transfers the contents of $280–284 to ARG and then "falls into" FADDT ($E7C1).

Other Operations: Subtraction, Multiplication, and So On. Creating routines to do the other three functions is very simple. Rewriting lines 18 and 32 of the improved listing to use FSUB ($E7A7), FMULT ($E97F), and FDIV ($EA66) will create the routines to perform the corresponding functions.

As it happens, there's also a variety of other simple functions that can be performed on the FAC with a single 'JSR'. A brief list is presented in table 1.

Information like what's given in table 1 is quite valuable, if not indispensable, when you're writing your own machine language routines that use Applesoft. There are a few notable sources for such information. The first is in an article by John Crossley of Apple Computer called "Applesoft Internal Entry Points," which has been reprinted in a number of places including *Apple Orchard*, *Call–A.P.P.L.E.* and *Call–A.P.P.L.E. In Depth #1*.

There is also a book called *What's Where in the Apple?* by William F. Luebbert that lists many of the entry points to not only Applesoft but to the Monitor, DOS, Integer Basic, and more.

Conclusion. In summary, then, we have seen how the FAC and ARG registers are used as the central points in almost all of Applesoft's numeric calculations. In addition (no pun intended), we have seen how the individual math routines are called to perform the desired functions.

These new routines should be very useful in creating your own floating point utilities. You may wish to try to create a routine to perform a simple function on an entire array as an exercise in using these new techniques.

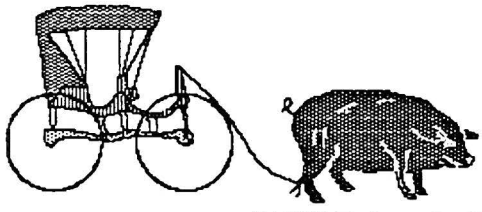
Until next month, then, happy Appling!

LABEL	ADDRESS	DESCRIPTION	COMMENTS
ABS	$EBAF	Take absolute value of FAC	
INT	$EC23	Perform INT function on FAC	
RND	$EFAE	Create a random number in FAC	
SIGN	$EB82	Set accumulator depending on FAC.	A = 1 if FAC > 0 A = 0 if FAC = 0 A = $FF if FAC < 0
SGN	$EB90	Test for sign of FAC	Leave result in FAC FAC = 1 if FAC > 0 FAC = 0 if FAC = 0 FAC = –1 if FAC < 0
SQR	$EE8D	Take square root of FAC	
EXP	$EF09	Raise e to the FAC power	
LOG	$E941	Log base e of FAC	
FPWRT	$EE97	Raise ARG to the FAC power (base e).	Load accumulator with FACEXP before calling.
FCOMP	$EBB2	Compare FAC to memory pointed to by Y,A.	On exit, A = 1 if mem < FAC A = 0 if mem = FAC A = FF if mem > FAC
NEGOP	$EED0	Multiply FAC by –1.	
FADDH	$E7A0	Add 0.5 to FAC.	
DIV10	$EA55	Divide FAC by 10.	Returns positive values only.
MUL10	$EA39	Multiply FAC by 10.	Works on both pos and neg numbers.
COS	$EFEA	Take cosine of FAC	
SIN	$EFF1	Take sine of FAC	
TAN	$F03A	Take tangent of FAC	
ATN	$F09E	Take arctangent of FAC	
FOUT	$ED34	Create a string in $100–110 equivalent to FAC.	On exit Y,A point to string. String is terminated by a 0.

Table 1.

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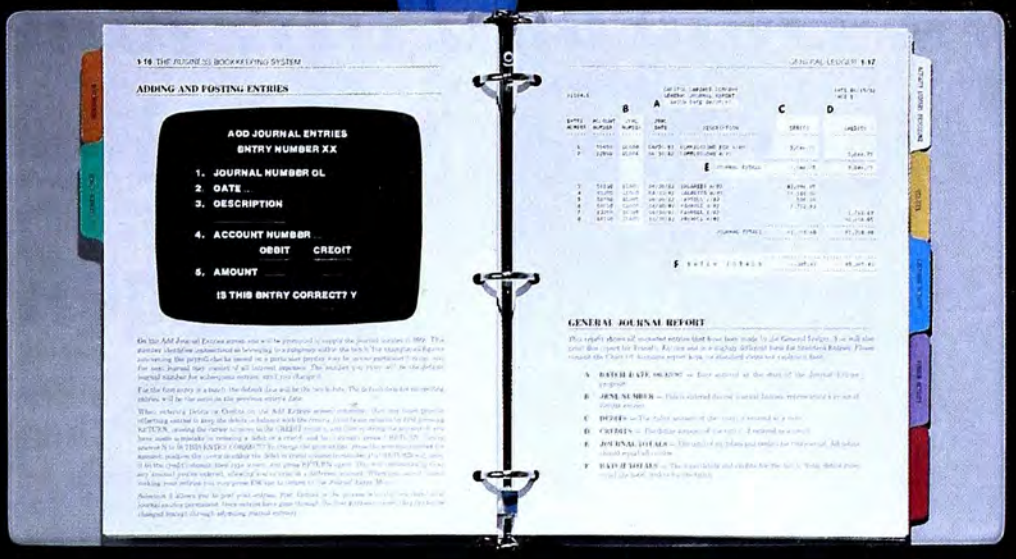
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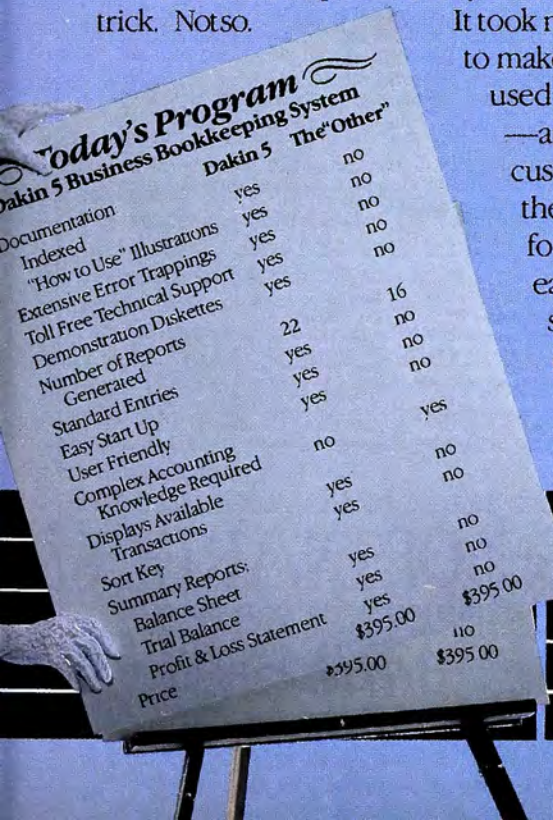
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One of the first portfolio accounting programs written for the Apple is *Portfolio Master* by James M. Huebner. In its original 1978 form, the program was titled *Portfolio Review*. The first version of *Portfolio Master* was introduced in 1979.

Portfolio Master is considered by many to be the granddaddy of portfolio accounting programs. Because of the program's age and performance, computer dealers who are investment-minded and Apple computer–equipped investors consider it the standard by which all other such programs should be judged. We'll take a good look at *Portfolio Master* now.

Portfolio Master, Investors Software (Box 2605, San Francisco, CA 94126; 415-981-5261). $195.

Back-up policy: One free disk with registration; $25 plus return of defective disk for each additional back-up.

System requirements: 48K Apple II Plus with two disk drives; printer recommended; Hayes Micromodem II optional.

Initially, the program requires that the investor set the program parameters. These parameters consist of the slot number in which the printer interface is located, any control characters that may be required by the printer, the number of line feeds the investor wishes to send to the printer (zero to two), the local access numbers and password for DowJones (if a modem will be used to retrieve stock quotes), the modem slot number, and the maximum number of securities to be held in the portfolio (or the maximum number of sales the user thinks he may have, referred to as the maximum number of line items).

The smaller the portfolio size, the faster the I/O operations performed by the disk will be. Be careful not to overestimate substantially the number of line items (portfolio size); doing so will lead to long waiting periods during disk input/output operations.

Once all of the parameter questions have been answered, the program writes a parameter file to the disk. It's not necessary to redo this procedure each time unless you need to change some of the information supplied. This would be required if the local Dow Jones access numbers were changed, or if you were to use a printer different from the one used when the parameters were set.

To begin using *Portfolio Master,* the investor is prompted to supply the name of the portfolio that will be the subject of the current session's processing. Once the name has been entered, the program prompts for a Y or N response: is the name correct? If your reply is no, you're prompted to reenter the name; if your response is yes, the main menu is displayed.

If there is no portfolio data in memory, the program displays a flashing question mark next to menu choice number 4—"input portfolio from disk."

It's then possible to load an existing portfolio from the disk or to create a new portfolio using the enter/delete module.

Assuming that we load an existing portfolio from the disk, an inverse status marker will appear in the upper right-hand corner of the screen; it simply states "OK." "OK" indicates that the portfolio has been satisfactorily loaded into the Apple's memory and that the program is ready to go forward. Choice number 9 on the menu, "save portfolio to disk," will be displayed in inverse video from this point on. This is a reminder that the current portfolio file should be saved to disk before the session is terminated. If this is not done, all calculations, changes, updates, and deletions performed on the portfolio will disappear when the system is shut off. This is, of course, a very good point to remember when using any program. If something is in memory and not saved to the disk, power-off means data good-bye.

Menu selection number one on the display/print menu gives the investor a portfolio listing. The date of the last update to the portfolio is displayed at the top of the screen. The percentage of each holding relative to the total value of the portfolio is displayed in the column headed %WGT. The %WGT calculation highlights the areas of the portfolio where risk may be concentrated based on the volatility of the securities in your portfolio.

The various classes of securities are flagged using standard terminology: C for call options, P for puts, R for rights, W for warrants, S for short sales, B for bonds, and E for expired options, rights or warrants. The flags are automatically assigned by the program when you enter the security. The program puts a seven-character limit on names of securities: Commodore would be displayed as *Commodo.*

Portfolio Master always lists the components of a portfolio in the following order: common stock, preferred stock, calls, puts, rights, warrants, short sales, bonds, t-bills, and cash. Within each security type, the holdings are arranged in alphabetical order. If you've made multiple purchases of the same security, they will be displayed in date order, with the most recent purchase listed first.

The program values short positions by extending the current price of the position. This may or may not be the true value of the holding. The %WGT of the position is correctly weighted for the short position against the balance of the portfolio. The correct current value of the short position is available in another table that the user has access to. This is the portfolio profit or loss table.

The program automatically begins flashing the code flag of an option, right, or warrant nine days before it is scheduled to expire. After expiration, the flag changes to an E and continues to flash. This is a valuable tool, since the flashing signal brings these expiring instruments to your attention before it's too late.

The second option on the print/display menu is a portfolio by category listing. The total holdings by security type—that is, common stock, preferred stock, and so on—will be displayed, totaled, and weighted relative to the entire portfolio.

The portfolio profit and loss table is choice number 3 on the print display menu. The cost of each holding and its price on the last update

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are displayed. Gains and losses are automatically computed. The program indicates in the last two columns whether the position is long or short. Long and short-term gains or losses are totaled at the bottom of the appropriate column. The portfolio's overall net gain or loss is also calculated.

A basis table is created by choice number 4 on the print/display menu. The table shows the price per security and the date of purchase. Short sales are reflected by showing the date the security was sold short and the sales price.

Choice 5 creates a sales table. The sales table allows you to keep track of the securities sold and the short positions that have been covered. The information displayed is the name of the security, the selling price, the date of sale, the basis, and whether it was a long or short-term gain or loss. At the end of the listing, the net realized gain or loss generated by selling from the portfolio is calculated and displayed.

A maturity and expiration table for options, rights, warrants, and t-bills is available through choice number 6 on the print display menu. This table allows an investor to see at a glance the relevant dates for the time-sensitive components of the portfolio.

Choice 7 on the menu shows portfolio descriptions. These descriptions are the full names of the companies in the portfolio. The progam limits them to a maximum of twenty-five characters.

Choice number 8 allows you to print any of the tables we've mentioned. The program prompts you to check the condition of the printer and to select the table to be printed.

If you choose to print out your reports in eighty-column format, the program will take tables that were generated separately in forty-column mode and combine them into an eighty-column report. The portfolio listing report will be a combination of the portfolio listing, portfolio profit and loss, and the basis tables. The sales table is transformed into a schedule of capital gains and losses.

The reports available through the print/display menu form the backbone of *Portfolio Master*. All of the other modules are designed to handle the information requirements of this section. Even though the importance of these other sections may not be immediately evident, their ease of use and efficiency greatly enhance *Portfolio Master*'s usefulness.

The update module allows an investor to update prices of securities and to reflect recent sales or purchases. When purchases or sales are entered through this module, they're reflected in the cash balance maintained by the program.

All securities are carried at the actual reported value with the exception of t-bills, which are carried at their face or maturity value.

When updating, you may choose to update individual securities or all securities. When an item is updated, the last price entered is displayed. The program requires that fractional prices be entered in decimal form. Even though most newspapers and financial publications list prices in fractions, the division required to convert fractions to decimals is not difficult or time-consuming. After a while, you'll be able to perform the conversions mentally.

When entering a purchase, an investor is prompted to check the portfolio name. If the correct portfolio is being updated, the investor responds by hitting Y and continues. If not, the name of the correct portfolio is entered, and the program prepares that portfolio for updating.

The program presents a list on the screen of all the types of securities that the program accounts for. You choose which security you're entering, that is, common stock, preferred stock, short sale, and so on. *Portfolio Master* then displays an entry menu that requires you to supply such information as the number of shares or units purchased, ticker symbol, description, current price, the cost of the security per share, total cost, and purchase date.

The program calculates the cost per share by dividing the number of units by the total cost, so it's not necessary for an investor to supply cost-per-share information. To make corrections, you'd answer no to the prompt "all correct." This places the cursor at the top of the screen. Pressing the return key moves the cursor from item to item. Once the correction is made, the cursor is moved to the "all correct" line and a Y is inserted for yes. A C (for cancel input) can be used to undo the entry.

After all updates have been entered, *Portfolio Master* loads its sorting routine and the portfolio is sorted. The sort arranges the portfolio first by type of security and then alphabetically within that type.

Once a security is part of a portfolio, its sale is reflected by entering the transaction's information through the current sales function.

The proceeds of the sale, whether it results in a profit or a loss, are reflected in the cash balance maintained by the portfolio.

Securities can be added or deleted without affecting the cash balance reporting of *Portfolio Master*. This is accomplished through the use of the enter/delete menu. The sales table may also be adjusted through this function without affecting the cash balance. An investor might use this function when the securities in question are being held in some form of stewardship; in such a case, the cash value of the securities would not belong to the investor and should not be accounted for as part of the portfolio.

Portfolio Master can also handle stock splits and stock dividends. After you enter the required information, the program automatically adjusts the number of shares, the cost price, and the current value. This module also handles splits for calls, puts, rights, and warrants. *Portfolio Master* allows you to delete the entire sales table at the end of a year and start a new one. This is advantageous for tax reporting purposes and is a great help.

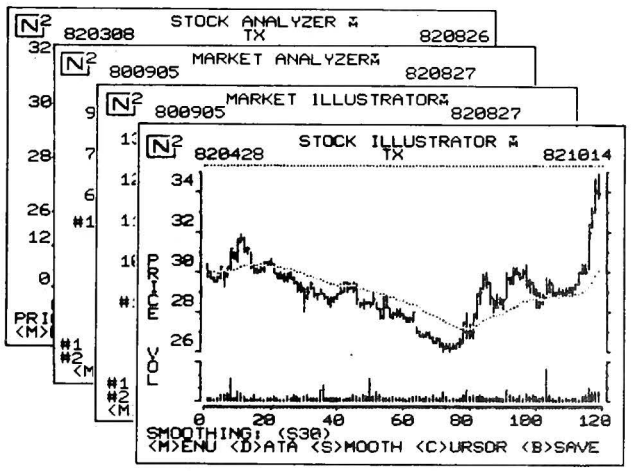
The Dow Jones Retrieval Service module allows you to update your portfolio automatically, using the Dow Jones database. All quotes, except for those on rights and United States Government bonds which are presently not supported by *Portfolio Master*, are fetched.

Portfolio Master was written by James Huebner, who has been involved in investment management for more than twenty years. *Portfolio Master* reflects his years of experience, skill, and dedication.

The program is excellently documented, and Huebner is more than willing to help users over the phone. His patience and understanding are almost legendary among users of the program.

These credentials would be difficult to argue with. *Portfolio Master* is easy to use, well documented, well supported, and reasonably priced. It is heartily recommended to any investor who needs a portfolio accounting program. ◨

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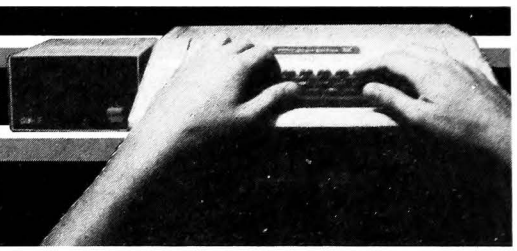


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Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

☐ **Source Telecomputing Corporation** (1616 Anderson Road, McLean, VA 22102; 703-734-7500) has a free brochure that helps executives decide whether or not their organization should provide electronic services to its members and what kinds of services are the best to consider. Private Sector is a collection of STC's programs, services, and computer resources that enable organizations to create specialized electronic services. The brochure, *How To Create a Private Electronic Information Group through the Private Sector*, urges executives to evaluate the necessary programming and pricing of electronic services and recommends some services that are readily available. Private Sector is presently being used by school superintendents, medical researchers, cable television executives, financial advisors, and travel agents.

☐ **Parjon** (14 Broadway, London SW1H OBH, England) has introduced an abstracting service for Apple owners. APABS is a service that gathers information on printed matter dealing with various Apple applications. The information is presented in the form of full reference and short summary. APABS subscribers can choose to receive a disk version, a printed version, or both.

☐ **The American Society of Clinical Pathologists** (2100 West Harrison Street, Chicago, IL 60612; 312-738-1336, 800-621-4142) has published several programs designed for clinical laboratory practice. *Basic Laboratory Calculations* helps in figuring statistical data and calculating amylase clearance, urine protein electrophoresis, and ratiometrics. $29. *Quality Control Statistics* compares test results to your lab statistics. It includes vertical Levy-Jennings charts, percentage frequency distribution analysis, and histograms. $150. *Lecture Generator System* lets the user prepare a display of up to fifty color images for lecture presentation. All displays are on a video monitor. The displays can be stored, changed, deleted, or rearranged. A modified version of Synergistic Software's *Higher Text* utility is built into the program and allows the user to display text in two different typefaces. $60. *Higher Graphics II* produces hi-res graphics and can be used with *Lecture Generator System*. The program lets you draw figures and create shapes including math symbols and scientific notations. $35. *aca Calibration and Drug Computations* calibrates older versions of the DuPont aca equipment for chemical analyses and for computing results for drug enzyme immunoassays. All aca test files can be updated. $95. *Radioimmunoassay Computations* computes results from radioimmunoassays based on equilibrium analyses. It includes five widely used RIA tests. $125.

☐ *Micromap II* from **Morgan-Fairfield Graphics** (4224-A University Way N.E., Seattle, WA 98105; 206-632-1374) is for anyone who wants to use the computer to generate maps. With it you can make colored and textured area maps, 3-D polyhedron or proportional circle maps, and statistical charts and graphs. The programs are divided into two sections: one for mapping of discrete data and one for mapping of continuous data. $650.

☐ Sing-along Christmas carols are available from **Solutions Softworks** (260 Laurel Lane, Bloomingdale, IL 60108; 312-893-5468, 312-529-2023) on *The Apple Family Sing-Along Christmas Disk*. The carols are in full four-part harmony, and playing them requires no hardware or music system. Words for each carol appear on the screen, and the music is pitched so everyone can sing along. $24.50.

☐ Store your disks in style. **Venice Woodworking** (12810 Venice Boulevard, Los Angeles, CA 90066; 213-390-4885) offers various items, all done in handcrafted solid oak. Floppy Fingers eliminates messy piles of disks. The rack holds six disks vertically and separately. $31.95. The Bridge houses up to three 5¼-inch disk drives and a monitor. It fits over the computer, and its sides allow air to circulate. $79.95. Floppy Drawers can store up to 340 disks in two bulk storage drawers and one random access drawer. The random access drawer pulls out and then drops down to an inclined position, letting the user select any of twenty disks, each with the label visible. $279.95. Floppy Drawers Add-on connects with the Floppy Drawers and gives you three extra drawers per Add-on. $239.95. Floppy Drawer should not be confused with its plural namesake. This one has one random access drawer and room for three disk drives or for books and manuals. $189.95. Floppy Drawer Add-on connects with the Floppy Drawer to give you one extra drawer. $159.95.

☐ **Muse Software** (347 North Charles Street, Baltimore, MD 21201; 301-659-7212) announces *Know Your Apple*, a program that gives you insight into your computer. The program tells the story of your Apple with animated graphics, voice, music, and friendly language. It also offers lessons to help you expand your knowledge and serves as a reference for information about the Apple. $34.95.

☐ *The DOS Enhancer* from **S & H Software** (58 Van Orden Road, Harrington Park, NJ 07640; 201-768-3144) creates sixteen-sector disks that include QuickDOS and an option for Integer Basic, Applesoft, or both. *DOS Enhancer* also updates DOS 3.3 disks by replacing DOS with QuickDOS while keeping the disk compatible with DOS 3.3 programs. Quickrun and Quicksave operate on Basic or binary programs up to 500 percent faster than DOS 3.3. $69.95. S & H also releases *Amper-Sort/Merge II*, a general-purpose sort and merge utility for text files. It can sort a thousand records in seconds, sort records alphanumerically in either direction, merge two to five presorted files into a single file, and sort random or sequential text files. Features a *VisiFile* index sort routine that can be called from within *VisiFile*. $69.95.

☐ **Opportunities for Learning** (8950 Lurline Avenue, Chatsworth, CA 91311; 213-341-2535) announces the Fall 1983 edition of *Selected Microcomputer Software*. The fifty-six page catalog features software in mathematics, science, language arts, computer programming and literacy, logic and simulations, social studies, foreign language, business, games, music, and art. Programs cover grade and skill levels from primary through college. Free.

☐ **Simulations Software** (Box 608, Station U, Toronto, Ontario M8Z 5Y9) makes you the doctor in *You're the Doctor?!* It's a recreational and educational simulation of medical diagnosis and treatment. In the game, you examine and treat patients who have a total of seven separate medical problems that range from skin rashes to abdominal pain. Advance from intern level to chief of staff. The game features hi-res graphics and sound effects, and player options include doing lab tests, giving physical examinations, administering anesthetics, and performing surgery. A surprise for the player at the end of a successful treatment. $17.95.

☐ Lots of new stuff from **Krell Software** (1320 Stony Brook Road, Stony Brook, NY 11790; 516-751-5139): The Sprite Graphics Board will let you keep as many as thirty-two single-color figures of eight-by-eight or sixteen-by-sixteen pixels on the screen at one time with a solid-color background. The board plugs into the Apple and is compatible with MIT's Logo as distributed by Krell. $325; $450 with Logo included. You can learn chess tactics and strategy from the experts with Socrates Chess Corporation's *Shelby Lyman Chess Tutorial Series* being marketed by Krell. The series uses the latest and most effective methods of chess instruction and artificial intelligence programming techniques to provide individualized instruction. All aspects of the game are covered, from understanding basic chess weaponry to the game's most subtle points and a chance to match wits against international grand masters. $39.95

per module. *The College Board 1983 SAT Exam Preparation Series* includes forty-two programs covering vocabulary, reading comprehension, word relationships, mathematics, and the test of standard written English. The series includes individualized diagnostic capability and specialized exam preparation for individual needs. Options provide classroom record management, printed worksheet generation, and comprehensive instruction in all the skills tested by the SAT and PSAT exam. $299.95. *Connections* is a game system designed to extend and develop the mental capacities of children of all ages. Players select from a variety of game formats as they search for logical connections and learn the principles of scientific reasoning. Subject matter is drawn from all fields of science and the humanities. Players may either compete with or cooperate with each other. They can also set difficulty levels and add data as desired. $99.95. *The Amazing Ben* is the first in a series of programs designed to introduce programmers of all ages to artificial intelligence. The programs guide the user in writing a series of increasingly difficult routines to help Ben go through mazes that he's never seen before. Ben's language enables him to sense his surroundings, write and read messages, ask questions and interpret answers, move at will across the screen, and create his own memory structures. $79.95.

☐ R H Electronics (566 Irelan Drive, Buellton, CA 93427; 805-688-2047), makers of the Super Fan II, introduces the Guardian Angel, a battery-powered AC back-up unit that keeps things operating during AC power interruptions. The unit consists of a rechargeable sealed battery, automatic battery charger, solid state power inverter, AC line voltage monitor, front-panel power status indicator, and alarm buzzer to warn of the loss of AC line power. Upon a blackout or brownout, the unit automatically switches from input power to back-up power within twelve milliseconds. The Guardian Angel will supply back-up power for three to six minutes while operating at full-rated output load power and can supply power for fifteen to thirty minutes at half-rated output. A front percent on disk space, and allow access to files of any type. The array roupower occurs. $595.

☐ The revised edition of the *Apple Grade Book Version 2.5* is available from **J & S Software** (140 Reid Avenue, Port Washington, NY 11050; 516-944-9304). This kindergarten through college grade-management system includes an elementary school option of keying in names once for a series of subject areas, class size of up to eighty students, and up to thirty-five activities per student. Also new is the option to obtain a list ing of students who are absent from tests and other activities. $34.50.

☐ **Interactive Fantasies,** a division of **Edu-Ware Services** (Box 22222, Agoura, CA 91301; 213-706-0661) unleashes *Empire II: Interstellar Sharks*, a science-fiction gaming system. It follows *World Builders* as the second system of the *Empire* trilogy. *Interstellar Sharks* gives you a futuristic civilization at the height of its material prosperity and monopolistic bureaucracy. The player must navigate through webs of red tape and survive the clandestine dealings of big monopolies to achieve success. The object is not wealth, but freedom. $32.95.

☐ The Great Pyramind of Cheops is explained and analyzed by Louis K. Bell (Box 7, Augusta, GA 30903; 404-790-6854), all on a disk. Dimensional analysis of the pyramid includes the measurements of the three chambers, the three principal triangles, and the Coffer. A proposed solution to Archimedes's seemingly impossible cattle problem is proposed, and a program on the Rhind Mathematical Papyrus, illustrating the Egyptian method of problem solving is offered. The program is the result of calculations gathered during twenty-five years of research. $25.

☐ *Basic Extension* from **Foxware Products** (165 West Mead Avenue, Salt Lake City, UT 84101; 801-364-0394) is a group of machine language routines that can be added to your *Apple Business Basic* program. Its disk routines can speed up disk access by 1,000 percent, save 20 to 30 percent on disk space, and allow access to files of any type. The array routines speed up the manipulation of string and numeric arrays. The utility routines add features that are not normally available in *Business Basic*: reset disable, string upshift, type-ahead buffer set and clear, and more. Requires *Apple III Business Basic*. $95.

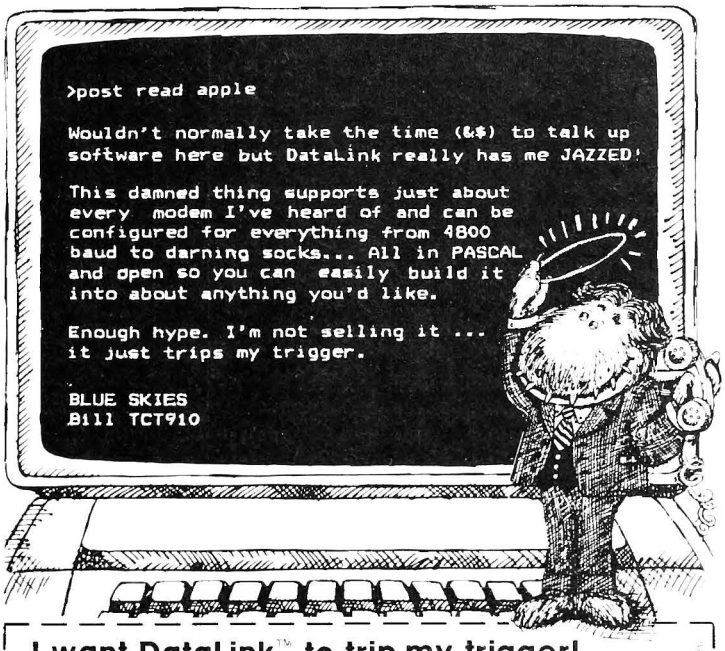
☐ The Model 2300 Universal EPROM Programmer from **Software Specialties** (Box 329, Springboro, OH 45066) permits programming EPROMs from memory, from disks, or from the keyboard. Any pro-

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gram, ROM, or EPROM in the computer's memory can be copied without being removed from the board. When programming EPROMs, the Model 2300 verifies each byte by a "read after write" operation, and automatic reprogramming is begun if an error is detected. An erase verify mode is also provided so that a partially erased EPROM is not accidentally programmed. It comes complete with programmer, interface card, and operating software. $429.

☐ More *VisiCalc* templates from **SpreadSoft** (Box 192, Clinton, MD 20735; 301-856-1180) for home users: *BudgetTemp* allows daily, monthly, and yearly input in up to twenty budget categories. Provides you with more than sixteen templates, each easily customized. *HomeTemp* can keep track of car or auto fuel costs, figure miles per gallon, or track the money you spend on your Apple. It contains a general-purpose tax deduction recording template with a Schedule A from the *Tax SpreadTemp* series. It provides interactive checking account reconciliation and a few general-purpose budget templates. *Family RecordsTemp* gives you easy inputting of formatted records. Included are recipes, home and personal property inventory, tax submission summaries, insurance records, medical and dental records, vehicle records, school records, and more. *HealthTemp* is a collection of templates relating to the health, nutrition, and exercise patterns and records of the individual. *SportsTemp* allows you to keep player, game, and league records for basketball, football, and baseball. $24 each; $84 for any four. Finally, SpreadSoft announces a support publication for *VisiCalc* users. *The SpreadCalc News* will contain special application templates with listings, programming hints, and articles aimed at teaching you how to get the most from your *VisiCalc* investment. Included will be tutorials, articles on users and their applications, product reviews, product news releases, and a letters department. Six issues per year. $25.

☐ **Spinnaker Software** (26 Brighton Street, Belmont, MA 02178; 617-868-4700) gets you into the holiday spirit with *A Christmas Sampler*. Depicted in the program are "The Night before Christmas," "A Christmas Story," and a selection of holiday carols. The program also features text on the screen and sing-along cards so everyone can join in the fun. $29.95.

☐ **CompuSoft Publishing** (1050-E Pioneer Way, El Cajon, CA 92020; 714-588-0997) announces the availability of a Swedish and French version of their book, *The Basic Handbook*. A reference book that documents Basic as used on more than 250 different computers, it helps the user translate a program from one computer to another. $19.95.

☐ While some programs help you create other programs, *Genesis, the Adventure Creator*, from **Hexcraft** (Box 39, Cambridge, MA 02238), lets you create worlds from nothing. You can create any type of world you choose; give it any purpose you please, find it an appropriate name, get the world to play with it as you sit and watch. Conjure up worlds at your command. $49.

☐ *The Apple Personal Computer for Beginners*, by Seamus Dunn and Valerie Morgan, shows readers how to make full use of the Apple's capabilities. The book takes a learn-by-doing approach; neither experience nor teacher is necessary. Features lots of examples on start-up, maintenance, and applications. The emphasis in the book is on color and graphics, and each step is illustrated with sample programs and sample screen responses. From **Prentice-Hall** (Englewood Cliffs, NJ 07632; 201-592-2348). 304 pages. $16.95.

☐ From **Single Source Solution** (2699 Clayton Road, Concord, CA 94519; 415-680-0202): *SBAPREP* is a program designed to develop and prepare small business administration (SBA) loan applications. It reduces the application preparation time from more than forty hours down to around four to eight. The program prepares the following: cover letter, P and L projections, SBA balance sheets, debt schedule, collateral loan schedule, SBA personal history forms, financial statements, cash-flow charts, and all other documents. Requires CP/M. $500. *Cardio-Pulmonary Parameters* is a program for hemodynamic monitoring that computes more than twenty commonly used variables related to the management of critically ill patients. $99.50; $25 for nonprofit organizations. *Flightplan 5.2* computes an aircraft flight plan at either the private

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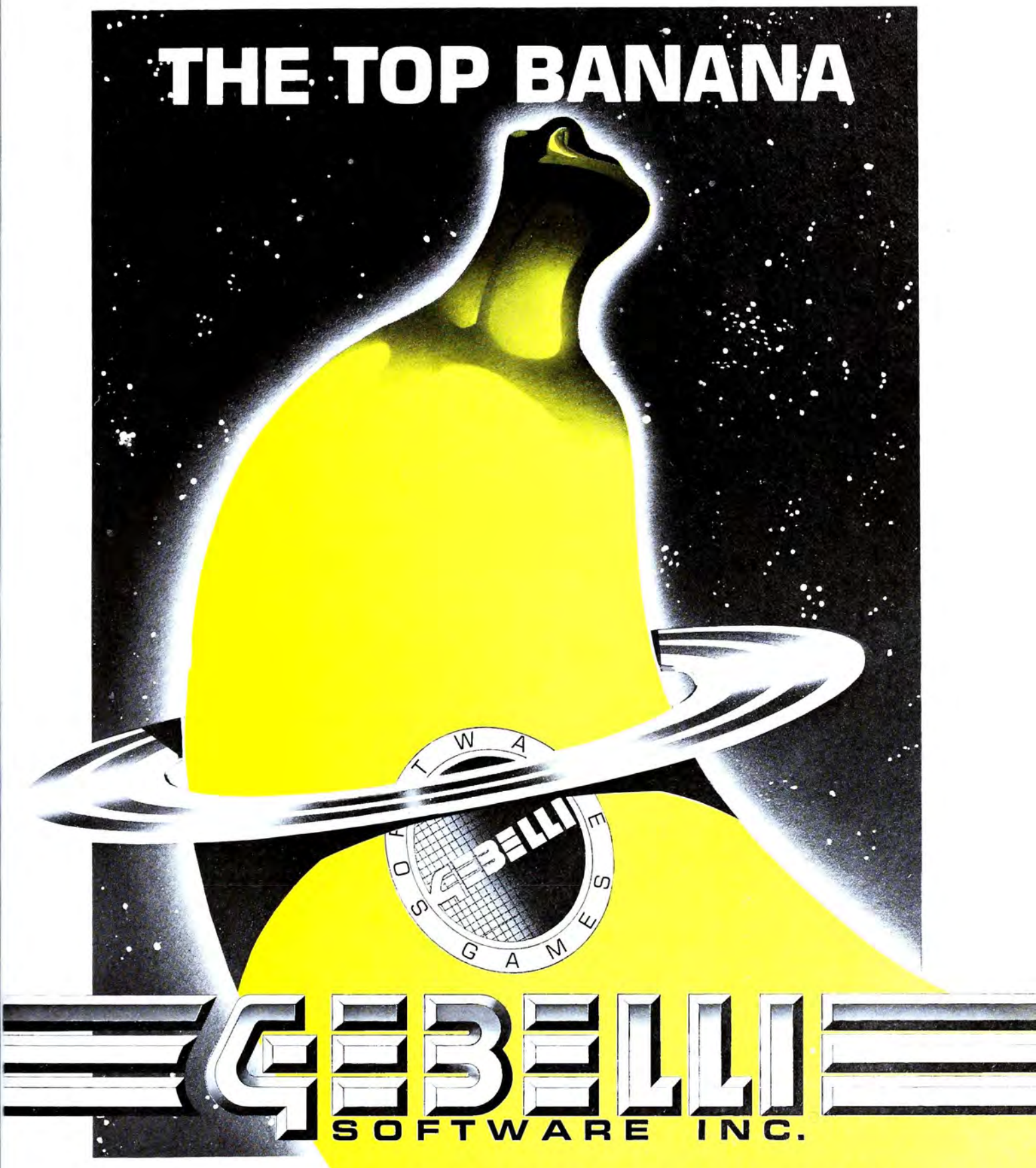
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or commercial aviation level. Flight plans can be saved for future use, either before or after computing, and can be recalled and printed, or recomputed and printed, in either forty or eighty column format. $59.50.

☐ **MPC Peripherals** (9424 Chesapeake Drive, San Diego, CA 92123; 714-278-0630) releases the AP-BUB Bubble Memory Module. It offers 128K of nonvolatile memory and is unaffected by hazards such as dust, heat, and pollution that would normally damage magnetic media. The module executes DOS read and write commands three times faster than a floppy disk. $875.

☐ *Milky Way Merchant* is the economics module in the *Learning Games Series* from **Davell Custom Software** (Box 4162, Cleveland, TN 37311; 615-336-3055). A trading strategy game for up to four players, the program lets you set up an economic model for a given situation and then formulate the appropriate trading plans. A bidding option lets players sharpen bargaining skills; without it, players learn to develop better trade route strategies. $29.

☐ The PhotoCaster from **Commsoft** (665 Maybell Avenue, Palo Alto, CA 94306; 415-493-2184) permits color or black-and-white photos to be taken with a standard television camera and then displayed, processed, and sent by modem to other Apples. In addition to sending and receiving photos in eight seconds, you can add titles and graphics to photos, create video effects, enhance images, store and retrieve photos on disk, and make automatic slide shows. A built-in graphics dump lets you make your own dot-matrix prints. Photos are processed in 128-by-128 resolution and in sixteen shades of gray. $499.95.

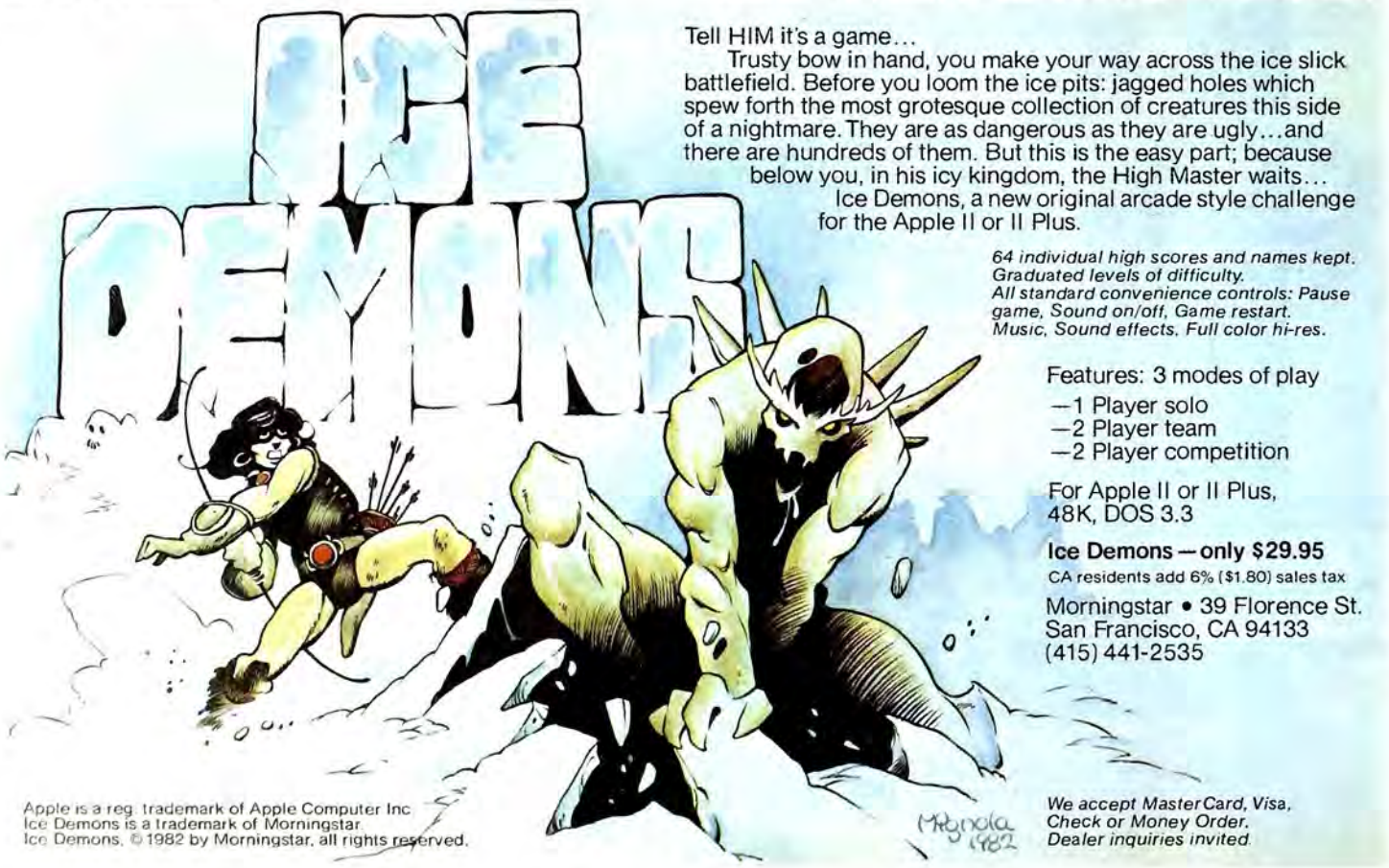
☐ A job-costing program from **Software Solutions** (9124 Highway 17, Scotts Valley, CA 95066; 408-438-2433) reduces the time spent estimating and preparing proposals. *Job Costing/Tracking* consists of two integrated programs. One is for estimating cost and writing proposals; the other is for tracking job costs. The program lets you view almost any other cost variable in the proposal while creating a new variable or changing an existing one. The proposal can be viewed on the screen or printed; each part can be printed separately or all at once. Features include up to 1,000 different cost elements per job, up to ten labor files and ten material files, definable overhead rates, what-if calculations, and modifiable printout. $237.

☐ **Alternative Software** (1165 Barbara Drive, Cherry Hill, NJ 08003; 609-429-3838) eases mass mailings with *Mass Mailer 6-1*, a menu-driven package that links to MicroPro's *WordStar* word processor. *Mass Mailer* will store and retrieve information, sort, print, add or delete, and select an entire list or any portion of it. Labels are changeable, and as they are changed, all the menus in the system also change to reflect the new label or code. The system allows for storage of multiple lists plus splitting and merging of files. It has a storage capability of eleven alphanumeric fields and fourteen category codes per list record and is adaptable to a wide range of uses without the need of programming changes. $199.95.

☐ If you're in the Newark, New Jersey, area in January, you may want to visit the New Jersey Microcomputer Show and Flea Market that will be held there on Saturday, January 22, at the Holiday Inn North, North Passenger Terminal of Newark International Airport. The show will include more than fifty commercial exhibitors and an indoor flea market area. Show hours are 10 a.m. to 5 p.m. Registration: $4. For information, contact **Kengore Corporation** (3001 Route 27, Franklin Park, NJ 08823; 201-297-2526).

☐ One way to use color graphics to their fullest is to learn three-dimensional graphics techniques. The *3DRB* package from **Metaresearch** (1100 S.E. Woodward Street, Portland, OR 97202; 503-232-1712) lets you do hi-res plots of 3-D figures with arbitrary rotations for viewing, label your graphs with full ASCII English labels, experiment with red and blue stereoscopic displays for full 3-D depth effect, and do animation of 3-D figures, using machine subroutines and Basic programs for 3-D games and displays. Red/blue stereoscopic glasses are included. $59.

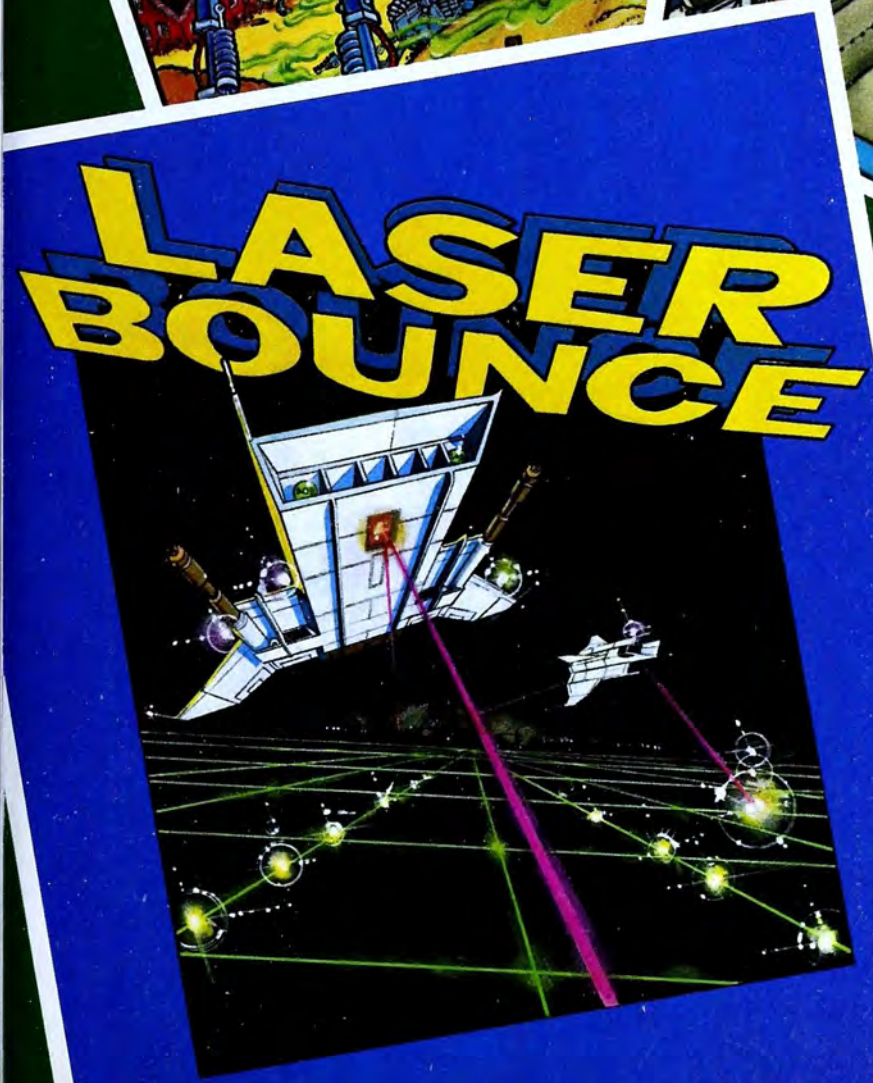
☐ Tired of playing games and balancing your checkbook? Use your Apple for something different—like cooking. *Micro Cookbook* from **Virtual Combinatics** (35 Main Street, Rockport, MA 01966; 617-546-6553) is an automated reference system that instantly provides food or beverage recipes based on the ingredients at hand. *Micro Cookbook* also includes nutrition guides, a calorie counter, and other food-related information. It lets you enter your own shopping reminder and select recipes by name, category, or available ingredients. $30. *Micro Barmate* performs similar functions for bartending. The program allows you to select



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☐ *The Incredible Jack*, a four-applications-in-one package, has been introduced by **Business Solutions** (Box 341, Kings Park, NY 11754; 516-269-1120). The package offers a personal filer, spreadsheet program, and word processing and mailing label capabilities. Can be used to create letters and reports with embedded calculations. The word processing capabilities allow you to produce formatted records and to include items that are automatically calculated as the document is being prepared. With the personal filer, records can be as small as a mailing label or as large as sixty sheets of legal-sized paper. Store as many as one thousand records on a single disk. The calc feature lets you build decision-making logic into your files. You'll need 64K and two disk drives. $79.

☐ If you have the Mill from **Stellation Two** (Box 2342, Santa Barbara, CA 93120; 805-966-1140), but you need more, check out A.S.A.P., a system that allows a wide variety of popular programs to use the power of The Mill. A.S.A.P. works with software intended for the Pascal run-time environment and runs under The Mill's 6809 coprocessor instead of under the 6502. Requires The Mill. $295.

☐ The Apple is the most popular microcomputer among political scientists. This explains why the Public Service Research and Computer Laboratory of the Department of Political Science and Public Administration at **North Carolina State University** will emphasize Apples in their *Political Science Micro Review* (PSPA Link 215, North Carolina State University, Raleigh, NC 27511; 919-737-2481). The review will have two components: the first is a newsletter focusing on items of interest to political scientists using microcomputers, plus listings of programs. The other is a disk volume, containing in each issue at least one political science program, public administration program, tutorial on programming, and public domain utility program. Bonus programs are also provided. Newsletter only, $10; disk version plus newsletter, $25.

☐ *Micromarkets* lets you use your computer to evaluate market potential and sales performance by giving you access to demographic and retail sales data for each state and for each of the thirty-eight largest metropolitan areas. Designed to work with *VisiCalc*, this program from **Orrington Economics** (Box 3756, Arlington, VA 22203; 703-527-5990) lets you define specific trading areas and measures of market potential, or you can add your own sales data and evaluate sales performance. $119.

☐ **Link Systems** (1640 Nineteenth Street, Santa Monica, CA 90404; 213-453-1851) announces *DataFax Version 2*. This version contains enhanced search capabilities that allow you to use the *and*, *or*, *range*, and *wild card* searches. Advanced print proficiency gives you greater control over the printout format. It's free to people who already have *DataFax Version 1*. Otherwise, forty-column version, $199; eighty-column version, $249. Apple III version, $299.

☐ It's not too late to get a free membership to the Source, "America's Information Utility," when you purchase any of the three *Transend* programs. **SSM Microproducts** (2190 Paragon Drive, San Jose, CA 95131; 408-946-7400) has extended the offer through December 31, 1982. Ordinarily, membership to the Source costs $100. Purchase of *Transend* gets you Source membership and your first hour on the Source for free. *Transend 1*, $89; *Transend 2*, $149; *Transend 3*, $275.

☐ **Computer Practice Keyboard** (616 Ninth Street, Union City, NJ 07087; 201-863-0999) has a printed keyboard called the Portable Keyboard that lets you practice keyboard fingering any time and any place. Each keyboard is printed on 8½ by 11-inch stock to fit standard size binders. $9.95.

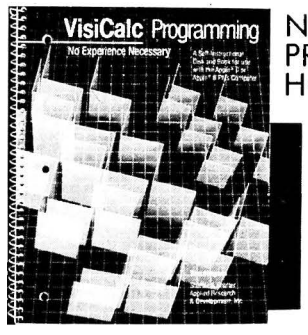
☐ **Prasek Computer Systems** (Box 2427, Santa Clara, CA 95055; 408-554-0420) announces *SXR Plus*, a utility that produces a sorted cross reference of Applesoft source programs. Variables are always included, and you have the option of including or excluding line references, numeric constants, and strings. All information is presented in a single alphabetized list in either forty-column or eighty-column format. The utility includes a search feature that can be used with standard video display, eighty-column video, or on a printer. $39.95.

☐ **Soft Images** (200 Route 17, Mahwah, NJ 07430; 201-529-1440) wants you to get ready for *Singles' Night at Molly's*. The game consists of two challenging solitaire card games called *Royal Flush* and *Sly Fox*. Both feature hi-res graphics and various levels of difficulty. In *Royal Flush*, you must place twenty-five randomly dealt cards into a matrix in such a way to get the highest possible score. Twelve poker hands (horizontal, vertical, and diagonal) are used in scoring. In *Sly Fox*, your goal is to create two piles, one from ace to king and the other from king to ace. $29.95.

☐ More stuff from **Superior Software** (4312 Arizona Avenue, Kenner, LA 70062; 504-468-2273): In *Doom Valley*, you attempt to save the lives of United Nations ambassadors after their plane crashes in a remote area. In this adventure, you can modify the game to suit your own tastes and learn programming at the same time. $19.95. Fast action is what you'll find in *Asteroid Belt* as you navigate your ship through asteroids while avoiding nasty alien spacecraft, space mines, and vicious swarmers who are out to destroy you. Source code included. $24.95. *Usable Graphics Demo Disk I* is a collection of more than thirty-five graphics routines, programs, and short games that you can incorporate into your own programs. $19.95.

☐ Five databases of on-line access have been added to **Dialog Information Services** (3460 Hillview Avenue, Palo Alto, CA 94304; 800-227-1927; 800-982-5838 in California). *Remarc* is the on-line version of the United States Library of Congress Catalog, containing all entries made from 1897 through 1978. *Mathfile* corresponds to the publication *Mathematical Reviews*, and includes records dating from 1973 to the present. This file contains about 350,000 records offering worldwide coverage of both pure and applied mathematics literature. *Chemlaw* is a file of federal chemical regulations in full text. *Textile Technology Digest* begins with 45,000 records (1978 to present) covering the literature of textiles and related subjects. Finally, in addition to the *Electronic Yellow Pages*, the *Services Directory* is a guide to almost two million records on all types of services (financial, business, office, and recreational). This database corresponds to the Yellow Pages of more than 4,800 telephone directories throughout the country.

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☐ The Ink Stick is an inking device from **Lawrence Electronics** (3651 North Cicero, Chicago, IL 60641) that mounts inside of spool ribbon printers and applies ink directly to the ribbon. It also provides the ribbon with a constant supply of ink or other liquid to maintain a constant level of ink in the ribbon. $3.

☐ **Systems Design Associates** (723 Kanawha Boulevard East, Charleston, WV 25301; 304-342-0769) unleashes *Career Directions*, a program designed for junior high and high school students. The program helps students to discover what their career interests are, determine what occupations correspond to their interests and abilities, and develop a plan to enter or prepare to enter the occupation of their choice. It covers paths for those who plan to attend college and for those who want to enter the job market directly out of school. The occupational database analyzes student interest in more than 460 specific occupations ranging from high-level professions to entry-level jobs. $59.95.

☐ **System Fabricators** (736 Hermosa Avenue, Hermosa Beach, CA 90254; 213-372-6273) has released a utility for the SOS clock III. The *SOSclock III Calibration Utility* allows easy calibration of the clock speed using only a small screwdriver. In minutes you can calibrate the clock to be accurate to within a few seconds per month. Also included on the disk are standard utilities for setting the clock from *Apple III Business Basic* and from Pascal. $20.

☐ **Pickam Software Products** (312 South Los Angeles Street, Los Angeles, CA 90013; 213-687-9530) has a new program for cager fans. *The Predictor for Basketball* predicts the winners for the professional basketball season. It also predicts the point totals of the games and which teams have a good chance of beating point spreads after early season losses. Predictions are saved to disk and can be printed for hardcopy file. $139.95.

☐ *Basic Guitar 1* from **Digital Concept Systems** (4836 Bucknell, San Antonio, TX 78249; 512-692-1201) takes the beginning guitarist from ground level to mastery of the primary chords in seven different keys. Chord diagrams and sound feedback are brought together to guide the student in learning new chords. The chord disk teaches tuning, practice with chords, and how to read chord diagrams. The song disk contains a warm-up routine and a routine that lets the student hear a song whose chords were learned on the chord disk. $49.95.

☐ **Satori Software** (5507 Woodlawn Avenue North, Seattle, WA 98103; 206-633-1469) announces *Bulk Mailer*, a direct marketing program that incorporates mail list management features. The program offers the capacity to hold 32,000 names, duplication research, and numerous options. It has fast sort routines for label printout and a coding feature to sort any and all entries you wish, with tens of thousands of potential codes for each entry. Label setup includes oversize printing for shipping labels. Soft disk version can hold up to 2,400 names. $125; Corvus hard disk version, $250.

☐ **Teaching Tools Microcomputer Services** (Box 50065, Palo Alto, CA 94303; 415-493-3477) has released the *Match Game Program*, a game that can be played with an unlimited variety of educational materials, for home or school use. The computer presents a game board of numbered boxes. Players uncover two boxes on each turn, trying to find those with matching contents. The game can be played with exact word matches, synonyms, math problems and answers, and more—or create your own games. One to four people can play at once; for solitary play, the computer takes the role of one player and adjusts its level of play to the other player's skills. $29.95.

☐ **H.A.L. Labs** (4074 Midland Road, Suite 23, Riverside, CA 92505; 714-359-8480) presents the Gizmo, a matchbox-sized device that allows you to take advantage of the fast speed of Atari-type joysticks. Used with the Gizmo and compatible software, these joysticks operate more than one hundred times faster than standard joysticks for the Apple. The Gizmo plugs into the game port, and the joystick plugs into the Gizmo. $15. Finally, *Supertaxman 2* has arrived to torment the rioting tax-evading citizens of Tanstaafl even further. Improvements over the original *Taxman* include different mazes for different levels, five cartoons, a pause feature, music, and the option to start at any level. You can select your own keys to play, or use an Atari joystick with the H.A.L. Labs Gizmo. Make those Tanstaaflians pay up! $25.

☐ *System II Ex-Turning Point* is a series of integrated business accounting programs from **Westware Software** (2455 S.W. Fourth Avenue, Suite 2, Ontario, OR 97914; 503-881-1477) that can be purchased individually or as a package. The series includes the standard accounting functions: general ledger, accounts payable and receivable, payroll, inventory, and a database. The point-of-sales feature generates invoices, updates the customer file, and creates an open balance of accounts receivable. On a cash sale, the main checking account is automatically debited. All sales information is updated to the ledger. Payroll, $545; general ledger, accounts payable and receivable, and inventory, $425 each; database, $345. Entire package, $1,495. Corvus hard disk version, $1,595 (five megabyte) and $1,695 (ten megabyte).

☐ You can now convert computer graphics to 35mm slides, prints, or overhead transparencies with the Computer Slide Express Service from **Visual Horizons** (180 Metro Park, Rochester, NY 14623; 716-424-5300). Just send the data file via modem or through the mail on a disk and receive your color slides, black and white prints, or enlargements by return mail. Prices vary.

☐ What'd you say? Oh, it was the computer. **The Alien Group** (27 West 23rd Street, New York, NY 10010; 212-741-1770) announces the Voice Box, a programmable speech synthesizer with unlimited vocabulary. It comes with a disk-based pronunciation dictionary for thousands of commonly used words and word fragments. The box can also be programmed for an unlimited number of unusual words, names, foreign languages, and sound effects. It features a talking face with lip-synchronized animation and variable pitch and speed. The AL-3001 model is for the Apple. Applications include animal sound effects as well as spoken clues in games, songs, and alien languages. $215.

☐ **El Dorado Software** (Box 1235, Shingle Springs, CA 95862; 916-626-8562) announces *Bizi-Calc*, the electronic spreadsheet templates for *VisiCalc*. The program lets the novice be up and performing financial functions while learning to operate the computer. *Bizi-Calc* is enhanced by Formfix, a feature that allows correction of entry error or disruption of the template. Includes a library of financial forms. $50. ◻■

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GRAPHICALLY SPEAKING

by Mark Pelczarski

This time around, we're going to continue our experimenting with assembly language graphics by taking the Basic character generator from two issues ago and the start of a machine language character from last issue and finish writing a real machine language character graphics generator. Actually, this particular article turns out to be much more about assembly language than graphics itself, but to do fast graphics you have to know some of the tricks to doing them quickly. Playing with some fast graphics routines also happens to be a nice, visual way to learn some assembly language. This column isn't going to be about assembly language all the time, however; in the future we'll look at types of tools available for those who don't have the time to tinker with machine language. But for now, on to the accumulator, the X and Y register, and hexadecimal addressing. . . .

When we last left off, we'd written a little routine that, given an X and Y screen value, would find the address of the Y line in memory from a look-up table we created, then, using what's called indirect indexed addressing, put the value $FF in the screen location we'd specified. The indirect addressing happened when we stored the address of the beginning of the screen line in a pair of locations, TEMPLO and TEMPHI, then loaded the X offset on the screen into the Y register and used the command:

```
STA (TEMPLO),Y
```

The parentheses around TEMPLO meant that the computer should find the address stored in TEMPLO and the following location (which we named TEMPHI) and add the contents of the Y register to that to get the final address to store something in.

In the process, we also used absolute indexed addressing to get numbers out of our look-up table, with commands like:

```
LDA LOOKLO,Y
```

Without parentheses, it means to take the address LOOKLO and add the contents of the Y register to get the final address.

Note the differences between the two types of indexed addressing we used. Both give you something like an array in Basic, but the absolute indexed (the one without parentheses) uses the exact value of the address you specify plus Y. Indirect indexed finds the address *stored in* the location you give, then adds Y.

Why these two types? Because the Y register is only one byte, and it can contain only the values 0 to 255. So with either addressing mode, your "array" can contain only 256 numbers. But, with the indirect indexed, we can change the *base address*. Going back to the short routine from last month, we couldn't index 8,192 bytes of a hi-res screen with only the Y register. But we could index a single line on the screen, because it's only forty bytes long. We wouldn't want 192 labels and 192 different plot routines, one for each line on the screen, though. So we compute the base address of each line (actually use the look-up table) and put that in a location that we use for indirect indexing from only one routine. The only restrictions of indirect indexed addressing are that the location where you put the address must be on page zero ($00 through $FF), must start on an even address (we used $06), and must be in low, high format (in a four-digit address, such as $12CD, the right digits, $CD, go in the first byte, and the left digits, $12, go in the second byte).

All terribly confusing (at least when you first try to learn it), but once you grasp that, the rest of assembly language is pretty easy.

Okay, Let's Tackle Another Routine Time. Instead of putting only one byte on the screen at a time, we'll take our Basic character generator and convert it to machine language so that we can put any of 128 characters on the screen. Each character is eight bytes: one byte wide (seven dots) and eight bytes tall. Before, we had the character definitions stored in a Basic array. Now, we'll store them in a binary table, and we'll load each byte using indirect indexed addressing (128 characters multiplied by eight bytes each gives 1,024 bytes; too much for using absolute indexed).

To start, we'll create a character table using the program in listing 1.

```
290  REM  THIS CREATES PART OF A CHARACTER DEFINITION
     TABLE, FROM ASCII 65 TO 67
310  FOR I = 65 TO 67
320  FOR J = 0 TO 7
330  READ V: POKE 28672 + 8 * I + J,V
340  NEXT J: NEXT I
345  PRINT CHR$ (4);"BSAVE CHARTABLE,A$7000,L$100": END
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 1.

You may notice that most of it is taken directly from the last program two issues ago, except that instead of storing in an array, we're poking into memory. We'll put the table at $7000, or 28,672 decimal. The letters A, B, and C, which are the three we defined, have ASCII values 65, 66, and 67. (ASCII is the standard character-to-number translation used by most computers. Page 138, Appendix K, in an active programmer's Applesoft manual can become quite worn. That's where they have the table listed.) Anyway, each character takes eight bytes, so to find the first byte of the nth character, you would look in 28,672 + 8 * n. That's where the poke address in the program comes from.

This program only has three character definitions. Others are left to you, using the technique from a couple issues back. Of course there are short cuts. If you have the *DOS Tool Kit, Higher Text,* or *Complete Graphics System*, the small character sets from all of those use the same format. In listing 3, where we actually use our finished routine from Basic, you can substitute a bload of any small character set at location $7000 (because some of them do not use the first thirty-two characters, try bloading at $7100 if the letters don't match up).

After storing a character table on your disk, either with listing 1 or through other means, you're ready to do the assembly language routine. See listing 2. We'll go through it step by step.

```
6000:                   1          ORG   $6000
0006:                   2  TEMPLO  EQU   $06
0007:                   3  TEMPHI  EQU   $07
0008                    4  CTABLO  EQU   $8
0009:                   5  CTABHI  EQU   $9
4000:                   6  LOOKHI  EQU   $4000
40C0:                   7  LOOKLO  EQU   $40C0
7000:                   8  CHRTAB  EQU   $7000
6000:00                 9  CHAR    DFB   0
6001:00                10  XVALUE  DFB   0
6002:00                11  YVALUE  DFB   0
6003:A9  00            12  START   LDA   #>CHRTAB   ; PUT CTABLE ADDRESS
6005:85  08            13          STA   CTABLO     ; IN CTABLO,CTABHI
6007:A9  70            14          LDA   #<CHRTAB
6009:85  09            15          STA   CTABHI
600B:AD  00  60        16          LDA   CHAR       ;GET CHARACTER NUMBER
600E:4A                17          LSR   A
600F:4A                18          LSR   A
6010:4A                19          LSR   A
6011:4A                20          LSR   A
6012:4A                21          LSR   A          ; DIVIDE BY 32
6013:18                22          CLC
6014:65  09            23          ADC   CTABHI     ; ADD TO HIGH BYTE OF ADDRESS
6016:85  09            24          STA   CTABHI
6018:AD  00  60        25          LDA   CHAR
601B:29  1F            26          AND   #$1F       ; FIND REMAINDER AFTER DIVIDING BY 32
601D:0A                27          ASL   A
601E:0A                28          ASL   A
601F:0A                29          ASL   A          ; MULTIPLY BY EIGHT
6020:18                30          CLC
6021:65  08            31          ADC   CTABLO     ; ADD TO LOW BYTE OF ADDRESS
6023:85  08            32          STA   CTABLO
6025:A2  00            33          LDX   #0         ; X REG WILL GO FROM 0 TO 7
6027:AC  02  60  34    LOOP        LDY   YVALUE     ; Y LOCATION INTO Y REGISTER
602A:B9  C0  40  35                LDA   LOOKLO,Y   ; GET ADDRESS OF YTH LINE FROM
602D:85  06            36          STA   TEMPLO     ; LOOK-UP TABLE AND PUT IN
602F:B9  00  40  37                LDA   LOOKHI,Y   ; TEMPLO,TEMPHI
6032:85  07            38          STA   TEMPHI
6034:8A                39          TXA              ;GET THE NEXT BYTE FROM
6035:A8                40          TAY
6036:B1  08            41          LDA   (CTABLO),Y ; THE CHARACTER TABLE
6038:AC  01  60  42                LDY   XVALUE     ;STORE THE BYTE ON THE
603B:91  06            43          STA   (TEMPLO),Y ; SCREEN
603D:EE  02  60  44                INC   YVALUE     ; NEXT LINE
6040:E8                45          INX              ; HAVE WE DONE 8 LINES?
6041:E0  08            46          CPX   #8
6043:D0  E2            47          BNE   LOOP       ; IF NOT, DO IT AGAIN
6045:60                48          RTS
```

Listing 2.

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The first eleven lines should look familiar from the last issue. We added a few extra equates (EQU) and a new define byte (DFB), but the rest is the same. The routine will originate (ORG) at $6000. We'll use two pairs of zero-page addresses for indirect indexing: TEMPLO and TEMPHI for the screen line addresses taken from the look-up table and CTABLO and CTABHI for addressing the character table. LOOKHI and LOOKLO, the pointers to the look-up table, are the same as before. CHRTAB is the pointer to the beginning of the character table.

CHAR is where we will put the ASCII value of the character we want printed. XVALUE and YVALUE are the X,Y location to print on the screen, as before.

Before proceeding, note that this routine was written with the assembler in the *DOS Tool Kit*. Some of the conventions differ with other assemblers, and we'll try to point out the differences. Also, if you are really interested in pursuing even a small amount of assembly language programming, invest in an assembler and in some type of reference book that has a chart of the 6502 assembly language commands. Otherwise it's going to seem like all these commands are being pulled out of a hat, made up as we go. There are fifty-five commands, but many are seldom used.

Okay. The beginning of the program loads the address CHRTAB into the accumulator, half at a time, and stores it in CTABLO and CTABHI. The symbol #>CHRTAB means a number, the low byte of the address CHRTAB. The number #<CHRTAB is the high byte of the address. At the far left, you see the hex numbers that are generated when the code is assembled. Note that at $6003, you get the values A9 00. A9 is the LDA code, and 00 is the value given #>CHRTAB. Two lines down, you get A9 70; again, the LDA code and then #<CHRTAB. In the beginning you equated CHRTAB with $7000, which is where 00 and 70 come from. The nice thing is you don't worry much about the numbers generated; the assembler does that for you.

Note: The #> and #< format varies with assemblers. If all else fails, do two equates for the address, something like:

```
CHRTAH EQU $70
CHRTAL EQU $00
```

and use those in place of #<CHRTAB and #>CHRTAB.

A Little Multiplication and Division by Powers of Two. The next part may be tricky. What we're trying to do is get CTABLO and CTABHI to point to the beginning of the letter we want. Now it just points to the beginning of a 1,024 ($400) byte table. A page of memory (not related to hi-res pages) is 256 ($100) bytes. The high byte of any address gives its page number in memory. The character table takes four pages ($400 bytes). Each page holds thirty-two characters (256/8 bytes = 32 characters), so CTABHI should be $70 if the character number is 0 to 31, $71 if the code is 32 to 63, $72 if the code is 64 to 95, or $73 if it's 96 to 127. It's $70 now; we have to add to that the character code divided by thirty-two.

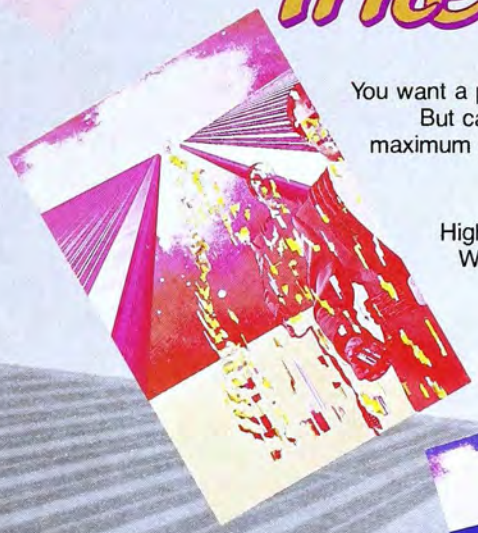
Similarly, the low byte should point to where in that 256-byte page the eight bytes for the letter starts. To do that, we need the remainder after dividing the character code by thirty-two (that is, which character is it of thirty-two on that page?), multiplied by eight.

For example, say we want character 36. Character 36 would be on the second page of the character table; the characters 0–31 are from $7000 to $70FF. Thirty-six divided by thirty-two is one, with a remainder of four. The page number that character 36 is on is $70 + 1, or $71. Furthermore, it is character 4 on that page (32, 33, 34, 35, and 36 are characters 0 to 4, and so on, on memory page $71). Since each character is eight bytes long, the definition for character 36 starts at byte 32 of that page (eight times four).

Now come the three tricky commands. LSR stands for logical shift right. It takes all the bits in a byte and moves them to the right one place. The rightmost bit gets thrown away (although you can find it, if you need it). The effect of this is dividing by two and throwing away the remainder! Examples (with four bits):

Before LSR	After LSR
0010 (2)	0001 (1)

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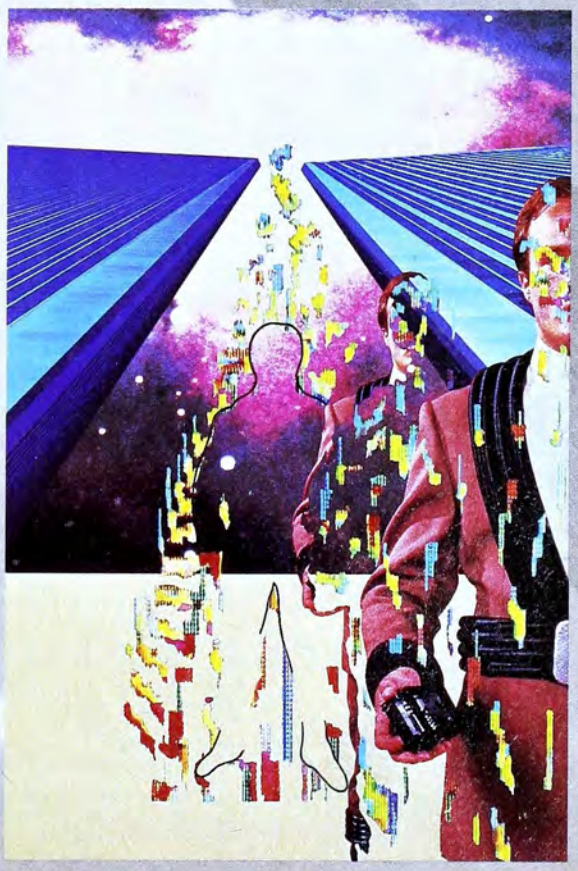


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Before LSR		After LSR	
1000	(8)	0100	(4)
1010	(6)	0101	(3)
1101	(13)	0110	(6)

By doing two LSRs in a row, it's like dividing by four. With three, it's dividing by eight. And with five, it's dividing by thirty-two. That's why the next six lines of the listing load the character number and then do five LSRs.

Similarly, ASL is arithmetic shift left. It does about the same thing, but in the other direction. It's equivalent to multiplying by two. More than one sequence allows you to multiply by 2, 4, 8, 16, and so on. A few lines down, when we need to multiply by eight, you see three ASLs.

AND is a logical *and* operation. If you remember some logic operations from high school, with *and* you get true as a result only if the two things you are performing an *and* on are also true. In binary, trues are ones. To show you how it works:

```
  10110
and 00111
  -----
  00110
```

Notice that only when both corresponding bits are set will the same bit in the result be set.

There is also an *or* command and an *exclusive or* command, and all three of these logic operators are extremely useful with graphics. For now, though, we're using AND as a short way to find the remainder of a division by thirty-two. Line 26 in the listing has an *AND #$1F*. $1F is 31 decimal, or 00011111 in binary. Performing an *and* on it with any number gives the remainder of a division by thirty-two. The left three bits in the byte would give the result of the division. Try it with a few numbers.

Back to the program. The five LSRs all affect the accumulator. Most assemblers accept LSR by itself as meaning that the accumulator is used. The *DOS Tool Kit* assembler requires the operand A to specify accumulator. Depending on the assembler you use, you may have to omit the A.

After the LSRs is a clear carry (CLC). There is one bit called the *carry bit* that holds the carry for any addition. That allows numbers larger than 255 to be used in arithmetic. It is also used in other operations, such as subtraction, and it is where the chopped-off bits in LSRs and ASLs get "thrown away." Since the next step is an addition, we don't want any junk messing up the addition operation, so clear carry sets the carry bit to zero.

ADC is add with carry. It adds the number pointed to, in this case CTABHI, to the accumulator. Then we store the result (STA), which is in the accumulator, back in CTABHI. CTABHI now points to the correct page for the character we want.

In the next two lines we load the character number again and then use AND to find the remainder of a division by thirty-two. Then the three ASLs multiply by eight, and we have the offset on the page for the letter we want. So we use CLC again, and add this offset to CTABLO, storing the result back in CTABLO.

Note: Again, for ASL, the A operator isn't used by all assemblers. Also, in our example, we started the table on a page boundary, $7000. We could have omitted this last addition and a couple of other steps because we are just adding to zero. The routine is more generalized this way, although at some later time you could put your table anywhere you want in memory, if need be. The only change you'd have to make is in the equate at the beginning.

Now for a loop. We have eight bytes to put on the screen, and CTABLO/CTABHI points to the first of these. For fun, we'll use the X register as a counter, from 0 to 7 (stopping when it reaches 8). LDX #0 does what you probably think: loads the X register with the number zero.

The first five lines in the loop you should recognize. They are still here from the short routine last month. We take the Y value, find the address of the start of that line in our look-up table, and put that address in TEMPLO/TEMPHI. Next we do a similar thing to get the first (or next) byte of our character. The X register is our counter. TXA transfers from X to A. TAY transfers from A to Y. (There is no TXY; too bad.) We transferred our counter to the Y register because it's the Y register that must be used for indirect indexed addressing. So we use it to get the byte for our character in line 41. The next two lines are also from our first routine last month; they store the accumulator value on the screen at the proper X offset.

That being done, we increment (INC) YVALUE (add one to it) so that the next byte will go one line down. Simple. Then we increment the X register with the INX command. Okay. Then we compare X to the number 8 (CPX #8) and branch to LOOP if they are not the same (BNE is branch if not equal) and repeat the process. If the comparison was equal, the program continues on the next line, which is an RTS (return from subroutine), sending control back to Basic.

Done!

Finally, there's listing 3, which is a Basic program that bloads the three binary files we need, gets a starting X,Y location, and loops through the process of getting a key, poking the ASCII value of the character and the X and Y values into the memory locations of the plot routine and calling the routine. Compare listing 3 to listing 6 from two issues ago. Same program, with the graphics changed to machine language. Remember, though, that unless you added your own characters, the only letters that will make sense on the screen are A, B, and C. We didn't define any others, We can't do everything here. . . .

```
10  HGR
12  PRINT CHR$ (4);"BLOAD LOOKUP,A$4000"
13  PRINT CHR$ (4);"BLOAD PLOT2,A$6000"
14  PRINT CHR$ (4);"BLOAD CHARTABLE,A$7000"
15  INPUT "X : ";X: IF X < 0 OR X > 39 THEN 15
16  INPUT "Y : ";Y: IF Y < 0 OR Y > 184 THEN 16
18  GET A$
20  POKE 24576, ASC (A$): POKE 24577,X: POKE 24578,Y: CALL
    24579
60  X = X + 1: IF X > 39 THEN X = 0:Y = Y + 8: IF Y > 184 THEN Y =
    0
70  GOTO 18
```

Listing 3.

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The Muppet Article



BY ROE R. ADAMS III

Come with us aboard the Swine Trek, as we find the glamorous First Mate Piggy getting ready to study for her final exam in galactic history. Captain Link Hogthrob is saying, "Well, First Mate Piggy, are you sure you wish to go through with this? It is the toughest exam in the galaxy."

"Let me tell you," replies the first mate, "if that old porker over there can be a doctor, so can I! I'll be the first woman to get a galactic Ph.D. (Doctor of Pig-headedness), and then we'll see who's boss around here!"

"Okay, if you insist," says the captain. "Dr. Strangepork, please prepare the pertinent past periods for Piggy's perusal."

Dr. Strangepork fusses with a strange glowing machine for a moment then invites Piggy over. "Step right this way, First Mate Piggy. Here is one of my finest inventions—the Vault of Ages, otherwise known as the Larder of History."

As First Mate Piggy sits down before the multicolored sphere, she squeals, "Why, it looks like an apple! All right, who took a bite out of it?"

"No, no," Dr. Strangepork replies hastily, "that is the recessed viewing screen. Now sit here, and all of Muppet history will be cast before your pearly eyes. Afterward, you'll be given a comprehensive, profound examination. To answer, you'll have to probe the very foundations of the universe. If you succeed, you'll go down in the annals of history alongside those great immortals: Sir Francis Bacon, Oscar Mayer, and Jimmy Dean.

"Good luck; you'll need it!"

The screen lights up with the standard, Lucas-style, thundering title, The Rise and Rise of the Henson Empire. *While antique kinescope pictures flash before her eyes, First Mate Piggy listens to the narrative.*

It was in 1954 that "Sam and Friends" first aired on WRC-TV in Washington, DC. Featuring Sam, Yorick, Mushmelon, and Kermit, this ground-breaking show ran for eight long years, receiving a local Emmy in 1958.

The show's characters sprang from the creative geniuses of Jim Henson and Jane Nebel, fellow students at the University of Maryland. Henson, then a sophomore, christened the troupe "The Muppets."

Performing in clubs and coffeehouses, the Muppets were an underground hit among college students. As Michael Frith, now vice president of art and design for Henson Associates, recalls, "The original Muppets were adult entertainment. It was not until much later that anyone thought of using them for children's programming."

How To Marry a Muppetaire. The next year, Henson and Nebel turned their collaboration into commitment; they married.

Meanwhile, in Cambridge, Massachusetts. . . .

Fresh from their years together at Connecticut's Deerfield Academy, Michael Frith and Christopher Cerf arrived at Harvard. The two friends promptly joined the staff of the infamous *Harvard Lampoon*, rising to the offices of president (Frith) and vice president (Cerf).

Many years later, Lisa Henson, one of Jim and Jane's daughters, would become the magazine's first female president.

Joining Jim Henson in 1961, Don Sahlin became one of the prime movers of the group. For the next twelve years, Sahlin built practically all the Muppets. Henson sketched ideas and Sahlin "fleshed them out."

Sahlin gave the Muppets their unique facial look; he created the "magic triangle." When the eyes, nose, and mouth are placed just right, the Muppet's face is centrally focused for the viewer, making the Muppet seem lifelike. Sahlin also made famous the "Henson stitch," which allows two pieces of cloth to be sewn together without a visible seam. Kermit's nose is made that way, with a seam down the middle.

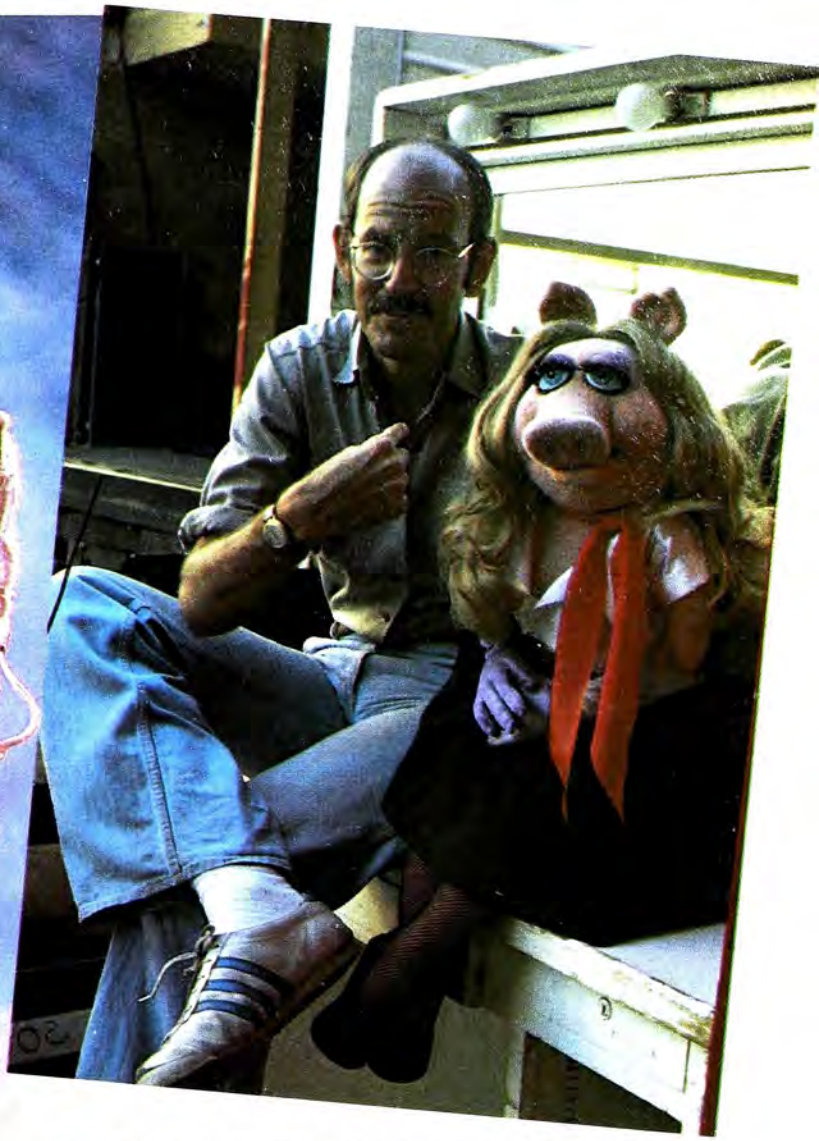
Jerry Juhl, another 1961 addition, started out as a puppeteer and soon began writing the scripts for the show. In later years, Juhl would become Henson Associates's chief writer.

Meanwhile, in Cambridge, Massachusetts. . . .

Cerf and Frith were busy writing *Alligator*—a hilarious James Bond parody. Having graduated from Harvard with honors in 1964, Frith and Cerf joined Beginner Books, the Random House subsidiary responsible for publishing Dr. Seuss.

The winds of destiny blew with force in 1964, bringing to the group





The "Fraggle Rock" gang of friendly, energetic, rascally Muppets; photo by Nancy de Pra. Gelfling Muppets Jen and Kira set out to save the world in *Dark Crystal*. Frank Oz and Ms. Piggy; Oz is a vp of Henson Associates, which signs itself ha!

an inventive, talented seventeen-year-old who would become one of the greatest puppeteers of the era. Frank Oz, according to Jim Henson, is the main reason that the Muppets are funny. It's Oz's unusual perception of life that gives the Muppets their unique flavor.

The Muppets' first big network appearance, on "The Jack Paar Show," also took place in 1964.

Close Encounters with a Sausage Dog Star. Designed by Don Sahlin for a dogfood commercial, Rowlf the Dog was the first nonabstract Muppet. Rowlf emerged as the Muppet's first international star, becoming a regular on "The Jimmy Dean Show" in 1965.

For the first time, people all over the country could enjoy the skill and artistry of Jim Henson's style of puppeteering. That same year, Jerry Nelson joined the Muppets, and Kermit the Frog guest-starred with host Bill Cosby on "The Tonight Show." The following year, the Muppets appeared on "The Ed Sullivan Show."

The stage was set for one of the biggest developments of the century in education. "Sesame Street" burst forth on public television in 1969. Produced by Children's Television Workshop, it had an immediate, profound effect on American education.

The thrust of the new show revolved around the interaction of special talented people and Muppets. Jon Stone, head writer and later director of "Sesame Street," helped chart the show through vast unknown waters, skillfully avoiding the reefs of preconceived ideas and bias that occasionally threatened the smooth progress of the series. Years later, Michael Frith observed:

"One of the most astonishing leaps ever made was when Jon Stone, who virtually invented 'Sesame Street,' decided to try his old friend and sometime collaborator Jim Henson as one of the performing partners on the program.

"At that time, the idea of the Muppets as children's entertainment was absolutely outlandish. It was insane. It was really quite a jump for Jon to do that, because the Muppets were so bizarre. Jim had strange creatures who ate each other when their backs were turned, and things that blew up. Who knew where the lightning was going to strike next?

"So, curiously, the shift of the Muppets from being an underground cult group to a mass-cult group was in an arena where the Muppets had never originally intended to be, and that was 'Sesame Street,' Children's Television Workshop. I still remember the very first 'Sesame Streets,' when you turned on the television and this monster came out, went 'Yagh, yagh, yagh,' and ate a radio! And you sat there and said, 'Good lord, did that really happen? Is this show really for kids?"

The Gang's All Here. Almost all the characters on "Sesame Street" were new Muppets, and they became cultural heroes overnight. Members of the gang included a classic "odd couple," Ernie and Bert, the Cookie Monster (whose direct ancestor was Yorick), Grover, Guy Smiley, and Kermit the Frog. Bantering with them were the Count, Sherlock Hemlock, and, in a delightful flight of fantasy, Snuffle-Upagus. Joining the Muppets as Caroll Spinney joined Henson was Big Bird, the

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The original Muppets. Left, back row, Oscar the Grouch, puppeteer Caroll Spinney, the Two-Headed Monster, front row, the Cookie Monster, Barkley the Dog, and Grover; photo by Roe Adams III. Right, Ms. Piggy and Michael Frith contemplate proofs of the Pig of the Year issue of another magazine; photo by Nancy Moran.

most prominent member of the species *Avis gigantus muppetandum*, and Oscar the Grouch. Then came Sully, Don Music, the Two-Headed Monster, Telly Monster, and the perpetual puppy, Barkley.

Also introduced on "Sesame Street" in various guises were the "Anything Muppets." Devised by the highly imaginative Caroly Wilcox, these were Muppets whose interchangeable features and costumes enabled them to be made up quickly to suit any scene or any occasion.

The interplay between the Muppets and television was also important and is best described in an excellent book from that era, *The Art of the Muppets* (New York: Muppet Press/Bantam Books, 1980).

According to the book, "Many aspects of the Muppets' growth and current form are directly related to their origins in television." The presence of the video monitors enables the puppeteers to observe their own performances while they're going on. This means, among other things, that puppeteers can make adjustments in what they're doing, either in response to seeing themselves live on their monitors or to seeing how a certain scene looks on the replay. As the book describes it, "The only reality exists on the television screen and the response to a situation is contained not in the twitch of an eyebrow but in the cock of a hand."

Some things always stay in your blood. In 1970, Chris Cerf and Michael Frith helped found *The National Lampoon*, to which they became contributing editors. That same year, Cerf left Random House to join the Children's Television Workshop, becoming the organization's first editor-in-chief of nonbroadcast materials. Developmental child psychologist Leona Schauble, who would guide the educational thrust of "Sesame Street," arrived at CTW two months later.

The fame of Jim Henson's Muppets on "Sesame Street" reached international proportions, with awards and praise pouring in from around the globe. In 1975, Henson was asked to work in England with Lord Grade's television company on an entirely different concept.

A Small Hop for a Frog, a Giant Leap for Muppetkind. Appropriately titled "The Muppet Show," the project represented a return to some of Henson's original perceptions of what Muppet entertainment should be. The show, starring Kermit the Frog as host, focused as much on adult humor as on ways to make children laugh. Syndicated to regular television channels around the world and translated into several languages, the show was an instant success, drawing more than two hundred thirty-five million viewers from more than a hundred countries.

Many new Muppet characters joined the Henson troupe at this time, as did some new creative people. Michael Frith had caught Jim Henson's eye two years earlier when Frith was doing the artwork for some of the Sesame Street books; he became Henson Associates's art director. Much of the "Muppet Show" look is credited to him.

Frith helped to design the Muppet pigs, from which evolved the buxom femme fatale, Miss Piggy. Miss Piggy became Kermit's Scarlett O'Hara; Kermit became Miss Piggy's "true love."

"First Mate Piggy, First Mate Piggy! Are you awake?" asks Dr. Strangepork.

"Of course, I'm awake! I just had my eyes closed in concentration," Piggy retorts angrily. "I was remembering my arrival at the academy, when my heart was pounding as I walked beneath the golden arch. The famous Galactic Motto glistened in the early light: 'As You Sow, So Shall You Reap.' How inspiring!"

Captain Link Hogthrob chuckles, "Well, before you start sowing, you'd better start reaping. You don't have much time left to study before the examination begins. So you'd better get back to watching that screen."

"Well, you don't have to be huffy about it," fumes First Mate Piggy. She stares into the viewing screen once more and releases the pause button.

It was the magic combination of Kermit and Miss Piggy that propelled "The Muppet Show." Clever new Muppets added depth and dimension to the cast of characters.

Just as "Sesame Street" had the "Anything Muppets," so "The Muppet Show" had its "Whatnots." These small Muppets filled out large group scenes and chorus lines. There were also the "Strange Things"—huge monsters.

At times, puppeteers and friends began to see themselves directly reflected in Muppets. It was no idle chance that the Muppet piano player in "Sesame Street" bore a strong resemblance to Chris Cerf. Cerf began singing at Harvard and he regularly provided voice and lyrics for the Muppet group.

Muppet Mecca. "The Muppet Show" ran five years in production. Still in syndication, it remains an inspiration to Muppets everywhere, regardless of fuzz, fur, or fin.

In the same year that "The Muppet Show" was reaching for the stars, "Muppets in the Land of Gorch" wallowed in the mud on "Saturday Night Live." Created primarily by Jim Henson and Michael Frith, this show was not for children but for sophisticated young urbanites.

The Mighty Favog (Frank Oz) resembled an ancient Mayan idol, or perhaps an exotic planter, and served as a godlike oracle on the show. The inhabitants of Gorch were gruesome, with mossy skin and ghoulish, deep-set eyes. The eyes were a significant departure for Henson; they were real glass eyes rather than stick-ons, and they contributed greatly to the ferocious look of these Muppets. Henson set a new trend with extensive use of body jewelry and barbaric costumes; King Ploobis really did have scrimshaw on his trunks.

In 1976, Chris Cerf became special consultant to Joan Ganz Cooney, president of Children's Television Workshop, and began the creative design of Sesame Place. Originally built in Philadelphia, this educational playpark was duplicated in Dallas, Texas.

The next phase of the Henson conquest of the world's heart began in 1977 with "Emmet Otter's Jug-Band Christmas" television special. Now the creative energies of Henson Associates were directed toward designing more realistic characters. Otters, possums, beavers, and woodchucks were created and costumed in intricate detail. Every effort was made to bring Emmet Otter's natural surroundings to life. The master touch of Franz "Faz" Fazakas made possible effects such as Emmet rowing a boat down a stream.

In 1978, the winds of destiny blew darkly. Don Sahlin's untimely death deprived Henson Associates not only of a good friend but of its finest Muppet designer, and just when Henson was about to embark on





Some of the people who make it all happen: Left, Mary Ann Horstmeyer watches Christopher Cerf work at his Apple; onscreen is a picture of Jen from the adventure game based on *Dark Crystal*. Center, Faz Fazakas works with a Doozer from "Fraggle Rock." Isn't it cute? Photos by Jonathan Becker. Right, Caroly Wilcox and Jon Stone confer over direction on "Sesame Street" set; photo by Roe Adams III.

his most challenging project to date, *The Muppet Movie.*

"Animal Want Popcorn!" *The Muppet Movie* brought to the screen all the characters the television show had made famous. In the grand finale, one hundred sixty puppeteers brought together almost every Muppet that had ever been created. Art director Michael Frith and the Henson puppet makers carried on the work of Don Sahlin.

In 1978, one significant event to occur was, in a sense, a small one, even microscopic. Chris Cerf discovered the Apple II.

The blossoming Henson empire would never be the same.

Computers were already a familiar part of Chris Cerf's life. His wife Genevieve is an electrical engineer and computer scientist. Once Cerf discovered the microcomputer, it wasn't long before their mid-Manhattan townhouse was replete with computers and peripherals, including an alphaSyntauri music synthesizer and an Apple Graphics Tablet. These blended in nicely with his large toy robot collection.

The Seeds of Educational Technology. It was at this time that Cerf conceived of a computer center for the embryonic Sesame Place playpark—using, naturally, Apples. He did the original programming for the first educational games, which were based on the Muppet characters, but it was Joyce Hakansson who was responsible for the construction of the Sesame Place computer center and for the compiling of the sixty some programs that eventually were used.

Chris Cerf became a present-day Johnny Appleseed, planting his enthusiastic feeling about Apple computers throughout the Henson empire. The first harvest yielded Jon Stone and Jerry Juhl, both of whom immediately appreciated the power of word processing on the Apple for script writing. From 1979 on, Stone wrote all his "Sesame Street" scripts on his Apple. It became a familiar sight to see Jon Stone on the set directing a "Sesame Street" episode with a rolled up copy of the latest script, hot off his Epson printer, in his back pocket. Juhl, meanwhile, handled the evolutionary development of the Muppets on his Apple.

Also in 1979, Frank Oz performed what began as a minor spot of non-Muppet puppeteering in a movie. His dynamic, mystical portrayal of Yoda, the ancient Jedi Master in *The Empire Strikes Back,* captured the imagination of the audience. Yoda was the surprise hit of the movie, a superstar overnight.

Nineteen seventy-nine was a year of progressive changes for the Muppets' human friends.

Jim Henson found a way to personalize the Muppet experience for children everywhere. A special exhibit, The Art of the Muppets, began touring the nation's museums. When it appeared at the Children's Museum in Boston, crowds were willing to wait hours to see the exhibit.

Through his own company, Christopher Cerf Associates, Cerf became creative consultant to Henson Associates, Children's Television Workshop, and Fischer-Price. His function? To help guide these companies into the microcomputer age.

"Ha, ha, ha. Apples? He, he, he." At Henson Associates, Apples play key roles in everyday business affairs. Early this year, Bill Effros introduced Apple word processing to several of the Henson groups. In production, accountant Nellie Evans and her assistant Tania David use the Apple to keep track of show residuals and departmental budgets. Marketing vice president Jerome L. Houle III considers the Apple invaluable for forecasting and trend analysis.

Another Apple became a librarian for a group of short, business-oriented Muppet films that corporations can use to liven up lunch breaks at long, serious company meetings. Produced with Henson's customary flair, the *Muppet Meeting Film* series has been a huge success; the fifteen films featuring Grump and Leo are in constant demand.

At Sesame Place playparks, Apples produce sound effects and maintain databases of park activities.

Two strong advocates of Apples at Henson are Harriet Yassky and Jane Leventhol. Yassky and Leventhol have in common small size and giant expertise, Leventhol in publishing and Yassky in business affairs and electronic products.

"We are very interested as a company in creating software and products for microcomputers, especially the Apple, featuring the Muppet characters," Yassky states. Her current project is the computer adaption of a precedent-shattering Henson film, *Dark Crystal.*

The alternative thrust that Jim Henson began with the Land of Gorch characters on "Saturday Night Live" reaches its majority in *Dark Crystal,* a nonanimated movie done with puppets. *Dark Crystal* is not, Henson stresses, a Muppet movie, at least not in the traditional sense of the fun-loving Henson movies. The difference is in the mood of the *Dark Crystal* world. As J. R. R. Tolkien portrayed the bittersweetness of Middle Earth in *Lord of the Rings,* so has Jim Henson captured the feeling of Lower Earth, a land ruled for ages by chaos.

DC Scrolls. The story purports to be based on a translation of the arcane *Book of Aughra,* written by Aughra, the immortal Keeper of Secrets. The book opens with Aughra recounting the story of her birthing:

> Of the race of Aughra, I, Aughra, am alone, the first and the last. Born from the need for rocks and trees for an eye to see the world. The wind blew and the blind trees sang and roots twisted in the dark rocks and the roots sang and the rocks cracked and I was Aughra. This is my song.

Aughra lives in a mountain observatory, replete with a gigantic mechanical model of the heavens. From here, she chronicles the evil reign of the reptilian Skeksis, an intelligent species that had gained power by casting the world into darkness. They had broken a fragment off the Great Crystal that was the focus of the three suns' light. Only the return of the missing shard to the darkened crystal can complete the crystal's matrix and end the tyranny of the Skeksis.

As the plot unfolds, Jen and Kira, the only surviving members of the Gelfling, an ancient elfin people, set out to restore the crystal's brilliance. Guided by the urRu, a mystical race, and riding their Landstriders, Jen and Kira overcome dangerous obstacles to heal the crystal. Even Aughra helps. The gentle Pod People watch over Jen and Kira while the Garthim, hitmen for the Skeksis, track them mercilessly.



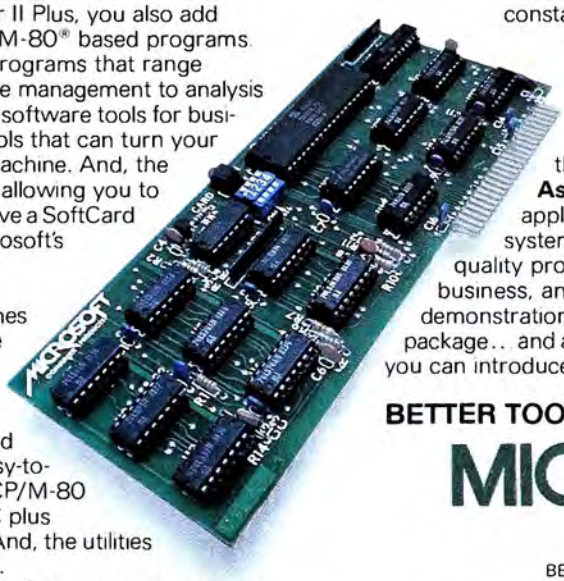
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Saga of a Skeksis: Leigh Donaldson's human hands practice with a waldo of a Skeksis hand, then the Skeksis is whole and chooses to boot the *Dark Crystal* adventure to see himself. Left photo by Jonathan Becker; center right and right photos by Marianne Bernstein.

"Get Them Muppets Out of Here! This Is Faery Country!" The world of *Dark Crystal* is brought to life in lavish and intricate sets by Brian Froud, illustrator of the bestseller *Faeries*. Froud based his visualization on Jim Henson's rich, suspenseful story.

The people at Henson Associates enjoy their work and take great pride in Muppet accomplishments; it's not surprising that cooperation was a keynote in the production of *Dark Crystal*. Gary Kurtz, producer of the first two *Star Wars* movies, joined with Jim Henson in producing the movie; Henson and Frank Oz were codirectors.

Dark Crystal is a milestone for the art of puppetry, too. The puppets are so smooth and fluid in motion and so lifelike that they can easily be mistaken for carefully animated characters. The creative technical genius of Faz Fazakas is credited with this accomplishment. Its generation can be attributed to Jim Henson's longtime delving into the realm of computer assisted robotics with his puppets' movements in mind.

Years ago, when Big Bird first joined the Muppets, Fazakas designed the remote control system to move Big Bird's eyes. In the process, he brought the worlds of waldos and computer enhancements to puppeteering. *Waldo* is a term coined by science fiction writer Robert A. Heinlein to describe mechanical extensions that allow operators working with special materials to perform delicate operations by remote control.

Around that time, Chris Cerf had produced, directed, and scored a robot Muppet show at Sesame Place. The robot Muppets' hand movements were made on waldos and recorded in digitized form. Later, the movements were played back to computer controlled Muppet robotic hands. Fazakas developed the waldos into very sophisticated tools to operate whole motor-driven characters.

"The early Disney automated figures moved at a very slow twenty-four time frames per second," Fazakas relates. "Of course, in terms of control, that is a very crude increment. You can actually see the slight jerkiness in the figures. That was state of the art twenty years ago. With the new techniques we have developed, we achieve many thousand time frames per second. The characters become very lifelike."

Wooden Acting. The Skeksis' lifelike appearance is credited to the use of special latex stretched over complex wooden frames. These frames with their multitude of wires and controls allow the puppeteer unparalleled range of expression. The hands are the work of Leigh Donaldson, under whose control the Skeksis' hands became capable of very subtle nuances of movement and were able to perform delicate intricate tasks.

Encouraged by Chris Cerf, Henson Associates undertook a bold move: to expand into the microcomputer games market. The company decided to adapt *Dark Crystal* to the Apple computer. At that time, Sierra On-Line was the chief publisher of hi-res graphics adventures. So Chris Cerf and Mary Ann Horstmeyer flew to California to discuss the venture with Roberta Williams, author of the epic microadventure *Time Zone*. A deal was struck.

Says Williams, "This adventure isn't like any we've done before. Jim Mahon, the art director at Henson Associates, sketches each page of the action and sends it to me. My people translate the sketches onto the Apple with graphics tablets.

"Then the hi-res pages are sent to Jim Mahon for his approval and suggestions. Actually, everyone in New York helps out. Harriet, Mary Ann, and Chris all review each screen and make suggestions.

"We plan on having the game finished and available to coincide with the release of the movie at Christmastime."

Meanwhile, back at home. . .

One project at a time no longer seems enough for the people at Henson Associates, not even when that project has several heads.

"After five years of doing 'The Muppet Show,' " explains Michael Frith, "we did a fork: going in two very different directions at the same time. In one direction was *Dark Crystal*, which called on all our disciplines to reinvent the whole idea of puppetry. In effect, we had to redefine what we were already involved with: not so much puppetry as the creation of the illusion of life. *Dark Crystal* is a completely different, very sophisticated world."

Rock of the Ages. The other branch of the fork took Henson to "Fraggle Rock," another world altogether.

"Never before had we decided to do a television show purely for children. In thinking through the idea, we saw that we really could do a show solely for children, and for children around the world. Such a show would deal with universal questions, problems, needs, misunderstandings, and understandings—things that affect kids all over the world and aren't particular to our culture.

" 'Fraggle Rock' is geared to the 'Mid-Kid,' kids seven to ten years old who're left out of virtually all other programming. The show addresses questions of self, growth, change, and, in particular, relationships with people outside the child's family."

Frith is creative director of "Fraggle Rock"; he developed the main

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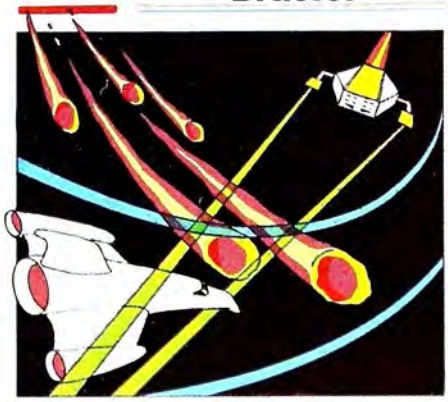
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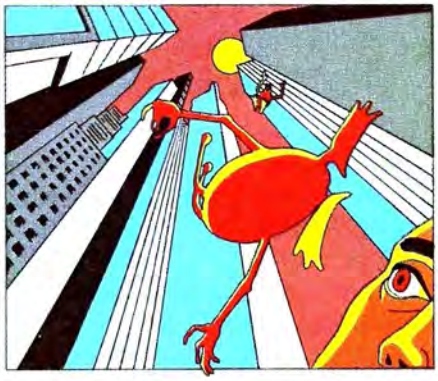
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Meanwhile, getting down to business . . . Left, Tania David, production accountant assistant, and Nellie Evans, production accountant; right, Harriet Yassky, director of business affairs, and Jerome L. Houle III, marketing vp. Photos by Marianne Bernstein.

concepts in the show. Once again, every Muppet is original.

Fraggle Rock is a multilayered world that's a self-contained ecosystem. Every species within this world has a symbiotic relationship with every other species. While Fraggle Rock doesn't actually exist in the human's world, there's a gateway between the two worlds through a hole in the wall of Doc's workshop. The only human to appear in the show, and bearing a close resemblance to Franz Fazakas, Doc is a puttering inventor. His workshop is cluttered with all kinds of odds and ends.

Through the portal in the baseboard, adventurous Fraggles occasionally sneak past Doc's dog, Sprocket, for prized bits of junk. Doc never sees a Fraggle.

The Fraggles share Fraggle Rock with a unique assortment of creatures, most of whom try to avoid having anything to do with the others. A constant irritation to the Fraggles are the "terminally cute" Doozers.

Doozers are only six inches high. Resembling a happy platoon of army engineers, with hard hats pulled down over their antennae, the Doozers work methodically, building intricate but often incomprehensible structures. They build over, through, or under anything. If a Fraggle takes a nap, he's likely to wake to find that Doozers have built a cloverleaf over him.

The other regular inhabitants of Fraggle Rock are the gigantic Gorgs, fifteen times the size of a Fraggle, who live in the Kingdom of Gorg. There are only three of them left, the Gorg royal family: Ma, Pa, and Junior. They live in a crumbling old castle and tend to their large garden.

It's this garden that's the source of conflict between the Gorgs and the Fraggles. The Fraggles love to raid the garden; one of the huge vegetables is enough to feed a dozen Fraggles. Consequently, the Gorgs are always trying to stomp on the Fraggles.

There's one other reason Fraggles dare risk the perilous foray into the Gorg garden: the Trash Heap. Reminiscent of the Mighty Favog, the Trash Heap is a living compost heap. The Fraggles think she's an oracle and brave the wrath of the Gorgs to seek her advice in times of trouble.

Gunsmoking Postcards. One of the Fraggles does venture out into the human world. Traveling Mat sets out to explore the World Beyond Doc's Room and doesn't return. Periodically, he sends postcards to his nephew, Gobo, describing his adventures in the outer world.

"Fraggle Rock" was produced in Toronto, Canada, and is scheduled to begin broadcasting in January 1983, following close on the heels of *Dark Crystal*. The show is to appear solely on Home Box Office, making it the first weekly series ever on a cable network.

With "Fraggle Rock," Henson Associates is breaking new ground internationally. As Michael Frith explains, "When we were doing 'The Muppet Show' in England, the cultural difficulty of taking a show from one country and putting it into another became obvious. We wanted people to accept the show both as entertainment and as something they felt strongly about personally—and that's a problem.

"We've solved this dilemma by personalizing the show for each host country. Doc is our lead-in to 'Fraggle Rock.' In each country, we'll shoot separate opening scenes using local performers in local settings. This will give a good international flavor, bringing each host country into the show. We'll also shoot the Traveling Mat sequences locally, making the viewers feel right at home."

Making that international flavor taste natural led to more innovation. The problem was to facilitate a script collaboration between Jerry Juhl in Los Gatos, California, and Jocelyn Gunnar Stevenson in Wales. Both writers use Apple word processing to do their work. With Chris Cerf's help, they began sending their scripts back and forth via modem. Then a communication triangle was set up between Juhl, Stevenson, and the studio in Toronto. The resulting episodes were developed in an environment totally independent of physical location.

The rest of the Muppets haven't been idle just because their friends were involved in new movies and television shows. Some of the Muppets have been in China shooting a "Big Bird in China" Sesame Street Special. Kermit the Frog took another Muppet group to Colorado to film a John Denver Special.

One Muppet friend, Leona Schauble, is now research director of the newly formed Children's Computer Workshop, a division of Children's Television Workshop. Schauble's group is responsible for creating Sesame Street based educational and entertainment games for the Apple and a host of personal computers.

Dial C for Computer Hero. Christopher Cerf Associates is deeply involved in a new concept in computer storytelling. Cerf's programs allow children to become their own heroes. He continues his "self-imposed mission of guiding creativity through the new-world thicket of computer technology."

"First Mate Piggy! Time is up!" says Captain Link Hogthrob in his most commanding voice. "Now, if you're still willing, you must take the comprehensive, profound examination that probes the very foundation of the universe."

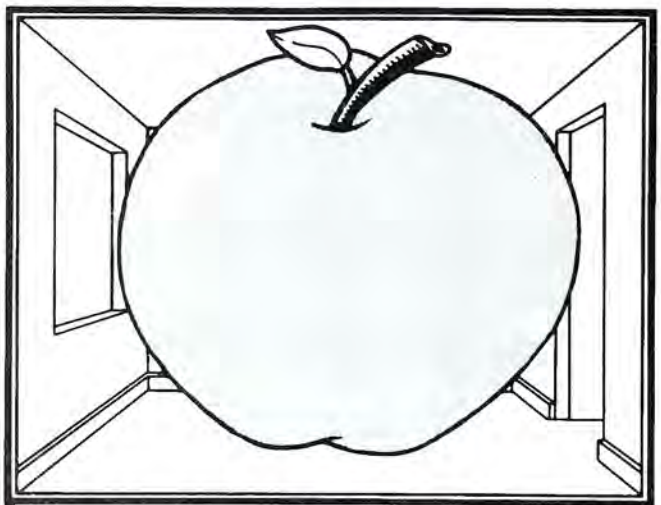
First Mate Piggy exclaims, "Where have I heard all that before? Of course, I'm ready! I'm always ready!"

Replies the captain, "Well, I certainly wish you luck. If you make it, I'll take all of us to the Restaurant at the End of the Universe for a snack."

"Brace yourself, Piggy," warns Dr. Strangepork. "You have only three hours to answer this one question, which will test your fitness to earn your Ph.D. Ready?"

"Ready, willing, and able," replies First Mate Piggy.

Dr. Strangepork lowers his voice dramatically and asks, "What color is the Frog?" ■



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Mind Your Business

BY PETER OLIVIERI



Here we are in the last month of 1982. Who can imagine what new advances are on the horizon in the world of microcomputing? What will 1983 bring?

Say, there's a good idea. Some evening while you're relaxing, curled up in front of a warm fire or just enjoying the warm evening breeze, jot down a list of the new products you think we'll see within the next five years. We can share our speculations in a future column.

As a reader of this column you get asked to do a lot of writing, but judging by your response, it seems that you must like having the opportunity to let your feelings be known. Send along your ideas to Softalk Crystal Ball, Box 60, North Hollywood, CA 91603. Who knows—sharing your thoughts may prompt someone to create just what you have in mind.

BUG on Printers. This month we'll spend some time discussing printers and word processors with Business User Group members. This can be an excellent vehicle for sharing your joys and frustrations. The assumption here is that what readers experience is well worth sharing.

It's a good idea to look at all the comments, since there may be more than one that's useful to you. In the interest of space, some comments will be faithfully summarized rather than shared in their entirety. Also, keep in mind that one person may like certain features of a product while another may think them worthless. In other words, take all of these comments with a grain of salt. And do your homework—you are the ultimate decision maker.

Epson Printers

I own an MX-80 F/T and use the Grappler interface card. I'm not sure of the strengths of the machine since I have nothing to compare it to. Its major weakness is the instruction book. It's not very well written. Instructions on using the printer for word processing are nonexistent.
Robert Bloomer, Santa Ana, CA

My printer is an MX-80 F/T and I use the Grappler Plus interface. It's an extremely versatile printer and I have no complaints about it. The paper sometimes needs adjustment, however.

Prior to this, I had a Silentype. While it was useful, it was not nearly as versatile as the Epson. I was also swayed by the fact that there are Epson user groups throughout the country, lots of articles about the Epson, and useful utility programs.
J. Waterfield, M.D., Springfield, NJ

I have an MX-80 F/T with Graftrax 80, interfaced with the Apple via an Orange Micro Grappler card. Some of the printer's strengths are its compact size, true descenders, a nine-by-nine matrix, reasonable price, and ease of changing ribbon and print heads. I have much more to say about its weaknesses. I have owned the printer since March 1982 and have not yet been able to use a complete, unbroken printer. My tractor-feed mechanism jams paper at the pin-feed area. This F/T mechanism has been under constant repair, and this has had serious consequences for my word processing applications. By the time I reach the sixth page of a document, top and bottom margins are uneven and left and right margins shift size.

There have been other problems. Two days after I bought the printer, new models were released (with Graftrax Plus and underlining). None of the dealers knew about this, even after ads had appeared. Even though my printer had not yet been shipped, neither the dealer nor Epson would allow me to swap my printer for a new model. The documentation stinks. It was originally written for a TRS-80. [*There is now an excellent book on the Epson for the Apple.*] As an example of some of the problems that I have had, consider that the dip switch settings shown in the appendices conflict with the settings in the Graftrax 80 documentation, which conflict with the settings in the Grappler documentation. *Ouch.*
Paul Metzker, Jonesboro, GA

The printer I have is an MX-80 F/T with Graftrax Plus. It is interfaced to my Apple III with an Apple III Universal Parallel Interface card. It is an excellent printer. I make frequent use of the capability to change the type of print in the middle of a document and it works quite well. In some applications, I like it better than a daisy wheel printer attached to a large mainframe we have. One weakness is in switching back and forth between tractor-feed and friction-feed.
J. Kustura, Kokomo, IN

I have an MX-100 printer with full graphics capability. *It* has full graphics capability, but *I* don't. There must be ways to do such things as to make a graph using *VisiPlot* and place it into a report typed with *Apple Writer*. I'm hoping to get a daisy wheel printer someday, and as a novice, I'm not sure what to look for. Any help in this regard will be greatly appreciated.
Linda Knoll, Swarthmore, PA

We have twelve MX-80s—three with Graftrax and six with Graftrax Plus, two MX-80 F/Ts, one MX-100 and one Diablo. [*This is from a school system. Whew!*] We looked at Okidata, Epson, Centronics, NEC, Texas Instruments and ProWriter. The Epson won easily. The ProWriter is probably a better printer, but it is new and has little software support. NEC is in the same category. TI is fast, but big and expensive. Okidata and Centronics are widely supported but local dealers reported some service problems with both brands.

It came down to the Epson versus the Okidata. A local dealer put a box of paper beneath each of these machines and began printing copies of a catalog. This ran for eight hours. The Epson printed 108 copies, the Okidata 82. This was mainly due to the Okidata's stopping every few pages to cool the print head. The Epson seemed never to overheat. Both printers required one ribbon change (late in the day). The Okidata had some problems a few months later. The Epson is still being used (and with the same print head).

We thus use MX-80s everywhere we need a printer, MX-80 F/Ts if we have to feed letterhead, and the MX-100 for large *VisiCalc* tables and for big graphs for display purposes. For 90 percent of our needs, the Epson gives good enough letter quality when used in enhanced mode. Our only complaint is speed. A long listing or rough draft of a book seems to take forever. We'd gladly pay twice the price for the speed.

For those cases where almost letter quality was not good enough, we looked at C. Itoh, NEC Spinwriter, Qume, and Diablo. The price was right on C. Itoh but we needed more speed. The Qume suffered from a bad local reputation for service. The NEC and the Diablo seemed about equal—both were excellent. Since the Diablo was available locally for less, it was our choice. As with the Epsons, we have never had to have the Diablo serviced. It chewed up a ribbon once in a while, but that seems to have corrected itself.
Bill Michael, Bedford, TX

NEC Spinwriter
I bought a Model 5510 in May of 1980. It uses an Apple high-speed Serial Card. The strengths of this machine include sturdy and attractive design and construction, mechanical reliability, excellent print quality (but use only NEC ribbons), simplicity of operation, and flexibility (different paper widths, types, and so on). It has some weaknesses. The printing speed is relatively slow. Bidirectional printing is allowed only if your software can control it. It is rather noisy. Finally, software areas can result in mechanical binding of the print thimble.

I wanted the best printer, and I think I got it. I feel that it is unlikely to become obsolete (except in terms of printing speed). Every print thimble available has at least one undesirable feature. On one, the zero looks like an "O." I wish there were a thimble with the same character set as the IBM Letter Gothic typing ball!
James Pittman, Jr., Albuquerque, NM

Centronics
I have a Centronics 779 with tractor feed. It is reliable, with low maintenance, variable print size and column width, and variable paper width up to twelve inches. Its weaknesses include upper case only, no graphics, too noisy, and too slow (60 to 100 cps). This was the best machine I could buy at the time.
R. Keelin, Lenexa, KS

Okidata
The printer model I have is the Microline 82A. The interface (OK12) was purchased from Interactive Structures in Bala Cynwyd, Pennsylvania. This machine has good quality print and prints about 120 cps. Alternative character sizes are available, as well as boldface print. Tractor-feed is an option. Ribbons are inexpensive. You can upgrade for hi-res graphics if you want to. Two weaknesses are the inability to underline and the fact that it can't do proportional spacing.
N. Wood, Saratoga, CA

Apple III Printers
For software development and generation of hard-copy graphics, we are using an Integral Data Systems model 460G dot-matrix printer. For correspondence and documentation, we are using a Brother model HR-1 daisy wheel printer. Both of these printers are interfaced to the Apple III with Apple's Universal Parallel Interface Card.

The IDS has been a very reliable printer. Since the Brother was a very recent purchase, it is too early to judge it in this regard, but it looks great. We really like the flexibility of the IDS printer. Its principal weakness is that the dealer has been trying to get accessories for it for more than three months with no success. As for the Brother, its principal strength is the high-quality text it produces and the fact that it will print ten, twelve, and fifteen characters per inch at the flip of a switch.
M. Williams, Sunflower Micro Systems, Kansas City, KS

Another Brother
We have a Brother HR-1. It is a daisy wheel printer and gives beautiful copy with an IBM ribbon. The manual is not as complete as it should be. So far its only weakness seems to be an inability to do superscripts and subscripts.
H. Podell, New Rochelle, NY

BUG Spray. Before we move on to user group members' requests for assistance, it's important to remember a couple of things when it comes to purchasing products. The first is that after you've bought a product, it tends to look good to you. Secondly, one good experience or one bad one gives little evidence as to the quality of a particular product. Look instead for consistent patterns, responses, and reactions.

A fairly reasonable summary of the printer information just presented would include the following observations. Epsons are inexpensive and popular; the manual that comes with the Epson is terrible; many programs don't allow you to use all of the printer's features; and a "rising star" might be the letter-quality Brother HR-1.

Ask the BUG. Many BUG members have questions that they hope can be answered by some of their colleagues. If you can provide some help with any of the following questions, please be in touch and your response will appear in this section of the column.

How well do daisy wheel printers print graphics?

How do you get an Epson MX-80 F/T printer with Graftrax 80 (interfacing with a Grappler card) to perform with *Apple Writer II*? For example, how do you italicize a book title in text? How do you underline text? How can superscripts or subscripts be done?

When using an Epson MX-80 F/T, how can you get the print commands that require an escape-code entry into an *Apple Writer* program?

How do you program *WordStar* (using a Microsoft CP/M installation) to control all the printer features?

With a Centronics 779, how do you turn the printer on and off from within a CP/M program (Microsoft)?

Is the PrintaColor PG-1000 worth the extra money over the IDS Prism for a color printer?

Would a four pen color plotter be better than a color printer? If you dump a hi-res screen to a plotter, does it do all of one color first or does it change pens fifty times trying to act like a printer?

Word Processors Processed. In an earlier Mind Your Business installment, you were asked for feedback on your experiences using different word processing programs. Since one of the purposes of this column is to provide a forum for sharing experiences, some of the comments received appear here. For more specific coverage of word processors, you may wish to refer to *Softalk*'s continuing series on word processors.

Apple Writer
"*Apple Writer II* is easy to use. The program commands are logical, and the manual is well organized. It produces standard Apple text files. It is powerful, with very flexible print formatting capability, and can print every ASCII character except for the back slash. The program has a buffer for deleted characters; you can make use of this if you wish to recover from a mistaken deletion. It will adapt for eighty-column use with the appropriate card. You can select for the word-wrap feature to be on or off. Commands can be upper or lower case.

"Weaknesses include copy-protected disks (you cannot make back-ups) and the inability to find or replace the *n*th occurrence of the string. In addition, the block move feature is awkward and of limited use, there is no preview mode that lets you see what the printed copy will look like, nearly anything you do ultimately leaves you in insert mode (which is irritating), and finally, it will not support proportional spacing or bidirectional printing.

"We use a lower-case adapter as well as a $20 disk from Videx that lets you operate in eighty-column mode on the Videx card. This is an excellent word processor."

"We have *Apple Writer II*. The program is easy to use, comes with very thorough documentation, and is well worth the price. Support is widely available. Among the program's weaknesses: unless you are using a Silentype or a Qume printer, some of the printing options won't be available to you (at least they won't be documented). According to my dealer, there seems to be no way that a user can italicize or use emphasized print (for example, with an Epson).

"We tried several packages before settling on *Apple Writer*. Our employer was using *Executive Secretary* but has now switched to *Apple Writer*. By the way, if you haven't moved up from the original version to version II, do so . . . it makes a big difference."

"We currently have *Apple Writer II*. It came with our Apple Family System. We like it a lot. However, we think we'll soon be moving up to an eighty-column card and will probably acquire *Word Handler*. We like the idea of being able to see on the screen exactly what will appear on the printed page. We looked at the *Word Handler* documentation and found it to be very simple. Page endings will be shown. We can print one page from the middle of a document if we wish.

"Our biggest complaint is the inability of most word processors to utilize fully the features of our Epson MX-100. In fact, after spending so much time learning how to do some things with *Apple Writer*, it may not be worth the extra investment of time to learn to do it all over again with a new word processing package."

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Super-Text

"We have *Super-Text II*. It is easy to use and the manual is well organized. The package is very powerful. It has a built-in "math mode," an autolink feature that allows for linking several disk files, the ability to copy, save, or delete blocks of text, and the capability of printing every ASCII character. You can set the colon (:) key to type *the* if you wish (interesting). A preview mode lets you see how the finished document will look. It is not limited to eighty columns of printed output and the print-formatting commands are extremely powerful. We got fairly good support from the vendor (Muse).

"Among the weaknesses we found: the files that are created cannot be accessed from Apple DOS or Pascal, disks are copy-protected, headers and footers cannot be printed automatically, there's no buffer when deleting text (once gone, it's gone) and no provision for eighty-column operation, there's a relatively small workspace (about twenty thousand characters), it does not take advantage of an additional 16K card if present, and it does not support proportional spacing or bidirectional printing. While we found this program difficult to learn, we are now used to it and think it is great. This may be a common feeling once a person has invested the time in learning a particular package.

"Recently, we also obtained *Super-Text 40/80*. It has all of the features just described and more. In addition, the colon key can now be used to enter any string of characters you wish. This can be extremely helpful in many applications. There are many improvements to the find and replace option. For example, you have single key control, multiple find and replace, and wild card options. Obviously, the package will work in either forty or eighty column mode. We found the on-screen messages to be better, and got good support from Muse. Headers and footers can now be printed. The package also loads, saves, and prints files created with a *Super-Text II* package.

"Some of the weaknesses cited earlier still exist. The two new ones are a smaller workspace (fifteen thousand characters) and the fact that the eighty-column mode is a bit awkward to work with (and makes for a considerable loss in speed). Since our copy did not interface with our Spinwriter, we had to print using our *Super-Text II*. The vendor says that a change is forthcoming. It has not forthcome yet.

"A final suggestion for word processing users. Get something to give you upper and lower case. The Videx eighty-column board is excellent and offers good support and a lot of extra features."

"We are currently using three word processing packages: *Super-Text II, Super-Text 40/56/70,* and *Screen Writer II. Super-Text II* was the one we standardized with. It was the easiest to learn to use. Although it allowed you only forty columns, many of our users began to prefer it because of the larger size of the characters. Columns of numbers were the only problem (they often looked strange on the screen). The inability to print headers and footers or an index bothered some people. Finally, it was difficult to interface the package with our Diablo and Epson (if we wanted to use all of the printer's features).

"*Screen Writer II* would have solved most of these shortcomings. However, it was quite difficult to learn to use, necessitating much flipping back and forth to the manual.

"*Super-Text 40/56/70* helped a lot, particularly with respect to using the printer. A lower-case adapter was no longer needed, and the seventy-column mode was quite useful for viewing what text would ultimately look like. However, some things changed. Math mode and split-screen use vanished. The speed seemed to slow considerably."

Happy Holidays. Well, we've rambled a bit longer than usual. But taking time to share reader feedback is worthwhile. In fact, a special section of the column will be dedicated to this purpose in the future. Next month, we'll get back to the regular format. Among other things, we'll discuss Apple III software and documentation and review some new products.

See you soon. Have a great holiday and a happy new year. ◨

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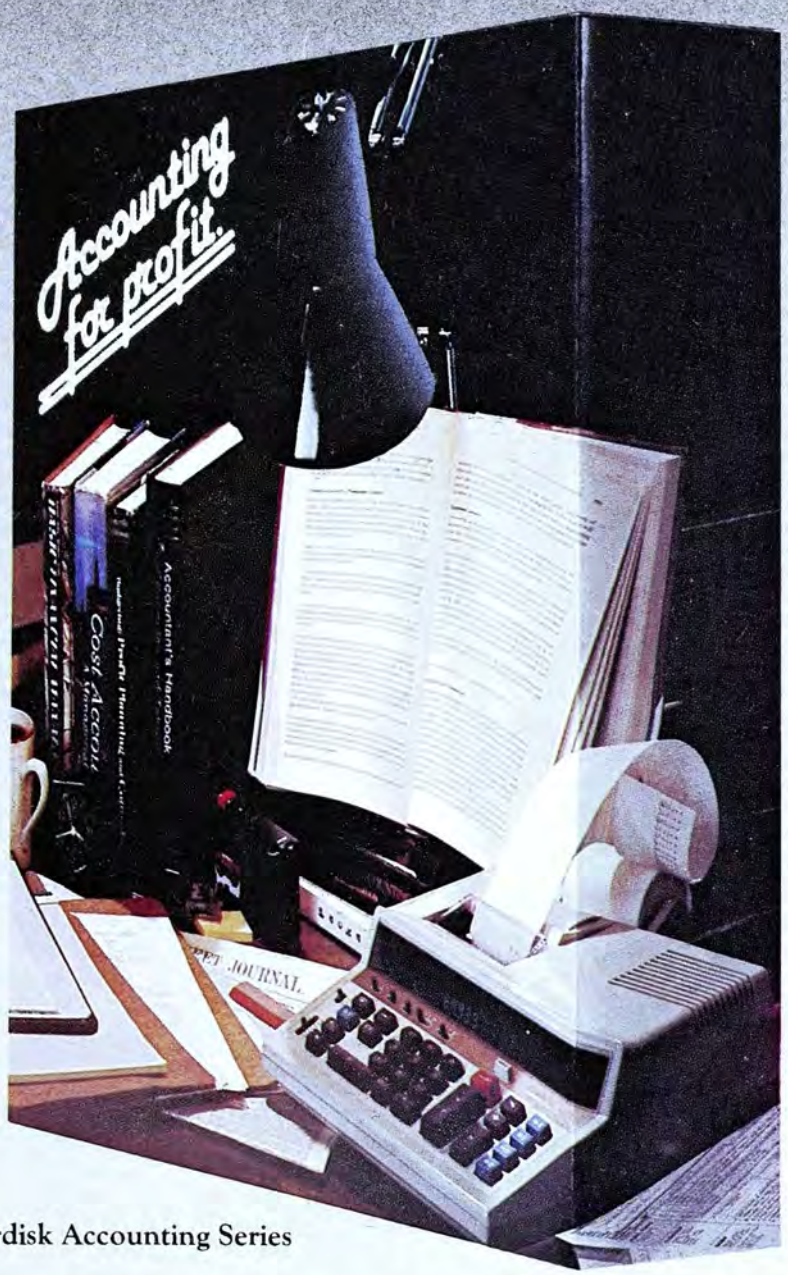
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THE ANIMATED APPLE With GraForth Part 4

BY PAUL LUTUS AND PHIL THOMPSON

This month we'll turn our attention to the three-dimensional graphics capabilities of GraForth and how they can be used for animation.

In any type of computerized 3-D graphics system, you start by creating a set of points, lines, and shapes in 3-D. Every point has a relationship to every other point: it can be higher or lower, closer or farther away, and more to the left or right. And, of course, this relationship depends on your point of view. The three different direction aspects of a point are represented using three numbers, or coordinates, labeled X, Y, and Z. It's the computer's job to convert your set of points according to some formula into points on a two-dimensional screen, using only X and Y coordinates. Then the points are connected with the appropriate lines, just as the 3-D points were connected with lines.

There are two different philosophies used in creating 3-D graphics. For the first, imagine a universe in which all of the 3-D objects exist. You describe the objects and tell the computer where they are in the universe. You then decide where your eye is, and which direction you're looking. The computer figures out which objects lie in that direction, converts them into a single two-dimensional image, and draws that image on the screen. This concept makes it fairly easy to represent complex scenes, but manipulating individual objects within that scene can be more time-consuming.

Another philosophy is to treat each 3-D object separately on the screen. You describe each 3-D object, then tell the computer where the objects should appear on the two-dimensional screen (or if they should appear at all), what size to draw them, and how they should be oriented. Each object is converted from three dimensions to two, independent of every other object. This means complex scenes can require more programming to produce, but manipulating each individual object is faster and easier. This is the technique used by GraForth.

GraForth allows you to manipulate 3-D objects through direct high-level commands. For example, the GraForth word *scale* sets the displayed size of a 3-D object, *xrot* rotates the object about the X axis, and *ypos* sets the vertical position of the object on the screen. These straightforward commands provide an easy-to-follow method of generating 3-D graphics.

The 3-D process can be divided into two parts: first, the image is created using the *Image Editor* supplied on the GraForth system disk. Then, the GraForth commands are used to read the image and draw the object on the screen with the appropriate rotation and scale. The image may reside in any free area of memory and is not changed by the drawing commands.

Let's define a couple of words for this discussion. An "image" is a set of 3-D points and lines as stored in memory. An "object" is a picture of the 3-D image as it is manipulated and actually displayed on the screen. Images can reside in memory without being assigned as objects and drawn; and two objects, though positioned and oriented differently on the screen, can both use the same 3-D image in memory. (For example, two rotating cubes on the screen can use the same set of 3-D lines.)

For each image, the X, Y, and Z coordinates can range from −128 to 127, giving a possible 256 positions along each of the three axes, which is plenty for most applications. The actual number of lines in an image is limited only by the amount of available memory. (Each end point of line entry in the image uses four bytes of memory.)

Up to sixteen different objects can be manipulated at one time in GraForth. They are numberd 0 through 15, and referenced with the GraForth word *object*. After giving an object command, the 3-D commands will manipulate that object until another object command is given. For example, if you type:

```
 3  OBJECT
30  XROT
10  SCALE
```

then object 3 will be rotated 30 units around the X axis and scaled to a size of 10. To manipulate a number of objects, you select each object in turn with *object*, then give the appropriate commands for that object.

Here is a quick summary of the individual 3-D commands, their effects, and the appropriate ranges of numbers to use:

Xpos, ypos. These set the X and Y position on the screen of the 3-D point (0,0,0) for the object and are used for positioning the object in the appropriate place on the screen. Xpos can range from 0 to 255 and ypos can range from 0 to 191. At the extremes, however, the object may overlap the edge of the screen, causing wraparound.

Scalx, scaly, scale. These commands determine the size of the object on the screen. Scalx sets the width and scaly sets the height. The word *scale* simply sets both width and height to the same number simultaneously. The range is from −31 to 31. A scale of 0 produces a displayed object with no thickness, and negative numbers create a mirror-image effect. Since two objects can use the same image in memory, symmetrical objects, such as bird wings, can be created using two objects side by side, with positive and negative scale numbers. This is the technique used for the two wings of the flying bat in the *Die Fledermaus* portion of the demonstration program.

Scalz. This determines the amount of perspective used. Perspective is what causes the front of an object to appear larger than the back. A large perspective number makes the front a good deal larger, and negative numbers provide "reverse perspective," with the back of the object larger than the front. Zero perspective means the front and the back will be the same size. The range, as above, is −31 to 31.

Xrot, yrot, zrot. These commands rotate the current object around each of the three 3-D axes. A complete rotation is divided up into units from 0 to 256. Zero is no rotation, 64 is a right angle, 128 is the same as 180 degrees, and 192 is three-quarters around the circle. Values greater than 256 or less than 0 can also be used for rotating more than once around. For example, a rotation to 258 units is the same as to 2 units.



Note: The actual rotation of the object changes for every other rotation value. This means that if you rotate an object in steps of 1 unit per draw, the view of the object will change every other draw, making the animation appear slower. It's best to increment rotation values in steps of 2.

Xtran, ytran, ztran. These commands translate, or "slide," the object in each of the three directions in space. The object can be shifted as long as none of its points falls out of the −128 to 127 position range. If this happens, a wraparound effect will occur. Therefore, translation works best with small images, having room to move.

Objcolor. This determines what the object's color will be when it is drawn if color was not specified when the image was created. If color was specified, then objcolor is ignored. The standard GraForth color numbers (1 through 7) are used. Note that objcolor also sets the normal color command, so be sure to reset color to the desired value after using objcolor.

Table 1 shows the 3-D parameters and the range of values they use.

Let's try some examples. First, we need a 3-D object to work with:

```
0 40 18 24 WINDOW ERASE
CR 132 PUTC PRINT " BLOAD TETRA,A2816 " CR
OBJERASE                          ( Clear 3-D variables )
0 OBJECT     2816 OBJADR     ( Set parameters for object 0 )
80 YPOS      10 SCALE
20 XROT      40 YROT
DRAW
```

As we present word definitions, you'll probably want to use the editor to enter the definitions, then compile them into the word library using memrd. Then you can experiment with the definitions by changing some of the parameters from the editor and recompiling. Of course, you can also type the word definitions directly into GraForth from the keyboard.

Creating animations with GraForth's 3-D graphics is easy and straightforward. As we mentioned in an earlier column, animation is simply a series of still pictures displayed rapidly one after another, providing the effect of movement. One fast way to generate this movement is

Parameter	Range	In steps of
XPOS	0 to 255	1
YPOS	0 to 191	1
SCALX	−31 to 31	1
SCALY	−31 to 31	1
SCALE	−31 to 31	1
SCALZ	−31 to 31	1
XROT	0 to 255	2
YROT	0 to 255	2
ZROT	0 to 255	2
XTRAN	−128 to 127	1
YTRAN	−128 to 127	1
ZTRAN	−128 to 127	1
OBJCOLOR	1,2,3,5,6,7	

Table 1.

with a do−loop:

```
257 0 DO I YROT DRAW 4 +LOOP
```

This example rotates the object a full circle around the Y axis. Since the loop is in steps of four, it repeats 64 times, producing 64 separate draws, one after another. For each draw, the rotation around the Y axis is set to the loop value, incrementing from 0 to 256.

This type of animation is straightforward, but for most applications a number of parameters need to be manipulated at once. Let's look at how to do more complicated manipulations with a few examples.

When using a do−loop, usually one draw will be performed each time through the loop. The size of the loop then determines how many times the object will be drawn. To change the parameters, two approaches are possible: the loop value can be used to generate the desired parameter values, or separate variables can be used to keep track of each parameter.

In the first method, the conversion from loop value to parameter value is done with short formulas. For example, if you want the tetrahedron to rotate around the Y axis three times for each rotation around the X axis, you can use this routine:

```
: THREE.ROT
  257 0 DO
    I XROT
    I 3 * YROT
    DRAW
  2 +LOOP ;
```

After entering *three.rot* into the editor and compiling (or entering it directly from the keyboard), it can be run by simply typing:

```
THREE.ROT
```

The trick is to find the right formula for the desired motion. Suppose, with the above example, you also wanted to make the tetrahedron grow in size from 12 scale to 20 scale. The change from 0 to 256 in the loop must be translated to a change from 12 to 20. Note that the difference between the start and end loop values is 256, and the difference in the scales is 8. If we divide the loop value by 32, we get a range of 0 to 8. If we then add 12, we get the desired range of 12 to 20:

```
Loop value 0   / 32 = 0 ... 0 + 12 = 12 Scale value
Loop value 256 / 32 = 8 ... 8 + 12 = 20 Scale value
```

The new routine looks like this:

```
: ROT&SCALE
  257 0 DO
    I YROT
    I 3 * XROT
    I 32 / 12 + SCALE
    DRAW
  LOOP ;
```

Now we'll look at a program adapted from the "rolling tetrahedron" display in the GraForth demonstration program. The tetrahedron moves down and to the right, rotates end over end, and grows and shrinks, giving the appearance of rolling closer, then farther away. You can use this routine with any image in memory.



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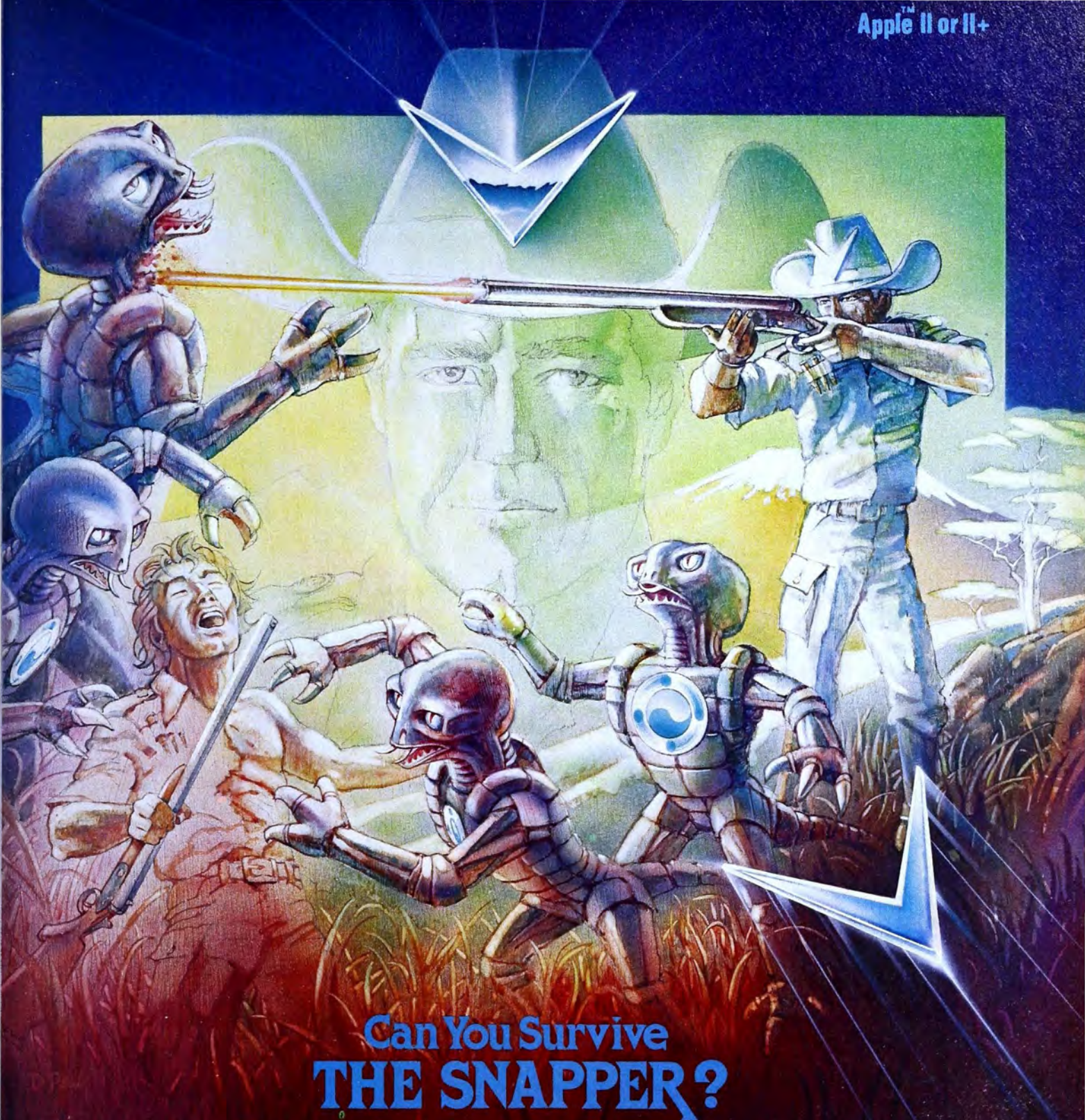
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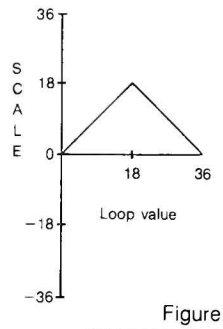


Figure 1.

```
: ROLL.OBJECT
  37 0 DO
    I 3 * XROT
    I 5 * YROT
    I 6 * 25 + XPOS
    I 3 * 35 + YPOS
    I 18 - ABS CHS 18 + SCALE
    DRAW
  LOOP ;
```

None of these formulas were arrived at by magic. As the routine was written, we tweaked each formula until we got the desired display. Here are the numbers that come out:

Loop value: 0 to 36
XROT: 0 to 108
YROT: 0 to 180
XPOS: 25 to 241
YPOS: 35 to 143
SCALE: 0 to 18, then back to 0

The scaling formula deserves more comment. The desired effect was to have the object grow and then shrink. We could have used two scaling loops one after another—the first increasing and the next decreasing. But then we would have had to keep all the other parameters moving smoothly through the transition from one loop to the next, without a skip in values. For simplicity, we decided to use a single loop.

With the loop value moving from 0 to 36, we wanted the scaling function to slide from 0 to 18 and back to 0. This can be shown with figure 1. Figure 2 shows the steps we used to achieve the effect.

Sometimes a more complicated animation cannot be performed inside a simple do–loop. This is especially true if the user is interacting with the program through a joystick or keyboard, and the program must make decisions. In this case, it's often best to use separate variables to keep track of each parameter. The parameters can then be updated at any time from the running program. The following program duplicates the *Roll.Tetra* routine using this technique.

```
VARIABLE XR     ( X rotation )
VARIABLE YR     ( Y rotation )
VARIABLE XP     ( X position )
VARIABLE YP     ( Y position )
VARIABLE SC     ( Scale )
VARIABLE DIR    ( Scale direction larger or smaller? )

: UPDATE.TETRA
  XR 3 + DUP ->   XR  XROT     ( Increase X rotation by 3 )
  YR 5 + DUP ->   YR  YROT     ( Increase Y rotation by 5 )
  XP 6 + DUP ->   XP  XPOS     ( Increase X position by 6 )
  YP 3 + DUP ->   YP  YPOS     ( Increase Y position by 3 )
  DIR IF                       ( If scale is increasing: )
    SC 1 + DUP ->SC SCALE      ( Increase scale by 1 )
    SC 18 = IF 0 -> DR THEN    ( change direction? )
  ELSE
    SC 1 - DUP -> SC SCALE     ( Decrease scale by 1 )
  THEN ;

: ROLL.TETRA1
  0 ->XR  0 -> YR              ( Initialize variables )
  25 -> XP  35 -> YP
  0 -> SC
  1 -> DIR                     ( Set scale direction )
  DRAW                         ( Draw first object)
  36 0 DO                      ( Start loop)
    UPDATE.TETRA               ( Set new parameters )
  DRAW                         ( Draw object)
  LOOP ;                       ( Loop back )
```

We used a do–loop to run the animation since no branching decisions were needed for this program. If they were required, the current value of any 3-D parameter would always be available.

For smooth animation, the GraForth 3-D graphics routines automatically take advantage of both hi-res screen pages in the Apple memory. During 3-D animations, one screen area is displayed while the other is being invisibly updated. This way, the lines are not shown being erased and redrawn. This is only true for 3-D graphics. GraForth text printing, line drawing, and character graphics always draw to both screens simultaneously. In this way, the screen-flipping 3-D graphics can be mixed with other kinds of graphics without causing lines and characters to repeatedly appear and disappear.

The sequence GraForth uses in putting a 3-D object on the screen is a four-step process: whenever the word *draw* is executed, the drawing routines are first directed to the graphics screen that is not currently being displayed. Then the previous 3-D objects are individually erased line by line by following the parameters that were originally used to draw them. Next, the new objects are drawn on the screen using the current parameters. Lastly, the display is switched to this screen, so that the new objects can be seen.

To increase speed, the word draw only works with the objects that have been referenced since the last draw command. This reference can be made by giving the object one or more new parameters, or by simply calling it again with *object*. This means that objects that don't need to be changed can be left on the screen as they are and will not slow the drawing of objects still in motion.

Suppose you're manipulating two 3-D objects (call them objects 1 and 2) simultaneously. First, both of them are in motion, and the animation toggles between the two graphics screens with each draw com-

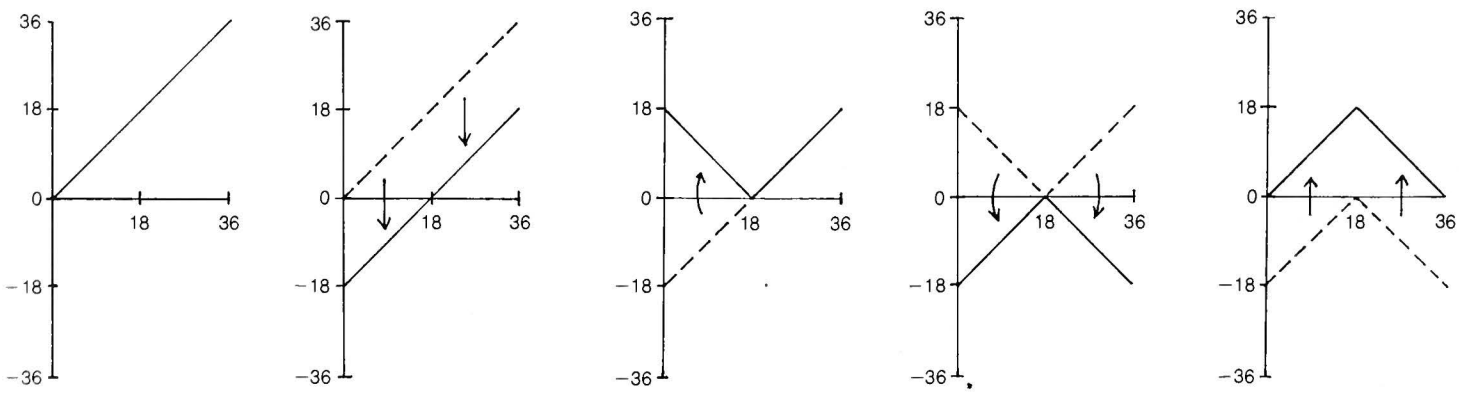
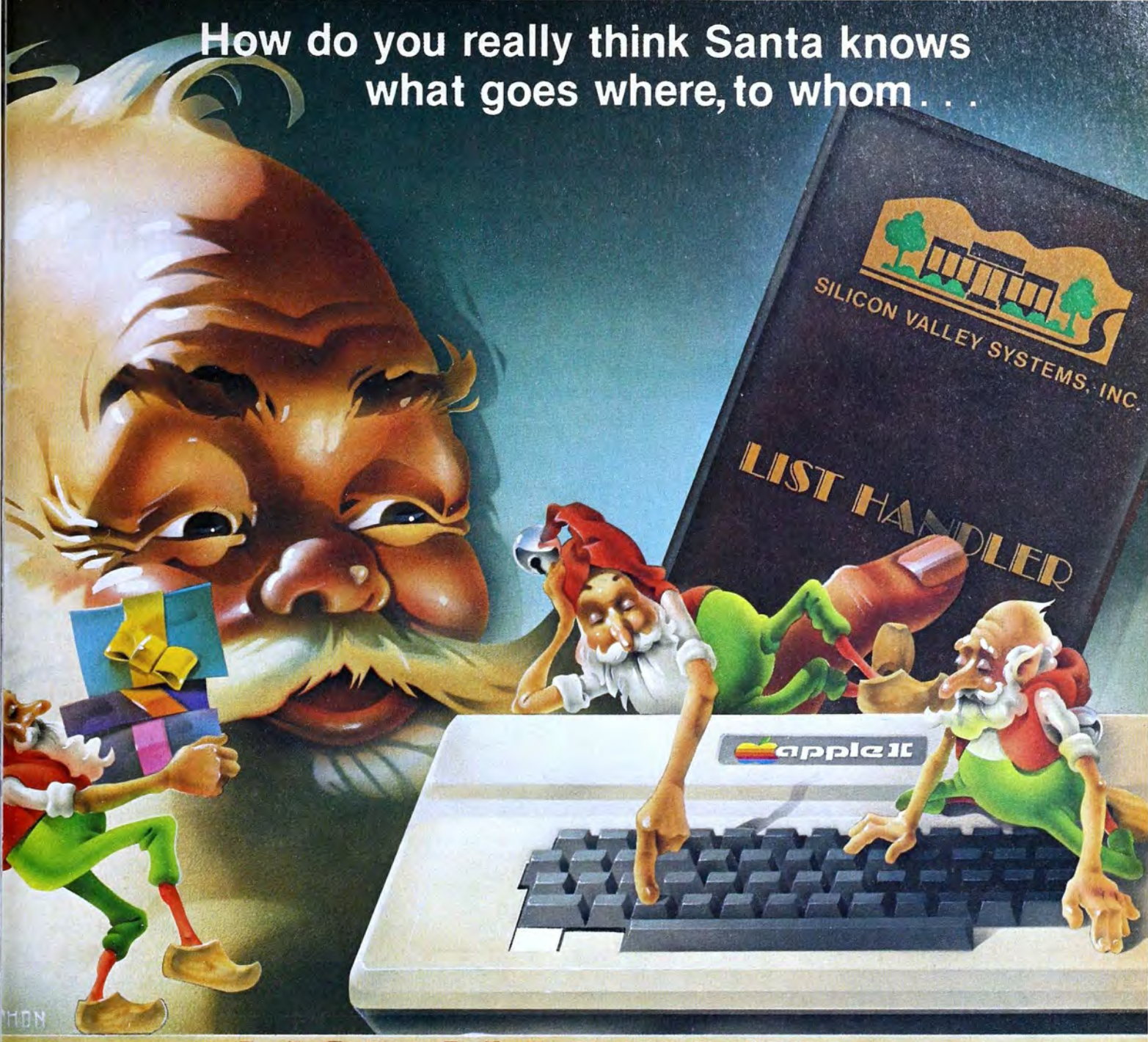


Figure 2.



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mand. Then you decide to stop the motion of object 1, while continuing object 2. To do this, you simply stop giving object 1 any new commands. Since object 1 was previously in motion, the picture of the object on the two graphics screens is different. As the animation continues with object 2, the display will switch back and forth between the two screens. The two pictures of object 1 will alternate back and forth, rather than remaining still.

The solution to this problem is simple: when you don't need to move an object any more, give it one extra *object* command, without any new parameters:

```
1 OBJECT
```

This will cause the same picture of the object to be drawn on the second graphics screen. The two pictures of the object will then be identical, and the object will remain still while other objects are manipulated.

Here then is a quick overview for doing 3-D graphics with examples to follow:

1. Load the images into memory:

```
CR 132 PUTC PRINT " BLOAD CUBE,A2816 " CR
CR 132 PUTC PRINT " BLOAD HOUSE,A3000 " CR
```

2. Initialize GraForth's 3-D variables:

```
OBJERASE
```

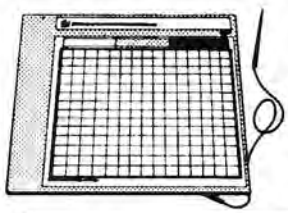
3. Select object numbers and the image addresses for those objects:

```
0 OBJECT 2816 OBJADR
1 OBJECT 2816 OBJADR
2 OBJECT 3000 OBJADR
```

4. Initialize the position and orientation for each object (this could be combined with providing the image address):

```
0  OBJECT  5 SCALE
20 XROT   20 YROT
50 XPOS   40 YPOS
```


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```
1  OBJECT  180 XPOS
10 SCALE     6 SCALZ

2  OBJECT
15 SCALZ   10 SCALE
50 XPOS   110 YPOS
```

5. For each picture to be drawn, execute a draw command:

```
DRAW
```

6. To continue animation of all objects, again select each object in turn, provide any new parameters, and call draw:

```
0 OBJECT  25 YROT
1 OBJECT   8 SCALE
2 OBJECT  65 XPOS
DRAW
```

7. If you want to stop the motion of one object while continuing to change others, call the object one more time (without any new parameters) to draw it again, to prevent residual motion:

```
1 OBJECT
```

Moving Faster. With a little extra planning, the speed of 3-D graphics can often be increased considerably. The line-by-line undrawing of each 3-D object uses as much time as drawing the new object. A faster method to remove old images is simply to erase the area of the screen the object lies in, and then not to bother doing a line-by-line erase.

The GraForth word *undraw* is designed for doing just this. Undraw erases a portion of the screen just as unblk does, on a character-size basis. However, undraw also sets a flag telling GraForth not to do a line-by-line erase of the 3-D object. After setting the block size and the position appropriately, you can erase the object yourself, so that the 3-D routines don't have to erase it. This method requires that you know what rectangular area of the screen is used by the object and that no other graphics lie in this area, since they would also be erased.

Here is an example of using undraw. Starting from scratch, let's first get an object onto the screen:

```
0 40 18 24 WINDOW ERASE    ( Optional )
CR 132 PUTC PRINT " BLOAD CUBE,A2816 " CR
OBJERASE
0  OBJECT  5 SCALE
20 XROT   20 YROT
DRAW
```

An easy way to determine the block size and placement to use with undraw is to fill the screen with characters, then draw the object over them:

```
0 VTAB 1000 0 DO I 10 MOD . LOOP 0 OBJECT DRAW
```

By simply counting down and across, you can see that the cube fills a block nine characters wide by eight characters tall, starting at *8 vtab 14 htab*. The undraw command can be used to erase this block during a 3-D animation:

```
ERASE
9 8 BLKSIZE
```

Now type this entire line, and then press the return key:

```
8 VTAB 14 HTAB 257 0 DO I YROT UNDRAW DRAW 4 +LOOP
  18 VTAB
```

This sets the character position for the block and rotates the object while erasing the block with undraw. Compare it with the same loop without undraw:

```
257 0 DO I YROT DRAW 4 +LOOP
```

The difference in speed is quite noticeable.

Next month, we'll continue with 3-D graphics, describing GraForth's internal 3-D object table and the format for 3-D images in memory. We'll also include a space shuttle simulation program, with a complete discussion of how it works. ■

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VENTURES WITH VISICALC

BY JOE SHELTON

VisiCalc has become a very useful tool in the corporate world. If you're a person who takes advantage of the program's capabilities on a regular basis, then you're well aware of how easy it is to use *VisiCalc* as a means of quantifying information for decision-making purposes. Look again at last month's discussion of decision matrix and probability value matrix and you'll see a couple of ways of using *VisiCalc* in this fashion. And, as you probably know, *VisiCalc* can also help you arrive at quantitative answers.

But there are still ways of using *VisiCalc* to make your life easier. This month we'll focus on some ways you can use the program to help you make decisions at home and in your personal life. After considering the examples offered here, you may see other ways of using *VisiCalc*—ways that might not otherwise have occurred to you.

We'll also look this month at a couple of problems you'll run into in one of the templates and see whether we can come up with any good solutions. We'll end this discussion with another problem. Then next time we'll compare notes on how we solved it.

Building a Bookcase. Suppose you're getting ready to build a bookcase. Having measured the area in which you plan to place the bookcase, you know that your creation can be eight feet high by four feet wide by one foot deep.

What you need to do now is determine how many shelves you can put in a bookcase this size. One method of determining how many shelves would be to take pencil, paper, and ruler and draw the bookcase to scale. You'd then be able to draw in shelves at different heights to simulate how the bookcase would look, and if you didn't like the configuration, you could just erase the shelves and draw them in again in different places. Another simple method of approaching this problem would be to cut out strips of paper to represent shelves. You could then move these around until you'd determined the optimum configuration for your bookcase. Not exactly a quick method of accomplishing the task, but it's easy and anyone can do it.

Obviously, *VisiCalc* can help you accomplish the same thing (why else would we be discussing it?). So, let's explore how *VisiCalc* can help.

To simplify matters, let's suppose that our bookcase frame consists of a bottom shelf, a top shelf, and left and right sides. There's space in the middle for our shelves.

When you think about it, arranging the shelves becomes a mathematical proposition. There's a limited space bounded by the top and bottom shelves; and in this area we're going to put shelves of a predetermined thickness. Each shelf will define a height limit for books. So, each time we (mathematically) install a shelf, the remaining space is decreased by the total of the shelf's thickness and the book area it bounds. As you see, we have now taken what was essentially a visual problem and quantified it.

Of course, the important factor from a template/bookcase designer's standpoint is the distance between shelves. That's what determines the height of the books that can be included. The template we create, then, must use the distance between shelves as the determinant.

It's time to try it. Boot *VisiCalc* and let's begin.

Rows 3 and 4 will be our variable section. Variables will be the height of the bookcase and the thickness of the shelves. If we decide to do a different bookcase in the future, we'll only have to change these two parameters. Cell B4 is where we will compute the number of shelves we'll have to purchase.

	A	B	C	D	E	F
1						
2						
3	Sides	8		+B3*12		
4	Shelves	.75				
5	Needed					
6						
7			Desired	Top of	Top of	
8			Shelf	Bottom	Next	
9			Space	Shelf	Shelf	Remaining

Figure 1.

In columns C, D, E, and F we will do the computations.

Enter the information shown in figure 1.

Column C will be the scratch area where we will enter the height that we require for books on each shelf. Columns D and E will provide the necessary calculations, and column F will tell us how much space remains. Once the template is completed, you can enter as many iterations of book heights as you desire until you have determined the best shelf configuration.

Since all of our shelf computations will be in inches, we need to convert the height of the bookcase, expressed in feet at B3, to inches—at D3.

We'll start our layout from the bottom of the template. That is a logical place to begin; records and large books are heaviest and take up the largest space, so we'll allow for them first.

Arbitrarily, in this model we'll allow for eleven shelves. We'll start by allowing for the thickness of the bottom shelf. Then we'll add other shelves.

In D20, enter +B4. This cell will always hold the value of the initial shelf thickness. As you begin designing your bookcase, you'll be entering the book height for the bottom shelf in C20, the book height for the next shelf in C19, and so on. But don't enter any of those values yet.

Column D will be used to compute the distance from the bottom of the bookcase to the top of the highest shelf. Column E will compute the top of the bottom shelf (column D) plus the book height for the next shelf plus the thickness of the next shelf. Since we have already entered a cell reference in D20, in cell E20 enter +D20+C20+B4. That will total the thickness of the bottom and top shelves, plus the book height.

In column F we'll show the total space remaining. That is the total available space (the height of the bookcase) minus space already allotted. The formula at F20 is +D3−E20.

At D19 enter +E20. This will show the height of the current shelf and allow the computation for the next shelf.

Now replicate the formulas at D19, E20, and F20 up to row 10. Be sure to replicate references to D3 and B4 with no change. Now the calculating part of the template is finished and you can begin entering book height values (in inches) in column C. Work your way up from C20 and notice the results. If you press the recalculation key (!) a number of times, you will see the values continue to change. That's because this template

includes recursive references. Later in this article we'll examine the matter of recursive references in greater depth.

The last step in the construction of our bookshelf template is to determine the number of shelves we need to buy. In cell B5 enter @COUNT(C9...C21)+1. This will give us the total number of shelves necessary, including the top and bottom shelves.

Once you've completed this template, save it to disk. We'll return to it later.

MPG. Here's another template; you can use this one as a tool for understanding more about the health of your car and about the operating cost associated with keeping it in good running order.

Most of us have a certain amount of awareness about how well the car we drive is running. And when the car begins to run abnormally—when it's slow to start, idles too slow or too fast, or accelerates poorly—we usually notice. But it's sometimes much more difficult to tell when a car is just beginning to go out of tune.

One way to get some indication of how well or poorly your car is running is by keeping a continuous record of how many miles it gets to a gallon of gas. By keeping such a record, you'll be able to see when your mileage begins to drop; often this drop in mpg happens long before you begin to notice any real difference in the way the car drives.

Of course, you will have to be able to take into account the type of driving you did on a particular tankful. If you did mostly around-town driving, you can expect a lower mpg rate; conversely, of course, you can expect a much better rate on steady-speed road trips. In addition, checking the mpg requires knowing the capacity of your car's gas tank, filling your gas tank to some measurable point every time, keeping totals of the mileage driven and the gasoline consumed between fill-ups. And, of course, if you're going to look at the cost of operating your car, you'll need to keep track of what the gasoline costs each time you fill the tank.

The template is very simple. First enter the column headings shown in figure 2.

In E3 enter +B3/C3 and replicate that down the column to E13 or as far as you like. It's not necessary to replicate it very far, though; you can always replicate it for additional rows later.

	A	B	C	D	E	F
1		Miles/				
2	Date	Tank	Gallons	Cost	MPG	
3						
4						

Figure 2.

Now, each time you fill your tank, you can compute your average mpg. You'll see some variation in this figure depending on whether you take lots of short trips or a few longer ones on a tank of gas. When it has been a while since you last had your car tuned up, your mileage will start to drop. Then when you have your next tune-up, your mpg figure should increase again.

Once you're aware of the range of mileage your car achieves, it's relatively easy to take mpg into account when you're evaluating the health of your car. If you wanted, you could also keep track of the kind of mileage you get when you buy various brands of gasoline to see if one brand actually gives you better mileage than another.

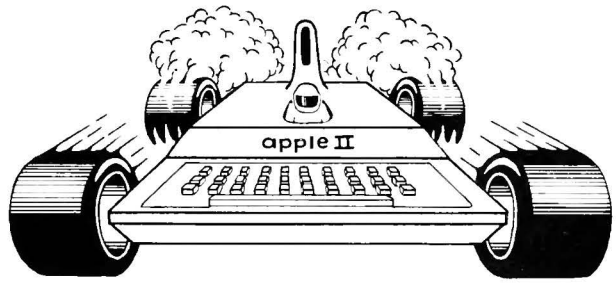
That was easy. Would you like to continue building the template as an aid to understanding the total cost involved in operating your car? You might be surprised at how expensive (or inexpensive) operating a car can be.

The real measure of the expense of operating a car is cost per mile. Of course, it's possible to measure cost per year instead.

There are two variables involved in the expense of operating a car. The first is the variable expense of the actual operation. This includes gas, oil, tires, and so on. The second category is fixed expenses. These are the expenses you'd incur even if you didn't drive your car. Included in the category are insurance, registration costs, garage costs, and various other expenses. You can see that because there's very little operating expense involved, a car that isn't being driven much would have a much lower total cost than one that gets driven a lot. But the first car would have a very high cost per mile.

In F1 and F2, enter *Operating* and *Costs*. If you wanted, you could

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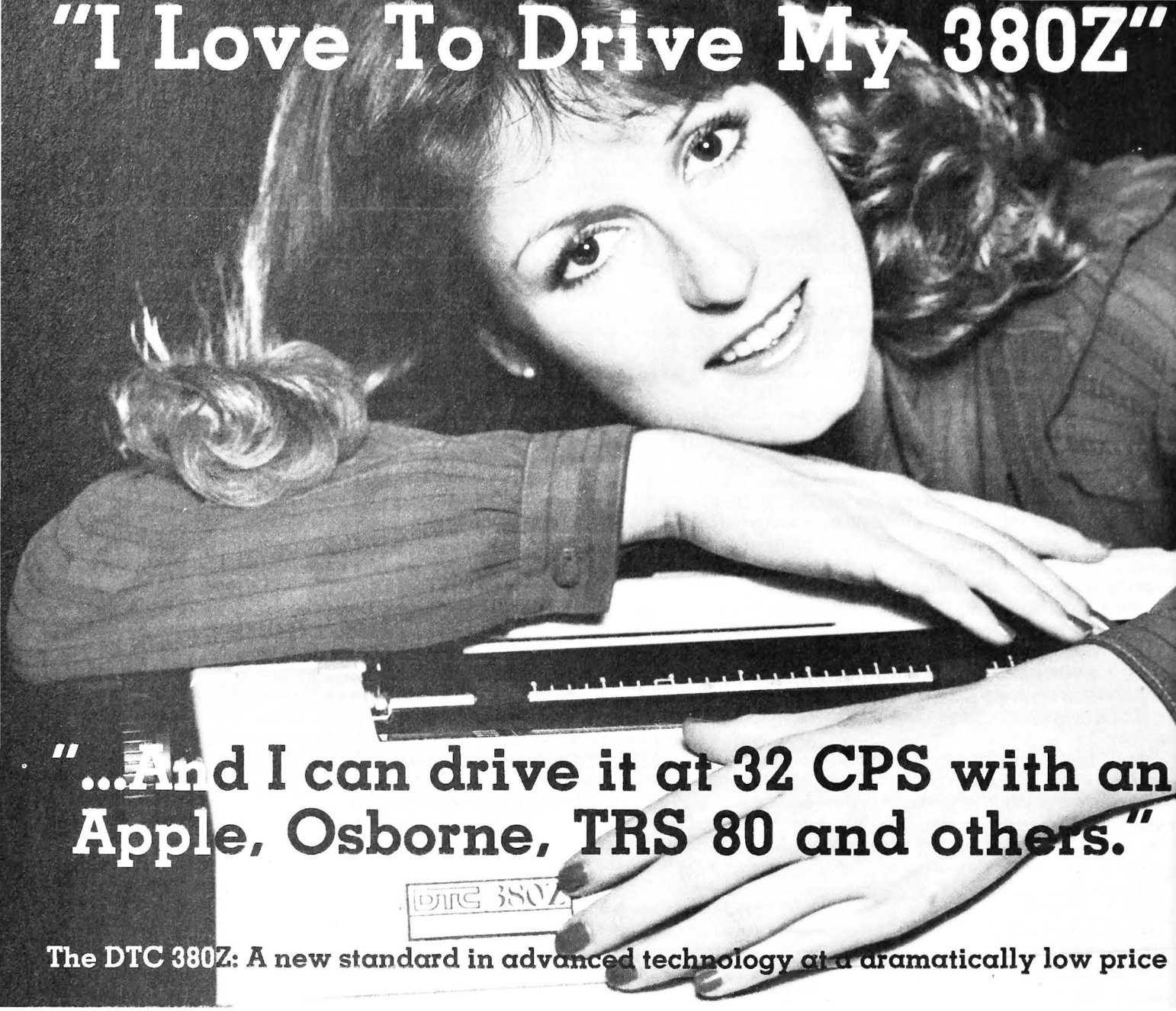
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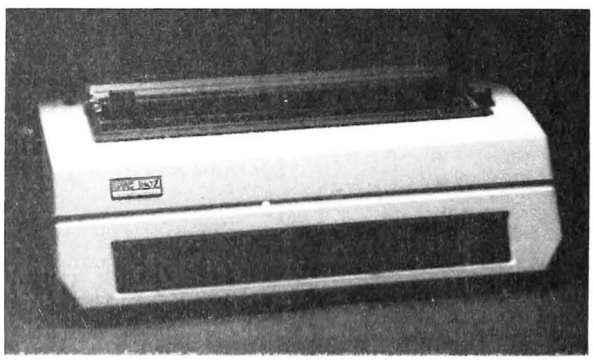
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	A	B	C	D	E	F	G	H	I
1									
2		Miles/				Operating	Ttl Op	Fixed	Ttl Cst
3	Date	Tank	Gals.	Cost	MPG	Costs	Costs	Costs	/Mile
4									

Figure 3.

create a different column for each type of operating cost and then total them in a Total Operating Costs column.

In G1 and G2, enter *Ttl Op* and *Costs* (Total Operating Costs). In H1 and H2, enter *Fixed* and *Costs*. And finally, in I1 and I2, enter *Ttl Cst* and */ Mile* (and don't forget to put in the quotes before the slash). Your template should look like figure 3.

In G3 enter +D3+F3 and in I3 enter +G3+H3/B3. You won't enter anything in columns F and H until you actually incur an expense, such as having to pay an insurance premium.

When you enter information in column H or column F, you'll find an immediate novelty. The Total Cost per Mile in cases where there are entries in H or F is very high. The next fuel entry brings the average for that fill-up back to normal. What do we do?

The answer is that we must look at total mileage versus total cost rather than looking for each individual entry. Insert two columns, one for a running mileage total and one for a running cost total. The formulas will be the last mileage (or cost) plus the current mileage (or cost). In the Ttl Cst/Mile column, divide the running cost total by the running mileage total and you have a running cost per mile.

A Thousand and One Uses. So far we have examined two somewhat unusual ways of using *VisiCalc* for fun and personal advantage. There are many more. For example, *VisiCalc* can be used to analyze tennis matches, football games, baseball games, and other sporting events. Its uses are limited only by your imagination. When you think of some good ones, write in to tell other readers about them.

Bookcases and Problems. If you saved the template we used to design our bookcase, load it now; we're about to use it again. If you haven't completed the template, consider doing so now; you'll get a lot more out of this section once you have the completed template ready to go.

As we have done in previous installments of this column, we're going to look at a couple of problems with the template and attempt to solve them.

The most obvious problem in this template is the number of recalculations you must do every time you change the height, the width, or number of the shelves. Experiment, by changing one of these variables, and recalculate until you see no more changes to be made in the template. You'll notice that changing the bookcase height requires only one recalculation to correct the values in the template completely, while the other two variables require numerous recalculations.

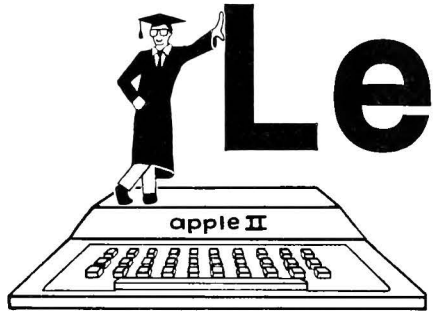
Any time you encounter this problem in a template, change the order of recalculation (/GOR or /GOC) and test the template again. *VisiCalc* begins calculations from the top and either calculates across each row going down the template or down each column going across the template, depending on the order of recalculation. Sometimes, changing the order of recalculation will completely solve the problem. If it doesn't, one of the two possibilities will usually alleviate the need for some of the recalculations.

If you look at the formulas in columns D, E, and F starting in row 19, you'll see that each entry requires the entry below to be completed before the next entry can be computed. This means that, when each row is recalculated, it uses an unrecalculated value in the row below. It then recalculates the value in the lower row. The value displayed in the row above is incorrect, while the value in the lower row is now correct. It takes another recalculation finally to display a correct value in the higher row. If you imagine ten rows, each requiring a recalculation, you can see that it could take up to ten recalculations for the template to be correct.

How do we fix this? Ideally, we initially design our template so that all references to other cells are either to the right of or below the cell with the formula. This isn't always possible, but there is a way to simulate it. This requires an "anti-recursive" table. This kind of table starts with the lowest shelf at the top of the template and each successive shelf one row down. In this manner, each recalculation works down the template, avoiding any recursive tendencies. In order to eliminate yet another

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recursive tendency, the anti-recursive table should be above the final table.

Of course, using the anti-recursive table alone is counter-intuitive to the user (you'd be entering the lower shelves at the top of the template), so the template must have a section where each required cell is referenced in the original order. Graphically, we can illustrate this as shown in figure 4.

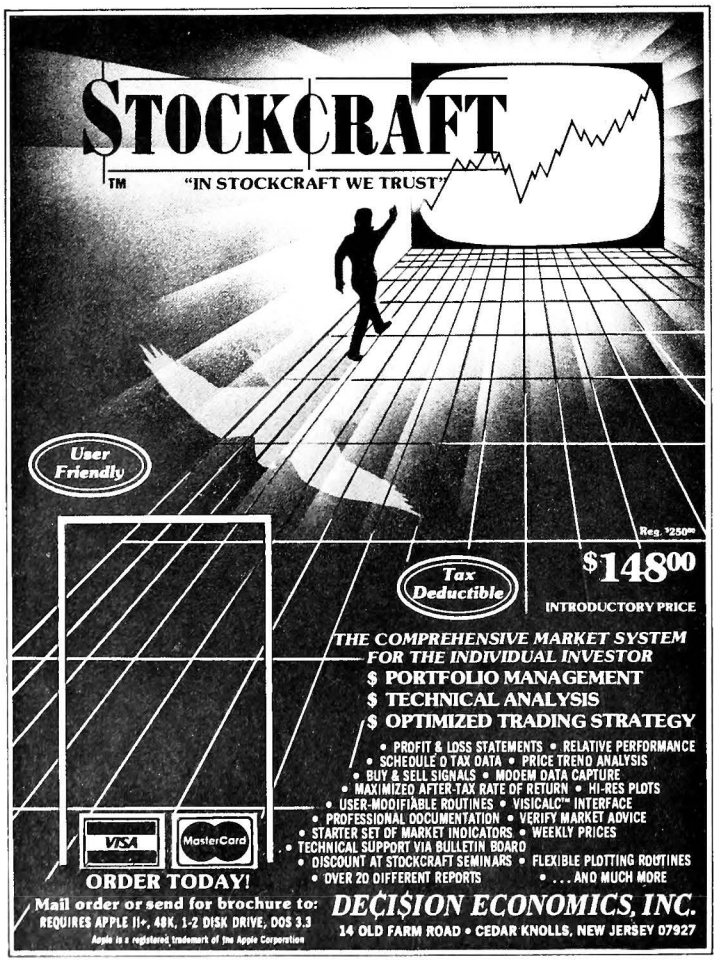
As a simulation of our shelf template, formula 1 in A1 would compute the *lowest* shelf, with formula 2 determining the next highest, and so on. The first cell in the user table references the lowest cell in the anti-recursive table, and each cell down the table references a successively higher cell in the anti-recursive table. In our example, the references in A11, A12, and A13 reference the cells in the anti-recursive table in reverse order. All computation and references in this model are started at the top of column A and worked to the bottom.

Too Much To Look At. When you review the template, you'll see values shown in every cell that contains a formula. Even the cells that have no shelf entered in column C display a value. While this doesn't affect the usefulness of the template, it leaves much to be desired esthetically. There are many times when it would be nice to be able to display 0, rather than a value.

In our shelf analysis, the factor that decides whether useful values or just "fall-through" values are displayed in columns D, E, and F is the presence of an entry in column C.

	A	
		Anti-Recursive Table
1	Formula 1	
2	Formula 2	
3	Formula 3	
		Normal User Report
11	+A3	
12	+A2	
13	+A1	

Figure 4.



	F	G	H
9			
10	@LOOKUP(D3-E10,G10...G11)	(+D3-E10)	(+D3-E10)
11		(+D3)	0
12			

Figure 5.

Let's see if there is a simple method of displaying 0 instead of a fall-through value. We'll take cell F10 as our example. We can use the @LOOKUP function to match the value computed by the formula in F10 (that is, +D3-E10) against a look-up table. The look-up formula in F10 and look-up table (with formulas rather than values displayed) would look like figure 5.

The look-up formula looks for a value equal to either D3-E10 or D3 (because E10 has a value of 0 once it has been set up with a @LOOKUP to make it 0 if there isn't a value in C10). If it finds a value equal to D3-E10, the look-up formula returns the value in H10, or D3-E10. If it finds a value equal to D3, it will return a 0. So, if you followed all that, and assuming all the cells have been modified, if there is no value in C10, then there will be no value in F10. If you enter a value in C10, F10 will display the correct value.

Can you see a problem with this solution? Each cell in columns D, E, and F would now require four additional cells for the look-up table. With three columns and eleven cells per column, that equals thirty-three cells requiring four cells each, or 132 cells for look-up tables alone. Clearly, this qualifies as a case of the tail wagging the dog!

Surely there is a simpler way? There is! The magic @IF function permits a simple and elegant solution. Think about what we are trying to accomplish. If there's no value in C10, we want to display a 0; otherwise we want to display the result of the equation +D3-E10. In *VisiCalc* vernacular, that translates to @IF(C10=0,0,D3-E10). Does that accomplish what we asked? If there is no value entered in C10, then C10 equals 0 and the @IF will return 0. Otherwise, the @IF will return D3-E10. If you use the same function on all the cells in the table, you will see the results we are looking for.

A Challenge! Okay, you have been an interested, but passive, reader so far. We're going to look now at a problem that happens often in templates and your challenge is to solve it. Relax, you have a month! Actually, it's a simple problem, although the solution may require a bit of experimentation. Look at figure 6.

This is a sales analysis for a company that sells copiers. The company is responsible for three areas. Sales reps have been hired to cover the three areas and the sales manager is trying to decide whether to hire more sales people to cover area 3. He is questioning whether salespeople actually contribute enough business to warrant adding more of them. The sales in area 3 are all from responses to national advertising by the parent company.

The sales manager has entered the values in columns B and C. The formula in column D is column B/column C (for example, +B4/C4). Since there are no sales reps in area 3, *VisiCalc* gives a division by zero error. When the sales manager tries to average column D in D7, the result he gets is another ERROR.

The sales manager could ignore the ERROR and enter an average of area 1 and area 2 sales reps (for example, (+D4+D5)/2), but he would like to be able to expand and use the template when he becomes national sales manager in a few months.

Can you fix the template so that any ERRORs that show in column D do not affect the formula in D7? The solution will appear in next month's column. ◨

	A	B	C	D	E	F
1		1982	Assigned	Sales/		
2		Sales	Salesrps	Slsrp		
3						
4	Area 1	100	2	50		
5	Area 2	125	5	25		
6	Area 3	55	0	ERROR		
7		Average/sales rep		ERROR		

Figure 6.

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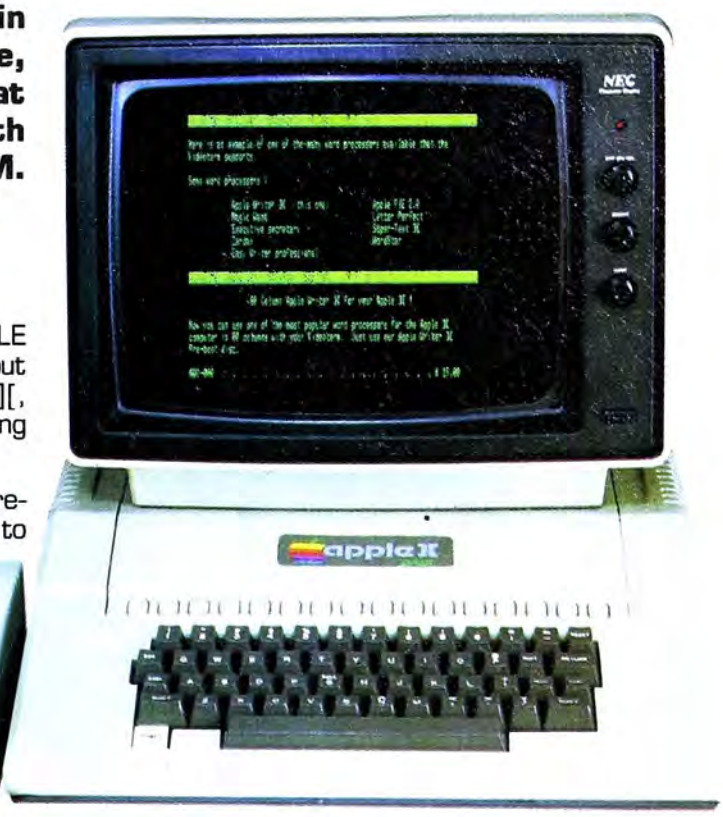
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For those who need even more power, a more advanced version combines all the above features with the ability to use many of the memory expansion boards currently available. A configuration editor allows VisiCalc to use a mixture of different kinds 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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Once again 'tis the season when the merchant shall cast his programs upon the waters, and *Softalk* shall gather all those programs together. This year's Stocking Stuffers Holiday Gift Guide brings it all home for Christmas in the most comprehensive listing of Apple hardware and software since last year's Holiday Gift Guide.

What follows, arranged by category, are the manufacturers' descriptions of their wares. We haven't tried all of them; we leave it to you to determine relative gift value.

Here's what you can assume in terms of basic requirements: 48K memory, Applesoft, an eighty column printer (if printer there need be), DOS 3.3, and one disk drive, unless specified otherwise. A ROM Applesoft requirement can be satisfied with RAM Applesoft in a language card.

At the end of the listings you'll find the complete addresses of all the firms and most phone numbers. If you can't find the product in your neighborhood computer store, you can call or write the company for the location of its nearest retailer.

Note that several companies have specially priced package deals for the holidays. Good hunting and joyeux nöel!

GAMES

Accent, Palo Alto, CA

Loop-Hole. Fast-action, hi-res game that pits two players against each other. Adults who don't normally play games will love it. Each game is different. $24.95.

Adventure International, Longwood, FL

Scott Adams Graphic Adventure #1 (SAGA), by Scott Adams. Now with hi-res, full-color graphics and voice synthesizer compatibility. Wander through an enchanted realm and try to recover the thirteen lost treasures. There are wild animals and magical beings to reckon with, as well as many other perils and mysteries. Can you rescue the blue ox from the quicksand? You'll never know until you try. $39.95.

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Scott Adams Graphic Adventure #3 (SAGA), by Scott Adams. Hi-res color graphics and voice synthesizer compatibility. In this exciting adventure, time is of the essence as you race the clock to complete your mission—or else the world's first automated nuclear reactor is doomed. So, tread lightly and don't forget your bomb detector. Difficulty level: hard. $39.95.

The Curse of Crowley Manor, by Jyym Pearson. The scene is London, 1913. Scotland Yard is buzzing with the news—there's been a murder at the Crowley estate. What starts out as a simple homicide investigation becomes a trip into the depths of the occult as you try to solve it. Uses many unique plot-twists and strange devices to guide you through to victory or a certain trip to the gates of hell. $29.95.

The Eliminator, by John Anderson. Hi-res, full-color graphics and sound effects make this incredible game even better. Defensive shields, complete movement controls, killer marauders, and much more add up to arcade-style action at its finest. $29.95.

Planetoids, by Marc Goodman. It's your ship versus a swarm of killer planetoids and alien ships as you try to destroy them before they blow you into the next galaxy. Gives you super-sharp hours of unlimited fun. $24.95.

Rear Guard, by John Anderson. Seldom has there been a program charged with such arcadelike power. In an awesome display of graphic realism, you are charged with protecting your mothership from the deadly waves of inhuman cyborgs that are approaching from behind. $29.95.

Tunnel Terror, by Eric Popejoy. Space and time go berserk—an Apple experience that will shatter your senses. While your ship moves around the circles on the edge of the dimensional tunnel, the enemy moves up the sides until they either reach the top or are destroyed by your ship's fission torpedoes. $29.95.

War, by Stan Erwin. State-of-the-art brilliance comes to the Apple. A detailed war game for one or two players. Your army consists of armored units, infantry units, engineer units, and aircraft. Set against a backdrop of forests, cities, and rivers, you must move your units into battle and eventually destroy your opponent. $24.95.

Alpine, Colorado Springs, CO

Lovers or Strangers. A computer game with a serious side. It evaluates how compatible two people are and how likely they are to have a successful relationship. But it's also fun and entertaining. Designed to stimulate laughter, conversions, and . . . romance. $29.95.

Apex, Spring Valley, CA

Saints and Sinners, by William C. Jones. A graphic musical comedy in a colorful board-game format that humorously attempts to explore the merits of religion in society. Features over forty popular tunes, dice rolling, card shuffling, and fancy hi-res graphics. Plenty of excitement for one to four players. Either DOS. $29.95.

ARS Publications, Venice, CA

Wizmaker, by Ron Richards. Use to modify characters for *Wizardry* and *Knight of Diamonds.* Rescue or make a superhero. Resurrect the dead. Can modify attributes, level, status, age, gold, spells, experience, and hit points. Includes maps. $20.

Artsci, North Hollywood, CA

Draw Poker, by Ken LaBaw. Everything in this hi-res computer version is the same as sitting at one of the tables in Las Vegas. Ask for new cards, bet the house limit, and so on. $24.95.

Roulette, by Roger Walker. A realistic simulation of one of the all-time favorite casino games. This one or two player game uses hi-res graphics and a spinning wheel to make you feel as if you are in Monte Carlo or Las Vegas. $24.95.

Craps, by Roger Walker. A one or two player hi-res dice game. In placing bets you can play the field, the pass line, and hardway rolls. Dice rolls are animated on the screen. $24.95.

Apple 21, by William Depew. All the excitement of casino blackjack is portrayed in the hi-res playing cards and green felt table. Up to three players may challenge the dealer by hitting, holding, or doubling down. $24.95.

Best of Bishop, by Bob Bishop. A real standard for hi-res graphics and animation on the Apple. In this package you get nine of Bob's best offerings. Five of these are fast-paced, hi-res action games (*Rocket Pilot, Saucer Invasion, Star Wars, Space Maze,* and *Bomber*), two animated classics (*Apple Vision, Apple Movie*), and the audio-visual favorites, *Talking Calculator* and *Music Kaleidoscope.* $39.95.

Photar, by SAB. A fast, colorful arcade game pitting the player against the mysteries and dangers of space. Pulsars weave their way through and around the black holes, while Photar and the rings of Saturn attack with unfriendly abandon. $29.95.

Casino Gaming Assortment. Contains *Draw Poker, Roulette, Craps,* and *Apple 21.* $69.95.

Avalanche, Palo Alto, CA

Taipan! by Art Canfil. Exciting strategy-adventure game featuring the China trade of the 1800s. In the role of a fortune-seeking taipan, the player braves the perilous South China Sea trading valuable cargo. Action-packed and exciting, for the youngest of pirateers to the sagest of commodity traders. $39.95.

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Andromeda Conquest. Vast-scale strategy game of galactic colonizing and conquest. One to four players compete to form galactic empires throughout the star systems. Each system of stars contains unique attributes, such as strange life forms and alien technologies, making interstellar exploration and battle interesting. $23.

Telengard. There are fifty levels of ever more complex mazes for mighty adventurers to explore in the mysterious underworld of *Telengard.* A real-time fantasy role-playing game where players use wits, magic, and fast reaction to fight monsters and reap very valuable rewards. $28.

Computer Acquire. The object is to become the wealthiest player in this business game about hotel acquisitions and mergers. For two to six players or a solitaire game against the computer. $25.

G.F.S. Sorceress. The first science fiction adventure game of the continuing saga of Joe Justin, aboard the Galactic Federation Starship *Sorceress.* You take the role of Joe Justin, falsely charged of mutiny, who must prove his innocence. Full-color manuals give players useful clues. $35.

V.C. Avalon Hill's first war game ever on the controversial Vietnam war. You command the chopper-based and heavily armed 1/509th Air Cavalry, with the 9/15th Field Artillery for fire support. Your task in this unconventional conflict is to bring the civilian population under control. $25.

The Alien. You are in charge of a starship with an escaped alien of unknown powers on board. It is up to you to capture or slay the alien. The alien is a deadly foe who will metamorphose into more deadly forms as time goes by—so time is also your adversary. $28.

Draw Poker. The crowd couldn't make it over for the weekly game? Relax; this game sets you up with four other players controlled by the computer. They play a smart and mean game and are not afraid to bluff occasionally. Be prepared to become a high-stakes loser or, if Lady Luck is with you, a big-time winner. $21.

Shootout at the O.K. Galaxy. Thirty alien warships have entered your patrol zone. Okay, shields up? This may sound like the latest summer space movie, but it's the preparations you make when playing *Shootout.* Purely graphical, combining arcade excitement with just the right touch of strategy. $25.

Galaxy! Have you ever wanted to conquer the universe? In *Galaxy!* players send galactic fleets to explore and conquer new worlds. Planets discovered may be barren worlds or possess immense industrial complexity. With sound effects; allows one to twenty players to compete against one another or the computer. A different star map is randomly generated for each game. $25.

Computer Stocks and Bonds. Be a Wall Street genius. Choose a general strategy and invest in the stocks that fit your game plan. In a bear market, players could lose their shirts. Invest in a bull market to make great gains. The winner is the one who makes the most money through game transactions. $25.

Voyager. A solitaire game that challenges the player to explore the four levels of an alien spacecraft's mazelike corridors and rooms in 3-D simulated graphics. To win, you must avoid robots that blast intruders, destroy generators and escape, and hunt out and annihilate killer robots. Comes with color, animated graphics, and sound capabilities. $25.

Bomber Attack. A real-time fast-action game. Command a supersonic bomber over enemy terrain. You must drop all twenty-five bombs on key locations before the enemy can down your bomber. Watch out for Red Cross hospitals; they're neutral ground. Cassette deck required. $16.

Midway Campaign. Your computer controls a huge force of Japanese ships whose objective is to invade and capture Midway Island. The Japanese made tactical errors that cost them the battle. You command the outnumbered and outranged U.S. naval forces. Your only advantage is surprise. $21.

Empire of the Overmind. Overmind, a tyrant that is part machine and part spirit of evil, overthrew the great king who escaped and planned revenge. Travel to the Empire and destroy the abomination. Includes deluxe copy of *Rhyme of the Overmind.* Recipient of *Electronic Games*'s adventure game of the year award. $35.

Controller. Air traffic control—guide the approach and landing sequence of up to eight planes. There are three types of aircraft, each with a different rate of climb, turning ability, stall-speed ceiling, fuel consumption, and fuel capacity. $30.

Tanktics. Armored combat on the eastern front of WWII. Includes full-color mounted map board and counters. You are the German platoon leader, outnumbered two to one—choose your tank types for one of five scenarios and specify what your opponent is to have. Go after or defend specified objectives from the Russians. $29.

Guns of Fort Defiance. You are the commander of a nineteenth-century artillery piece in a stockade. Specify a type of ammunition and set the elevation and deflection of the cannon. The computer controls enemy forces, randomly attacking with cavalry, infantry, or another artillery piece. $25.

Dnieper River Line. Fictionalized engagement between the German and Russian forces in the Ukraine during 1943. You must repel Russian efforts to breach the Dnieper River defensive positions. Four levels of complexity; comes complete with more than three hundred counters and mounted map board. $30.

Avant-Garde Creations, Eugene, OR

Hi-Res Computer Golf, by Stuart Aronoff. Drives computer games to a whole new level of sophistication. Choose from five eighteen-hole courses. One to four players must choose proper clubs, account for wind direction and velocity, and adjust for proper swing. Judgment, skill, strategy, and a keen eye are needed for this challenging computer sport. $29.95

Zero Gravity Pinball, by Don Jones. Pinball has gone into orbit. Five levels of difficulty. With ten independent flippers, an unpredictable black hole, and zero gravity, this game will keep you busy for hours even at skill level one. Take your computer into outer space. $29.95.

Death Race '82, by Don Jones. Escape from the Death Squad cars. Only James Bond-style driving will keep you alive. A game of hot pursuit, combining the skill of perilous driving with the thrill of a high-speed chase. Ten treacherous mazes and ten different speeds ensure many hours of fun. $29.95.

Federation, by Jim Haga. You are in command of a Federation starship. Fast, never-ending arcade action as your ship wipes out the invading Drorn drones, motherships, and surface installations on a mining planet in another galaxy. $29.95.

Lazer Maze, by James D. Spain. A keen eye and quick trigger finger are the keys to victory in the hall of laser justice. Laser beams that you fire are bounced through mazes of reflecting baffles at an enemy alien. You must correctly predict his position. This game will challenge skills you didn't even know you had. $29.95.

Beagle Bros, San Diego, CA

Beagle Bag, by Bert Kersey. Twelve listable games, plus many bonuses. *TestTrain, Magic Pack, Buzzword*—almost all the *Game Pack* games re-released on one jam-packed copiable disk. Bonus: *Beagle Menu* greeting program displays a catalog of only the programs you want displayed for one-key cursor selection. Unprotected. $29.50.

Broderbund, San Rafael, CA

Deadly Secrets, by Scott Schram. Our hero escapes a burning building via an involved and perilous route. Finding himself in a secret military base below the lobby, he's ordered to capture a terrorist who has stolen the fail-safe code that launches a nuclear attack! A hi-res adventure game. $34.95.

Seafox, by Ed Hobbs. In a lone submarine you take on a convoy of enemy ships and its escort, while dodging exploding depth charges, mines, and torpedoes. You will need superior maneuvering ability, courage, and a welcome aquatic ally to survive. $29.95.

The Arcade Machine, by Chris Jochumson and Doug Carlston. Create your own arcade games—it's easy! No programming knowledge

needed. Comes with a selection of full-color monsters (or design your own), dramatic explosions and sound effects, automatic and high scoring features, and more. $59.95.

Serpentine, by David Snider. Giant serpents set forth to slay their slithery cousins. To add to the fun, the snakes lay eggs and fight ferociously to protect their young. A fast arcade-style game with many levels of play. $34.95.

Choplifter, by Dan Gorlin. With realistic throttle action you maneuver a daredevil rescue chopper. You fight off enemy jet fighters and air mines above, tank fire and air-to-ground missiles below, rescuing hostages held behind the lines and bringing them out alive. Requires joystick. $34.95.

Labyrinth, by Scott Schram. Descend into the depths of Prince Julian's long-abandoned diamond mines in search of treasure. Encounter terrifying creatures guarding dark corridors with walls that move constantly to expose entryways and seal off exits. Eight levels. $29.95.

Star Blazer, by Tony Suzuki. Test your ability to attack and evade supersonic tanks, heat-seeking missiles, explosive balloons, enemy jets, and fuel-guzzling bluebirds (bluebirds?) in your maneuverable fighter; battle to clear away the Flatlanders' radar and ICBM installations. $31.95.

Track Attack, by Chris Jochumson. Steal gold from a moving train by intercepting it in your fast car. Jump the train and run across the top to take control of the engine. You'll need great timing and good peripheral vision. $29.95.

David's Midnight Magic, by David Snider. Hi-res pinball at its best. Dual flipper controls, upper and lower playing levels, tilt mechanism, rollovers, multiple-ball play, electronic deflectors, and many special effects. Requires paddles or joystick. $34.95.

Red Alert, by Olaf Lubeck. Hiding behind a thin red shield, you protect your base from destruction by Space Meanies and Thudputters using your radar, ack-ack, and remote rocket fire. Requires joystick. $29.95.

Genetic Drift, by Scott Schram. Quick! Save the world from domination by sharks, cockroaches, and other more adaptable sorts. Control genetic drift by zapping unstable life forms that threaten you and mutate them into friendly life forms that ensure our mutual safe passage into the next age. $29.95.

Space Quarks, by Chris Jochumson. Small, playful, beautiful but dangerous little particles hypnotize you with mysterious and intricate dances. But beware—when prodded, space quarks become very agitated and come flying down on you like kamikazes. Hi-res action with ten levels of play. $29.95.

Apple Panic, by Ben Serki. The apples will get you if you don't watch out. Forced to flee from pursuing apples in a multilevel mansion, you set traps for your pursuers along the way. A fast arcade-style game with great graphics and animation. $29.95.

Galactic Empire, by Douglas Carlston. The first episode in the four part Galactic Saga. A classic strategy game of military planning and logistics, played out in real-time hi-res with optional sound effects. $24.95.

Galactic Trader, by Douglas Carlston. Episode two of the Galactic Saga. You make your fortune buying, selling, and bartering commodities throughout the galaxy. $24.95.

Galactic Revolution, by Douglas Carlston. In the third episode of the Galactic Saga you ignite or suppress the impending revolution by swaying the allegiances of various power groups throughout the galaxy. $24.95.

Tawala's Last Redoubt, by Douglas Carlston. In the final episode of the Galactic Saga you join the rebel leader Benthi in an assault on the stronghold of the cruel Prince Tawala. $29.95.

BudgeCo, Piedmont, CA

Pinball Construction Set, by Bill Budge. The first computer toy. Enables players to build, play, and produce their own pinball games without the need to know how to program. Provides instantaneous control over all phases of play. No typing is required. Includes magnifier for detailing. One or two button joystick. $39.95.

Raster Blaster, by Bill Budge. Detailed simulation of pinball, with full color hi-res graphics, animation, and sound effects. *Softalk* readers' most popular program of 1981. $29.95.

CE Software, Des Moines, IA

Mission Escape! by Jim Jacobson. Exciting hi-res action game. Fight your way through ten rooms filled with deadly imperial storm troopers, robots, and drones. $24.95.

Wall Street, by Donald Brown. Up to nine players buy and sell stocks in a hyperkinetic stock exchange. Not recommended for the faint of heart. $24.95.

SwordThrust #1: The King's Testing Ground, by Donald Brown. Your character's life begins. You'll find stores with the equipment you'll need as an adventurer, as well as a novice cavern to test your skills. $29.95.

SwordThrust #2: The Vampyre Caves, by Donald Brown. Your foe is the Prince of the Undead himself. You'll need every edge you can get to escape with body and soul intact. *SwordThrust#1* required. $29.95.

SwordThrust #3: Kidnapper's Cove, by Donald Brown. You've been hired to rescue a sick child from a gang of vicious kidnappers. Time is short and half of your gold is at stake. *SwordThrust #1* required. $29.95.

SwordThrust #4: The Case of the Sultan's Pearl, by Donald Brown. A guard is dead and the pearl that controls the sultanship is gone. Can you figure out whodunit . . . in time? *SwordThrust #1* required. $29.95.

SwordThrust #5: The Green Plague, by Donald Brown. The scourge of the Middle Ages—plague—is back. You must find the cure or perish along with thousands of others throughout the kingdom. *SwordThrust #1* required. $29.95.

SwordThrust #6: The Eternal Curse, by Donald Brown. A spectre disturbs your sleep, begging for you to free him. Your quest leads you into the dreaded castle of Baron Tyme. $29.95.

SwordThrust #7: The Hall of Alchemie, by Peter Wityk. The master alchemist has harnessed the forces of science and magic and plots to use them to control the world. Only you stand in his way. $29.95.

Continental Software, Los Angeles, CA

L.A. Land Monopoly, by Jeffrey Stanton. Hi-res graphics version of the popular board game for two to six players. Uses Los Angeles street names, but has a customizing module to create a game of your choice, including the real one. Follows *Monopoly* rules. Save-game feature. $29.95.

3-D Skiing, by Jeffrey Stanton. An arcade game where one maneuvers a slalom skier down a 3-D course. The object is to run the staggered gates, which advance toward you as you ski, in the fastest time. Includes a second game of ski jumping, where one to four players compete on a seventy-meter jump. $24.95.

CPU Software, Everett, WA

Human Fly. Climb the CPU Towers. Beware of falling flower pots, unpredictable birds, grip-wrenching earthquakes, menacing gorillas, and more. $29.95.

Oil-Rig. Fast-paced simulation including arcade-type hi-res drilling and prospecting. Make quick business decisions and watch out for disasters such as exploding refineries, sinking off-shore platforms, and more. $29.95.

Cross Educational Software, Ruston, LA

Dinosaurs. Four games, a graphics demo, and a paddle graphics program. Games include *Fire Fight*, an arcade-type dinosaur battle, and *Dinosaur Hangman*, where a Zeuglodon will get you if you don't watch out. $15.

Blitzkreig II. A fast hi-res war between you and the bombers. Shoot down the airplanes before they blast your gun. $15.

DataMost, Chatsworth, CA

Crazy Mazey, by Ron Meadows. You're caught in a crazy maze of mean city streets—and the goons are out to get you. Grab the hidden cash and put the pedal to the metal if you want to get out alive. The most intricate hi-res mazes will push your skill and agility to the edge. $29.95.

Spectre, by Bob Flanagan and Scott Miller. You're stuck in a derelict spaceship lost in the universe. The space spooks got your crew and now they're gonna get you. Keep 'em away by closing the space ports and gobbling the dots as you navigate haunted corridors of 3-D maze action. $29.95.

Tharolian Tunnels, by Rod Nelsen. If you've got what it takes, you'll

become a hero in the great Tharolian challenge. Robotic spacefighters and automatic defense systems protect the giant planet. Blast the automated defense ships, penetrate the devilish Tharolian tunnels, and conquer the planet. $29.95.

Money Munchers, by Bob Bishop. Those beautiful dollar signs are everywhere. All you have to do is run through thousands of random mazes and grab the cash as you go. But watch out: those mean money munchers and their nasty guardians want that lot for themselves. $29.95.

Aztec, by Paul Stephenson. Ancient legends tell of the fabulous golden idol hidden within the mysterious lost pyramid. The treasure was once discovered by a demented archaeologist who planted booby traps to guard his fantastic discovery. And the ancient Aztecs left a fiendish collection of traps and guardians. So tread lightly—or you'll never make it out alive. $39.95.

Tubeway, by David van Brink. Strange beings from a parallel geometric universe have launched a fleet bent on conquest. The battle is yours alone. It's far from easy because normal strategy doesn't work! You'll have to fight by their bizarre, geometric rules. Fastest, most fascinating of the new style space games. $34.95.

Swashbuckler, by Paul Stephenson. Transport yourself to those diabolical days on the Spanish Main when evil pirate ships flew the skull and crossbones and struck terror in the hearts of young and old. You're trapped aboard the wickedest pirate ship of all, with only your courage and the cold steel of your sword to protect you. Lunge, parry, slash and stab your way to freedom. $34.95.

Snack Attack, by Dan Illowsky. Here's the Chinese food of maze games. More habit forming than a bag of peanuts. Taste the challenge; it won't just amaze you—it'll three maze you! But watch out. Nobody can play just one game. $29.95.

Mars Cars, by David Husch. You've landed on the mysterious red planet. The treasure awaits but so do the Mars cars and hundreds of barriers that you must destroy to reach the treasure. Use your human intelligence to outwit the alien treachery of the vicious killer cars and penetrate the sixteen levels to the planet's center. $29.95.

Thief, by Bob Flanagan. You won't stop until you've become the master thief of the galaxy. It's you alone against the rampaging robots through four levels and seven mazes of nonstop action. Fast, frustrating, rewarding—and a bit diabolical. Enjoy the speed and challenge, hour after hour. $29.95.

Casino, by Bob Rosen. Polish up your gaming prowess and prepare to break the bank. You choose the game and the stakes. What's your pleasure? Blackjack? Poker? Roulette, baccarat, or keno? The five most popular gambling games, complete with professional-style rules. The best action this side of Vegas. $39.95.

Pandora's Box, by Bob Flanagan and Scott Miller. You've opened the forbidden box—and now all the evils and plagues of the past are loosed upon mankind. Armed with bolts of lightning, you must recapture these corrupt creatures of doom and return them to the prison. Time is short: the world is already changing for the worse. So strike quickly, before it's too late. $29.95.

Vortex, by Kevin Bagley. From the dark side of the universe comes the Vortex—a deadly, swirling gravitational whirlpool. And now the world shakes and trembles and shrieks. Your starbase is immobilized by its deadly, unseen grip. An army of methane-breathing aliens spiral into the Vortex. Brace yourself; the battle is on. $29.95.

Computer Gin Rummy, by Art Carpet. Deal yourself in on the greatest gin rummy you ever played and get two other rummy games on the same disk: Knock and One-Meld. Makes other card games seem dull and boring. Truly professional-level play, and it's always ready to take you on, day or night. Three games in all. $29.95.

Pig Pen, by TMQ. Watch out! The oinks are on the loose in the newest, cleverest switch in the maze craze. The fierce, wild pigs are searching for you, so you'll have to make a run for it. But as you do, you leave behind a telltale trail of dots to show your path. Escape to the next jack, but there's no escape from those nasty pigs. $29.95.

Solitaire and Cribbage, by Art Carpet. Here's a great way to relax and enjoy not two but five challenging card games. Programmed to take out the effort and distractions common to many computer card games while leaving the fun and challenge in. Cribbage plus four solitaire games: Klondike (one or three cards at a time), Picture Frame, or Pyramid. $34.95.

Dynacomp, Rochester, NY

Black Hole. Visual simulation of closely observing a small black hole. Enter a defined close orbit, maintain it for a given length of time, and then exit. If you use too much fuel in achieving the orbit, you may not be able to break free later. Apple III in emulation mode. $19.95. Cassette: $15.95.

Valdez. Simulation of supertanker navigation in Alaska's Prince William Sound. Detailed analysis of ship response characteristics; model of tidal patterns in the Sound. Navigation is aided by a variable range radar display that shows the land masses and other traffic (ships and icebergs). Element map included. Apple III in emulation mode. $21.95. Cassette: $17.95.

Go Fish. The classic children's card game, adapted for one player against the computer. Strategy is simple, yet provides an easy way to introduce children to the concepts of chance and analysis, as well as being an enjoyable and challenging game. Apple III in emulation mode. $18.95. Cassette: $14.95.

Bridge Master. Comprehensive bridge program designed to provide hours of challenging competition. Bidding features include the Blackwood convention, Stayman convention, pre-emptive openings, and recognition of demand bids and jump-shift responses. You may replay the same hand with the option of switching cards with your computer opponents. Apple III in emulation mode. $21.95.

Earthware Computer Services, Eugene, OR

Volcanoes, by Gordon Goles. An exciting simulation of volcanism. As a research scientist, you predict volcanic eruptions to save lives and property, and reap the rewards. *InfoWorld* rated "Excellent! Fun!" Apple III in emulation mode. $49.50.

Star Search, by Mark and Gordon Goles. Assemble your crew and ship's stores for your journey into a mythical planetary system. Will you find alien life forms? Adventure and challenges. Space fiends and dungeon fanatics will love this one. Apple III in emulation mode. $45.

Edutek, Palo Alto, CA

Cooperation Maze. Enjoy the fun of cooperation. Two players work together to move up and down, left and right, and through a maze to reach a goal. Players will enjoy maneuvering to outwit this game's maze and moving obstacles. Requires game paddles. $20.

Brain Teaser. Solve a logical/geometrical problem—using special rules. Rearrange orange and black squares until they match a unique design. The system also guides players, who ask for help, toward the development of a problem-solving strategy. Requires game paddles. $25.

Alien Contact. Sharpens intellectual skills. The player is a language expert in outer space who must memorize alien symbols. After reaching the top of the alien memorization scale, the player returns to Earth through starry heavens. $20.

Epyx/Automated Simulations, Sunnyvale, CA

Monster Maze, by Bob Schilling. Trapped in a 3-D chamber of horrors, you're pursued by more than forty mutant monstrosities down corridor after corridor, through many unique mazes that are different every time you play. Can you rid the maze of these rude rascals and collect all the gold? You only have nine lives. $29.95.

New World, by D. A. Decker, Jr. Lead an expedition to the New World in this game of conquest and colonization in the year 1495. As England, France, or Spain, you recruit colonists, purchase supplies and soldiers, then transport them across the Atlantic. A successful strategy can win you control of the entire Western Hemisphere. $29.95.

Fore! Now you can play golf like the pros without joining a country club. Whether you're a novice or an expert, you can play your ball the way you want to play it—every time. Tee off from your choice of two courses with a bag of fifteen clubs to choose from. $29.95.

Tuesday Morning Quarterback. You're the coach and captain. The outcome of the game depends on whether you can outguess your computer opponent and call the best plays. Choose from sixteen different of-

fensive plays—plus an option play and six defensive options. You've only got a few seconds in the huddle to decide. $29.95.

Crush, Crumble and Chomp! Breathe fire, terrorize cities, snack on a horrified populace, and further develop your villainous personality. Take on the persona of any of six demonic beasties. Select from four mouth-watering metropolises and five different objectives. More than a hundred possible scenarios await your beastly appetite. $29.95.

Dragon's Eye. An overland adventure that invites you into a completely detailed world of fantasy involvement. Though relatively easy to learn, the subtle interplay among magic effects, monsters, weapons, and treasures retrieved makes the game a challenge. Combines simplicity with variety and real-time battle graphics. $29.95.

Temple of Apshai. Perform heroic deeds in a labyrinth filled with treasures, traps, and monsters. Animated color graphics portray the Temple and all its contents—magic, monsters, doomed cities, and damsels in distress. Do battle in real time, with over twenty types of monsters, each represented by a unique graphic shape. $39.95.

Upper Reaches of Apshai. This is the first in a series of expansion dungeons for the award-winning *Temple of Apshai.* There are four fun levels and more than 150 rooms, gardens, berry patches, and caverns. Take your favorite character along, or have the Innkeeper generate a new one for a combined indoor and outdoor adventure. $19.95.

Curse of Ra. Second in a series of expansion modules for *Temple of Apshai.* Takes you on a journey into the deserts of ancient Egypt. The cobra, the jackel, the mummy, and more—all roaming freely about more than one hundred chambers, and each has but one purpose. $19.95.

Ricochet. Rack up as many points as possible in this abstract action-strategy game. You have two launchers to fire at your opponent's goal. With six pieces for your chessmen, you maneuver them to block your goals while setting up the best possible shot for yourself. $19.95.

Jabbertalky. This programmable word game thrusts you into a world of language games. Eight levels of difficulty—up to sixteen word-game variations to challenge your wit and intelligence. Improve your vocabulary and your command of language. $29.95.

Funtastic, Drexel Hill, PA

Space Cadette, by Dan Illowsky. By the author of *Snack Attack.* Train at the academy on the space battle simulator. If you do well enough you make space patrol. Play against computer or opponent; two people can play at the same time. Six levels. Fast, smooth, colorful animation. Progresses in difficulty to ensure a long-lasting challenge. $34.95.

Gebelli Software, Sacramento, CA

Phaser Fire, by Salt City. A new and exciting game with 3-D effects; a battle for outer space. From defense of the Star Portal to travel into the intergalactic vortex, you must battle for the right to reach unknown galaxies. $29.95.

Zenith, by Nasir Gebelli. From intra-city battles to jettisons into hyper-space, you will confront action and danger at every angle. $34.95.

Horizon V, by Nasir Gebelli. While on a routine patrol of one of the five planetoid outposts of the Galactic Federation, you are set upon by angry G-bellians who believe you have kidnapped one of their most prized performers, Paulette the G-belly dancer. $34.95.

Russki Duck, by Eric Knopp and Alan Merrell. As a secret agent working for the CIA, you must recover the stolen MX plans which are hidden in a duck before foreign agents can smuggle them out of the country. (Why a duck? Who knows?) Fun and excitement for all ages. $34.95.

High Orbit, by Alan Merrell. Build intergalactic space stations and launch them into high orbit; destroy alien vessels before they obliterate the nodules. Thirty-two levels of play offer immense fascination to both beginners and advanced players. Tests your ingenuity all the way. $29.95.

Eggs-It, by Nasir Gebelli. An eggstra eggsciting game by the eggsceptional master of animation, Nasir. If you play this game, you might crack up. $29.95.

Neptune, by Nasir Gebelli. As commander of a naval vessel, you must seek and destroy enemy robot-amphibians that have infiltrated neutral waters. From the depths of the ocean to the hidden dangers in the caves, it provides you with every challenge you might expect. $29.95.

Laser Silk, by Eric Knopp. In this simulated work of nature, you must safeguard your delicate web from the preying insects and annoying bugs that invade your territory. $29.95.

H.A.L. Labs, Riverside, CA

Sheila, by Brian Fitzgerald. A challenging cross between arcade skill and fantasy. Rescue Sheila from her tower prison. Battle vicious guardian creatures with spears, bombs, and magic devices you find hidden in the castle. You will also find the mystical keys to the tower and some fun along the way. $25.

Super Taxman 2, by Brian Fitzgerald. The fastest, most responsive maze game ever created, even better than the now famous *Taxman.* Features include pause, help mode, music, new cartoons, and fruit. Select any of the four mazes and ninety-nine skill levels. Includes a high-speed challenging stage where you can earn extra men. $25.

Hayden, Rochelle Park, NJ

Crystal Caverns. Underground adventure game. $34.95.
Kamikaze. Dive-bombing arcade fun. $34.95.
Championship Golf. Choose from twenty clubs. $24.95.
Crime Stopper. Hijacked heiress adventure game. $34.95.
Bellhop. Beware the hotel ghost. $34.95.
Shuttle Intercept. Space arcade action. $34.95.
Final Conflict. Robot battle strategy. $34.95.
Laser Bounce. Laser grid arcade game. $34.95.

Highlands Computer Services, Renton, WA

Mummy's Curse. Hi-res color pictures guide you through this adventure game set in the mysterious and dangerous deserts of Egypt. $30.

Goblins. Escape to Goblin country. An adventure game to challenge your skills. Hi-res pictures and some animation help you on your journey. $27.50.

Creature Venture. Adventure game where you make your way deep into Uncle Stashbuck's mansion, punch out Boogeyman, and so on, to finally find the Stashbuck fortune. Hi-res pictures and some animation just for fun. $24.95.

Tarturian. One hundred sixty hi-res pictures take you through this role-playing adventure game. Select your characters carefully, gather weapons and treasure for the final battle against the Tarturian. $24.95.

Oldorf's Revenge. One hundred hi-res pictures help you explore the caverns and castles looking for treasure in this adventure game. Find the Grezzerlips' sword, visit the Snotgurgle's palace, and so on. $19.95.

IDSI, Las Cruces, NM

Shuffleboard. Hi-res color simulation of the classic game found on the decks of ocean liners. An exciting game to play against your Apple or a human opponent. Apple III in emulation mode. $29.95.

Pool 1.5. A real-time, hi-res color simulation of pool. This action-packed game allows you to play eight ball, rotation, nine ball, or straight pool. Requires game paddles. Apple III in emulation mode. $34.95.

Trickshot. Hi-res color successor game to *Pool 1.5* that allows precision ball-placing capability. Features trickshot examples, four new games, disk storage of shots, and more. Apple III in emulation mode. $39.95.

Juggler. Fast, exciting hi-res game in which you test your juggling skills against your Apple. Arcade-quality color graphics with realistically smooth motion. An addictive and challenging game that will keep you juggling for hours of fun and enjoyment. Apple III in emulation mode. $29.95.

Independence Software, New York, NY

Key to the Storm. Tired of mindless violence on your video monitor? So were the Founding Fathers after the Revolution. In 1787 the literary talents of Thomas Jefferson were fused with the radical hi-res graphics of Ben Franklin's computing device. $34.50.

Infocom, Cambridge, MA

Zork I: The Great Underground Empire. Confronts you with perils and predicaments ranging from the mystical to the macabre, as you

strive to discover the twenty treasures of Zork and escape with them and your life. $39.95.

Zork II: The Wizard of Frobozz. Takes you into new depths of the subterranean realm. There you'll meet the Wizard, who will attempt to confound your quest with his capricious powers. $39.95.

Zork III: The Dungeon Master. The final test of your courage and wisdom. Your odyssey culminates in an encounter with the Dungeon Master himself, and your destiny hangs in the balance. $39.95.

Deadline. This mystery initiates you into the genre of real-life adventure. Pit yourself against a twelve-hour time limit to solve one of the cleverest and most baffling cases in the annals of criminology. Totally original concept in interactiveness. $49.95.

Starcross. Mind-bending science fiction first. Launches you into the year 2186 and the depths of space. Rendezvous with a gargantuan starship, succeed in gaining entry to its mysterious interior. Once within, you will explore a startling, complex, and engaging world and come face to face with otherworldly beings. $39.95.

Insoft, Portland, OR

The Count, by Pear Software. Hi-res blackjack game that teaches card counting and betting strategy. Extremely easy to learn, a must before your next Las Vegas trip. $24.95.

Zargs, by Max McKee. Your mission: complete the secret Zarg space station before the alien attack. You pilot four ships and dock each to the Zarg superstructure. Once all ships are docked, the station is transformed to a mighty battleship and the battle begins. Four-level arcade game written in GraForth. $34.95.

Spider Raid, by James Marsh. As one of the last spiders remaining on Earth after the great destruction, you must survive by avoiding acid rain, spraybius toxicus beetles, and other deadly hazards in your quest for the fly. A fast-action arcade game, written in GraForth. $29.95.

Intelligent Statements, Chapel Hill, NC

Ken Uston's Professional Blackjack, by Jack Briner. No substitutes exist: With actual simulations of over seventy U.S. casinos and sixteen user-controlled parameters. Drill and flash card modules help you learn card counting. $89.95.

Interactive Fantasies, Agoura, CA

Prisoner 2. Remake of the infamous game *The Prisoner.* Hi-res graphics, a spectrum of colorful animation, startling sound effects, and the same sinister personality that put the original on the charts for two years. $32.95.

International Software Marketing, Syracuse, NY

Prism, a Storydisk. The hunt is on for three priceless gold keys hidden somewhere in the continental U.S. Hidden in three separate locations are a diamond key, a ruby key, and a topaz key. All the clues needed to find the keys are contained in the story of *Prism.* A surprise climax will be revealed, but not until all three keys have been recovered. $19.95.

Kennedietsch Productions, Oak Park, IL

Merry Canned Nightmares & Dreams. Sophisticated animation and intricate weavings of strategy and chance make this new generation game an interest-holding classic for children or adults. One to four players interact with various animated characters to gain fame, wealth, happiness, or knowledge. But beware of the Evil One! Hi-res with sound. $39.95.

Krell, Stony Brook, NY

Sword of Zedek. Treachery, deceit, and witchcraft are confronted in the right to overthrow Ra, master of evil. Players encounter wolves, dwarves, elves, dragons, and other fantasy characters in their search for the twelve treasures that include invisibility, invulnerability, and other special powers. $24.95.

War of the Samurai. An incredible game of combat and intrigue. Exciting, easy to play, but strategically complex version of Go. Options include terrain features, mobility, and probabilistic rules of capture. Detailed graphics. Destined to be a classic. $39.95.



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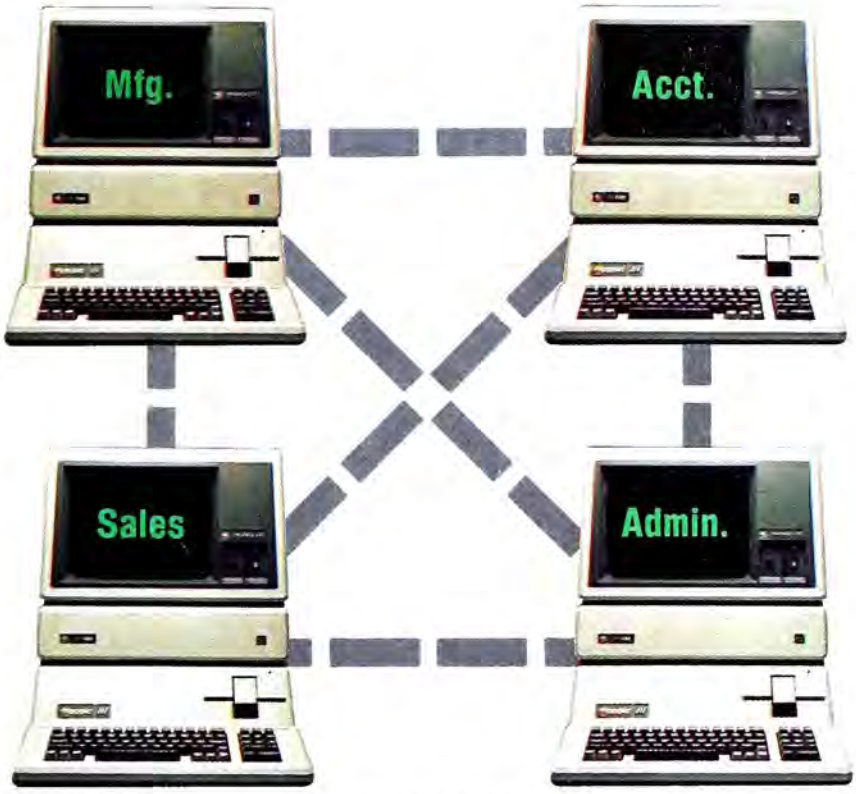
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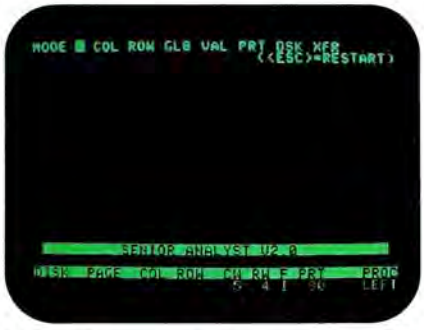
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Black Death. Players fight the spread of this deadly plague by choosing strategies for inoculation. This challenging game for one or more users is designed to teach basic principles of epidemiology and public health decision making. $24.95.

Time Traveler. Using the time machine, players face a challenging series of historical environments in which they must build alliances and struggle with the ruling powers. This adventure game confronts the player with complex decisions and the demand for real-time action. The best of the adventure games. $24.95.

Pythagoras and the Dragon. This mathematics game introduces Pythagoras as a mentor to the player, in the *Sword of Zedek* program. When help is requested, Pythagoras poses mathematical questions. Depending on speed and accuracy of response, he confers secret information useful to overthrow Ra, master of evil. Levels available range from arithmetic through plane geometry. $39.95.

Odyssey in Time. An advanced form of *Time Traveler.* This spectacular game includes all the intellectual challenges of *Time Traveler* but adds ten additional historical eras. Each game is different and may be interrupted and saved at any point for later play. $39.95.

Black Gold. Players must deal with all the facets and uncertainties of exploring and marketing oil. This economic simulation for up to four players incorporates option buying, well drilling, geological conditions, varying prices, strikes, the demands and intrigues of greedy potentates, and other realistic conditions. Created by a distinguished energy specialist. $39.95.

Star Clipper. An interplanetary trading game. Players profit from technological change, exploit scarcity, and devise economic strategy as new planets are discovered and opportunities revealed. Up to six players must navigate, avoiding space pirates and time warps as they ply the intergalactic trade routes. $39.95.

The Shelby Lyman Chess Tutorial Series. Shelby Lyman, master-teacher of chess, has created this series for all microcomputer users. Every aspect of chess is covered from understanding chess weaponry to the chance of matching wits with the grand masters of the game. Latest artificial intelligence techniques customize each program to the user's rate of progress. $39.95.

All Time Super Star Baseball and Super Star Baseball. Based on interaction of actual batting and pitching data. Select rosters and lineups and exercise strategic choices including hit and run, base stealing, pinch hitting, intentional walk, and so on. Highly realistic. Each game includes about fifty players allowing a nearly infinite number of roster and lineup possibilities. $24.95.

Hostage; Prime Time; Bulls and Bears. Hostage: Players participate in a series of dramatic adventures with human lives in the balance. During play, terrorists and authorities confront each other as they struggle towards their goals. *Prime Time:* Players compete as network executives selecting television shows from sitcoms, dramas, soaps, westerns, news, and documentaries. Compete for ratings and advertising revenues. *Bulls and Bears:* Dominate the market by correctly using the news bulletins and rumors central to this fast-moving game. Stocks range from speculative and highly volatile to the staid. $49.95.

L&S Computerware, Sunnyvale, CA

Acey-Deucey, by Larry Sherman. A fast-moving game with cards so realistic you won't believe it. Play by yourself, challenge your friends or the computer. Apple III in emulation mode. $29.95.

Microsoft, Bellevue, WA

Microsoft Decathlon, by Timothy W. Smith. Become an Olympic champion in the greatest of all athletic competitions with this exciting skill game. Each of the ten events is presented with extraordinary animated graphics. To emerge the victor, you'll need a good sense of timing, fast reflexes, and good coordination. $29.95.

MicroStand, Seaside, OR

Robot Frenzy, by Aaron Hanson. Arcade-quality attacking robots. Your mission: to secure the treasures in each room before the robots get you. Shoot them, and watch out for the mines. Increasing difficulty and sweaty palms as you advance through each maze. $39.95.

Mind Systems, Northampton, MA

Spitfire Simulator, by Ted Kurtz. Pursue 3-D moving targets in a 360 mph Spitfire fighter plane. Eight target types (Me 109, for example). Scores for targets destroyed. Aerobatic flight simulator (loops, rolls, and so on) with two landing fields. Many convenient control options. Can access *AirSim-1* scenery to fly a Spitfire around New England. Paddles or joystick. $40.

AirSim-1, by Ted Kurtz. Flight simulator with scenery along New England coast from Boston to New York City; with five landing fields. Aerobatic (loops, rolls, stalls, and so on). Cruising speed approximately 120 knots. Equipped for instrument flying (artificial horizon, HSI) with an instrument-flying mode (500-foot ceiling) for practicing instrument approaches. Paddles or joystick. $40.

Morningstar, San Francisco, CA

Ice Demons. A free-wheeling battle across the ice against the High Master and his despicable demons. Original action with multiple play modes. Play alone, with a friend, or against an opponent. Keeps sixty-four names and high scores on four separate lists. Music, sound effects, full color, and hi-res. $29.95.

Muse, Baltimore, MD

ABM, by Silas Warner. Enjoy missile madness with *ABM*. Can you save the East Coast from enemy attack? $24.95.

Castle Wolfenstein, by Silas Warner. One of the best selling games in America. There's nothing else like it—an all-time favorite arcade/adventure game. Join the craze or initiate a friend. $29.95.

RobotWar, by Silas Warner. The best-selling game that teaches programming. Program your own robot and let him loose on the battlefield. Learn to program and have hours of fun. For kids of all ages. $39.95.

Firebug, by Silas Warner. Fire up your Apple with this challenging new game. Can you find your way through this burning maze? $24.95.

Frazzle, by James Nolan. Exciting outer space game. Alien beasties surround and attack your *Frazzle* ship: save yourself from total destruction. $24.95.

The Cube Solution, by Leonard Biggerstaff. Master the cube. Here's the enjoyable way to deal with the common cube headache that any cube owner will appreciate. $24.95.

The Best of Muse. A fantastic value—ten Muse games on one disk. Provides any Apple owner with a great selection of enjoyable games. $24.95.

International Gran Prix, by Richard Orban. Arcade-quality 3-D formula one car race. Five courses, eight levels of difficulty, five-speed manual transmission, one-button shifting, and full instrument panel. Paddles or joystick. $30.

Odesta, Evanston, IL

Mind of Man Series: Chess, by Larry Atkin; *Checkers*, by David Slate; and *Odin*, by Larry Atkin and Peter Frey. These classic games of strategy and thought are available in their most definitive microcomputer version. In addition to their superior playing strength, they introduce a new generation of interactive intelligence. Featuring comprehensive documentation, vinyl disk-protecting albums, and extensive user menu that's completely cursor controlled. Designed to instruct the beginner and challenge the proficient. $49.95. *Chess*: $69.95.

Omega Microware, Chicago, IL

Night Falls. An exciting arcade-style game that tests your ability to survive the invasion. Fight off the aliens each night and rebuild your city during the day. See how many nights you can survive. $29.95.

Penguin, Geneva, IL

Pie Man, by Eagle Berns and Michael Kosaka. As the pies come out of the oven, you need to get a can of whipped cream and squirt some on the pie. Then grab a cherry, place it on the pie, and put the pie in the pie bin. Watch out for the slightly tipsy wedding cake baker. $29.95.

Transylvania, by Antonio Antiochio. In this hi-res graphic adven-

ture, you search all of Transylvania to find and rescue the princess. Encounter vampires, werewolves, and other creatures as you comb through the forest and castle. Put the clues together in time and the princess is saved. If you don't, she dies at dawn. $34.95.

Spy's Demise, by Alan Zeldin. This arcade game combines action and mystery. Somewhere on each floor of a Soviet diplomatic mission are nine parts of an encoded message. You must put the pieces together and solve the puzzle. Avoid the embassy guards who make frequent rounds at unscheduled intervals. $29.95.

Phoenix, Lake Zurich, IL

Birth of the Phoenix, by Paul Berker. An adventure tutorial designed for the novice. Learn the tricks of solving the more complex adventure games, mapping, dealing with locked doors, light sources, and so on. Complete with manual. A must for beginners. Either DOS or Apple III in emulation mode. $22.

Adventure in Time, by Paul Berker. Using all his wits, the experienced player will race through time in an effort to save the world and capture a master criminal. One of the most exciting text adventures ever. Either DOS or Apple III in emulation mode. $29.95.

Queen of Phobos, by Bill Crawford and Paul Berker. Set in deep space aboard a derelict starliner, this hi-res graphic adventure pits you against four computer-generated opponents. Your mission—get the famed mask of Kuh-Thu-Lu and get out alive. Only the strong will survive. $34.95.

Sherwood Forest, by Dav Holle and Dale Johnson. The first in a series of Softoon Adventures that combine the best of color hi-res graphics with a great storyline and, for the first time, add an element never before seen—full color animation. Apple III in emulation mode. $34.95.

Powersoft, Pitman, NJ

Perquackey. An exciting vocabulary game that pits the players against the clock. Apple III in emulation mode. $14.95.

Stone's Reversible Games. Contains two games: *Dynamaze* and *Ultra Blockade,* a combination of fast action and strategy. You can stop the play at any point, back up, and then do an instant replay. Reversibility makes learning a challenging new game more fun. Apple III in emulation mode. Integer, machine. $24.95.

World of Odyssey. An adventure game utilizing the full power of Disk II, which enables the player to explore 353 rooms on six different levels full of dragons, orcs, goblins, gold, and jewels. Restart game where you last left off. Apple III in emulation mode. $24.95.

Cubik. A 3-D hi-res version of tick-tack-toe, played on four planes, each four rows deep and four rows wide. Integer. Apple III in emulation mode. $14.95.

Program Design, Greenwich, CT

Minicrosswords. Computer-generated puzzle. You fill in up to eighteen words from definitions you request from the computer; five hundred games in all. For all ages. $23.95.

Astro Quotes. Guess the words at the bottom of the screen from clues furnished by the computer, so that it can drop the letters where they belong in the quotation above. The better you get, the harder the quotes get. High school to adult. $23.95.

Code Breaker. Break the computer's code and figure out the messages. Start out by decoding scrambled letters; go on to tougher codes in which both letter and word order have to be unscrambled. Ages ten to adult. $23.95.

Quality, Reseda, CA

Ali Baba and the Forty Thieves, by Stuart Smith. A fantasy adventure game with sultans, thieves, and fierce and friendly creatures. Treasure, magic, and great danger await you. Allows one or more players to participate in the adventure. Hi-res color graphics, music, and sound effects. The frequency at which the wandering monsters appear is selectable. $32.95.

Beneath Apple Manor; Special Edition, by Don Worth. The classic fantasy role-playing game returns in hi-res graphics with sound, save-game capability, and many more new features. If you are a fantasy game zealot, you will have to own this special edition of the first Apple fantasy game. $29.95.

Fracas, by Stuart Smith. A fantastic adventure game for up to eight players. Journey in the land of Faroph, search for hidden treasure while warding off all sorts of unfriendly and dangerous creatures. Define your own characters; rooms are displayed graphically; sound effects enliven the battles. $24.95. Cassette: $19.95.

Meteoroids in Space, by Bruce Wallace. Your spaceship travels through a shower of deadly meteoroids. If your ship is hit it will be destroyed, so you use your laser gun to blast the meteoroids. All the action is displayed in fast, smooth, hi-res graphics accompanied by sound effects. $19.95.

Fastgammon, by Bob Christiansen. Known for its outstanding graphics and its speed of play, this popular program is the standard with which other computer backgammon games are compared. It's you against the computer. Hi-res color graphics and musical cartoons. $24.95. Cassette: $19.95.

QS Reversi, by Lee Merrill. This outstanding version of the ancient game Othello has twelve levels of play. It outplays other commercially available microcomputer Othello games. $29.95.

Astro Apple, by Bob Male. Delightful and stimulating way to entertain friends—produces natal horoscopes. Included in the horoscope are personality and emotional behavior descriptions. Thirty-day forecasts tell you which days are good for business, and what the stars say about your temper, pocketbook, and love life. $19.95. Cassette: $14.95.

Pro Poker, by Jay Allen. Eight-handed California draw poker, written by a professional poker player. The eight players can be human players or computer players. Kibbitz mode makes this fast-playing game an excellent tutorial on draw poker. Hi-res graphics. $39.95.

Rainbow Computing, Northridge, CA

Pot O' Gold Plus. Variety of forty-six games in lo-res, hi-res, or text. Paddles required. With an Echo II text will be spoken, otherwise text is displayed on screen. Includes *Othello, Eliza, Sink the Ship, Pinball, Color Math, Space War,* and more. $39.95.

Skram, by Jim Day. A hi-res picture puzzle with twelve square pieces. Sounds easy, but there's a catch. Unscramble by sliding one piece at a time. Picture scrambled anew each time. Use pictures on the disk or use your own. $19.95.

Science Research Associates, Chicago, IL

Free Enterprise. This strategy game simulates the challenge of operating a business enterprise with each player competing with others and making total company decisions. From one to six people can play, and three difficulty levels allow motivated but inexperienced high schoolers to compete effectively with more experienced adults currently involved in business. Includes player's guide, decision recording pad, and record keeping pad. $100.

Cross Clues. A word game that calls on vocabulary, spelling, word skills, and luck as two players or teams compete to uncover hidden words in an interlocking grid. Time chosen for completion can help even the competition, so ages twelve through adults can play. Easy to learn. Fifty different puzzle grids provide hours of fun. $35.

Sentient, Aspen, CO

Gold Rush. Avoid renegade Indians, ferocious grizzly bears, and unscrupulous claim jumpers in this fast-action, hi-res graphics game. Get past the hazards and stake your claim in the gold-rich hills of Colorado. $34.95.

Oo-Topos. First adventure written by a science fiction author. Complete a dangerous outer space mission for the galactic council in one of the largest classic adventures ever. $32.95.

Congo. Rescue survivors of a lost expedition as you float down the headwaters of the raging Congo river. Avoid wild animals, natives in war canoes, and dangerous rapids on your quest. $34.95.

Cyborg. Realistic adventure with an action-skill game hidden in the plot. As a futuristic cyborg—half human, half computer—you're lost in a strange forest, desperately needing food and power. Find them while seeking the clues to your location and purpose. $32.95.

Sierra On-Line, Coarsegold, CA

Cannonball Blitz, by Olaf Lubeck. You must reach the top of the hill where a rebel soldier is sending down cannonballs. Use the ladders, the balloons, teeter totters, and elevators to help you reach the top. If a cannonball hits you, the headache is always fatal! $34.95.

Crossfire, by Jay Sullivan. You must rid the city of the aliens throughout. Unfortunately, each alien has four lives—metamorphosing after each hit into a quicker, stronger assailant. Speed and concentration are the ingredients needed to keep you out of the *Crossfire.* $29.95.

Frogger, by Olaf Lubeck. The popular arcade game now available for home computers. Try to help your little green friends cross a dangerously busy highway and a treacherous river. One game where you must really look before you leap. $34.95.

Jawbreaker, by John Harris. A game for all of those bitten by the maze-craze bug. Run through the candy store eating all you can while avoiding rowdy brats loose inside. Watch out—they can be a real pain in the tooth. Fun and frolic in hi-res graphics. $29.95.

Lunar Leeper, by Chuck Beuche. At last—a game where you try to save the aliens. Visit the planet of Opthamolia and perform a rescue like none you've ever seen. Can you save the leepers, rescue the little men, and not be mistaken for a flying hamburger? $29.95.

Threshold, by Warren Schwader. A shoot-'em-up like none you've ever seen. Targets include everything from space fish to flying Volkswagen Bugs, at every speed and flight pattern imaginable. See if you can survive twenty-nine levels of outer space oddities as you pilot the space fighter *Threshold.* $39.95.

Pest Patrol, by Mark Allen. Are you ready for an all-out war—man-versus-bug style? There are armored snails, bouncing spiders, and diving waldoes, who all have nothing more in mind than to squish you like a common, uh, bug! Quick, smooth hi-res graphics make this game as fun to watch as it is to play. $29.95.

Mouskattack, by John Harris. A maze game with rats, cats, and plumbing? You must finish laying your pipes and still keep an eye out for Super Rat. Fast, smooth animation and sound. A plumber's nightmare. $34.95.

Ultima II, by Lord British. The second of a planned, epic-sized trilogy. Travel land and sea, journey through space, and explore the infinity of time. Beware of "The Revenge of the Enchantress . . ." as you travel the paths of Lord British. $59.95.

Sabotage, by Mark Allen. Seated behind your powerful gun encampment, you must shoot down enemy bombers and helicopters; if enough parachuting saboteurs make it to the ground, it's all over for you. Fun and frustration in quick hi-res graphics. $24.95.

Pegasus II, by Olaf Lubeck. While traversing the far reaches of space, you fly over an unfamiliar valley. Just by luck, you have crossed the barriers of an unknown alien defense system. Can you survive an assault on an enemy race and still make it home? $29.95.

Laf Pak, by Chuck Beuche. Good games are no laughing matter—or are they? This game features *Creepy Corridors, Apple Zap, Space Race,* and *Mine Sweep.* A sound software investment for the whole family. $34.95.

Marauder, by Rorke Weigandt. A real-time simulation of an attack on a distant alien planet. Can you break through the force field, survive the corridors of robot sentries, and destroy the planet's power center? Even if your mission is successful, escape time is short. $34.95.

Mission Asteroid: Hi-Res Adventure #0, by Ken and Roberta Williams. An introduction to the Hi-Res Adventure line. Can you become a successful astronaut and save Earth from the asteroid about to collide with it? First you must find the secret password, but hurry! Time is of the essence. A fantastic adventure for beginning adventurers. $19.95.

Mystery House: Hi-Res Adventure #1, by Ken and Roberta Williams. The first Apple hi-res graphic adventure featuring a whodunit murder mystery in an old Victorian mansion. Can you find out who the killer is before he finds you? $24.95.

The Wizard and the Princess: Hi-Res Adventure #2, by Ken and Roberta Williams. The only adventure to appear in *Softalk*'s Top Thirty list for over a year. An evil wizard has kidnapped a princess. Can you save her from his clutches? Your path is beset by magic, strange puzzles, and the unknown. $32.95.

Cranston Manor: Hi-Res Adventure #3, by Harold DeWitz. Mr. Cranston hid all of his sixteen treasures in his large old estate. After his death, it's finders keepers. Beware: a (k)night in Cranston Manor is a night you won't easily forget. $34.95.

Ulysses and the Golden Fleece: Hi-Res Adventure #4, by Bob Davis. Travel back to the land of classical mythology and see if you're the stuff legends are made of. Ride the famed winged-horse Pegasus, hear the song of the sirens, meet Pluto, and more. Both sides of one disk. $34.95.

Time Zone: Hi-Res Adventure #5, by Roberta Williams. The largest graphic adventure for *any* microcomputer. Travel into the past, present, future; meet famous historical figures; and save Earth from the evil Ramadu! Good puzzles, many dangers and challenges that will have you adventuring for a long time. Both sides of six disks. $99.95.

Softporn, by Charles Benton. Travel to the gambling city of Lost Vague-ness and fulfill your wildest fantasy. If you play your cards right, you might even get rich. An adventure for adults only. $29.95.

Sierra Software, Las Vegas, NV

Space Adventure Episode One, by Alick Dziabczenko. Fly the space cruiser *Callisto* through true 3-D space and solve the puzzles as the pilot of this real-time spacecraft simulator. Beware of the alien that takes over the ship. With hint sheet. Hi-res color graphics. $29.95.

Space Adventure Episode Two, by Alick Dziabczenko. The saga continues as you pilot the space cruiser *Callisto.* Real-time 3-D battles, an on-board computer, and puzzles to solve. Supports the Sierra Sound Effects System. With hint sheet. Hi-res color graphics. $39.95.

Retro-Ball, by Alick Dziabczenko. Air hockey simulation with a twist—a rocket-propelled puck scores against an opponent or the computer. Uncanny, smooth graphics supplied by Video-Sync (included). For one or two players. Brilliant hi-res color graphics. Apple III in emulation mode. $29.95.

Alien Lander, by Alick Dziabczenko. Offers you a bird's-eye, 3-D view of a lunar landscape as you maneuver your ship up or down to a soft landing. Set the thrust, gravity, and density of the atmosphere. Clever aliens peek at you from behind the rocks. Brilliant hi-res color graphics. Apple III in emulation mode. $29.95.

Sirius, Sacramento, CA

Wayout, by Paul Edelstein. An amazing new kind of 3-D maze game. Offers twenty-six different challenging hallway mazes to find your way out of with much needed help from your compass and map maker. $39.95.

Blade of Blackpoole, by Tim Wilson. Exciting adventure game features a myriad of tough situations and colorful detailed graphics. Set in the old English days of magic swords, knights, and dragons; truly a work of art. $39.95.

Bandits, by Tony and Benny Ngo. Stop the devious gangs of space bandits. They've got dozens of deadly attacks you must repel in order to save the supplies on your lunar outpost. Colorful and imaginative graphics and exciting nonstop action. $34.95.

Escape from Rungistan, by Bob Blauschild. This unique adventure game features imaginative music and animation. You must escape from a Rungistani jail cell and find your way past deadly snakes, bears, cannibals, and much more on your way to freedom. A very treacherous yet popular journey. Applesoft. $29.95.

Freefall, by Mark Turmell. The latest whimsical challenge from the author of *Beer Run* and *Sneakers.* Features four different diversions in which you must guide a free-falling figure past a unique variety of deadly obstacles to safety at the bottom of the screen. $29.95.

Type Attack, by Jim Hauser and Ernie Brock. Designed to teach or improve typing skills and doubles as an exciting fast-action game. Features attacking letters, words, and phrases that must be repelled by typing same on your keyboard. Great graphics, great sound, great fun. $39.95.

Flip Flop, by Scott Huskey. A mind-bending strategy game for one or two players. Nine different courses you must learn to get your marbles through before your opponent does. Take time and plan your drop—do it right and you'll flip; if not, you're a flop. $29.95.

Sneakers, by Mark Turmell. Eight separate attacks from some of the

most animated and colorful characters ever to attempt to stomp you into submission. This seemingly endless variety of challenges has made *Sneakers* one of the most popular Apple games of all time. $29.95.

Twerps, by Dan Thompson. Challenging game of skill with a good sense of humor. Rescue poor stranded Twerps from a variety of space creatures hungry for dessert. $29.95.

Kabul Spy, by Tim Wilson. Classic adventure game of mystery and intrigue. Use your weapons and your wits to secure the information you'll need to rescue the kidnapped professor from Afghanistan. In-depth plot, extensive vocabulary, and colorful graphics. Applesoft. $34.95.

Sir-tech, Ogdensburg, NY

Wizardry, by Andrew Greenberg and Robert Woodhead. The all-time classic fantasy role-playing game. Rated "Best Quality Game" in the 1981 *Softalk* poll. Hundreds of monsters and items. Huge 3-D maze. Fifty spells. Multiplayer. For ages ten to adult. A true thinking person's game that has captured the interest of tens of thousands of players. Apple III in emulation mode. $49.95.

Knight of Diamonds, by Andrew Greenberg and Robert Woodhead. The second scenario in the *Wizardry* series features new monsters and treasures, and contains a complete adventure. *Knight of Diamonds* requires characters of thirteenth level or greater developed in *Wizardry.* For ages ten to adult. Apple III in emulation mode. $34.95.

Legacy of Llylgamyn, by Andrew Greenberg, Robert Woodhead and W.A.R.G. (Wizardry Advanced Research Group). The *Wizardry* adventure continues in this, the third scenario. The descendants of characters developed in *Wizardry* and/or *Knight of Diamonds* face even greater challenges. For adventurers of any level. For ages ten to adult. Apple III in emulation mode. See your dealer for price and availability.

Galactic Attack, by Robert Woodhead. A real-time war game that will sharpen your wits. Combines the strategic flavor of conventional war games with the real-time tactics of an arcade game. As commander of the *Blaise Pascal* you must recapture the solar system—or die trying. Apple III in emulation mode. $29.95.

Star Maze, by Gordon Eastman. Why have quiche-eating wimps from the future published this arcade game? It's got stunning graphics and requires both fast reflexes and quick wits. Play it and get blown away. Apple III in emulation mode. $34.95.

Wizardry Character Printout Utility, by Andrew Greenberg and Robert Woodhead. A helpful utility for keeping records of your *Wizardry* characters. Print your character information using any printer. See your dealer for price and availability.

Soft Images, Mahwah, NJ

Singles' Night at Molly's. Solitaire in a saloon can be fun, but it's better on your Apple. Fair warning: If you get hooked on solitaire, beware of this game. $29.95.

Blackjack Strategy. Play like a winner! Complete system including a simulator, tutor, strategy table compiler, and a hi-res Blackjack game. Give yourself the edge. $69.95.

Pandemonium. A word game for our time. At last—a computer word game that entertains, challenges, and educates; is thoroughly fascinating, stimulating, and highly addictive. Built-in 6,000-word dictionary. $39.95.

The Software Farm, Aurora, CO

Monster Mash, by David Eisler. The scene is an infrequently visited graveyard that is occupied by a rather rowdy group of monsters. It is your job to keep the monsters in the graveyard and protect the visitors using your new Monster Masher System. Playable at many different skill levels. $29.95.

Software Technology, Belmont, MA

The Matmoss, by Gary E. Haffer. Unlike any adventure game ever developed for the Apple. This is not a linear game but a highly skilled ad-

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The Axlon RAMDISK™ 320K Memory System for the Apple II and Apple II Plus* provides access speeds never before available. The Axlon memory system is designed to interact with Apple DOS 3.3* and Apple Pascal 1.1* like two standard floppy disk drives while delivering the lightning fast access speeds of RAM memory. This also leaves 32K of RAM for advanced programming techniques. The interface board is slot independent and draws no power from your Apple. The rechargeable battery system built into the unit provides three hours of backup in the event of a power loss. Drop by your local Apple dealer or contact Axlon, Inc. for more information.

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Norad. Hi-res, high-speed, arcade-quality game that challenges you to defend the entire continent against a nuclear onslaught. The advantages of using a little strategy in your playing and unique game design make this more than your usual shoot-'em-up. $34.95.

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Stoneware, San Rafael, CA

Compucube. Rubik's Cube Apple computer game. $29.95.

Tranquility Base. Lunar landing computer game. $24.95.

Strategic Simulations, Mountain View, CA

Southern Command, by Roger Keating. Battalion-level simulation of the Israeli counterattack to cross the Suez Canal during the October War of 1973 against Egypt. Played on a colorful twenty-eight by thirty-nine hex-grid map with scrolling capability in the two-player game, or any of the four computer-as-opponent scenarios. $59.95.

The Road to Gettysburg, by Paul Murray. Advanced-level, board-assisted computer game that effectively simulates the feel of command of an American Civil War army. Each commander's only means of communication with his troops is the frustrating dispatch system. Players must deal with misinterpretation of orders and even disobedience of corps commanders, played by the computer. $59.95.

Pursuit of the Graf Spee, by Joel Billings. Simulation of the maneuvers and battles of the famous German pocket battleship in the South Atlantic in 1939. Players can experience the feel of the chase with each ship rated for speed and strength, or the feel of combat using the innovative tactical combat system. $59.95.

Guadalcanal Campaign, by Gary Grigsby. This fifty to eighty hour long simulation of the Guadalcanal campaign lasts 294 turns and is surprisingly easy to play. Every Japanese and American ship that historically participated in the campaign is rated for speed, damage points, number of guns, and various other features. Also includes abridged scenarios. $59.95.

Cytron Masters, by Dan Bunten. Robot warriors consisting of laser-blasting shooters, kamikaze-like mine cytrons, guided missiles, mobile bunkers, and anti-missiles battle to destroy their opponent's command center on a variety of battlefields. Packed with fast-paced action, animation, and sound effects. Choice of three speed levels. $59.95.

Galactic Gladiators, by Tom Reamy. Fourteen bizarre species from a remote galaxy face each other in combat on a variety of strange terrains. Each creature is rated for seven characteristics. They can be armed with two of fourteen possible weapons. Players may combine creatures, battlefields, and game rules to form an infinite number of scenarios. $39.95.

The Cosmic Balance, by Paul Murray. Space battles take on a new dimension with this tactical space game. Each player designs and builds each of his ships, choosing the amount and size of engines, drives, weapons, defense belts, and numerous other factors. Semi-animated graphics and rapid execution phase virtually guarantee a fast and exciting game. $39.95.

S.E.U.I.S., by John Lyon. Players build spaceships from a choice of six prototypes, forming squadrons until they have enough squadrons to form a fleet. Then they conquer planets and attack other fleets. Actual ship-to-ship combat is arcade-like, requiring sharp reflexes and a quick eye to Shoot 'Em Up In Space. $39.95.

Battle for Normandy, by Tactical Design Group. Simulation of the D-Day invasion in 1944 that allows players to recreate the Allied invasion or the German defense using their own strategies. Commanders in this invasion, however, need only glance at their computer to keep track of their supplies, transport availability, fuel, weather, troop fatigue, and leadership ratings. $39.95.

Germany 1985, by Roger Keating. First game from Roger Keating's modern warfare series When Superpowers Collide. Battalions of Soviet infantry, tanks, artillery units, and paratroopers have attacked the southern center of West Germany. NATO forces must contain and repel this invasion. Includes two scenarios, each with its own map display. $59.95.

SubLogic, Champaign, IL

Flight Simulator, by Bruce Artwick. Combines superior flight simulation with the best 3-D graphics available. Practice take-offs and landings, steep turns, rolls, and other aerial maneuvers. Then declare war and head to enemy territory where your mission is to destroy the enemy's fuel depot. $33.50. Cassette: $25.

Night Mission Pinball, by Bruce Artwick. Highly acclaimed arcade simulation. The playfield has five bumpers, seven stand-up targets, nine rollovers, two spinners, and much more. Offers ten user-selectable modes of play, forty user-adjustable parameters to create, and the ability to save up to a hundred custom modes of your own design. $29.95.

Saturn Navigator, by Wes Huntress. Hi-res adventure simulation that takes you on a spaceflight from Earth to Saturn. You perform the maneuvers necessary to achieve a successful approach and insertion. Sophisticated 3-D graphics provide an out-of-the-window view of the ringed planet during your approach. $34.95.

Space Vikings. Science fiction adventure in deep space that combines the excitement of arcade play with the realism of a true 3-D simulation. The galaxy is in rebellion—you command a Federation starship and your Viking troops are ready for battle. Requires color monitor. $49.95.

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Superior Software, Kenner, LA

Asteroid Belt, by Scott Whittenburg. Hi-res, arcade-type, fast-action game for one or two players. Navigate your ship through the asteroids while avoiding alien ships, space mines, and swarmers sent to destroy your fleet. Assembly language for speed; unlocked, with source code for easy customization. $24.95.

The Quest for the Holy Grail, by Thorne D. Harris III and Mark B. Hattier. Adventure game featuring hi and lo-res graphics, extensive, interactive text, and music. Search for the Grail throughout Merrye Olde England and encounter killer rabbits, black knights, fair maidens, wizards, wanton wenches, and others. $24.95.

Doom Valley, by Robert Grumbles and Nick Mangus III. Classic adventure where you attempt to save the lives of United Nations ambassadors after their plane crashes in a remote area. See how adventures are written. Modify to suit your own tastes. The perfect way to learn programming on the Apple while having fun at the same time. $19.95.

Synergistic, Renton, WA

Odyssey: The Compleat Apventure, by Robert Clardy. Sail across the Sargalo Sea, explore islands, caverns, and castles. Gather forces and weapons to defeat the Caliph of Lapour. This fantasy adventure game has hi-res and lo-res maps; unending variety and challenges. $29.95.

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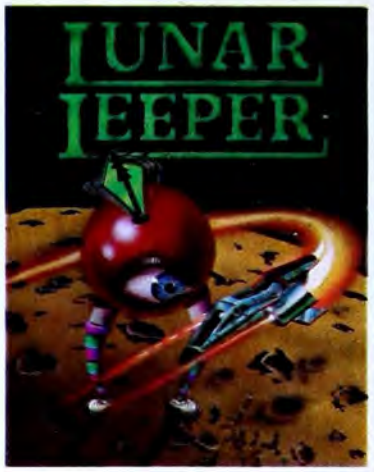
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Bolo. A tank maze game with a huge playing area. To destroy the opposing tank bases you must fight off enemy tanks with varying intelligence levels. Nine levels of difficulty combined with five tank speeds make this a super-challenging game. $34.95.

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Telephone Software Connection, Torrance, CA

Telegammon, by Anton Dahbura and Ed Magnin. Play backgammon with a friend over the phone. Each move displays instantly on both Apples. Can save or load previous games. Has a built-in chat mode. Only one side needs a copy of program. Requires Micromodem. $35.

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Ultrasoft, Issaquah, WA

The Mask of the Sun, by Alan B. Clark, Larry Franks, Christopher P. Anson, and Margaret Anson. Premier release of a series of challenging and truly enjoyable animated adventures. Phenomenal graphics and animation are created by Ultravision, Ultrasoft's exclusive graphics language. See and feel your movements; traps have more realism, puzzles are more involving. Sound, upper and lower case text, and acceptance of English sentences as commands. $39.95.

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United Software of America, New York, NY

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Anthro-Digital, Pittsfield, MA

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F.A.R.M. Aids, by Mike Mulder, SDS. Set of seven *VisiCalc* templates covering best crop, finishing hogs planner, feeder pig production planner, beef feeder planner, cash flow summary, inventory summary, and net worth statement. Manual shows samples and fits in your *F.A.R.M., VersaCalc,* or *VisiCalc* binder. *VisiCalc 3.3.* $60.

F.A.R.M., by Specialized Data Systems. Money accounting package designed for the farmer includes accounting, tax, and records management. Allows for crops and livestock, enterprising, checkbook balancing, and Schedule F printout with interface for *VisiCalc.* Reports cash flow, budgets, tax information, and money borrowed; allows easy editing of transactions. Two disk drives. One Farm: $395; Educational (for schools): $250; Commercial (unlimited number of farms): $995.

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Small Business Trilogy, by Don Jones. This versatile business system combines *The Complete Mailing Label and Filing System, Ultra Plot,* and the *Ultra Plot/Complete Mailing Label and Filing System* interface, plus *Introduction to File Maintenance* with your Apple. Allows you to create visual records from your mailing database. $175.

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Business Solutions, Kings Park, NY

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Cavri Systems, New Haven, CT

Cavridex. Audio-visual file management system provides an Apple-based method of cataloguing and retrieving videotaped and text material. Screens of text information are stored in the computer, with corresponding audio-visuals on the videotape. Specific screens of text and/or video material are retrieved through keyword searches. Requires two disk drives. $1,200, including hardware.

Applesoft Basic Software Package. Combines the logic and memory of the Apple with the audio-visual capabilities of video for creation of training and educational courseware. Permits control of video player from the computer program or keyboard, branching to any point on the videotape, and the integration of CAI with video teaching segments. $995, including hardware.

The Ghostwriter. Authoring system allows nonprogrammers to create, modify, and update sophisticated computer-assisted instruction or interactive video programs. Provides graphics capability, a comprehensive screen editor, unlimited branching, and scoring of responses. Printer capability provides complete lesson listings. Lesson verification process identifies any errors or omissions. $1,590, including hardware for VCR.

Century Software Limited, Phoenix, AZ

The Tax Byte '82, by Monte C. Fremouw. Provides strategy for professionals and individuals desiring to analyze income tax planning. The easily selected menu options provide quick, easy, and efficient analysis for computing what-if situations before you make an irreversible decision. $47.95.

CE Software, Des Moines, IA

Bond Yielder, by Richard Hinson and Donald Brown. Calculate yields, prices, and interest on a variety of bonds—quickly, easily, and accurately. Apple III in emulation mode. $149.95.

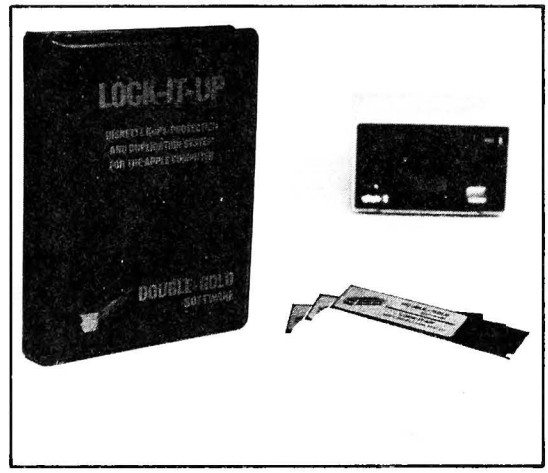
C&H Video, Hershey, PA

The Slide Show, by Bruce A. Cash and Robert W. Hench. Utilizes hi-

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DISKETTE COPY-PROTECTION
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FOR THE APPLE COMPUTER

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



- All sectors on the diskette can still be used.
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- Extensive support is provided should you have any problems or special needs.
- Our system is supported by numerous disk copying services should you need a large quantity of diskettes duplicated.

DOS VERSION:

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

REQUIRES: 48K Apple II or II+ with Applesoft in ROM or language system and at least two disk drives.

PASCAL VERSION:

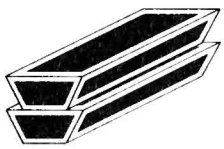
- Any standard Apple Pascal 1.1 diskette can be protected.
- Files may be transferred to a standard Pascal diskette, but they will not run unless they are on the protected diskette.
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- Compatible with Apple Fortran.

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On one hand, having all those options is a good thing. On the other, it can make picking the right one pretty difficult.



Computers come in two parts. You have to buy both.

We'd like to help. So here are a few suggestions about how to buy the computer that's right for you.

Computers come in two parts.

One part is the "hardware," which is the machinery itself. The other is the "software," or a program, as it's sometimes called.

Software is the part that tells the computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything.

And vice versa.

You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration, keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

The simpler the better.

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.



Meaning there are no complicated routines to follow to perform a simple task. And no programming language to learn.

Some people, however, will tell you that software has to be complicated to be powerful.

Nothing could be farther from the truth.

Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

ABOUT BUYING A HERE'S SOME HELP.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, three products make up the family. PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way. Here's a little more about each of them.

PFS:FILE. The simplest way to get organized.

Basically, FILE works like a paper filing system, without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

FILE lets you arrange your information in "forms" you design yourself. So you can get at and really use your information in ways never before possible.

What's more, FILE lets you change the original form without having to redo the information on it.

PFS:REPORT. Making the most of your information.

REPORT summarizes the information on your forms so you can use it to analyze, plan and make better-informed decisions.

With REPORT, you get presentation-quality reports—sorted, calculated, formatted and printed—automatically, in seconds.

PFS:GRAPH. Instant pictures.

GRAPH gives you presentation quality bar charts, line graphs, and pie charts, in black and white or color, on paper or the computer screen. To get a clearer picture of things and spot trends instantly, you simply enter your information and specify the kind of graph or chart you want. GRAPH does the rest.

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res graphics and twenty specially created TV-like transitions between "slides." May contain up to seventy-five slides or graphics pages in a slide sequence. Fast picture loading (approximately four seconds). Sequences can be repeated, edited, or modified and saved under a different name. Slide advance options include game paddle button, keyboard, timed, or free-run. $49.95.

Continental, Los Angeles, CA

The Home Accountant. Maintains up to one hundred budget categories. Prints checks, personal balance sheets, and net worth statements. Provides bank reconciliation, automatic transactions, line graphs, and trend analysis. Keeps track of five checkbooks, cash, credit cards, and other liabilities and expenses. It will help you to control your household finances. $74.95.

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Cyber-Tech, Chatsworth, CA

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The Business Bookkeeping System. General cash accounting system that includes four modules: general ledger, customer, vendor, and employee activity ledgers. Ideal for small businesses and also for accountants to use as a client accounting system. Easy-to-use system features menu-driven screens along with built-in error trappings. Two disk drives. Apple III in emulation mode. $395.

Data Security Concepts, Des Peres, MO

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Decision Support, McLean, VA

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Desktop Solutions, Houston, TX

VC-Documenter, by Danny Shephard. Builds a translation table using the column labels and row labels in your *VisiCalc* model, then lists your model formulae in English to the screen or printer. A must-have utility for hard-copy program backup, user training, or use in understanding the structure of unfamiliar models. Very flexible. $49.95.

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FSM, Los Angeles, CA

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Howard Software Services, La Jolla, CA

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Data Perfect. Complete database. Fast, maximum user control. No disk swapping. Design your own format; utilities and reports included. Complete searching and sorting. Form letters and mailing labels compatible with *Letter Perfect* word processor. $99.95.

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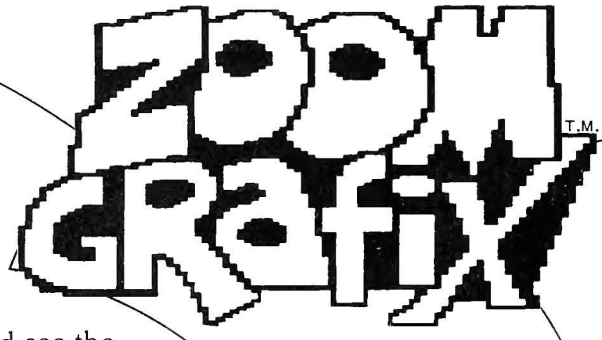
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Omega Microware, Chicago, IL

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Forms Foundry. Using the universal form or plain paper, you may print invoices, sales receipts, purchase orders, debit and credit memos, statements, and so on. Just enter the information when prompted. Apple III in emulation mode. $149.95.

P.M.S., La Crescenta, CA

P.M.S. Dental Billing System. Handles the billing needs of up to five dentists. Simple to operate, includes comprehensive documentation. Up to ten thousand active patients and five thousand transactions per billing cycle. Generates all insurance forms plus fourteen other reports. Requires Corvus hard disk. $1,995.

The Physical Exam. Uses a combination of constant values and a format that will print a report for the patient. The default section is for stating the physician's normal descriptions for up to fifty body parts. Time-efficient, cost-effective; one of the simplest programs ever written to ease a doctor's workload. $99.

Powersoft, Pitman, NJ

Real Estate Analysis Program. A powerful program that supplies the following: cash flow before and after taxes, adjusted basis, capital gains, pre-tax and post-tax proceeds, and return on investment percentage. Will also supply amortization and depreciation schedules. Apple III in emulation mode. $29.95.

Business Utilities. Business I deals with the areas of real estate, banking, securities, leasing, investment analysis, and statistics. *Business II* is applicable to real estate, banking, investments, securities, and insurance analysis requirements. Apple III in emulation mode. $49.95.

Practical Software, Monsey, NY

The Disk Labeller. A visual way to organize your disk. Will automatically print labels for disks showing sectors free, sectors used, and DOS. Features include built-in default and escape functions, automatic

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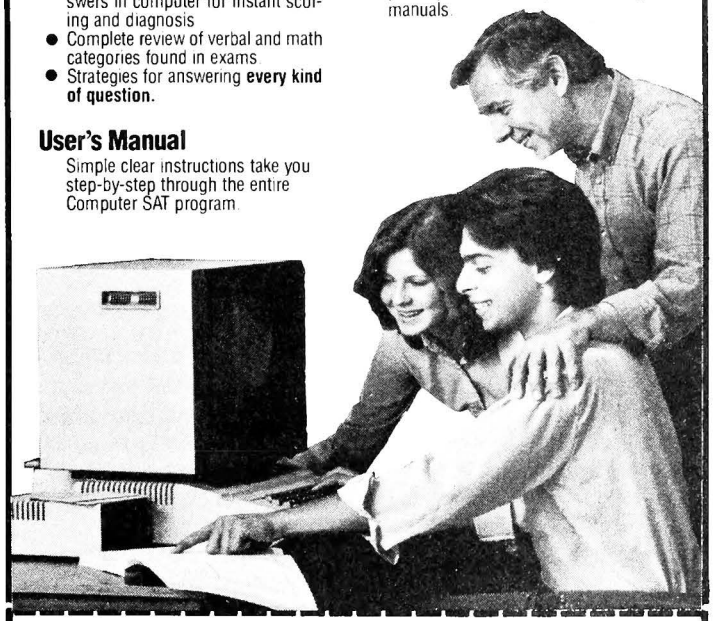
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Professional Calculations, Eugene, OR

ProCalc. VisiCalc templates for architects, engineers, machine designers, and technical educators—calculates all the static loading values for any of the forty-two loading conditions listed in the AISC manual. Apple II and III with *VisiCalc.* $130.

Quality, Reseda, CA

GBS. A programmable relational database management system of unmatched power. Has optimal program generators *Quick Gen* and *Report Gen. Quick Gen* allows a nonprogrammer to create a business program and a data file. *Report Gen* produces a wide range of customized reports. *Menu Gen* ties all of your programs together. Eighty-column card required. $650 with generators. $300 for *GBS* alone.

Spellwright, by Pete Nielsen. Easy-to-use spelling checker; menu-driven; operates quickly. Full printer support and works with lower case adapters and eighty-column boards. Can operate with most types of DOS files. It has a main dictionary of more than 11,000 words. $59.95.

USMail, by Frank Wood. CP/M-based mailing list program that handles more than 1,000 names and addresses on a single disk. It supports commands such as add, delete, examine, change, print, label, search, sort, and many more. Z-80 card required. $99.95.

Rainbow Computing, Northridge, CA

Statistics with Daisy, by Kevin C. Killion. Excellent user convenience. Offers full range of statistical capabilities: basic stats, correlations, hypothesis testing, multiple regression (six procedures), nonparametric stats, data/time series transforms, and analysis of variance. $79.95.

Bowling Data System 2.0, by Arnold Hooten. This data management program provides accurate record keeping and report generation for bowling leagues of up to forty teams with six bowlers per team. Eighty-column printer. $149.95.

Super Sound, by Tom Cleaver. Musical rhythms, gun shots, sirens, lasers, explosions—add these and many more exciting sounds to your Apple. Use them in your programs or create your own sounds. $19.95.

Some Common Basic Programs. Includes the selection of programs in the book *Some Common Basic Programs,* by Osborne (included). For ease of use, the seventy-six programs are separated into four categories. $40.

Realty Software, Manhattan Beach, CA

Property Management General Ledger. A flexible system for property owners and property managers. Easy to use even for the novice. A set of programs that track rental income and expenses and provide general-ledger accounting as well as management reports that are timely and accurate. Features include tenant information report; year-to-date income report; rent receipts; late rent, vacancy, and expense detail reports; and operating statements. Apple III in emulation mode. $450.

Property Listings Comparables. Complete system for maintaining real estate listings and comparable sold properties, including a comprehensive screening capability for selecting properties. All property information is easily entered and updated by filling in a form on the screen. Attribute selections of properties on file; make performance selections too. Apple III in emulation mode. $325.

Home Purchase. Designed to aid home buyers and sellers as well as investors and realtors in making knowledgeable decisions when buying, selling, and comparing properties. The analysis considers the effects of insurance, property taxes, utility expenses, interest rates, closing costs, debt service, and more. Apple III in emulation mode. $50.

Loan Amortization. Calculates the loan payment and displays a schedule of loan payments including dates, payment number, payment, principle, interest, and loan balance. Schedules can be generated for fully amortized, interest-only, and less than interest-only loans, with payments from 1 to 365 per year. Apple III in emulation mode. $50.

Construction Cost/Profit. For builders and investors in building projects—allows a quick, thorough analysis of the potential profits. Interest rates, legal fees, demolition and construction costs, land draw, and financing are considered. Shows return on investment and leverage achieved based on estimated sales. Apple III in emulation mode. $50.

Property Sale. Shows the net financial result of a property sale. Calculates the total gain realized, total taxable gain, return on investment, and total cash to seller. Sales price, financing, legal fees, term of ownership, depreciation, selling costs, and financing included in the analysis. Property-to-property comparison can be made. Apple III in emulation mode. $50.

APR Loan Analysis. The annual percentage rate of a loan is calculated based on the base interest rate of the loan, loan fees (points), prepaid interest, and the term of the loan. Shows monthly payment, total payments and interest (full term), and the annual percentage interest rate. Apple III in emulation mode. $50.

Serendipity Systems, Ithaca, NY

Micro-General Ledger. A system specially designed for small business. $99.95.

Micro-Inventory. An inventory package specially designed for small business. $99.95.

Sierra On-Line, Coarsegold, CA

General Manager, by Malachowski, Cooper. Database manager that allows you to organize, store, file, find, save, retrieve, interrelate, control, and print out all or selected parts of your information. Supports from one to four disk drives (even hard disk systems). Includes utility programs others lack. Upper and lower case characters provided without additional hardware. $229.95.

Small Business Computer Systems, Lincoln, NE

SBCS General Ledger. This menu-driven program features a variety of reports, more than five hundred user-defined accounts, a large number of transactions, budgeting, nine different profit centers, and thorough audit trails. A flexible program with extensive error checking and user prompting. Detailed documentation includes practice session. Warranty, free updates. Two disk drives. Apple III in emulation mode. $349. Demo: $30, credited toward purchase.

Agri-Ledger. For use in any agricultural operation, this menu-driven double-entry system includes multiple enterprise analysis (up to twenty-six farms, ninety-nine enterprises each), a flexible chart of accounts, budgeting, cash-flow templates, user-defined quantity fields, Schedule F reports, five-year history, multiple bank accounts, detailed documentation, and more. Two disk drives. Apple III in emulation mode. $395. Demo: $30, credited toward purchase.

SBCS Accounts Payable. This menu-driven system provides for credit and debit memos, user-defined aging periods and vendor codes; maintains vendor purchase history. Has a variety of reports for specified vendors, check calculations for specified invoices, check register, and several different check formats. Use alone or integrate with *SBCS General Ledger.* Two disk drives. Apple III in emulation mode. $349. Demo: $30, credited toward purchase.

Accounts Receivable/Osborne Conversion. Converted from the Osborne/McGraw-Hill *Accounts Receivable,* this open-invoice system provides for credit and debit memos, full or partial payments, progress billing, invoice aging, and printing of statements. Processes paid and unpaid invoices and maintains customer purchase history. Use alone or integrate with *SBCS General Ledger.* Two disk drives. Apple III in emulation mode. $249.

General Ledger/Osborne Conversion. Converted from the Osborne/McGraw-Hill *General Ledger,* this menu-driven program features a variety of reports, departmentalizing, flexible chart of accounts, and large number of transactions. An efficient way to organize your business. Two disk drives. $249.

SoftHouse, Rochester, MN

Filewhiz, by Steve Goss. The fact that small businesses are picking up this program (originally designed and priced for the home market) testifies to the usefulness of this versatile information manager. Favorably re-

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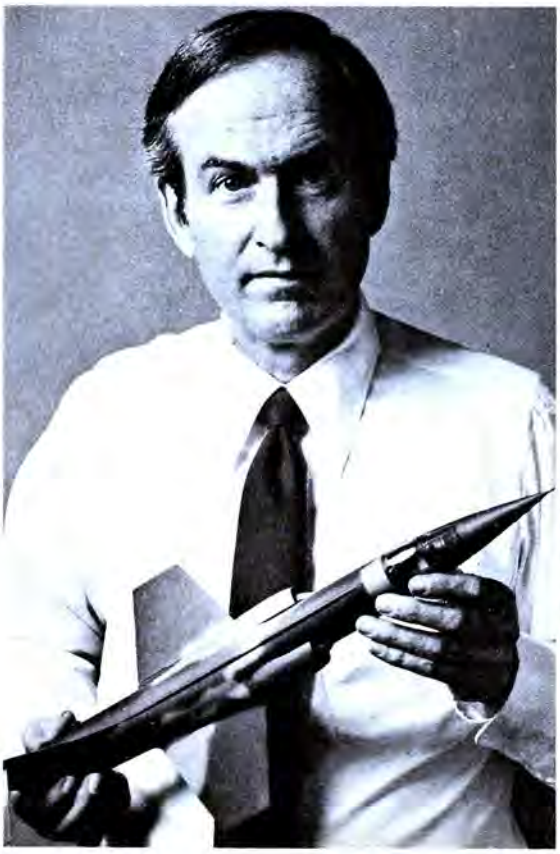
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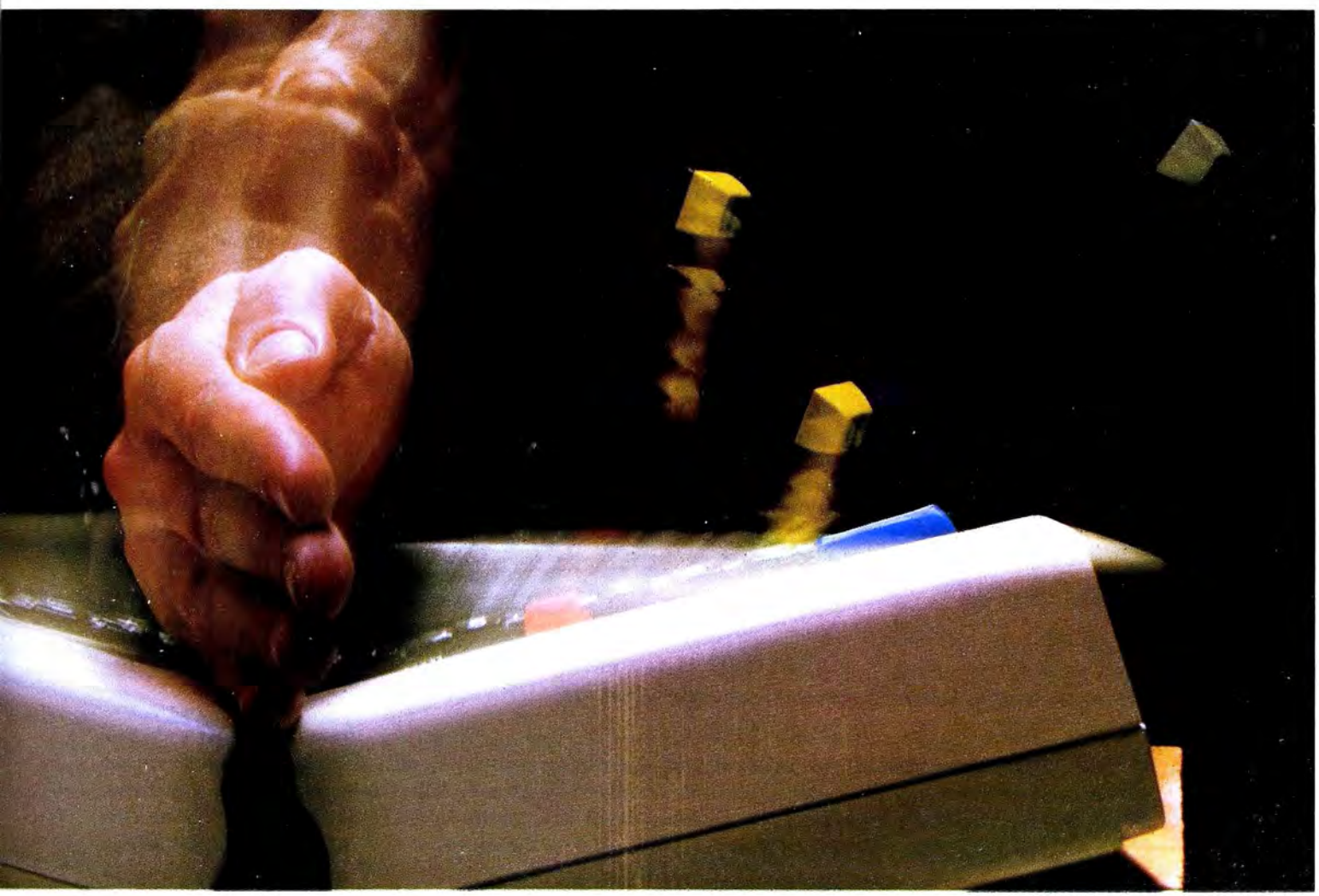
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viewed and having an excellent cost/performance ratio. $79.

Software Dimensions, Citrus Heights, CA

Accounting Plus II. Comprehensive yet easy-to-use accounting system that consists of the four modules needed to automate a small business accounting process: general ledger, accounts payable, accounts receivable, and inventory control. The system produces financial statements and detailed reports, and includes a start-up manual to simplify the transition to automated accounting. Two or three disk drives or hard disk. Apple III in emulation mode. $395 per module; $1,250 for all four.

Payroll Plus. May well be the most flexible and best-designed payroll system for the Apple. It maintains payroll information, including tax tables for every state and most local taxes; generates payroll checks and a full range of reports; allows job costing; and can be used alone or with *Accounting Plus II.* Two or three disk drives or hard disk. Apple III in emulation mode. $425.

Plus Package. Four enhancements to *Accounting Plus II. General Ledger Plus* provides extra reporting features, including prior year and budget reports. *Invoices Plus* makes invoice generation even easier and more flexible. *Labels Plus* produces mailing lists and labels. *Data Plus* converts data for use with *VisiCalc* and other products. Two or three disk drives or hard disk. Apple III in emulation mode. $99 to $295.

Software Publishing Corporation, Mountain View, CA

PFS Family. Designed the way all software should be: simple, straightforward, and powerful. Members of the *PFS* family consistently rank among the top ten best selling programs in the country. There's *PFS:File,* for information management; *PFS:Report,* for making the most of your information; and *PFS:Graph,* for computer graphics without computer programming. All work together and there are more new programs on the way. From now to December 31, when you buy *PFS,* you also get a subscription to *Personal Computing,* free. (Offer good only in U.S.A.) Buy any one *PFS* program, get one year free; any two, get two years; all three, get three years plus a free copy of Adam Osborne's book, *Introduction to Microcomputers.* Versions for the III. *PFS:File:* $125. *Report:* $95. *Graph:* $125.

Software Solutions, Scotts Valley, CA

Job Costing/Tracking. Save time in proposal preparation, job cost tracking, cost analysis, and negotiations. Control your costs and be more profitable by having the financial information you need to make important business decisions. Two disk drives. $237.

Software Technology, Belmont, MA

Mailing List Program, by Gary E. Haffer. Maintains complete mailing list for up to 800 entries; sorts, searches, and prints. Apple III in emulation mode. $60.

IFO-DBMS Version I, II, and *III,* by Gary E. Haffer. Complete database management system includes Samdex, quick formatted print, sort keys, and more. Apple III in emulation mode. IFO-I: $150, IFO-II: $200, and IFO-III (hard disk): $450.

Inventory, by Gary E. Haffer. Maintains complete inventory control on up to 1,000 items. Sorts, searches, minimum quantity, and back orders. Apple III in emulation mode. $275.

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Payroll Package, by Gary E. Haffer. Maintains complete payroll information, calculates pay, prints checks, W-2 forms, and quarter reports for up to 125 employees and more. $275.

Accounts Payable/Accounts Receivable/General Ledger, by Gary E. Haffer. A total accounting package. $350 each; *A/P:* $275.

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SouthWest EdPsych Services, Phoenix, AZ

Check Writer. A flexible and powerful mini accounts payable system. Maintains accurate records on 400 checks per month, 100 vendors, and 100 separate accounts. Unique format system allows layout of the printed check to be customized by the user so any check form can be used. $69.95.

Spectrum, Sunnyvale, CA

Personal Finance Master (PFM). Comprehensive, easy-to-use financial management system designed expressly for personal/home and small business accounting applications. Employing easy-to-read, on-screen forms, it tracks and manages up to twenty-five different asset or liability accounts, typically including checking, savings, credit card, and mortgage loan. $75.

S.S.R., Rochester, NY

Infotory. A simple but comprehensive inventory management system that handles five thousand inventory items. Its unique data-management feature offers flexibility in creating custom reports. Sales and cost analyses are provided by categories (product groups, departments, and so forth) designated by the user. Also available for hard disk drives. Requires two dual-density disk drives. $425.

Stoneware, San Rafael, CA

DB Master. Database management system for business. One of the most sophisticated applications packages available for the Apple, incorporating powerful report-generation facilities and versatile screen formatting commands. Multiple primary and secondary search keys for both printing and displaying records are easily designed by the first-time user. *Softalk*'s second annual most popular software poll voted *DB Master* number one among business programs. $229.

DB Master Special Edition. For hard disk systems. Provides users of hard disk systems greater flexibility, capacity, and faster access. It's considered to be the most powerful database produced for the Plus. $499.

DB Master Utility Pak #1. First in a series of accessory programs for *DB Master Version Three.* Provides users with four of the most popular supplementary programs: translator, restructure capability, recovery of damaged files, and file reproduction. $99.

DB Master Utility Pak #1 For The Hard Disk. Offers the same features as the standard *Utility Pak #1.* $99.

DB Master Utility Pak #2. Extends the capability of the *DB Master* file management system. It is compatible with both the standard version of *DB Master* and the *DB Master Special Edition For Hard Disk.* It features global editor, mailing label printer, transaction file merge, special reblocker, change read protected fields, and print data entry forms. $99.

DB Master Stat Pak. A complete accessory statistics package for *DB Master* users. It performs statistical analysis on data contained in *DB Master* files. $99.

Electronic Price Sheet. The optimum selling tool for retailers to display a complete range of products and options for use by their customers. $99.95.

Micro Memo. A desk calendar program that gives prior notice of any event or dealing up to a full month in advance. $39.95

Synergistic, Renton, WA

Mailing List Database. Enter your name and address files, sort them quickly and easily by any field, and print labels or lists. Unbelievably fast and easy for anyone to work with. $49.95.

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The Data Reporter. A complete information processing system including a text editor, data graphing and statistical analysis program, label maker utility, and a powerful, easy-to-use database. $299.

Inventory Manager. Inventory control package that can summarize

profit margins, calculate wholesale-to-retail markups, list back-order status, recommend reorder points, print purchase orders, and so on. Can handle 2,700 different inventory items on a two-disk system. $149.95.

Word Weaver III. Word processor for the Apple III. Organize text by using global editing commands to replace, delete, move, kill, and copy. Text can be displayed in eighty columns and printouts may be up to 185 columns. $99.95.

Telephone Software Connection, Torrance, CA

Phone Secretary, by Ed Magnin. Finds and dials home and office phone numbers, times the calls, and keeps a log to compare with your phone bill. Holds more than one thousand names, two numbers each. Prints alphabetical phone book. Can use most clocks, or time calls in software. Requires Micromodem. $25.

Desk Calendar II, by Leighton Paul. Helps you better manage your time. Reminds you of important dates and appointments. Prints daily schedule with room to add your own notes. Searches by keyword and knows most holidays. Stands alone or works well with most clocks. $35.

TMQ Software, Buffalo Grove, IL

File-Fax. A database management system that offers quick access to files and records, retrieving information at exceptionally high speeds. It has a unique, powerful report generator. Designed especially for those new to computing—it's easy to learn and simple to use. It will satisfy the advanced operator as well. $175.

United Software of America, New York, NY

Conquest 2.0, by Ken Germann and Toby Zweifach. Latest release of the fully relational database. Up to five separate files can be accessed simultaneously. New features include word processing interface, user-formatted screens and reports, and DIF module. Two disk drives or Corvus. $250.

VisiCorp, San Jose, CA

VisiCalc. Powerful electronic worksheet that helps you solve number problems. Explore alternatives asking "what if?" Just change any number in your problem and the new results are instantly calculated. Whether it's investments, cash flow, inventory, cost estimates, or budgets, *VisiCalc* will help you analyze the impact of decisions before you make them. $250.

VisiCalc Business Forecasting Model. Seven interrelated *VisiCalc* templates provide you with the financial information most vital to your business. Use all the "what-if" power of *VisiCalc* to produce income statements, balance sheets, statements of cash flow, financial ratios, sales and cost-of-goods summaries, salaries reports, and assets and depreciation. Automatically transfers data from one work sheet to another. $100.

VisiFile. Organize, maintain, and more effectively use your business information. File name and address lists, prospect and customer files, personnel records, parts lists, merchandise inventories—almost anything. Store, search, sort, retrieve, display, calculate, and print reports, lists, even mailing labels. Change file formats easily, without reentry. Automatically transfers data to other Visi programs. $250.

VisiSchedule. Powerful project planner that makes it easy to control projects. It instantly shows skill levels, costs, and the critical path among your project's tasks. It allocates costs, specifies earliest and latest start dates, slack times, holidays, prerequisites, and deadlines for each task. Move, slip, or change any task, skill level or cost, and instantly see the impact. Easily transfer data to other Visi programs. $300.

VisiDex. Organize your personal information and manage your time. File names, addresses, new ideas, important numbers and dates, things-to-do-lists, meeting notes, report highlights, tax and stock records—anything. There are no structured formats to bother with. Unlimited cross referencing allows you to find everything faster. Daily calendar keeps track of upcoming events for you. $250.

Desktop/Plan. Highly organized financial planning, budgeting, and analysis package for doing complex and frequently used financial calculations. Print out boardroom-quality reports and produce graphs for greater visual clarity. If you currently use time-shared financial modeling programs, you'll find this familiar and easy to use—and no more monthly time-sharing bills. $250.

West Side Electronics, Chatsworth, CA

Time-Clock II. Requires *Superclock II.* Automatically keeps track of how much time is spent on various tasks, including computer usage. Report feature prints out a detailed accounting of all time spent for each job. $30.

Ziggurat, Arlington Heights, IL

Generic-Rate. Helps the electronic equipment manufacturer estimate the MTBF of his products. The program builds, edits, and analyzes data files of part type, environment, quality, learning factors, and so on. The straightforward and easy-to-use software adheres strictly to MIL-217C handbook predictions. Covers more than four thousand part classes. Either DOS. $49.95.



Hayes Microcomputer Products, Norcross, GA

Smartmodem 300. Connects directly to the phone line and your computer's RS-232C port to communicate with remote computers from 0 to 300 baud. Executes and responds to your commands and special parameter settings. Features include built-in audio monitor, Touch Tone or pulse dialing, and full or half duplex. Requires RS-232C serial port, RS-232C cable with DB-25 connector, software. Estimated retail: $289.

Smartmodem 1200. High-speed version of the popular Smartmodem 300 with identical operating features. Operates at 1,200 bps or at 0 to 300 baud; compatible with Bell 212A-type modems. Extensively tested; compact design; competitively priced. Both modems are FCC approved for direct connection to any U.S. telephone system. Requires RS-232C serial port, RS-232C cable with DB-25 connector, software. Estimated retail: $699.

Micromodem II. Slides directly into an Apple II peripheral slot and connects directly to a standard modular phone jack to allow your computer to communicate over phone lines. Eliminates the loss and distortion of data found with acoustic couplers. Built-in command language dials a telephone number, sets duplex and baud rate (110 or 300), and permits control of your computer from a remote location. Estimated retail: $379; with terminal program: $409.

Hayes Terminal Program for the Micromodem II. Communications software for the Micromodem II with any of three Apple operating systems: DOS 3.3, CP/M, or Pascal. Menu options: originate/answer call; create, list, transfer files; set communications parameters. Three file transfer protocols, including verification for error-free transmission between Hayes terminal programs. Supports concurrent printing through several printer interface cards. Estimated retail: $99.

Intra Computer, Kew Gardens, NY

Softerm, by Softronics. When used with Intra's PSIO board, allows emulation of popular CRT terminals by DEC, Lear Siegler, Hazeltine, ADDS, and TeleVideo. Will communicate at up to 9,600 baud with hosts and time-sharing systems via direct connect or standard modems. $150.

Data-Trans, by Aby Microcomputer. Enables transfer of all file types (includes VisiCorp and DIF formats) between Apples equipped with Intra's PSIO board. Includes a text editor and the ability to send/receive and automatically answer an external modem. This package can also access many dial-up services. 300 Baud: $75. 1,200 Baud: $100.

Link Systems, Santa Monica, CA

DataLink, by Rudi Diezmann. Communications package that features a transmit/receive speed of 9,600 baud computer to computer, or 1,200 baud over phone lines; plus single-keystroke session control, automatic dial and retry, CRC-16 error checking, and full interrupts. UCSD Program requires 64K and has floppy/hard disk capability. $99.95.

Macrotronics, Turlock, CA

Terminall T2. Hardware and software system that converts your Apple into a state-of-the-art communications terminal to send and receive Morse code and radioteletype. Easy to connect to your radio and easy to use. Features fantastic reception, multilevel displays, hardware clock, user-defined WRUs, ASCII printer driver, and more. $499.

Microcom, Norwood, MA

Micro/Courier. An electronic mail program that communicates between Apples. The software sends and receives correspondence, charts and graphs, *VisiCalc* reports, and entire programs all unattended and automatically. Menu-driven features include commands to create, edit, and revise messages; automatically dial message recipients; and store incoming mail to disk. Micromodem II. $150.

Micro/Telegram. Allows Apple owners to access Western Union services worldwide. Using your Apple you can send or receive Telex II, Telex, and mailgrams. Menu-driven features include an editor to create, edit, and revise messages; automatic dialing capability; stores incoming messages to disk; maintains one hundred names and numbers in a user directory. Micromodem II, TWX line from Western Union with RJ11 jack. $150.

Micro/Terminal. Lets you access and exchange information with mainframe and minicomputers, with databases like the Source, Dow Jones, and Compuserve. Unique blend of menus and commands—easy to learn while still being flexible and fast. Allows information to be printed as it is received. Supports a variety of modems. $85.95; for the III: $99.95.

Novation, Tarzana, CA

Apple-Cat II. Direct-connect modem that is a full personal communication system. The single circuit board permits communications up to 300 baud, full duplex, or 1,200 baud, half duplex. Can be upgraded to 1,200 baud, full duplex. $389.

212 Apple-Cat II. A single card LSI-based modem installed in the Apple with the *Apple-Cat II* using a ribbon connector. It permits 1,200 baud, full duplex communication with any Bell 212A compatible data set. Upgrade module: $389. Full two-card system; $725.

Softronics, Memphis, TN

Softerm. High-speed CRT terminal emulator up to 9,600 baud for the following terminals: IBM 3101, DEC VT100 and VT52, Data General D200, ADDS Regent series, Lear Siegler ADM-3A and ADM-5, Hazeltine 1400 and 1500 series, and TeleVideo 900 series. Also includes file transfer with data compression, keyboard macros, and automatic dialer. Requires serial interface card. $150.

Softspoken, Redondo Beach, CA

Super Smart, by John V. Longawa. Complete terminal package. Generates and receives full ASCII with true lower case. Built-in editor stores and creates data or text. Giant phone list with search and autodial

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capability. Ideal for time sharing and bulletin boards. Micromodem II. $60.

Source Telecomputing, McLean, VA

The Source. Dial up a wealth of information and entertainment, including UPI, electronic mail, stock information, airline schedule and travel reservations, games, electronic shopping—hundreds of services in all. Compatible with all Apples; modem or communications card required. One-time $100 fee, then charges from $20.75 to $5.75 per hour.

Southwestern Data Systems, Santee, CA

ASCII Express. The first communications package released by SDS, this program still offers an economic solution to the basic communications needs of the Apple owner. Package features include a built-in directory, keyboard macros, a text editor, and more. $59.95.

ASCII Express: The Professional. The most powerful Apple DOS communications package available. Easily transfer Apple files of any type or size. Supports all popular modems and eighty-column cards. Features include interactive macros, 1,200 baud capability, unattended operation, protocol transfers, and much more. $129.95.

Online. Lets your Apple become your own private access dial-up system with four levels of passwords for complete security. Fifty user accounts; ideal for electronic mail or announcements by clubs or businesses. $89.95.

P-Term: The Professional. Pascal users will find this to be the best communications package available for the Pascal Apple. Supports all popular modems and eighty-column boards, 1,200 baud operation, protocol transfers, and more. A must for the Pascal user looking for a versatile communications package. Pascal. $129.95.

Z-Term. Sophisticated, full-featured terminal package for the CP/M Apple; send files of any size, receive files up to 41K, autosave mode, terminal emulation, and much more. $99.95.

Z-Term: The Professional. All *Z-Term* features plus supports Novation Apple Cat, Christensen, and Pan transfer protocols, 1,200 baud, autoanswer, unattended transfer, slow printer buffer, and more. The best in CP/M communications software. $149.95.

SSM Microcomputer Products, San Jose, CA

Transend 1, by Tim Dygert and Bob Kniskern. Provides intelligent terminal and file transfer capabilities for Apple to Apple, and Apple to mainframe communications. Menu driven, supports 110, 300, 1,200 baud modems. Features an 18K buffer with data capture and print buffer memory areas, and permits simultaneous receiving while printing. Modem. $89.

Transend 2, by Tim Dygert and Bob Kniskern. Offers all features of *Transend 1,* plus verified file transfer. Permits Apple to Apple transfer of any Apple DOS 3.3 file without converting to text files prior to transmission. Allows automatic transmission of any number of files from single disk; can transfer entire disk without user interaction; estimates transfer time prior to transmission. Modem. $149.

Transend 3, by Tim Dygert and Bob Kniskern. Offers all features of *Transend 2,* plus unattended electronic mail capabilities. Turns the Apple into a low-cost, full-feature data communications center. Offers electronic mail with password security, text editing, mailbox, clock, and calendar for unattended scheduling and receiving, and automatic redialing. Three disk drives, modem. $275.

Telephone Software Connection, Torrance, CA

Terminal Program, by Ed Magnin. Memorizes and repeats your logon to most systems. Capture buffer (16K) can be reviewed and printed on or off line. Uploads text easily. Requires Micromodem. $35.

Telephone Transfer II, by Leighton Paul and Ed Magnin. Sends Applesoft, Integer, binary, or text files from one Apple to another. Two countdown timers show remaining transfer time. Chat while sending files. Automatically corrects errors due to line noise. Compatible with Micromodem or Applecat (with ROM). $75.

VisiCorp, San Jose, CA

VisiTerm. Communicate with larger computers and other personal computers. Transfer disk file information over the phone, and tap into time-sharing services, news wires, stock reports, and other information databases for instant information on nearly anything. Match host computer requirements such as baud rate, stop bit, parity, and many others. $100.



Agri Computing Systems, Royalton, IL

Student Information Management System (S.T.I.M.S.), by David D. Lohmeier. Master file of all students is built and maintained for processing of class schedules, attendance accounting, grade reporting, student record reporting, and student medical record reporting. Codes are provided for customizing. Northstar Advantage. Over one thousand students: Northstar Advantage with hard disk. $3,500; with hardware: $8,995; over one thousand students, with hardware: $10,495.

Anthro-Digital, Pittsfield, MA

Hebrew II and *Hebrew II Plus,* by Michael Heckman. Mini word processor for the Hebrew language; prints right-to-left on the screen, with vowels. IBM keyboard layout; can label graphs and pictures; prints on any printer with graphics. Allows you to combine Hebrew and English on the screen and switch between languages. $60. *Hebrew II Plus:* $90.

Apex, Spring Valley, CA

World Alphabets, by William C. Jones. An interactive system designed primarily for educational purposes. Nine fonts are available: Arabic, Cherokee, Chinese, Egyptian hieroglyphics, Greek, Hebrew, Japanese, Russian, and Sanskrit. Choose among three options: educational prose, alphabet tables, or you-write. Choose a Roman font, with diacritics and special characters for all major European languages. Either DOS. $89.95.

Apple, Cupertino, CA

Apple Logo. A sophisticated, proven tool for problem solving, both for children and adults. It's a language for programming, designed to accommodate both the beginner and the advanced user. An ideal tool for home education. Teaches problem-solving skills by providing a flexible tool for individual exploration. $175.

Avant-Garde Creations, Eugene, OR

Z.E.S. Authoring System, by Z.E.S. This system could be used as an introduction to the Apple for instructors. Write classroom courseware or training programs with no programming knowledge. Menu-driven sys-

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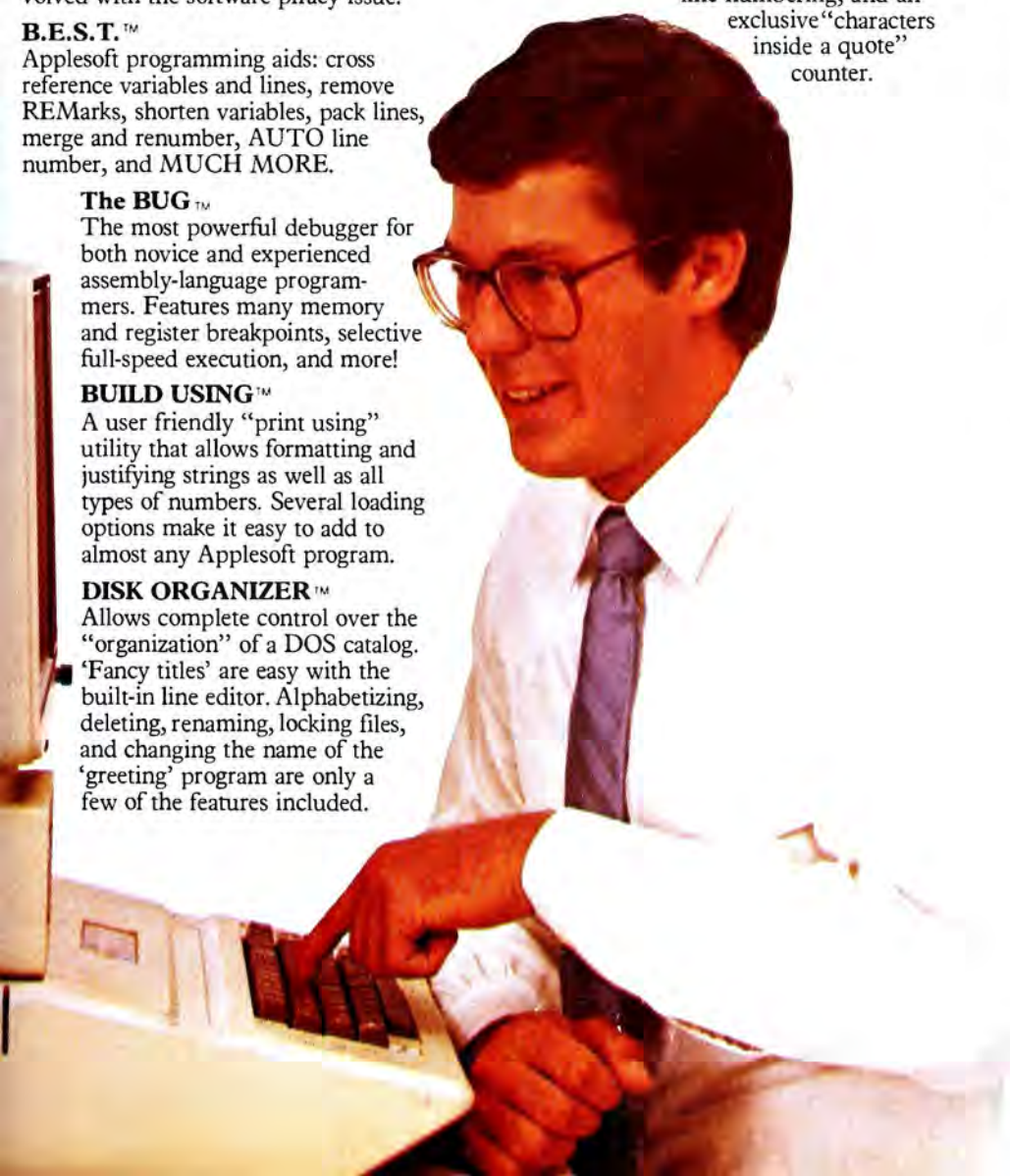


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Basic Scientific Subroutines: Volume I. Basic subroutines designed to facilitate the application of microcomputers to scientific tasks which have previously been largely in the domain of the large time-share mainframes. Book included. Apple III in emulation mode. $20.95 per collection. Cassette: $16.95 per collection.

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Children's Carousel. Nine games that have great color and sound (including the carousel and alphabet songs). Includes *Matching Shapes*, *Counting*, *Letter Recognition*, and more. Has been field tested with many children. Apple III in emulation mode. $19.95.

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Compu-Read 3.0. Four learning units develop and strengthen reading skills: letters, words, synonyms and antonyms, and sentences. $29.95.

Edu-Ware Fractions. Contains six learning units: definition and parts of the fraction, denominators, addition of fractions, subtraction of fractions, multiplication of fractions, and division of fractions. $49.

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Counting Bee. Eight learning units explore beginning math: addition, block counting, subtraction, shape discrimination, comparing weights, water height, moving circles, and length comparison. $29.95.

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Algebra 1. Contains five learning units: definitions, number line operations, sets, evaluation expressions, and rules for equation reduction. $39.95.

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Algebra 3. Five learning units concentrate on monomials, polynomials, simple factoring, factoring and binomials, and quadratic trinomials. $39.95.

Rendezvous. Simulates an actual space shuttle flight in four phases from earth liftoff, through orbital rendezvous and approach, to alignment and docking with a space station. $39.95.

FlipTrack Learning Systems, Glen Ellyn, IL

How to Operate the Apple II Plus. Lets you learn by listening to a friend. Three spoken-voice cassettes and an operator's guide provide clear, nontechnical instruction for teaching family, staff, clients, or yourself. Chosen by Apple Computer for training their own field sales reps. $49.95.

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Harcourt Brace Jovanovich, San Diego, CA

Computer SAT. Complete program for scoring high on the Scholastic Aptitude Test. Leads students step-by-step through the test preparation process, diagnoses the student's strengths and weaknesses, prepares a study plan, and guides him through a comprehensive set of study exer-

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High Technology, Oklahoma City, OK

Harmonic Motion Workshop. Visually presents simple and damped harmonic motion by the use of hi-res graphics. An object is placed in harmonic motion on the screen. The student can alter such variables as phase, amplitude, and the damping factor, and immediately see the effect on the motion of the object. $75.

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Lab Statistics Package. Developed by a college physics professor, this package provides an easy method of introducing laboratory students to statistical procedures used for the analysis of raw data. The concepts presented are applicable to physics, chemistry, biology, engineering, and the behaviorial sciences. It consists of two main programs, least squares demo and statistical calculations. $50.

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Human Systems Dynamics, Northridge, CA

Anova II. Performs analysis of variance on randomized designs, repeated measures designs, or mixed designs for both equal *n* and unequal *n*. Also performs analysis of covariance; allows you to edit and transform data and create disk files. Output includes SS, MS, df, F, and p values. Apple III in emulation mode. $150.

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Innovative Programming Associates, Princeton, NJ

Introduction to the Computer. A basic foundation module covering the use of the keyboard and the operation of computer system components. Introduces the user to computer terminology and theory, and presents a brief historical background. $44.95.

The Computer as a Calculator. Shows how the computer can be used to perform calculations ranging from simple arithmetic functions to more advanced topics such as trigonometry and combined functions. $29.95.

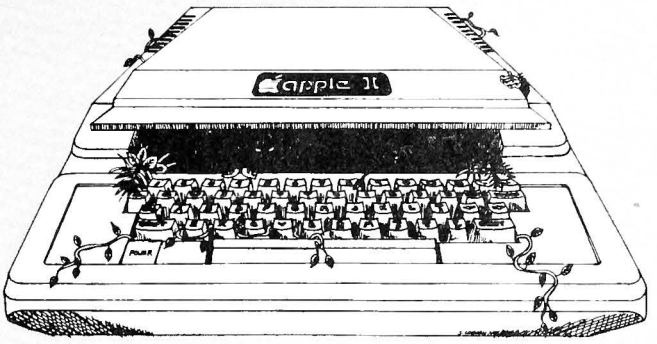
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Interactive Microware, State College, PA

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Krell, Stony Brook, NY

Krell College Board SAT Preparation Series—1983. Building on Krell's College Board SAT Preparation Series, which has demonstrated a mean combined math and verbal score increase of more than 150 points using sophisticated drill and practice techniques alone, the new forty-program series uses artificial intelligence techniques, customizes drill, practice, and construction. $299.95.

Krell's No Frills Logo. Consists of: two copies of Krell's *Logo* for the Apple II; utility disk with M.I.T.'s valuable demo programs, including *Dynatrack*; and the official M.I.T. technical manual, *Logo for Apple II*, by H. Abelson and L. Klotz. *Frills Only* support pack: $99. Combination: $159.95.

Krell's Sprite Graphics Board. Two disks. Demonstration software and the Sprite Editor with full documentation. $325; with *Logo*: $425.

Primary Fight. An excellent game for teaching the prime number concept and developing factoring skills. Political mathematical game in which up to six players compete for the nomination of their party. Results dependent upon individual campaign strategies and mathematical skill. $39.95.

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Botticelli. Fascinating new approach to a classic game. Players compete to teach the computer how best to interrogate their opponents in order to discover which historically famous men and women their fellow players are thinking of. A delightful introduction to the world of artificial intelligence and the art of questioning. $24.95.

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Wordsworth. Players compete to form words from the letters they hold. Letter values change from game to game. A variety of bonus options and challenging constraints are available—verbs only, nouns only, parts of speech to fit special stories that are revealed only when the story is complete, and so on. $39.95.

Hardscrabble. Challenging word-search game for up to four players. Players compete for points by forming words in any direction. Skillful play can increase word-score points by double, triple, or an even higher multiple. $39.95.

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The Amazing Ben. Spectacular introduction to artificial intelligence. In a series of programs, users will learn Ben's language and teach him to traverse a previously unseen maze. You'll see what Ben sees, learn how to control Ben's motion, his ability to write and read messages, and to examine and alter his memory. $79.95.

Graduate Record Exam Series. Educator edition includes more than thirty programs covering vocabulary, word relationships, reading comprehension, mathematics, analytical reasoning, and logical diagrams. $349.95.

Lightning Software, Palo Alto, CA

MasterType, by Bruce Zweig. Typing instruction in game format. Zap the enemy word by typing it correctly or the word zaps you. Eighteen lessons, graduated from home letter recognition to eight-letter words and basic language key words. Ability to create your own lesson. Apple III in emulation mode. $39.95.

Link Systems, Santa Monica, CA

LinkSampler I, by Rudi Diezmann. Disk tutorial illustrating UCSD Pascal principles and techniques through a series of twenty-one teaching programs. Requires 64K and has floppy/hard disk capability. Version for the III. $59.95.

L&S Computerware, Sunnyvale, CA

Crossword Magic, by Larry Sherman. Supply words using any subject and *Crossword Magic* will interconnect them with lightning speed. Print professional quality puzzles with most dot matrix printers or play them on the screen with crystal-clear graphics. Apple III in emulation mode. $49.95.

Microsoft, Bellevue, WA

Typing Tutor II. Provides a highly individualized approach to learning and teaching typing on a microcomputer. Ideal for experienced as well as beginning typists; helps you increase typing speed and accuracy through a series of personalized lessons and drills. $24.95.

Microsoft MuMath/MuSimp System. Interactive symbolic math system that allows you to perform algebraic, trigonometic, and transcendental functions; integration and differentiation with more than six hundred digits of accuracy. Expressions can be evaluated and simplified even if numeric values have not been assigned. Available for standard Apple system or with SoftCard. $250.

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Muse, Baltimore, MD

U-Draw II. Kids will be amazed at what they can draw with *U-Draw II.* They'll have hours of fun and learning. $39.95.

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Nova Software, Alexandria, MN

Finger Painting, by Dean Hinmon. Allows a person as young as three to finger paint in self-selected colors and background using joystick control. Also erase, save, and load a picture with animated fun. Fully developed and tested using Montessorian and Piagetian principles of motor and intellectual development. $14.95.

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Passport Designs, Half Moon Bay, CA

Music Tutor. A CAI program for the Soundchaser that teaches general music theory and helps develop listening skills. Comes with four training units: intervals, matching and tuning, chords, and melodic games. Includes a teacher's disk, which allows instructors to set up drills corresponding with the skill level of their students. Mountain Computer Music System. $195.

Powersoft, Pitman, NJ

Electrical Engineering Series. Combines three programs in one. *Electrical Engineering I* covers many of the typically used calculations in electrical circuits and other electrical design. *Electrical Engineering II* covers the broad spectrum of electrical engineering. *Active Filter Design* goes beyond the normal cookbook approach. Apple III in emulation mode. $59.95.

Automotive Diagnosis. Will assist the user in diagnosing most automobile problems. Integer. Apple III in emulation mode. $19.95.

Spanish Vocabulary Drill. Provides practice by using three types of drills, matching Spanish to English and English to Spanish. Comes with sample lessons and a lesson editor. Instructions on converting this program to other languages are included. $24.95.

French Vocabulary Drill. Provides practice in French vocabulary by using three types of drills, matching French to English and English to French. Comes with sample lessons and a lesson editor as well as instructions on converting this program to other languages. Apple III in emulation mode. $24.95.

Italian Vocabulary Drill. Provides practice in Italian vocabulary by using three types of drills, matching Italian to English and English to Italian. Comes with sample lessons and a lesson editor. Instructions on converting this program to other languages are included. $24.95.

German Vocabulary Drill. Provides practice in German vocabulary by using three types of drills, matching German to English and English to German. Comes with sample lessons and lesson editor. Includes instructions on converting this program to other languages. Apple III in emulation mode. $24.95.

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Statistics Series. Statistics I is a set of programs that do power curve, fitting, linear regression analysis, logarithmic curve fitting, and exponential curve fitting; hi-res graphics. *Basic Statistics* will process a given data set of univariate numbers computing the mean, standard deviation, standard deviation from the mean, probable error of the mean, and probable error. Apple III in emulation mode. $34.95.

Program Design, Greenwich, CT

The New Step by Step. A tutorial program that teaches you how to program in Basic. You can learn at home, at your own speed on your own Apple. Comes with two disks, four audio cassettes, and a typeset workbook in a hard vinyl binder. Junior high to adult. $79.95.

Vocabulary Builder 1: Beginning. Eleven programs include a set of graded vocabulary questions on synonyms and antonyms (the most common type of vocabulary on IQ tests). The last question is a vocabulary test. A total of four hundred questions and two thousand words. $23.95.

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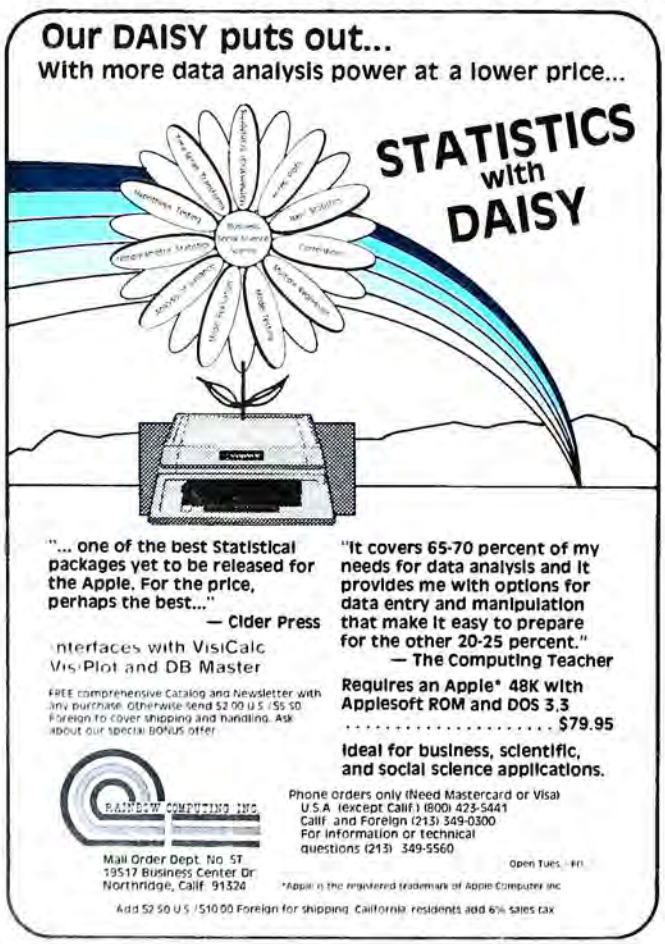
Reading Comprehension: What's Different? Five reading-comprehension programs that present logical problems in which the student picks the one word in four that doesn't belong with the rest. Builds analytical skills essential for understanding what you read. Ages eight and up. $23.95.

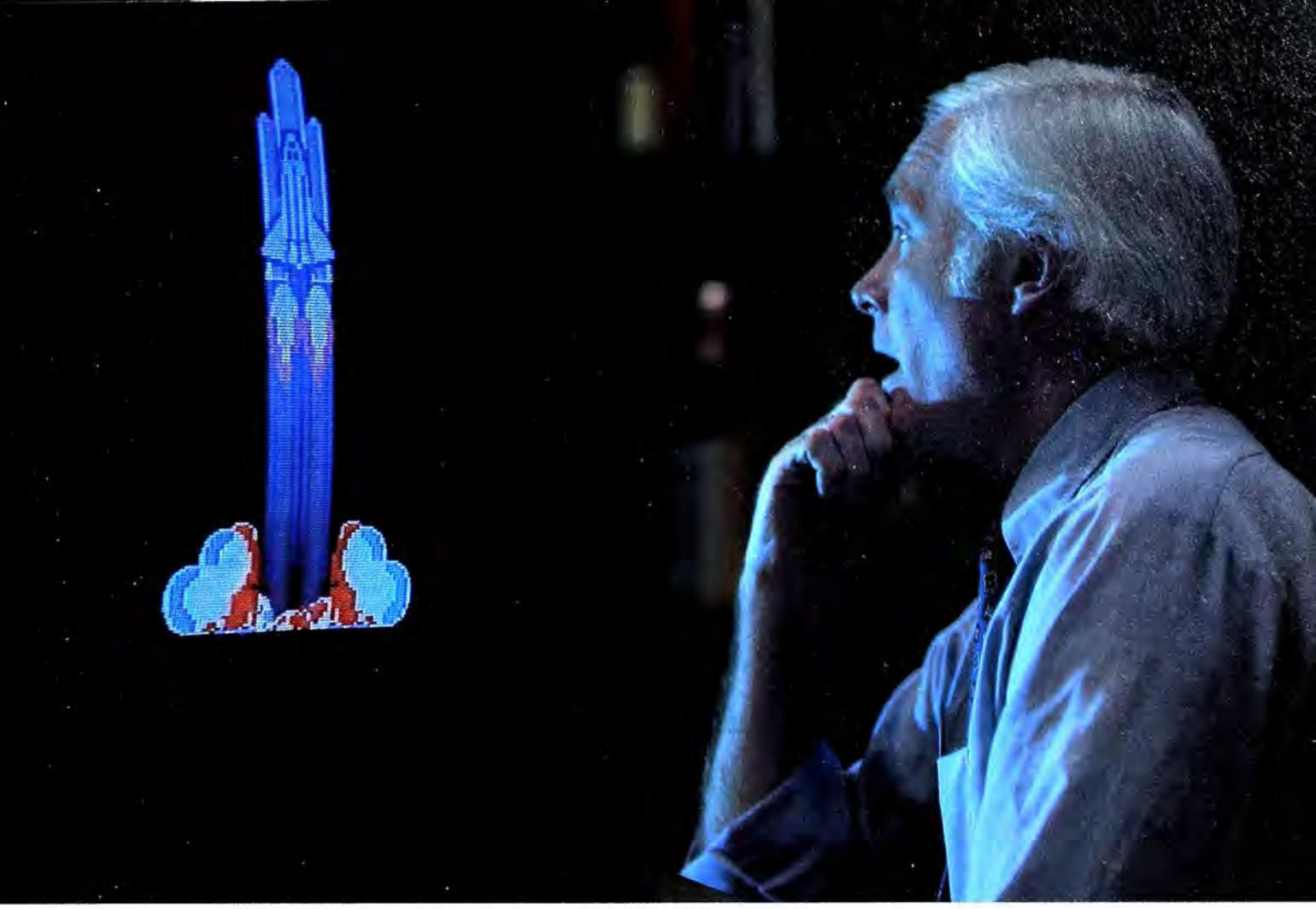
Pre School IQ Builder. Part one: Decide whether pairs of figures are the same or different. Part two: Match the letter on the monitor to one on the keyboard. Both programs teach vital cognitive skills; both are wonderful ways to introduce children to computers. Ages three to six. $23.95.

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Science Research Associates, Chicago, IL

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WordSkill for the Microcomputer. A vocabulary development/enrichment program in game format for students in grades seven to twelve. Teaches synonyms, antonyms, definitions, and analogies. Includes one *WordSkill* text, teacher's manual, word-list pad, and student record sheets. $200.

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Micro Discovery. A computer literacy program for grades four to eight. Introduces students to the microcomputer and gives the fundamental understanding of computers. The program contains computer concepts, basics of programming, and the impact of computers on society. $190.

S-C Software, Dallas, TX

S-C Elementary Math Disk, by Bob Sander-Cederlof. The author used these to help his four oldest children with their addition, subtraction, multiplication, and division. Includes a long division demonstrator and both text and lo-res graphic flash cards of varying degrees of difficulty. $15.

Serendipity Systems, Ithaca, NY

Inter-Stat. A statistical analysis program for business and teaching. Patterned after *Mini-Tab,* a popular mainframe statistical package. $99.95.

Instructor Gradebook. A gradebook system specially designed for instructors. $79.95.

SmartWare, Dayton, OH

Matman. Interactive mnemonic calculator for real matrices. Add, subtract, invert, transpose, split, square root, and several factorizations and decompositions. More than twenty-five modes. Will hold thirty-five ten by ten matrices in 48K. Manual allows complete tailoring to your needs and provides applications. $29.95.

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Software Technology, Belmont, MA

Language Reading Development Program, by Gary E. Haffer. A complete reading comprehension, perception, and learning package that guarantees success in your reading problems. Instruction manual, tutorial, four disks, and complete prescription guider. Apple III in emulation mode. $125.

SouthWest EdPsych Services, Phoenix, AZ

The Math Machine. More than a hundred instructional objectives cover math skills typically taught in kindergarten through sixth grade classrooms. Innovative reinforcement system, record keeping, and management included. For schools and parents. "Very effective and well worth its price," said *The Computing Teacher.* $79.95.

The Spelling Machine. Kid-tested, inexpensive, effective instructional software to improve spelling skills. Contains seven hundred words and sentences; innovative reinforcement system, record keeping, management, and text editing systems for insertion of user-selected words. For schools and parents. Given a summary rating of "10/10" by *School MicroWare Reviews.* $49.95.

The Reading Machine. State of the art in computer-assisted reading instruction. Covers reading skills typically taught in kindergarten through third grade classrooms, with more than two dozen instructional objectives. Record keeping, management, and reinforcement systems included. Large hi-res letters, pictures with each word, upper and lowercase letters. $59.95.

Spelling Sorcery. Three exciting color graphics programs that harness the power of arcade games to make spelling fun for children and adults. $29.95.

Math Wars. An exciting multiplayer arcade game for children and adults. Fast, hi-res color graphics are combined with sound educational content to produce a truly educational game. More than thirty instructional objectives cover addition, subtraction, multiplication, division, fraction, and decimal areas. $39.95.

Southwestern Data Systems, Santee, CA

Spanish for the Traveler. Excellent gift for anyone wishing to make the Apple a treat for the whole family. Opens up the magic world of being at ease while traveling in a foreign country. Learn the essentials of the Spanish language needed for traveling, or brush up on earlier classes in Spanish; makes it easy to learn the language quickly. Includes manual and four audio cassettes. $59.95.

Spinnaker, Cambridge, MA

Snooper Troops I and *II,* by Tom Snyder. Case I: *The Granite Point Ghost,* Case II: *Disappearing Dolphin.* First two cases in a series of interactive mysteries. The player, as private detective, sleuths about to determine the perpetrator of the crime and the motive. Clues surface as the player drives around town, questions suspects, searches houses and uses the Snoopnet computer to obtain background information. Ten to adult. $44.95 each.

FaceMaker, by DesignWare. A computerized spinoff of the popular Mr. Potatohead. Three games in all. The child first creates a face. The face completed, the child then makes his screen character smile, wink, wiggle its ears or stick out its tongue. Lastly, the child is asked to repeat a sequence of faces shown on the screen. Four to eight. $34.95.

Story Machine, by DesignWare. An educational toy that helps children learn to write sentences, paragraphs and simple stories. Using a supplied list of words, including nouns, verbs, and other parts of speech, a child types a sentence and then watches as the sentence is animated on the screen. Five to nine. $34.95.

Delta Drawing, by Computer Access. A precursor to Logo's turtle graphics. It includes much of the power of turtle graphics, but removes the difficult syntax. Children create colorful drawings on the screen us-

ing single key commands to control the *Delta* cursor. Changes are easy to make. Complex pictures, patterns, and designs can be built from simple parts because drawing programs can be nested inside one another. Four to fourteen. $59.95.

A Christmas Sampler, by Dr. Mark Cross. A yuletide program that brings a variety of holiday classics to life with full-color graphics, music, and sound. Interspersed with animation, the graphic depictions of "A Christmas Story," "The Night Before Christmas," and a selection of Christmas carols are accompanied by screen texts for easy follow-along by younger family members. $29.95.

Rhymes and Riddles, by Dr. Mark Cross. A letter-guessing game presented in three formats helps children spell, learn words to nursery rhymes and popular sayings, and use the keyboard. Children are treated to a new color graphic reward and corresponding tune each time they correctly identify the punch line or complete a verse or saying. Heavy use of color graphics. Four to ten. $29.95.

KinderComp, by Dr. Doug Davies. Five games for the very young computer user utilizing color graphics and sound. *Draw* lets the child create colorful masterpieces on the screen. *Scribble* sends an enlarged character across the screen. Fill in the fifth number in *Sequence*; the right answer brings a colorful reward. Similar rewards appear in *Match*. In *Name*, the child delights in watching his name dance on the screen when he has spelled it correctly. Three to eight. $34.95.

Sterling Swift Publishing, Austin, TX

The Arithmetic Classroom, by Courses By Computers. For home or the classroom—eight packages plus games: addition, subtraction, multiplication, division, fractions—basic concepts, fractions—addition and subtraction, fractions—multiplication and division, and decimals. Each learning package contains a lesson disk, practice workbook, and achievement record forms which are used for keeping track of learning progress. $49.95 each. Games: $29.95.

How To Program in the Basic Language, by James Poirot and Don Retzlaff. No previous knowledge of computers needed. Twelve tutorials, on disk or cassette, ranging from keyboard operation, input commands, arrays, and so on; includes two applications programs. Hands-on microcomputer workbook serves as reinforcement for skills learned in the tutorials. Recommended for grades six through fourteen, teachers and parents. $69. With workbook: $74.95.

SubLogic, Champaign, IL

Whole Brain Spelling. Designed to help the user develop internal visualization skills for improving spelling. Uses the graphic color capabilities of the Apple to provide positive feedback and to emphasize visual aspects of the learning process. Available in six word-list categories: General, Medical, Scientific, Secretarial, Fairy Tale, and A Child's Garden of Words. $34.95.

Synergistic, Renton, WA

Star Gazer's Guide. Displays and describes the constellations, major stars, nebulae, and galaxies seen in the Northern Hemisphere. Gives stellar coordinates, instructions on related topics. $30.

Planetary Guide. Discover our solar system from the moon and sun, to the planets and their orbits, to comets and asteroids. Hi-res graphics, informative manual. $30.

The Linguist. Study a foreign language by entering words, definitions, phrases, and phonetic pronunciations of any European (Romance) language as well as Japanese, Hebrew, Russian, and Greek. Program can drill and test students of all ages. A learning tool. $40.

Video Coach. A combination speed reading/speed typing software program. Speed reading teaches you to skim and tests on comprehension. Speed typing acquaints you with the keyboard and drills you on each key. Home educational package. $29.95.

Syntauri, Palo Alto, CA

MusicMaster, by Prof. Kuhn (Stanford U.) and Dr. Lorton (U. of San Francisco). Modular software package for basic musicianship. Topics range from simple note recognition to identification of complex melodies. First module assists in learning scales, intervals, and triads. Easy-to-use at home and cost-effective for schools. All programs contain a teacher management system for record keeping and scoring. Can be used with the four or five-octave alphaSyntauri system. First module: $150.

Systems Design Lab, Redondo Beach, CA

Multiple Regression. A statistical program used for multipurpose predictions. May be used in business, education, or in any field where historical information is used to predict future events. $39.95.

The Forecaster II. A statistical program used for linear regression trend analysis. May be used in business, education, or in any field where historical information is used to analyze current trends. $29.95.

Telephone Software Connection, Torrance, CA

Time Tutor, by Ed Magnin. Quizzes your children on telling time in both directions—looking at an analog clock or typing the time and then making the clock's hands match a digital display. Has five skill levels. Keeps a progress chart for each user. $25.

Universal Systems for Education, Colorado Springs, CO

PAL (Personal Aid to Learning). The only diagnostic/remediation program ever written for reading education for grades two through six. Covers all the reading skills needed for each of those grade levels: phonics, vocabulary/structural analysis, comprehension, and study skills. Actually diagnoses reading problems and provides remediation directly targeted at correcting those problems. $199.90; each additional grade level: $99.95.

Village Software, Westlake Village, CA

Einstein, by Chuck Elliot. Fast-paced interactive game on the hottest topic of our times—nuclear power and nuclear war. Rapidly teaches you about the scientific, technical, military, medical, and ethical questions involved in the nuclear issues. Either DOS. $24.95.

Wims Computer Consulting, Tulsa, OK

Antfarm, by Dr. Jacques LaFrance. A system for teaching and learning structured programming. It involves a very simple English-like language for instructing an ant to move about its farm, the screen. Ants can dance, march, follow a maze, and so on. Fun and educational. It is simple enough for children, but interesting and effective for adults too. $49.95.

Nutrichec, by Dr. Duane Thurman and Bill Parkey. Computes nutritional content of a diet. Database contains the vitamin, mineral, calorie, protein, fat, and fiber content of 748 foods. Provision given to expand by about 200. User's nutritional needs are estimated or computed based on specified activities. Results displayed or printed both in tabular and bar-chart form. $59.95.

Window, Watertown, MA

Window. A new interactive magazine on disk with a focus on learning. Each issue includes articles, software reviews, and regular columns. Also offers a feature program guaranteed to be worth the price of the disk itself. For example: *Window-on-Basic* (Vol. 1, No. 1), for learning about programming; *Notebook* (Vol. 1, No. 2), a file management program for organizing information. $24.95 per issue. One-year subscription (five issues): $95.

Ziggurat, Arlington Heights, IL

Spelling-Binder. Allows students to recognize, find, and correct mistakes in spelling, usage, or any course content testable in sentence form. Comes with three twenty-five sentence spelling drills and software to create your own exercises for any course content. Excellent for school or home use. Either DOS. $24.95.

Accessory Drills. Each set contains three twenty-five sentence drills ready to use with *Spelling-Binder*. The drills are classroom tested and targeted for the secondary grade levels. Select from subject-verb agreement, pronoun agreement, or verb tense agreement. Specify drill categories. Either DOS. $19.95 per category, or three for $49.95.

Gradekeeper. The answer to classroom record keeping. Organizes

grades for a one hundred–student class in three weighted categories. Features class or student summaries, grade editing, sorting by grades or averages, screen or printer-directed output, easy grade entry, and grade clearing for new semesters. Either DOS. $24.95.



Accent, Palo Alto, CA

Accu-Shapes. Easy-to-edit, easy-to-use shape building program. Construct in lo-res, view in hi-res. Move back and forth between the two. Page through shape tables. Several universities are using this program to teach graphics. Program available to convert shape tables created with other programs. Fast assembly language. $49.95.

The Graphic Solution. The complete animation package for the nonprogrammer to superimpose text and animation over any graphic background. Ideal for creating and animating education and training aids, business presentations and promotions, process flows, or demonstrations. Demo, comprehensive manual. $149.95.

Animation Graphics, Reston, VA

A.G.I.L. (Animation Graphics Illustrator's Library). Package includes a paint program, animation editor, and shape/font maker and editor. Create and animate hi-res images with sound and color, draw with shapes that you create or load from a library. Easy-to-use menus; requires no programming knowledge. A tool for your imagination that teaches computer graphics literacy. Paddles, joystick, or tablet. Paint program: $139; animation editor: $89; shape/font maker and editor: $59.

Apex, Spring Valley, CA

Hi-Res Plotting Package, by William C. Jones. Features hi-res function plotting with a twist. Graphs are calculated and stored on disk and viewed in rapid succession when the game paddle is turned. Makes every Apple an oscilloscope. Also includes a 3-D plotter (transparent and hidden line) and many other useful math routines. Either DOS. $19.95.

Beagle Bros, San Diego, CA

Alpha Plot, by Bert Kersey and Jack Cassidy. Create hi-res pictures and charts with variable-sized text, all appendable to your programs. See lines before you draw; mixed and reverse colors. Instant circles, boxes, and ellipses. Relocate any section of a picture. Picture scruncher reduces hi-res to one-third disk space. Unprotected. $39.50.

Frame-Up, by Tom Weishaar. High-speed Apple slide projector utility lets you create professional displays of intermixed, hi-res, lo-res, and text "slides." Fast! Loads hi-res pictures in under three seconds. Each image may be advanced by keyboard or paddle. Auto-run mode lets you show each picture as long as you want. Unprotected. $29.50.

C&H Video, Hershey, PA

Higher Text Extended, by Robert W. Hench and Bruce A. Cash. Allows users of Synergistic's *Higher Text II* to add text easily to hi-res pictures or create textural display pictures. Lightning-fast machine language routines that simplify and extend the capabilities of this complicated program. Perfect program for the novice or experienced user who needs to add text to pictures with a minimum of fuss. $22.50 ($53 with *Higher Text II*).

Computer Stations, Saint Louis, MO

Portrait Subsystem. Create computer portraits that may be heat transferred to T-shirts, posters, and other novelty items. Special hardware requirements: paddles, and an Epson MX-80 with Graftrax or Centronics 739. $1,175. Extra heat transfer ribbons: $20.

Dithertizer II. A video digitizer with driver software for image dithering and contour control. Uses frame-grabber method of digitizing to load the hi-res page with a video camera. Package includes interface card, video camera, appropriate cables, and driver software. Setup takes only minutes. $650.

Combined Enhanced Graphic Software. What you see is what you get. Allows user to dump what is on the hi-res page of an Apple onto paper. Supports an extensive list of printers and interface cards. $54.95.

Combined Graphic Writer. Customize printouts of text files with twenty-one interchangeable fonts from the *DOS Tool Kit.* Underline, boldface, and inverse are features available in each character set. May be used in conjunction with *Apple Writer 1.1, Magic Window, Screen-Writer II,* or any sequential text file. $54.95.

Hewlett-Packard, San Diego, CA

The Hewlett-Packard 7470A Graphics Plotter. The perfect gift for the home hobbyist or the business professional. The plotter can draw multicolor graphs or text charts—even do your own greeting cards. It plots on paper or overhead transparencies. Requires serial card. $1,550.

Highlands Computer Services, Renton, WA

Hi-Res Text Kit. Font generator with extensive software added to allow the nonprogrammer to easily put fancy fonts on both hi-res screens (up to eighty columns per line). Special draw mode for fancy borders. Save and load screens from disk. Twenty fonts included. Information for using font generator in Applesoft programs included. $40.

Hi-Res Printer Kit. Print one, two, or four screens as one picture with ninety degree rotation and expansion. Load screens from disk by positioning cursor on file name in catalog. Start/stop/display screens one and two, multiple copies, and so on. Includes version for integrating with *Hi-Res Text Kit,* Epson (with Graftrax+), IDS 460/560, and Apple parallel cards. $35.

Insoft, Portland, OR

GraForth, by Paul Lutus. Fast graphics language for entertainment and educational software development. Easy to learn; features turtle graphics, character graphics, 3-D graphics, and a music synthesizer. A 220-page tutorial/reference manual is included. Apple III in emulation mode. $75.

Interactive Microware, State College, PA

Scientific Plotter. Draws professional-looking graphs. Data may be input from the keyboard, disk, or from a user subroutine. More than one data set may be plotted on the same graph. Plot data in one, two, or four quadrants with different scales superimposed on the graph. $25.

Curve Fitter. Permits selection of the most appropriate curve to fit experimental results. Available methods include scaling and transformations, averaging, smoothing, interpolation (polynomial, cubic spline, or Stineman), and least squares fitting (polynomial, geometric, or exponential). $35.

Vidichart. High-speed machine language graphics display subsystem permitting CRT display of data from analytical instruments or user databases. Up to four different curves may be shifted left, right, up, or down

on the screen, and expanded or contracted along the X or Y axis. $75.

Interactive Structures, Bala Cynwyd, PA

PKASO Printer Interface. Offers text and graphics printing capabilities for the Apple. Outstanding characteristics include full snapshot dump at any screen image, sixteen-level gray scale printing, user-created or software-defined characters, and both hi-res and lo-res graphics. $175. Apple III: $205.

International Software Marketing, Syracuse, NY

Graphmagic. In a matter of minutes anyone can use their microcomputer to produce pie charts, bar graphs, line graphs, and scatter grams. Can be used by youngsters or engineers, homemakers or businessmen—it is mastered in minutes and performs with ease. The data for graphing may be entered and edited directly or it can be read from *MatheMagic, VisiCalc*, or any DIF file product. $89.95.

Penguin, Geneva, IL

The Complete Graphics System II, by Mark Pelczarski. Everything needed for computer-aided design. Easily draw and design in 2 or 3-D, mix text and graphics freely, define shapes, and create typefaces with unique character generator. Great for presentations, videotape displays, storing design on disks, graphics for other programs, or just experimentation. Paddles or joystick. $69.95; Apple Graphics Tablet version: $119.95.

Additional Fonts and Character Sets, by Mark Pelczarski and others. Add variety and the capability of other languages to *The Complete Graphics System II* with this two-disk set of fifty extra fonts. Alternate fonts include Old English, Italic, Shaded, Block Broadway, Oriental, Celtic, Barnum, Computer, and others. Other language fonts include Hebrew, Greek, Cyrillic, Arabic, and Katakana. $19.95.

The Graphics Magician, by Mark Pelczarski, David Lubar, and Chris Jochumson. Add fast, smooth animation and hundreds of pictures to your programs. Create animated shapes and draw paths; have up to thirty-two independently controlled figures on screen. Use a special palette of more than one hundred colors to create pictures and objects in highly compressed format. Easy to use and includes a special programming tutorial. Paddles or joystick. $59.95; Apple Graphics Tablet version: $69.95.

Special Effects, by Mark Pelczarski and David Lubar. Paint on your computer in more than one hundred colors with ninety-six different brushes. Contains magnify mode for precision touch-ups; mirror image and color reverse capabilities. Move any part of a picture anywhere. Includes packing routine for increased disk storage of any standard graphics screen. Paddles or joystick. $39.95; Apple Graphics Tablet version: $69.95.

Phoenix, Lake Zurich, IL

Zoom Grafix, by Dav Holle. Hi-res graphics screen printing package works with 700 combinations of printers and interface cards. Prints upright and sideways, either screen, in any size or proportion. Also print any portion of the hi-res screen using the zoom window. Apple III in emulation mode. $39.95.

Rainbow Computing, Northridge, CA

Poor Man's Graphics Tablet, by Vincent Arnold. Designed for precision drawing and tracing. Has an unlimited palette of colors and fifty-nine different textures. Full shape table functions are included; can move, rotate, duplicate, or combine shapes. Complete documentation. $49.95.

Rainbow Graphics, by Bill Smith. Draws lines, dots, frames, circles, polygons, and boxes by using your joystick. For use by artists, youngsters, the handicapped designers, or anyone who wants to have fun drawing. Full shape table functions. Joystick with two buttons. $29.95.

Sierra On-Line, Coarsegold, CA

The Artist, by Schwader/Williams. Used to design such Apple favorites as *Threshold* and *Crossfire*, and adventure graphics for *Time Zone*. Has animation capabilities and blow-up feature for precise graphic editing. Sierra On-Line uses it—find out why. $79.95.

SmartWare, Dayton, OH

Grafpak II. Zoom hi-res graphic printing for more than seventy printers and more than twenty I/O cards. Print at any ninety-degree orientation, full or partial screen, positive or negative inking, at any feasible scale factor. Add hi-res upper and lower case, English or Greek text. Modular; easy to use. $34.95.

Turtle Pak. Zoom hi-res graphic printing for use with Apple and SofTech UCSD Pascals. Print upright/rotated, with positive or negative inking, at any feasible scale factor. Prints *Business Graphics* .S.Data files. Interactive or use in your program. Supports more than fifty printers and more than twenty I/O cards. $34.95.

Softspoken, Redondo Beach, CA

The Fonts, by John V. Longawa. Disk-based type face system that utilizes the full graphics capability of the Epson MX-80 to produce high-quality print with user-definable character fonts. Controlled by Basic or by text or binary files. Font editor supports variable font sizes. $30.

Software Technology, Belmont, MA

The Coloring Board, by Gary E. Haffer. An excellent way to create, read, and store your data in hi-res. Also, a lettering mode with upper and lower-case letters. Plus much more. $75.

SouthWest EdPsych Services, Phoenix, AZ

Auto Graphics. An easy-to-use, economical hi-res graphics generator that creates text, characters, and animation in five colors at twice normal size. Makes it easy to include hi-res graphics in any Applesoft program. No license or fee required. $24.95.

Stoneware, San Rafael, CA

Graphics Processing System. New graphics software program for the Plus. It creates, manipulates, and edits graphics in the manner of a word processor with text. It's designed for use by architects, engineers, art directors, interior designers—any one whose work involves graphics. Professional: $179, Standard: $69.

SubLogic, Champaign, IL

A2-3D1 Graphics Family. A collection of graphics programs designed to accommodate the needs of both new and experienced programmers. Define 2-D or 3-D wire-frame objects in any size and orientation; manipulate your eye to view these objects from any perspective. Features selectable resolution, full-color capability, independent object manipulation, and motion file generation. $119.85.

AB-3D1 Basic 3-D Graphics. A load-and-go Basic version of SubLogic's *3D1* graphics package, ideal for those applications where a very high-precision output (up to 4,000 by 4,000) is required. Can be used with a plotter. $40. Cassette: $30.

Superior Software, Kenner, LA

Usable Graphics—Demo Disk I. A truly superior collection of more than thirty-five graphics routines, programs, and short games, that you can use and incorporate into your own programs. No copyright or protection problems. Even includes a few commercial games "in the making." Hi and lo-res. More than 400 sectors of tricks and fun. $19.95.

Synergistic, Renton, WA

Game Animation Package. A graphics utility that allows generation of multicolored shapes and tables of hundreds of full-screen color sketches. Includes bit-mapped graphics, vector graphics, color fill, and fast and easy animation. $49.95.

Higher Graphics II. Performs the hi-res functions of hardware devices. Create and edit shapes and shape tables for animation. Produce games, business, and educational displays. Stunning detail and color. $35.

Telephone Software Connection, Torrance, CA

Banner Maker, by Ed Magnin. Add some excitement to your next special event. Great for parties, club meetings, boosting your favorite team, sales promotions, or fun and profit. Creates long banners on form-

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Giant Graphics, by Ed Magnin. Turn your favorite hi-res pictures or graphs into giant three by three or three by five foot posters. Needs form-fed paper but works well even with nongraphic printers. Includes free sample poster. $35.

United Software of America, New York, NY

Apple World, by Paul Lutus. Powerful 3-D graphics as only Paul Lutus can make it. Over sixteen million definable points in space. Change your computer into a sophisticated graphics designer. Design an image, and look at it from any conceivable viewpoint; rotate, zoom, transverse all three axes. With built-in editor. $59.95.

3-D Supergraphics, by Paul Lutus. Have you ever wanted to put 3-D animated shapes into your programs and demonstrations? You can do that and more—animation and cartooning are easy. Add color, text, and moving objects to your Applesoft, Integer, or machine language programs. Simple DOS-type commands. $39.95.

VisiCorp, San Jose, CA

VisiTrend/Plot. Makes it easy to understand relationships between data series, to anticipate future trends, and to add visual strength to your reports and presentations. Automatically produces line, bar, pie, area, x-y, and high/low charts. Performs multiple linear regression, trendline forecasting, percent change, lead, lag, moving averages, smoothing, and more. Easily interchanges data with other Visi programs. $300.

VisiPlot. Add a visual dimension to all your financial analysis, forecasting, budgeting, and business planning. Presentation-quality graphs and charts will help you understand business information and add clarity to reports and proposals. Produce line charts, bar charts, area graphs, high/low graphs, x-y plots, and pie charts. Automatically interchanges data with other Visi products. $200.



Adventure International, Longwood, FL

Pro-Pix, by James Talley. The definitive program for keeping track of scores, listings of current division win-loss standings, and the all important predictions of probable game outcomes. You pick the scores before the game is even played. Will add an extra helping of excitement to your NFL season this year. Last year it outguessed Jimmy "the Greek" Snyder. $24.95.

Apex, Spring Valley, CA

Household Management I, by William C. Jones. A series of database management utilities of great use to the entire family. Includes date and appointment reminder, shopping list, checking account, compound interest, mortgages, perpetual calendar, Christmas list, phone list, personal diary, recipes, bartender, budget analysis, metric conversion, auto maintenance, and business hours. Either DOS. $39.95.

Household Management Package II, by William C. Jones. A series of database management utilities suitable for the small business or home. Includes mailing file and labelmaker, checking account, perpetual calendar, document locator, telephone list, foreign currency exchange, metric conversion, general inventory, and appointment calendar. Either DOS. $39.95.

Basic Learning Package, by John Sudikatus. Teaches the beginner the fundamentals of programming in Applesoft Basic. Eight comprehensive lessons guide the user smoothly through DOS commands, screen control, input/output, flow of control, arithmetic functions, arrays, graphics, and more. Either DOS. $49.95.

Best Programs, Alexandria, VA

Personal Computer/Personal Finance Program. Perfect for personal and small business money management. Easy to use; one entry for each income and expense transaction provides reports on budget performance, expense/income histories, cash flow, tax deductions, credit card debt, and so on. Bar graphs summarize data from accounts for easy analysis. $95.

Bible Research Systems, Austin, TX

The Word Processor. Includes the entire King James version Bible text on eight disks with capabilities to search on any character string, word, or phrase; to display or print any portion of the Bible; and to store permanent libraries of topical or word-content indexes to the Bible. An ideal tool for personal Bible study or lesson preparation. $159.95.

Big Red Apple Club, Norfolk, NE

Big Red Apple Club, contact John Wrenholt. A national Apple computer club. Members receive the club's monthly publication, *The Scarlet Letter*, containing programs, utilities, and educational applications. Club also has a software library of over 2,000 programs distributed to members free of charge. One year membership: $12.

Broderbund, San Rafael, CA

Personal Accounting, by Jay Villareal. Facilitate your personal financial management with this easy-to-use system. Clear, step-by-step menus take you through each function. Keeps track of utilities, checkbook, credit card, and cash transactions. $69.95.

Cannella Sales, Syracuse, NY

Kel-Co Horse Race Handicapping, by Armond F. Cannella. Three software packages: one for analyzing thoroughbred races (*RS-5*); another for analyzing harness races (*RS-6*); and the third for analyzing thoroughbreds, *A Handicapper's Guide to Fiscal Fitness*. A novice need only learn to interpret racing papers (clear instructions included) to operate. *RS-5* and *RS-6*: $200; *Handicapper's Guide*: $600.

C&H Video, Hershey, PA

The Menu II, by Bruce A. Cash and Robert W. Hench. State-of-the-art menu planning program allowing the user to create and store recipes and plan meals for up to 1,295 people. Creates alphabetized shopping lists that combine like ingredients for maximum economic efficiency. Handles twenty-four ingredients per recipe; ample comment lines and quantities that follow standard, cookbook-style fractions. Produces printed copy of the full menu. $39.95.

Commsoft, Palo Alto, CA

PhotoCaster. Permits color or black-and-white photos taken with a standard TV camera to be displayed, processed, and, using a self-contained modem, sent between Apple computers over conventional telephone lines. In addition to sending and receiving photos in eight seconds, you can add titles and graphics to photos, create special video effects, enhance images, retrieve and store photos on disk, and make automatic slide shows. $499.95; with camera: $749.95.

As an Apple owner, you're entitled to a free trial subscription to Softalk. If you've never received Softalk, merely fill out this card and mail it in. If you have received Softalk in the past, or are receiving it now, you can use this card to renew or to register a change of address.

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CompuServe Information Service. On-line information utility that offers A.P. wire service; weather reports; commodities, money market, business, and science news; movie reviews; banking; CB; games; bulletin board; and more. Modem. $5 to $35 per hour.

CPU Software, Everett, WA

Auto Atlas. Allows you to plan entire cross-country trips. You will be shown which interstates to choose, how long the trip will take, and approximate fuel costs. Also very useful for geographic information including points of interest, capitals, and populations. Includes individual maps of all states. Two disks. $47.50.

Creative Games International, Indianapolis, IN

Game Writer. A new experience in gaming that allows you to create, then play, arcade-type games. The only limitation is your imagination. No programming experience necessary. Simple to operate, menu-driven. Four games included: *Gee Man*, *Atomic Fallout*, *The Infinite Hole*, and *Jail Break.* Paddle or joystick. $59.95.

Cross Educational Software, Ruston, LA

Aquarium. A community aquarium simulation and four games with ten different fish. Fish interact, eat, breed, and grow up. Catch them in *Aquarium Fishing.* Applesoft or Integer. $25.

The Christmas Story. In three 48K parts: Shepherds, Prophecy, and Wise Men. It contains the story of the birth of Christ, seven hymns, and extensive hi-res graphics. Applesoft or Integer. $12.

Presbyterian plus *Bible Books* plus *Hymn Book.* A full disk of programs including a game teaching the Presbyterian Child's Catechism, games and songs teaching the Bible books, and hymns taught with a bouncing ball above the words. Applesoft or Integer. $15.

Methodist plus *Bible Books* plus *Hymn Book.* A full disk of programs including games and songs teaching the Bible books, hymns with a bouncing ball, the history of the Methodist Church with a game teaching John Wesley's twenty-five articles. Applesoft or Integer. $15.

Jonah. The Bible story of Jonah illustrated with twenty hi-res pictures. There are three versions: no text, easy text for young readers, and full text for adults. $6.

Stellar Astronomy. Eight programs that can be understood by ninth grade students. *Types of Stars* draws an H-R diagram and explains main sequence stars, novas and super novas, white dwarfs, red giants, blue giants, and variable stars. *Cosmology I* and *II* discuss physical and philosophical theories of origins. $30.

Dietware, Spring, TX

Dietician. Allows you to make up a diet menu with specified content of calories, carbohydrates, proteins, fats, cholesterol, and sodium. Comes complete with the composition of 700 foods. This database can be further expanded by the user. Diet menus can be printed out in a comprehensive format. $59.95.

Dynacomp, Rochester, NY

Personal Finance System. One of the most complete financial management packages available, allowing the individual or small businessman complete flexibility in maintaining all aspects of financial record keeping. Store from 300 to 2,000 transactions on each disk. Apple III in emulation mode. $39.95.

8th Dimension Enterprises, Sunnyvale, CA

Personal Inventory. Designed for individual and professional use. Prevents the frustration of thumbing through technical journals and magazines looking for a special article. Gives you the journal's name, month, year, and page of the title or partial title. $59.95.

Gnosis, Philadelphia, PA

P-LISP Interpreter, by Steven Cherry. LISP language interpreter. Complete LISP implementation includes more than eighty functions. Supports all DOS commands; includes hi-res graphics and floating point math (with 64K machines). Complete *P-LISP* tutorial with learning disk teaches LISP with hands-on approach. $149.95.

Gold Disk, Glen Arm, MD

Pro/File Predictions, by Momentum. The ultimate adventure is predicting the future. This program will do just that for all National Football League games for the 1982-83 season, with an overall accuracy rate as high as 70 percent. $39.95.

Gourmet Software, San Jose, CA

The Pizza Program. Takes the work out of planning family meals, makes menu planning a pleasure. Sophisticated yet easy to use. Guaranteed to save time and effort. Also creates original shopping list and calorie counter. $34.50.

Heller Software, Harrisburg, PA

Audio Spectrum Display, by John H. Barnes. Multicolored graphics display of audio frequencies entering the cassette port. Connect your stereo and see your music. Entertaining and educational. One channel per octave over ten-octave range (31 Hz to 16,000 Hz). $19.95.

Checkbook, by H. Lewis Heller and John H. Barnes. Records checks, reconciles with bank, lists for tax purposes and budgeting. Nonprotected disk. Well documented. $19.95.

High Technology, Oklahoma City, OK

Disk-O-Check. Hassle-free checkbook balancing for home or small business. It's easy to see where and how you're spending your money. Categorizes your checks by expense classification, providing you with a detailed report summarizing all the checks and the total amount spent for each separate category. $100.

Information Unlimited Software, Sausalito, CA

TellStar. Identifies and locates stars and planets from anyplace in the world at any time of day or night. Tell it your location, time, and date; then *TellStar* will draw a hi-res map of the sky. Use your game paddles to locate an object and it gives you its identity and complete description of its viewing location. $39.95; Level II: $79.95.

Insoft, Portland, OR

Electric Duet, by Paul Lutus. Music synthesizer, plays two notes simultaneously without additional hardware. Two-part music can be created, edited, saved, and played back at any time. Music can also be incorporated into user programs. Apple III in emulation mode. $29.95.

Learning Shack, Irvine, CA

HomeTax. New self-teaching personal income tax preparation system. Self instructing, helps understand and fill out federal income tax. Comes with toll-free number for assistance. Tax deductible. Program answers all questions; no documentation necessary. $95.

LJK Enterprises, Saint Louis, MO

Edit 6502. Fast coresident, two-pass, assembler, disassembler, text editor, and machine language monitor. Complete control with forty-one commands, five disassemble modes, and twenty-four monitor commands (including step, trace, and read/write disk). $99.95.

Micromize, Ashland, OR

Nutraplan. A diet generating and analysis program that rapidly assesses and plans your individual requirements from a database of over 1,500 foods. Limits are user adjustable: protein, carbohydrates, fatty acid and fats, ten vitamins, seven minerals, two electrolytes, fiber, and cholesterol. $79.

Muse, Baltimore, MD

Know Your Apple. Do you know someone who's getting an Apple for Christmas? This unique program teaches owners all about their new computer. Comes gift-boxed in a miniature box replica of the Apple. $34.95.

Nikrom Technical Products, Leominster, MA

Master Diagnostics and *Master Diagnostics Plus*, by Nick Romano, Ph.D. *Master Diagnostics* will examine every functional operation of your computer, detect errors, and report any malfunctions. Besides the diagnostics part of the analysis, *Master Diagnostics Plus* provides routines for complete internal and external maintenance of your computer, its peripherals, and monitor. Features disk drive speed calibration, head-cleaning kit and programmed head-cleaning routine, motherboard ROM test, Applesoft or Integer card ROM test and other card tests. Also tests DC Hayes Micromodem II, parallel card PROMs, monitor skew, hi-res color, speaker function, internal maintenance, and more. Manual and head-cleaning kit with cleaner and cleaning wands are provided. $75.

Passport Designs, Half Moon Bay, CA

Notewriter. Transforms Soundchaser into a real-time monophonic music transcriber. Allows you to lay down melody or bass lines, write your own lead sheets and band parts in any key, meter, or tempo. The notes you play on the keyboard appear simultaneously on the screen in standard music notation. Soundchaser, Grappler. $99.

Turbo-Traks. Tunes-up the Soundchaser Computer Music System into a powerful live performance synthesizer and sixteen-track digital recording studio in an affordable package. Simulates an analog tape deck, allows the use of one to sixteen oscillators per voice, and extended recording time. $195.

Kaleido-Sound. By plugging any audio input into the Apple cassette port, the user can activate real-time, full-color graphics synchronized to music. It comes with five unique selectable kaleidoscopic patterns, each with variable color schemes. Complete with an audio connecting cable. $39.95.

Phoenix, Lake Zurich, IL

Banner Magic, by Barry L. Star. Now you can create fantastic banners on your own printer. Great for parties, picnics, sporting events, or special celebrations. Say it with style using seven-inch letters on large banners. $24.95.

Powersoft, Pitman, NJ

Super Checkbook III, by Jim Powers and Tom Thorpe. A totally new program that virtually replaces your check register. Some of the features are bar graphs, fast sort and search, reconciliation, and disk input/output. Information can be output to the video screen or printer. Apple III in emulation mode. $49.95.

Income Statement System. Provides both gross and net income statements. Gives summarized reports including budget figures based on *Super Checkbook III* transactions. Maintains totals for current month, current year to date, and three prior years to date. Apple III in emulation mode. $49.95.

SCIII Checkwriter. Allows you to print checks and vouchers from text files created by *Super Checkbook III.* Together, these programs make a complete, usable, and economic checkbook/check printing combination. Apple III in emulation mode. $29.95.

Super Checkbook III Plus. Combination of *Super Checkbook III, Income Statement System,* and *SCIII Checkwriter.* A complete, economic checkbook/budget/check printing combination for personal computers. Apple III in emulation mode. $119.95.

Address File Generator. Allows you to create four different types of address files: holiday, birthday, home, and commercial address. You can create, add to, or display (video or printer). Search on any field, sort up to three fields at one time, and edit file. Apple III in emulation mode. $29.95.

Black Jack Tutorial. Teaches you how to play a winning game by eliminating poor play. Whenever you make a bad move the program will stop and show the proper move. Apple III in emulation mode. $14.95.

Practical Software, Birmingham, AL

The Handle. Family finance program that maintains files on as many accounts as necessary. Easily access expense records by payee, date, amount, code, or a combination of all four. More than twenty options to aid you in maintaining and analyzing expenses. Includes plotting with bar, line, and monthly graphs. Apple III in emulation mode. $69.95.

Computer Cookbook. Let your Apple maintain your recipe files. Comes with several recipes; add your own in easy-to-use, easy-to-correct format. Plan a whole meal—program adjusts ingredients for number served. Search recipe file by category or recipe name. Apple III in emulation mode. $29.95.

Computer Shopper. Let your Apple help you with your grocery list. Make list by choosing from large categorized grocery file. Get printout with item, price, and total. Add your own items and prices. Change and delete items anytime. Apple III in emulation mode. $29.95. *Computer Shopper* plus *Computer Cookbook*: $45.

Quality, Reseda, CA

Satellite Tracking Software, by Sat Trak International. An international group of professionals offers ready-to-use software for beginners, professionals, or schools to allow you to operate your own space center and satellite tracking site. Contains three programs: *Trak* (for position and world map display), *Look* (for the look angles with which to observe a satellite), and *Obs* (for entering observation updates). Disk or cassette: $49.95.

Shadetree Software, Columbia, SC

The Store House, by Mike Baker. Personal inventory system with thirteen definable categories, automatic file setup, multiple files, printer options (top and bottom margins, form length, number of copies), and many more extras. Inventory household items, disks, coin collections, and so on. Thirty-page manual. $36.95.

Sierra On-Line, Coarsegold, CA

LISA Educational, by Randy Hyde. A complete learning system to help Basic programmers conquer assembly language with a minimum of time and confusion. Contains tutorials, utilities, and subroutines needed to help both professional and novice programmers increase their knowledge of machine language programming. $119.95.

LISA 2.5, by Randy Hyde. The most popular assembler available today. Features easy-to-learn commands, quick assembly (assembles over 20,000 lines a minute), flexible use of DOS, support of extra RAM cards, and over thirty pseudo op-codes to turn your Apple into a sixteen-bit machine. $79.95.

Smith Micro, Sunset Beach, CA

Stock Portfolio System. Second edition. An investment portfolio accounting, record keeping, and time-control system. Investments covered include stocks, bonds, options, money markets, CDs, and other cash accounts. Security values entered either manually or via modem. Terminal mode provided for news access. Apple III in emulation mode. $185.

Softdisk, Shreveport, LA

Softdisk. Monthly magazine on a two-sided disk. Packed with useful information for the novice and experienced Apple owner. Lots of subscriber-contributed programs including games, tutorials, utilities, and more. Helpful, fun, and inexpensive. $10 for the first issue and $5 per subsequent issue when previous disk is returned.

SoftHouse, Rochester, MN

Baby Names, by Steve Goss. Sophisticated yet easy-to-use database manager that makes computers and naming babies interesting, educational, and entertaining. $29.95.

Softspoken, Redondo Beach, CA

MSM, by John V. Longawa. An enhancement to The Mill Assembler Development Kit that combines the features of ASM09, ASM09.BIN, and LOAD09 all into one standalone, *brun*able 6809 assembler. Produces text or binary object files. Supports eighty-column cards. The Mill, The Mill Assembler Development Kit. $35.

Soft Touch, Costa Mesa, CA

Recipe Handler II. Programming to suit your "Appletite." Store and organize up to one thousand food recipes, each up to 1,450 bytes long.

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Software Technology, Belmont, MA

The Creator, by Gary E. Haffer. If you know what you want to do, then this program will tell you how. The premiere program generator for the Apple. Create Basic programs in seconds by simply answering English questions. $200.

Southwestern Data Systems, Santee, CA

Financial Management System II. Enter an entire month's checking, charge card, and cash accounts in minutes with personalized macros. Easy correction of any record allowed. Designed for home and small business accounting; includes budget manager, account manager, account auditor, check writer, and more. $64.95.

SP Software, San Jose, CA

SP Filing System. A low-cost data storage and retrieval system. Fast, simple, and self-prompting. Easy to use. Not copy protected. $39.95.

SP Real Estate Analysis. An easy-to-use, hand-holding, self-prompting program to aid in evaluating a potential real estate investment. Can be rerun with certain parameters changed (such as selling price) and with new calculations automatically made. $59.95.

SP Calendar 1983. A cute, novel, useful program to keep track of birthdays, parties, meetings, and so on. Self prompting; not copy protected. $39.95.

Superior Software, Kenner, LA

Grab Bag Disk. A disk full of games, demos, utilities, and who knows what. No guarantee as to what's on it, but guaranteed to be at least 100K of fun. Not copy protected. What do you have to lose? $15.

Usable Graphics—Demo Disk I, edited by Thorne D. Harris III. A collection of more than thirty-five graphics routines and games that you can use and incorporate into your own programs. No copyright or protection problems. Even includes a few games in the making. Hi and lores; more than four hundred sectors. $19.95.

Syntauri, Palo Alto, CA

Composers Assistant, by Kentyn Reynolds. Print out, in score format, your musical compositions created on the four or five octave alphaSyntauri synthesizer. Features include polyphonic printout, 1/16 notes and rest resolution, accidentals, variable key and time signatures, and editing for expressions, lyrics and chords. $295.

Dolphin, by Charlie and Jo Kellner and Eric Larson for the Institute for Delphind Research. This software utilizes the Mountain Computer MusicSystem and has digitally constructed dolphin whistle sounds that can be changed in frequency or waveform. In addition, you can make your audible real-time sound effects visible on a hi-res screen. All proceeds go to IDR. $39.

Systems Design Lab, Redondo Beach, CA

The Gold Edition. The most sophisticated pro football point spread prediction system ever designed (not a game). Recommended only for the serious pro football handicappers. From week six to sixteen during the 1980-81 season, it has been a proven winner in all categories over the Las Vegas line. $199.50.

Pro Football. If you're looking for a program that can predict pro football point spreads quickly and accurately—this is it. During the 1980-81 season it consistently beat the experts with percentages ranging from 65 to 70 percent over the Las Vegas line in the upset categories. $49.95.

Win at the Races. A Thoroughbred handicapping system that employs the formulas and procedures of the currently popular book *Winning at the Races,* by Dr. William Quirin. Dr. Quirin has spent several years in research using the most modern scientific methods to develop a true thoroughbred handicapping system. $49.95.

College Football. Very similar to the *Pro Football* program. During the 1980-81 seasons, this program has consistently produced outstanding results against the Las Vegas line. $49.95.

Telephone Software Connection, Torrance, CA

Video Librarian, by M. R. Connolly, Jr. Maintains an electronic card catalog for your videotapes and videodiscs. Quickly locates entries by title, category, or keywords. Prints entire list in order by title, tape number, or blank time remaining. $40.

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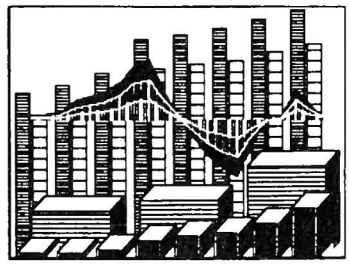
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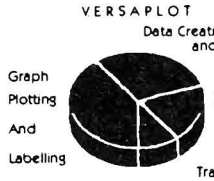
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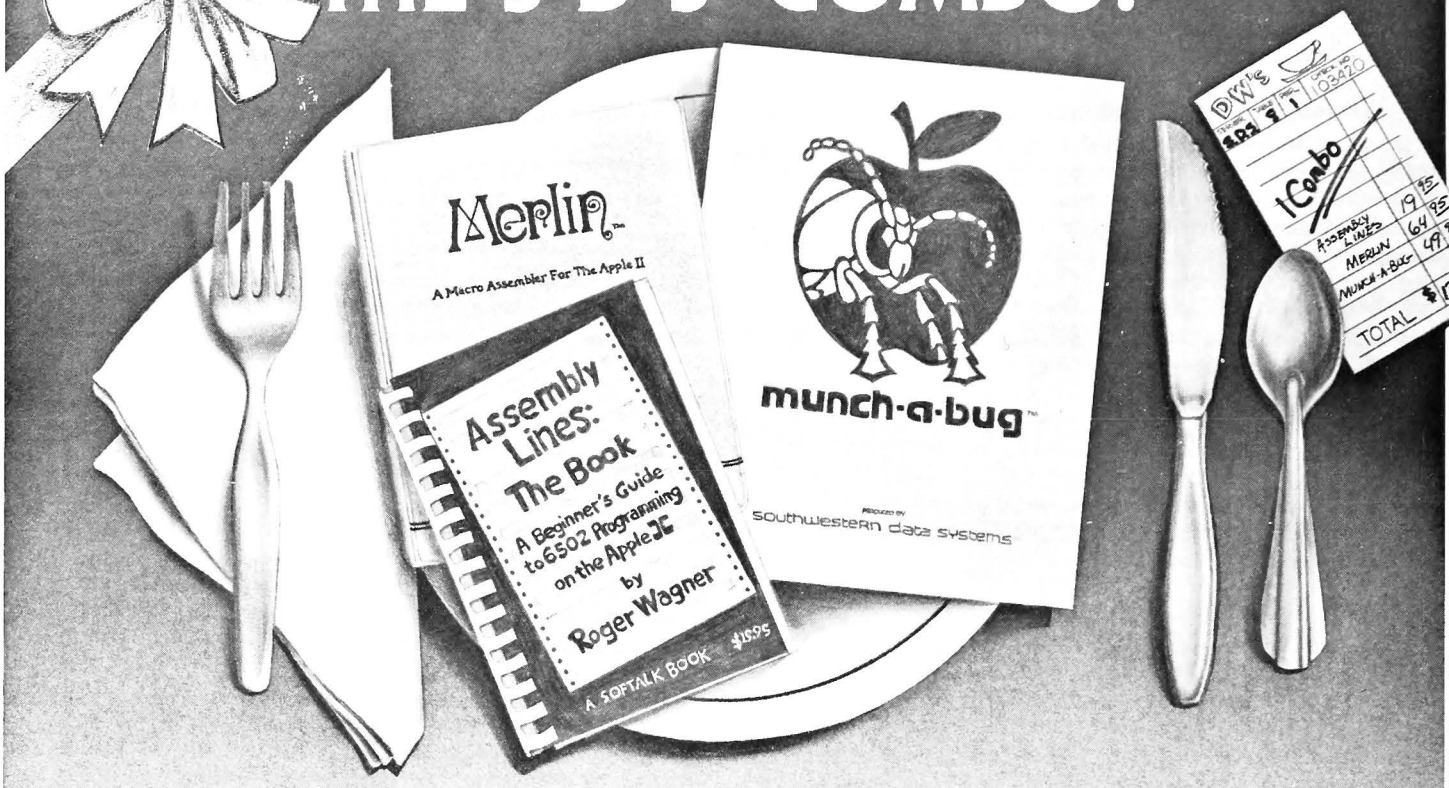
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Pascal Tools. Two packages of programmer's aids that include: *Tool I*—cross reference generator, version compare, split/concatenate, pagination, make text/make data. *Tool II*—patch, binary file compare, disk verify, p-code disassembler, pattern grabber, and arbitrary text file generator. Pascal. $75.

Adventure International, Longwood, FL

Apple Spice, by Corey Kosak and David Fox. A set of fast assembly language routines that alleviate some of the drudgery of writing programs in Applesoft Basic. Allows you to concentrate more on your program logic and less on things like prettifying the screen and detecting keyboard entry errors. Also greatly expands Applesoft's capabilities by adding features found in many larger Basics such as print using, string search, if-then-else, and line input. $29.95.

Anthro-Digital, Pittsfield, MA

Amper-Magic, by Bob Nacon. Painless way to attach machine language routines to your Basic programs. Attach any number of relocatable routines and then call them by name. Takes care of all addresses and variables, even as you edit. No knowledge of machine language required. Add your own routines from published sources. No license required for commercial use. $75.

Amper-Magic Command Library Volume Two, by Bob Nacon. Twenty-six more machine language routines ready to go, including print using plus, by far the most comprehensive print using with conditional capabilities for both strings and numbers; print text screen; print array without looping; and poke with logic, which allows you to set, clear, or toggle any bit in RAM. Twenty-two more. Requires *Amper-Magic*. $35.

QuickTrace, by John Rogers. Machine language debugger with single step, trace, and background modes. Shows all registers, stack, processor status, flags, last and next instructions, and nine user-definable stopping locations and conditions. Stopping conditions trigger automatic switch from background to single step. Relocatable, works with Basics, DOS, graphics. Superb as an educational tool. $50.

Apex, Spring Valley, CA

Hi-Res Football Editor, by William C. Jones. Permits user control of football plays through keyboard cursor movement in the edit mode, and paddle control while running plays. Runs plays in slow motion and reverse. Freeze-frame feature allows insertion, deletion, and alteration of frames. No mere game has ever given the user so much control. Either DOS. $24.95.

Artsci, North Hollywood, CA

Forth II, by William Graves. A threaded language many times faster than Basic and, after a little practice, as easy to program. Some of its features include: one hundred-page manual, memory efficiency, disk-based editor/compiler, plus verbs for graphics, game, sound, disk, and tape I/O. $69.95.

Forte, by Gary Shannon. An interpretive language devoted to the playing and writing of music. Can either play music through Apple's speaker or output to an external amplifier. $29.95.

Avant-Garde Creations, Eugene, OR

Hi-Res Secrets, by Don Fudge. The secret is out—here's the last graphics utility you may ever need. Complete Apple hi-res graphics utility for the need of today's creative programmer. Revealing documentation combined with completely relocatable color graphic, animation, and sound routines make this the most useful package on the market. $125.

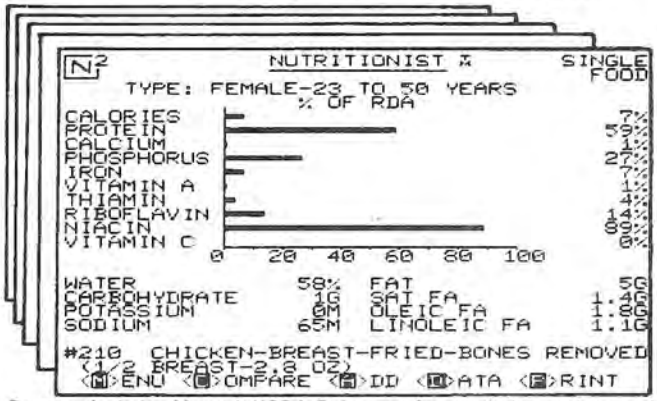
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Beagle Bros, San Diego, CA

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Typefaces for Apple Mechanic, by Bert Kersey. Twenty-six proportionally spaced shape table typefaces for use with *Apple Mechanic*'s *Hi-Writer* and *Xtyper* programs. Full ninety-six-character fonts. Completely editable. Bonus: *Beagle Menu* greeting program lets you catalog only selected file names for one-key cursor selection. Unprotected. $29.50.

DOS Boss, by Bert Kersey and Jack Cassidy. Rename Apple's DOS commands (*Catalog* can be *Cat* and so on); protect your programs from unauthorized tampering and listing; personalize *Disk Volume* heading; customize catalogs. Includes *The DOS Boss Book* and *Tip Book #2*; hours of entertaining educational Apple reading matter. Unprotected. $24.

Flex Text, by Mark Simonsen. Run Applesoft with variable-width text—twenty, forty, fifty-six or seventy columns, upper and lower case—without hardware. Understands normal Applesoft commands so you can program as usual, but with the ability to add text to graphics or graphics to text. Each text character is redefinable. *PLE* compatible. Unprotected. $29.50.

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Busywork, by Dale Ludewig. Collection of integrated program routines in Applesoft. Valuable tool for beginning and intermediate programmers developing business application programs. Valuable learning tool. Start with *Busywork* and add your code, calling *Busywork* routines as necessary. Completely copiable and listable. Includes sixty-page manual. $39.95.

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Link Index, by Curt Bianchi. Free-standing utility based on the sophisticated B-tree indexing method that provides a rapid key retrieval system for data files. UCSD program requires 64K and has floppy/hard disk capability. Version for the III. $195.

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Forth-79 Version 2, by MicroMotion. A complete, professional, fast, and portable software system for real-time applications. Base system includes screen editor, macroassembler, string package, thirty-two–bit integer arithmetic, 200-page manual. Requires Z-80. $99.95; $139.95 with floating point and hi-res.

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Super Tracer II, by John Wrenholt. An advanced program debugger for Applesoft Basic. Five modes of operation allow you to execute programs a line at a time, or stop at selected break points. Examine and change variables during program execution. Works with DOS and graphics. Will not affect text screen display. $59.95.

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Quality, Reseda, CA

Bag of Tricks, by Don Worth and Pieter Lechner. Four comprehensive utility programs on disk, and documentation that includes information about the Apple's disk operating system. Useful to beginners and experienced programmers alike. It includes many hand-holding tutorials that assist in repairing damaged disks, allow you to change sector ordering, reconstruct blown catalogs, and so on. $39.95.

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Cross-Ref, by Jim Aalto. Speeds and facilitates your Applesoft program development with variable cross reference, find variable, replace variable, line cross reference, line only listing, and so on. Fast and friendly, it coresides with your Applesoft programs and DOS. $24.95. Cassette: $24.95.

S-C Software, Dallas, TX

Es-Cape, by Bill Linn. Full-function, interactive program editor for Applesoft. For painless programming: complete line editor for fast, easy

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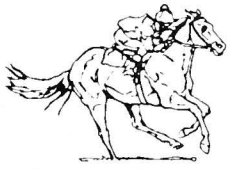
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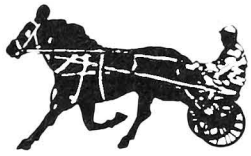
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Munch A Bug. Powerful, full-featured assembly language debugging program with many unique options. Makes it easy to find errors in machine language code for the beginner or pro. Special options allow it to become dormant until specified conditions are met, at which point it activates a powerful trace mode. $49.95.

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Music Maker. Unsurpassed sound quality and ease of use for novice users and professional musicians. Create and play four-voice music on the Apple with no additional hardware requirements. Enter whole to 256th notes; dotted notes, triplets, and quintuplets; staccato, regular, or legato notes; all flats and sharps. $39.95.

Sympathetic Software, Huntington Beach, CA

Disk Prep, by Stephen L. Billard. Used to certify disks on the Apple II. Formats the disk, writes a worst-case test pattern to it, and checks to ensure that the recording surface is usable. Sectors containing the errors are made unavailable to DOS. Particularly useful if you intend to use the backside of your disks. $25.

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Higher Text II, by Ron and Darrell Aldrich. Colorful, customized text; ten-character set provided or define your own. All features of normal text screen plus ten colors, lower case; no hardware modifications. $40.

Higher Fonts I. A collection of twenty-five hi-res graphic character sets for use with *Higher Text II.* Includes foreign languages, special graphic symbols, and a variety of alphabetic styles. $15.

Program Line Editor. Powerful programmer's aid allows fast and easy editing and modification of program lines without retyping the lines. Insert, delete, or replace parts of any line. $40.

Global Program Line Editor. Improvement of the *Program Line Editor.* Includes global editing, type-ahead buffer, programmable cursor control, powerful line editing features, and so on. An indispensable utility. $65.

Soft Seventy. Get seventy-column display and upper and lower case on your Apple without any additional hardware. This flexible utility can be added to your own programs. $50.

Integer Basic Compiler. The fastest compiler on the market. Offers machine language speed and flexibility to both beginning and advanced Basic programmers. One hundred times faster than Applesoft; uses half the memory space of compiled Applesoft. $149.95.

Thunderware, Oakland, CA

Thunderclock Plus DOS-Dater. Lets you use your Thunderclock Plus to help organize your disk files. *DOS-Dater* upgrades the regular DOS on your disks. Every time a program is saved or a file is modified, the time and date (to the minute) are stored in the catalog with the file name. Now you can know instantly exactly when your files were last updated. $29.

United Software of America, New York, NY

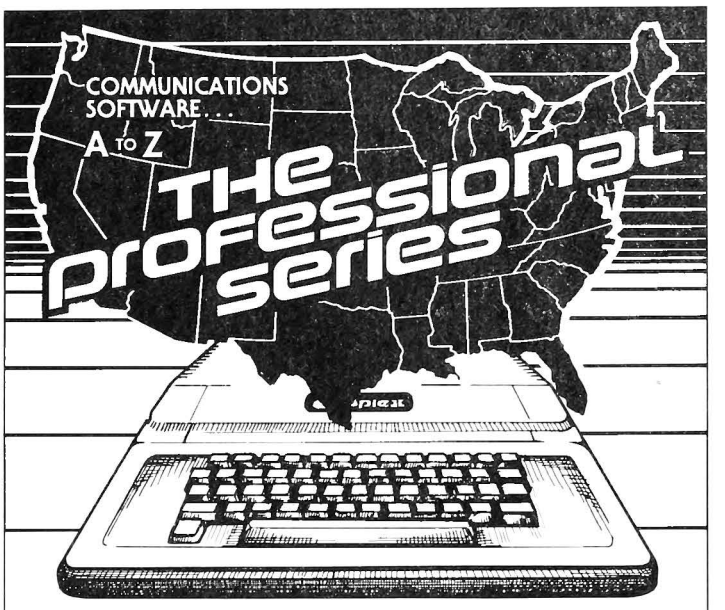
Super Kram, by Ken Germann. Programmer's utility to give Applesoft true keyed random access method capabilities. Multiple key access. Fast access of your files—any field can be accessed in under a second. $150.

Videx, Corvallis, OR

Apple Writer II Pre-boot. Will allow you to run *Apple Writer II* using the Videoterm eighty-column card. When combined with an Enhancer II, this provides a complete word processing package. *Apple Writer II.* $19.

V Calc 80. Allows you to view your *VisiCalc* worksheets in eighty columns, enter labels in upper and lower case, and display up to twenty-five fields on the screen using the Videoterm eighty-column card. Requires *VisiCalc* and Videoterm. $49.

Videoterm Utilities Disk. Contains a number of useful programs designed to expand the power of your Videoterm. Comes complete with a fully documented manual. Videoterm. $37.



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"THE PROFESSIONAL SERIES" from SOUTHWESTERN DATA SYSTEMS provides sophisticated communications software for standard Apple DOS, PASCAL and CP/M operating systems, delivering virtually EVERY feature you could ever use in smart terminal software. Aside from minor differences, the PRO's are operationally similar and fully conversant with each other.

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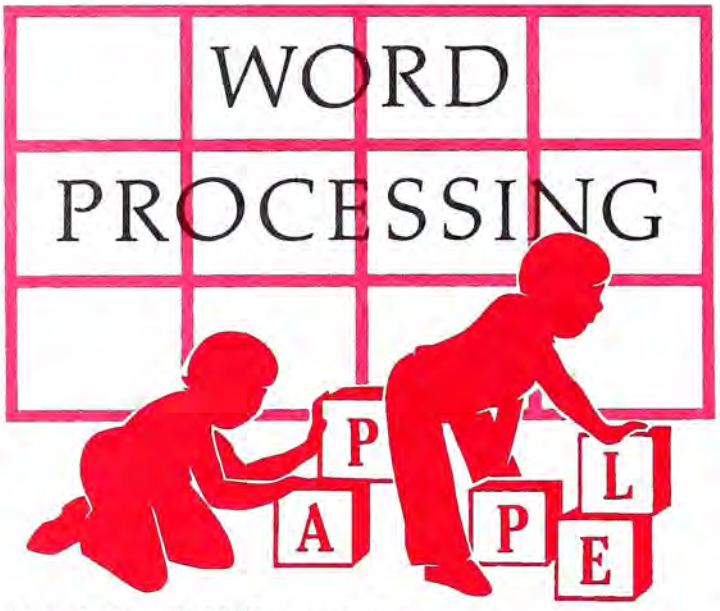
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V Calc 80 with Memory Expansion. For those who need even more memory for their *VisiCalc* work space, this version will allow you to use additional memory cards in your Apple to give you up to 176K. *VisiCalc*, Videoterm. $89.



Artsci, North Hollywood, CA

Magic Window II, by William Depew. An advanced version of the *Magic Window* word processor. New features include eighty-column board and hard disk compatibility, seventy-column hi-res video driver (requires 64K) showing underlining and boldface on the screen, 160-character line length, multiple copy and sequential printing features, and DOS housekeeping commands. $149.95.

Magic Window, by Gary Shannon and William Depew. Transform your Apple into a sophisticated word processor. Learning is effortless with a unique menu system and single keystroke commands. Formatting your text is done directly on the screen, so what you see is what you get in print. The window can slide over a full-sized document, solving the Apple's forty-column display limitation. You can type as fast as you want without losing characters. $99.95.

Magic Words, by William Graves. Uses the same positive features of *Magic Window*: menu selection of options, simplicity of use, accuracy, and speed. When a spelling error or typo is found, you see the mistakes in context on the screen or printout, and are given choices of how to handle each. The user may add additional words to the 14,000-word dictionary. $69.95.

Magic Mailer, by William Smith and William Depew. A mailing list merge system designed to take *Magic Window* document files and replace names, addresses, and so on, with individualized data—creating customized letters, invoices, labels, or reminders. Use *Magic Window* or *Magic Window II* to create a letter and make an address file to generate as many form letters as you wish. $69.95.

Magic Pak. Contains *Magic Window*, *Magic Mailer*, and *Magic Words* in one package. $225.

Magic Pak 80. Contains *Magic Window II*, *Magic Mailer*, and *Magic Words* in one package. $272.

Avant-Garde Creations, Eugene, OR

Write Away, by Doug Stinson. An advanced, professional word processing system that will be a welcome addition to any business software library. Unsurpassed speed and flexibility. Simple-to-learn commands. Interfaces easily with most printers. $175.

Broderbund, San Rafael, CA

Bank Street Writer, by Intentional Education and Bank Street College. The only word processor most people will ever need. Ideal for correspondence, school papers, manuscripts, and so on. Lower case without

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 % )
```

Into This

VC-DOCUMENTER outputs a listing of your VISICALC model formulas **translated into English** by utilizing the Row/Column Headings that are already in your model.

APPLICATIONS

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Cross Educational Software, Ruston, LA

Peachy Writer. Easy to use text editor—only four commands to memorize. Basic features include editing, upper and lower case, right justification, and pauses between pages. Printer control characters can be inserted in the text. $24.95.

Dynacomp, Rochester, NY

Text Master. General-purpose text editor. Powerful, English-oriented commands that permit the complete manipulation of correspondence, computer programs, data to be used by other programs, and more. Interfaces with any printer; can process any length file, segment by segment. Apple III in emulation mode. $49.95.

Heller Software, Harrisburg, PA

D-Zine-A-Page, by H. Lewis Heller. Writes, edits, and prints pages of text; has many options of more expensive word processors. Nonprotected disk. Well documented. $19.95.

Kensington Microware, New York, NY

Format II. Very powerful, very fast. Features text displayed on screen exactly as it will print out; edit and format text with single mnemonic keystrokes—C for center, J for justify, and so on; built-in mailing list with sorting and logic; prints with any printer. $250.

LJK Enterprises, Saint Louis, MO

Letter Perfect. Fast character-oriented, menu-driven, single-load program. Right justification, database merge, screen format, multiple print drivers. $149.95.

Muse, Baltimore, MD

Super-Text 40/80 Column, by Ed Zaron. Deluxe word processor for the Apple featuring eighty-column screen, math mode, and split screen. The gift of efficiency for your favorite businessman. Lower-case adapter or eighty-column board required. $175.

Super-Text 40/56/70, by Ed Zaron. A great value in word processing—no additional hardware required. Features forty, fifty-six, or seventy column display and the unique character design mode for creating display characters in cursive, foreign languages, and so on. $125.

Sensible, West Bloomfield, MI

Sensible Speller. The finest spelling-verification program designed specifically for the Apple. The official *Random House Dictionary, Concise Edition* (80,000 plus words) is included in both disk and hardcover form. The average time to proofread a ten-page document (about 3,350 words) is one minute if there are no spelling mistakes. Several versions. $125.

Sierra On-Line, Coarsegold, CA

ScreenWriter II, by Kidwell, Schmoyer. State-of-the-art word processing, inexpensive and hardware independent. No extra hardware for lower case, seventy-column display, printer spooling. Edits Basic, text, and binary files; complete search and replace. $129.95.

ScreenWriter Professional. Combines all the features of the best-selling word processor *ScreenWriter II* with the spelling verification system, *The Dictionary.* A complete word processing and verification system for the serious user. $199.95.

The Dictionary, by Tom Cain. Spelling verification system with a word inventory of more than 28,000. Has a user-definable inventory of up to 3,000 words. By making back-up lists, you can have many lists of 3,000 words of your own choosing. Compatible with *ScreenWriter II, Pie Writer* and all word processors that dump to a standard DOS 3.3 text file. $99.95.

Ziggurat, Arlington Heights, IL

Proportional Text Formater. Formats text for your Centronics 737/739 printer. Features proportional, condensed, elongated, and underlined characters with full, left, centered, and right justification; plus full, half-forward, or reverse-line feeds, column tabbing, pagination, and more. Requires *Apple Writer* plus Apple, CCS, Grappler, Mountain CPS, or JBE interface cards. Either DOS. $39.95.

Formater III. Many of the same features as the *Proportional Text Formater* but designed for use with the NEC PC8023A printer and its proportional character set. Features enhanced characters and has the same requirements. $34.95.

Universal-MonoSpaced Formater. Allows use of your printer's software-controlled features. Select print styles, double widths, underlining, reverse linefeeds, graphics, alternate character sets, and so on. Limited only by your printer. Comes with Epson, Centronics, and PC8023A commands; plus customizing software for other printers. Same requirements as other Ziggurat formatters. $34.95.



Accessory III, Anaheim, CA

Key III. New detachable keyboard adapter for the Apple III. Comes with a lower keyboard cover, thirty-six-inch extension cable, and complete installation instructions. Cable hides under the keyboard when in normal position. $129.

Apple, Cupertino, CA

Business Graphics III. Makes presentation of financial models and plans even more effective. Convert any numerical information into comprehensive, easy-to-read charts and graphs. Reports, forecasts, and proposals will look more professional and have greater impact. $175.

Senior Analyst III. A flexible financial modeling and planning program for managers or professionals who need to analyze, consolidate, and share financial information. Easily develop complex models and consolidate many models into one, or pull information from existing models into a newly created one. Model budgets, planning, profit and loss reports, cash flow projections, and forecasts. $350.

CE Software, Des Moines, IA

Programmers Power Tools III, by Donald Brown. What *Programmers Power Tools II* did for Applesoft, this does for Business Basic. These invokable modules will make your programs faster, simpler, and more professional. $59.95.

Compu-Law, Culver City, CA

Client Management System II, by David J. Kalmick. Comprehensive, lightning-fast law office time-billing-client-management system. Designed by forty-nine attorneys. Data entry and billing; management re-

porting and docket schedule/critical dates calendar. Twenty management reports include statements, financial recaps, case control, A/R aging, fees billed, G/L info, and trust account reporting. Menu driven; no training. Five megabytes of storage. $2,500. Apple II: $1,995.

Creative Software, Cypress, CA

Data Base III. General-purpose information retrieval system. A fast and versatile program for the III, allowing you to design the database to fit your needs. The powerful report generator allows calculations, totaling, averaging, and counting. Reports can be created to fit existing forms. $175.

Fiberbilt, New York, NY

Apple III Carrying Case. Features foam-padded cover and base, removable locking cover that allows for cables to exit the case with the cover closed and locked, nonmetalic hold-down strap, rubber no-slip bumpers and sturdy ABS plastic end-cap construction. Brown. $100.

Great Plains Software, Fargo, ND

The Hardisk Accounting Series. Business/management accounting software. Includes general ledger, accounts payable, accounts receivable, inventory with point of sale, and payroll. Requires 132-column printer. $495 to $595 per module.

Last Electronics, San Andreas, CA

Plexa-Lok III. Acrylic protective cover for the Apple III. Slips over keyboard, protecting it from spills, dust, and unwanted little fingers. Apple can be left on for extended periods without worry of overheating. Enhances the look of that expensive investment. $24.95. Frosty Apple: $1.50 extra.

Mind Systems, Northampton, MA

Transfer III. Transfers individual disk files either way between Apple DOS 3.3 disks and an Apple III. Can transfer *VisiCalc* files, sequential text files, and Basic programs converted to text files for example. Menu driven. Uses emulation mode. $60.

P.M.S., La Crescenta, CA

P.M.S. Medical Billing System. Handles up to five physicians at a fraction of the cost of other systems. Simple to operate, includes comprehensive documentation. Up to ten thousand active patients and six thousand transactions per billing cycle. Generates all insurance forms plus fourteen other reports. $1,995. Apple III: $2,495 (with a Corvus hard disk).

SmartWare, Dayton, OH

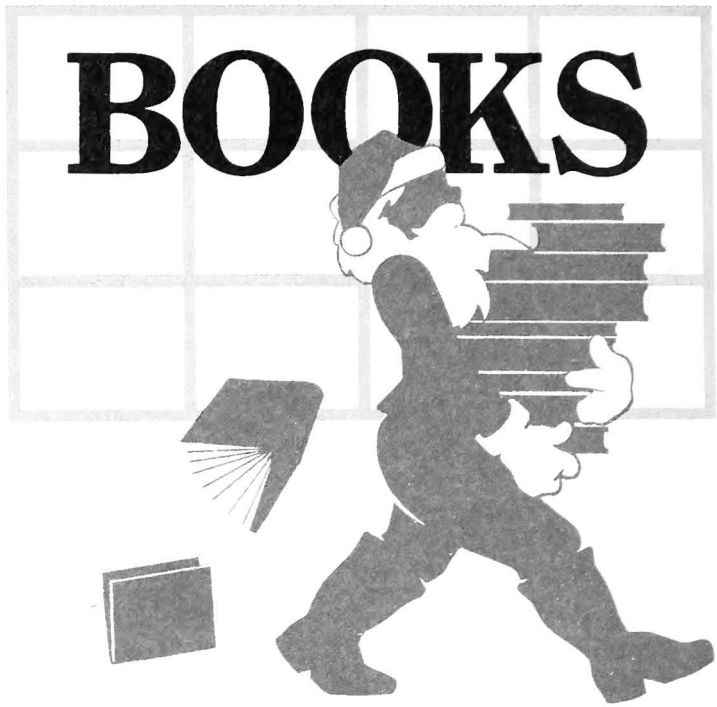
Grafpak III. Zoom hi-res graphic printing via printer for use with Business Basic or Pascal. Prints any black and white screen, and some color screens with aliasing. Supports more than fifty dot matrix and letter quality printers. Interactive or use in your program. No extra hardware needed. $44.95.

Soft Science, Clifton, NJ

Datachron Clock/Calendar. Time-and-date stamp your files. Thirty minute installation, no expansion clock required. Provides SOS with time and date information that is automatically used to record all catalog or directory entries. Know when a letter was written, which is the latest *VisiCalc* revision, and so on. Displayed each time you boot. Battery backup; easily set with system utilities. Enables reserved variables to be used in your programs. $59.95.

VisiCorp, San Jose, CA

VisiCalc Advanced Version. Extends the problem-solving power, speed, and accuracy of electronic work sheets throughout your organization. Now individuals and departments can quickly develop their plans in a uniform manner, consolidate them into an overall plan, and print out presentation-quality reports. Create powerful templates that are easy for others to fill in. $400.



Advanced Systems Technology, Overland Park, KS

Vanloves Apple II/III Software Directory. A guide to Apple software arranged in more than thirty categories. Reports on product features; very straightforward, simple to understand. Soon to be published twice a year. $24.95.

The Apple Directories, Chicago, IL

Blue Book for the Apple, by WIDL Video. The complete where-to-find-it master directory of software, hardware, and accessories for the Apple. Loaded with useful information, including more than 2,300 software and hardware listings in fifty-seven different categories from more than 450 sources. Photos, illustrations, and indexes. Softcover, 464 pages. $24.95.

The Book Company, Los Angeles, CA

The Book of Apple Software. Articles, reviews, and evaluations of Apple software rated for reliability, ease of use, documentation, error handling, and more. $19.95.

Clark Software, Shamokin, PA

A Guide to Investor Software. Stock market software directory gives program descriptions and prices. Lists financial database services as well as associations, books, and computer games for investors. Recommended by the American Association of Individual Investors. $5.95.

CompuSoft Publishing, El Cajon, CA

The Basic Handbook, Second Edition, by David A. Lien. An encyclopedia of nearly 500 Basic words. Simplifies translation of programs written for one computer to another. The *Softalk* review of March 1982 says, ". . . you'll find this reference invaluable." $19.95.

Lama Publications, Bloomington, IL

Lama Software Directory for the Apple. For the who, what, where of Apple computer software, refer to the Lama Software Directory. Over 500 programs listed under precise headings for easy reference. Each listing includes program name, program description, Apple configuration, and ordering information. New issues every four months. $4.95.

Peelings II, Las Cruces, NM

Peelings II. A magazine devoted exclusively to reviewing Apple software. Each bimonthly issue reviews, in depth, about twenty Apple pro-

grams. $21 for nine issues; $38 for eighteen. Foreign orders add $15 per year for airmail postage.

Quality, Reseda, CA

Beneath Apple DOS, by Don Worth and Pieter Lechner. The highly praised, best-selling technical manual that uncovers the mysteries of Apple's disk operating system. Fills in the gaps left by Apple's DOS manual. Over 160 pages include many features, program listings, and an index. $19.95.

S-C Software, Dallas, TX

Apple Assembly Line. Monthly newsletter for assembly language programmers, beginner or advanced. Tutorial articles, advanced techniques, handy utility programs, commented listings of code in DOS and Apple ROMs. $15 per year; add $3 for first class postage in U.S., Canada and Mexico; add $13 postage to other countries. All back issues available at $1.50 each plus postage.

Apple Assembly Line Quarterly Disks. Available to subscribers, containing source code printed in three consecutive issues of *Apple Assembly Line.* $15 each in U.S., Canada, and Mexico; $19.50 with corresponding issues of newsletter; other countries add $1 postage.

Softalk Books, North Hollywood, CA

Assembly Lines: The Book, by Roger Wagner. Become a better assembly programmer with a compilation of the first fifteen installments of Wagner's "Everyone's Guide to Assembly Language," published in *Softalk.* Complementing the fifteen updated and expanded columns, Wagner has added new material to benefit the novice and experienced programmer alike. Five appendices, an index, and an introduction. $19.95.

Soft Images, Mahwah, NJ

Lamp. Bi-monthly cross-reference, indexed by author, review, and subject content, to approximately one hundred computer publications. Each issue contains 200-plus pages with a cumulative year-end issue. $69.95.

Sterling Swift Publishing, Austin, TX

Swift's 1982 Educational Software Directory, Apple II Edition. Contains a carefully selected collection of quality software specifically suited to the educational market. Typical listings included administrative, computer literacy and awareness, statistical packages, computer-assisted instruction, and more. Two comprehensive indexes are included: one by alphabetical listings, the other by discipline and grade level. $14.95.

Systems Design Lab, Redondo Beach, CA

Winning at the Races, by Dr. William Quirin. The first major scientific study of what the computer reveals about jockey, trainer, class, weight, form, track condition, post position, distance, and more. In addition, the book includes a detailed study of speed handicapping with speed charts for 101 American tracks. $21.95.

ACCESSORIES

Comark, Elmhurst, IL

Disks. Memorex, single-side, double-density mini floppy disk: $2.25 each. Nashua, single-side, single density mini floppy disk: $1.99 each. Maxell, single-side, double-density mini floppy disk: $2.75 each. Verbatim, single-side, double-density mini floppy disk: $2.50 each. Dysan, single-side single-density mini floppy disk: $3.75 each.

Flip n File, by Innovative Concepts. Durable file box for both mini and large disks, provides easy filing and protects your disks from dust. $29.95.

Com-Pute Services, Oak Park, IL

Wabash Diskettes. Hub-reinforced 5¼-inch disks. Full warranty for one year. Bulk pack of ten, no container: $20; standard box of ten: $21.95; in plastic case: $24.95. When ordering multiples of ten, subtract $1 per box.

Doss Industries, San Francisco, CA

Apple-center Model 12 and *Model 10.* Model 12 allows you fast and easy access into your Apple, plus it locks tight to protect your Apple and two disk drives into one attractive and secure system. The Apple-center cooling fans are built in. Model 10 has no electronics and is compatible with side mounted fans. $239.95.

Apple-center. Designed to arrange an Apple, nine-inch monitor, and two disk drives into one attractive and secure system. The Apple-center features Surge Sentry voltage surge protection circuitry, a filtered cooling fan, and a key-locking on/off switch. $229.95.

Fiberbilt, New York, NY

Home User Apple Computer Case. Holds an Apple plus two disk drives that may remain connected to a monitor and/or printer with the cover closed or removed completely. Features a foam-padded interior, nonmetalic hold-down strap, rubber no-slip bumpers, and sturdy ABS plastic end-cap construction. Black. $65.50.

FMJ, Torrance, CA

Cool Stack Standard. The ideal and proven way to organize and keep your Apple cool. Includes a quiet, high-quality fan; shelf for your disk

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drives and optional Power Sentry power module; shelf for monitor; fully adjustable library rack for your disks and manuals. All-steel construction for optimum strength. $86.

Cool Stack Sentry II. This model combines the features of locking the computer and disk drives with cooling the computer. Easy tilt action for fast access to inside the computer; fully adjustable library rack for storing disks and manuals. $175.

Power Sentry. Custom-designed for the *Cool Stack* with four AC outlets controlled by a keylock switch. A separate lighted switch controls one outlet for easy rebooting. Contains state-of-the-art transient suppression and a security bracket to prevent removal of the plugs, effectively deterring theft of the monitor and printer. $69.95.

Disklok. Prevents unauthorized access or tampering with the Apple II disk drive. Can be used on the disk drive alone or with the *Cool Stack*. Easily installed utilizing existing holes in disk case. $18.

Printer Pal. Stores your computer paper underneath the printer for more desk space and convenience. All-steel construction for sturdiness and durability; textured finish in either off-white or black. Includes fully adjustable support brackets to keep the paper in place. $29.95 to $54.95, depending on brand of printer.

MicroStand, Seaside, OR

Touch Top II. A professional-quality joystick combined with large one-inch arcade buttons positioned where they belong—on top. Precision construction and painting to match the Apple. Snaps directly into your Apple and comes equipped with cooling vent slots. $99.95.

MicroStand 2.2. New shelving unit is now compatible with both the System Saver and Super Fan II for the best of both utility and cooling. Solid steel construction; painted to match the Apple. $49.95.

Disk Caddy. Solves the problem of practical disk storage. Sturdy steel construction to protect against magnetism; painted to match the Apple. Holds about one hundred disks. Comes with index cards. $49.95.

Microbridge. Printer stand. Steel construction and sized to fit the Epson MX-80 or any similar-sized printer. Painted to match the Apple; holds your computer paper neatly tucked underneath. A must for any disk-bound printer. $29.95.

Copystand. Copy holder—a necessity for anyone who types. Tough metal design and practical enough to hold the largest text at a convenient reading angle. Apple color. $19.95.

Accessory Bridge. A utility shelf about 11 by 8 by 4 inches high. Can be used for a monitor stand or as a printer stand for most 132-column printers with room underneath for computer paper. Sturdy steel and Apple color. $39.95.

Opti-Sound, Henderson, TX

Opti-Case. Airline transportation cases for the Apple II and III. High-density, shock absorbent esterfoam interiors; exterior is industrial-grade plastic laminated onto plywood. Steel corners and hardware, aluminum edges and valances. Sky blue. Also custom-designed cases for all configurations. $225; Apple III: $260.

Picture House, Daytona Beach, FL

Basic Comfort II Desk. A functional desk designed for the Apple II. Allows work space (writing paper, books) directly in front of the operator and places the keyboard at typing height. Walnut or oak high-pressure micalaminate. $169.

Southwestern Data Systems, Santee, CA

Executive Library Cases. These unique cases hold twenty disks in an expandable vinyl case. Ideal for anyone who needs to carry disks with them. Case closes to compact size when traveling, opens up in a fanned pattern when put on a desk for easy access to any disk. Velcro fasteners keep support flaps tucked away when case is closed, yet allow for easy opening to form a stand for the case when in use. $24.95 for 5¼ inch; $29.95 for 8 inch.

Vinyl Diskette Pages. These come in packs of ten vinyl notebook pages, each of which holds two disks. Well suited to archiving large numbers of disks in an economical manner while providing easy access to stored disks. $6.95 per pack of ten.

Williams & Foltz Computer Furniture, Berkeley, CA

Apple Cart. Quality crafted, solid oak furniture for the Apple. Twenty-six inches high; top size is twenty-five by thirty-six inches. Precision knock-down design, locking casters, hand rubbed oil finish. With cord winder and disk drive hangar. $445.

HARDWARE



Advanced Business Technology, Saratoga, CA

ABT BARWand II. Bar code reading wand provided with demonstration software reading three different types of bar codes (UPC, LabelCode, Paperbyte), ten-foot coil cord with sixteen-pin connector. Plugs into game port. $195.

ABT CashBox BarWand II. Bar code reading wand with ten-foot coil cord with Switchcraft connector—designed to plug into ABT's CashBox. $195.

ABT CashBox—Unmodified. Enameled steel cabinet housing steel cash drawer mounted on nylon roller bearings. Removable cash tray, two-conductor unshielded cable exiting through top for connection to power supply, internal SPST switch. $225.

Advanced Logic Systems, Sunnyvale, CA

Z-Card. A CP/M interface board with complete hardware and software that adds the CP/M operating system to your Apple. Necessary for programs such as *WordStar, SuperCalc, Condor*, and most other sophisticated or business-type software. $269.

Smarterm. Eighty-column video display interface board with crisp, easy-to-read eighty by twenty-four screen display and standard five by seven character set. Includes automatic forty to eighty column switching, inverse video, full ASCII keyboard with twelve additional characters, upper and lower case, and supports true shift key operation. $345.

Enhancer Kit. Optional seven by eleven character set for the Smarterm video display board for larger characters and descenders. $39.

Add-Ram. A 16K RAM memory expansion board for the Apple, used by all popular operating systems for the Apple. $149.

The Dispatcher. Advanced serial RS-232 interface used to connect your Apple to a letter-quality printer, a modem, external terminal, or another computer at any of seven baud rates, from 110 to 19,200. $139.

Printermate. Universal parallel printer interface used to connect your Apple to any Centronics-compatible printer. $99.

Synergizer. All the hardware and software necessary for CP/M on your Apple has been conveniently packaged at a savings for you. In-





4 Games You'd Better Resist!

It's sinful and indecent the way your vital signs are excessively stimulated and your brainpower ferociously consumed when you fling everything you've got against these challenges! All too often you'll wholly neglect mate, mother, job, and fatherland, and suffer the consequences.

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By Dr. Charles Kingston



Requires 48K Apple Plus DOS 3.3

USA UNITED SOFTWARE OF AMERICA

$22.50

Color and Sound!

Joystick, Keyboard, or Paddles
Fast Action Arcade Game

BugBattle



cludes Z-Card, Smarterm, Add-Ram, and *The CP/M Handbook*, by Rodnay Zaks. In addition, *SuperCalc*, the popular spreadsheet program, and *Condor Jr.* file management system are included free. $750.

The Words Set. Complete hardware and software package for word processing on the Apple. Includes Z-Card with CP/M software, Smarterm eighty-column video interface board, and *WordStar* software program from MicroPro. $740.

The Files Set. Complete hardware and software package for database management on the Apple. Includes Z-Card with CP/M software, Smarterm eighty-column video interface, and *Condor Jr.* relational database management from Condor Computers. $740.

The Numbers Set. Complete hardware and software package to do financial spreadsheet, modeling, and analysis on the Apple. Includes Z-Card with CP/M software, Smarterm eighty-column video interface, and *SuperCalc* spreadsheet program from Sorcim Corporation. $690.

The Alien Group, New York, NY

Voice Box Speech Synthesizer. With ROM dictionary, singing capability, speaker, random sentence generator, and singing face. Needs as little as nine bytes (not 9K) to use as subroutine with another program. Plug into any Apple slot and hear it speak for itself. $215.

Alpha Logic Business Systems, Woodstock, IL

Multiport. A push-button, switch-selectable game I/O extender; allows connection of up to six devices. Up to four game paddles or two joysticks may be used simultaneously in addition to other devices such as light pens or hardware keys. Heavy-duty construction includes diode-isolated switches, four-foot strain-relief cable, and gold-plated contacts. Factory tested, fully guaranteed. $59.95.

Amdek, Elk Grove Village, IL

V-300 Video Monitor. Twelve-inch green phosphor display; nonglare screen allows for nonstrain viewing, easy reading and operation; 18 megahertz bandwidth and 900 lines (center) resolution. Compatible with every computer and word processing system. UL, FCC approved; composite input. $199.

V-300A Video Monitor. Twelve-inch amber phosphor display. Same as V-300 except for new amber display. $210.

V-310 Video Monitor. Twelve-inch amber screen monitor TTL input. No-strain viewing, easy reading operation, nonglare screen, 18 megahertz bandwidth and 900 lines (center) resolution. $219.

Color I Video Monitor. Thirteen-inch color monitor with 260(H) by 300(V) line resolution. Built-in speaker and audio circuit, front mounted controls for easy adjustment, UL/FCC approved. $399.

Color II Video Monitor. Thirteen-inch high-resolution color monitor with RGB video input, 560(H) by 240(V) line resolution; eighty by twenty-four character display capability. Compatible with the III. $899.

Color IIA Video Monitor. Thirteen-inch hi-res color monitor with 560(H) by 240(V) line resolution, eighty by twenty-four character display capability with RGB analog input compatibility for up to 4,096 computer-controlled color variations. $999.

Color III Video Monitor. Thirteen-inch color monitor with RGB input with commercial grade CRT for hi-res graphics display; 260(H) by 300(V) line resolution; eighty by twenty-four character display capability; sharp, crisp color separation. Compatible with the III. $499.

Color IV Video Monitor. Thirteen-inch color monitor with RGB analog input for 4,096 software-controlled colors, 720(H) by 420(V) line resolution, 80 by 225 character line display, contrast and brightness controls. Compatible with the III. $1,299.

Amdisk 3 Micro-Floppydisk Drive. Compact floppy disk drive offers up to one megabyte double density storage and is plug compatible with 5¼-inch drives. Two drives (with built-in power supply) furnished to accommodate unique three-inch hard plastic disk cartridges. $899.

Model DXY Plotter. X-Y coordinate plotter with four pens meets the need for an economical unit for personal or business computers. Figures drawn using control command, functions may be expanded by adding additional ROM, ten by fourteen effective plotting range, furnished with Centronics interface with easy computer connection. $949.

DVM (Digital Video Multiplexor). Low-cost interface that allows the Apple to be used with an RGB monitor, such as Amdek's Color II and Color III video monitors. $199.

Apple, Garden Grove, CA

Hand Controller II. Precision-built game paddles. Specific features include complete proportional control, dual diameter control knob, precision push-button switch, and comfortable hand-held operation. $34.95.

Joystick II. Specifically designed hand-control product. Adds a new dimension to games or serves as a flexible input device in graphic and word processing applications. Specific features include optional automatic or manual centering, precision trim controls, two flexible push buttons, complete proportional controls, and full 360-degree X-Y control. $59.95.

Cursor III. Specifically designed hand-control product for the III. Can add a new dimension to computer games or word processing applications. Specific features include complete proportional control and two fire buttons. Designed for table-top or hand-held operation; full 360-degree X-Y control. The only joystick for the III. $59.95.

Applied Analytics, Upper Marlboro, MD

MicroSpeed. Minicomputer performance for the Apple—high-speed hardware/software superset of the Forth language with free Applesoft and Pascal booster disks. Apple III in emulation mode. *MicroSpeed II System* (2MHz): $495; *MicroSpeed II System* (4MHz): $645. Special $100 holiday system discount.

ATV Research, Dakota City, NE

Apple-Verter APX-800. High VHF-band tunable modulator designed to plug directly into the Apple. Installs in seconds with adhesive-backed Velcro. Ideally suited for nontunable, quartz-locked television receivers. Built-in 5V regulator permits use on other computer systems. $29.75.

Micro-Verter MVX-505. Battery powered, tunable UHF modulator

MIMCO STICK

the Stick of Champions for the Apple][*



- **external socket** gives easy access to full game i/o connector
- rocker switch selects between joystick and external socket
- high quality self-centering stick with trimming adjustments
- three hair trigger buttons for maximum game flexibility
- smooth 0 to 255 range in both x and y axes

Mimco Stick
1547 Cunard Road
Columbus, Ohio 43227
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(Ohio residents add 5.5% tax)
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(614) 237-3380
(214) 454-3801

$59.95

designed as a stand-alone unit for the Apple. Also, when used with the appropriate adapter from JMM Enterprises, it is widely used with the Osborne. $35.

Axlon, Sunnyvale, CA

Axlon Ramdisk 320K Memory System. Plug-in compatibility; 320K bytes of RAM (200NS) memory designed to function like two thirty-five track floppy disk drives. Compatible with Apple DOS 3.3 and Apple Pascal. Invisible memory refresh; built-in auxiliary power. Draws no power from your Apple. Includes software for diagnostic, fast load and copy routines, and business applications. $1,395.

Computechniques, Fairfield, OH

Arcade-dapter. Now you can play keyboard input arcade games using an Atari-compatible joystick. Selectable formats and built-in auto-repeat function. Revision four or up. $49.95.

Joystick. A rugged, high quality stick especially designed for use with the Arcade-dapter. $20.95.

Computer Micro Works, Dayton, OH

The PROM Switch. Switch ROMs and EPROMs into motherboard. For example, switch between autostart and old monitor ROMs to make reset really work (return to monitor mode), or run commercial firmware. Switches any one of three Apple ROMs or type 2716 EPROMs into a motherboard ROM socket (D0-F8). $49.95.

The Disk Switch. Gain positive control of your Disk II's write status. Modes are safe (cannot write), normal, and write (override protect tab). Switch and mode LEDs mount on drive's faceplate and match its decor. Full instructions. Kit: $11.95; DSA-1 (assembled, plain faceplate): $34.95; DSA-2 (assembled, Apple faceplate): $39.95.

The Promette EPROM Carrier. Safely plug single-type 2716 EPROMs into motherboard sockets D0-F8. Low profile, easy to install, no soldering. $4.95.

The DOS Switch. Directly boot thirteen or sixteen sector disks on a DOS 3.3-equipped Apple. Plugs into disk controller card. $19.95.

Corona Data Systems, Westlake Village, CA

Corona Personal Hard Disk. Five and ten million character hard disks that fit right inside the computer without an attachment on the outside. Compatible with most business and management software. Five megabyte, $1,995; ten megabyte, $2,495.

Corvus Systems, San Jose, CA

Corvus Winchester Disk Systems. For the Apple II and III. Six, eleven, and twenty megabyte capacities. Low-cost backup with Corvus Mirror Video Tape backup system. From $3,195.

Corvus Omninet. Local area network for the Apple II. Uses twisted pair cable, supports up to sixty-four nodes, allows sharing of Corvus mass storage as well as printers and other peripherals. Up to 4,000 feet total network length. $495 per computer, $990 for Omninet disk server (one per network).

Corvus Multiplexer. Local area network for the Apple II and III. Uses flat ribbon cable up to one hundred feet from shared Corvus mass storage system. From $230 per computer, $900 for host multiplexer.

Creative Computers, Forked River, NJ

Key Wiz Keyboard. Finally an answer to memorizing all those *VisiCalc* commands. Contains thirty of the most used *VisiCalc* commands in plain English, a numeric keypad—useful with any program—and twenty-one commands of four most popular word processing systems. Installation is simple. Plug standard keyboard cable to I/O board and I/O board to motherboard. $339.

Data Terminals and Communications, Campbell, CA

D.T.C. 380Z. Personal computer letter-quality daisy wheel printer, 48K buffer, thirty-two characters per second. Software compatible with Diablo 1640/1650/630. Features include automatic proportional spacing, serial and parallel interfaces, full bidirectional printing, standard ribbons, and twelve different print styles. $1,199.

The Pizza Program

Announcing the first dinner menu planning system. It will save you time and add new zest to your meals. It may even convince your wife buying an Apple* was a stroke of genius.

ENDS HO-HUM DINNERS

Are you tired of the same old thing for dinner? Would you like more variety in your evening meal? Is there something you'd rather have but don't get very often? The Pizza Program is designed just for you. It's a delightful new software package designed to end the dinner-blahs with computer generated menus. Here is how it works.

You review what you like from the pre-selected food groups in the system. Delete any foods you don't enjoy. Add anything new at any time. Then decide how often you like to eat certain items. For example. Don't like liver? Then eliminate it with a few simple keystrokes. Or, you can plan for it as seldom as once every 99 weeks or as often as daily.

Want to go out to your favorite restaurant? Enter the restaurant's name as a "Main Course." Now your computer will automatically remind you to go out to eat—and as often as you select. It will delete all other items from that meal except the name of the restaurant.

AUTOMATIC SHOPPING LIST

You get a new menu each week or for just a few days if you want. And, it generates a detailed shopping list, automatically. It can arrange each item on the list in sequence according to the aisles at your favorite store. Studies show a shopping list will discourage impulse buying and save you money.

Also, it generates a per serving calorie counter. This is easy to delete anytime you are not in a diet mood or want to celebrate for any reason. You never count calories unless you want to.

RANDOMLY DELICIOUS

Say goodby to boring meals. Your computer will remember variety is the spice of life. This system makes eating at home a pleasure again. Each menu is randomly generated from major food groups according to the specific criteria you select. The system is easy to learn and easy to operate. Yet it is a sophisticated piece of software which will prevent menu mix-ups.

It will add a new dimension to your home meals without increasing your food costs. It is rumored The Pizza Program may actually reduce the climbing divorce rate. Husbands now have something to look forward to for dinner. Wives think it is terrific because it saves time and effort. And, kids love anything computerized. This is a useful and practical application you'll appreciate day after day, week after week.

TRY IT FOR 30 DAYS WITHOUT RISK

This tested system is guaranteed to make your life easier and happier. Our home trial lets you actually use The Pizza Program for a full 30 days before you decide to keep it. Watch the fun and convenience it creates. Enjoy better meals and see how much time it saves. If you are not satisfied for any reason, return it within 1 month for a prompt and courteous refund. Your investment is just $34.50 plus $2.00 for shipping and handling. (California residents add 6½% sales tax.) Full documentation is included.

OUT OF THE RUT

One housewife's reaction to this program is typical. She wrote, "Before using your system I found myself getting into a rut of serving the same things over and over. The Pizza Program has changed all of this for me. We now have a wider variety of dinners and best of all I don't have to decide what they will be. If this was all it did, I'd be thrilled. But it isn't. The shopping list I receive along with my menus has been such a time saver. I quickly run through it and delete anything I feel I don't need and add something I might. I would have a hard time going back to doing my menus by hand."

This system requires an Apple II Plus* with 48K and 1 disk drive. We urge you to take advantage of our no-risk, 30 day home trial offer. To order call toll free and use your VISA or MasterCard. Or, send a check to the address below. There's no obligation. Order today.

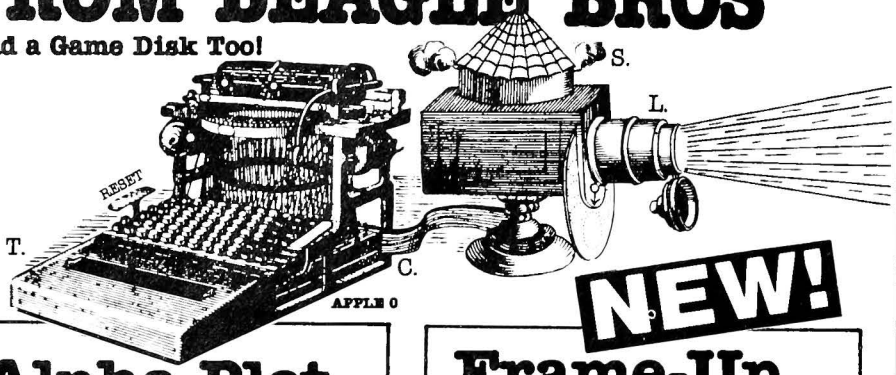
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NEW APPLE® UTILITIES FROM BEAGLE BROS

And a Game Disk Too!



NEW!

Alpha Plot

Hi-Res Graphics/Text Utility by Bert Kersey & Jack Cassidy

Hsre are a few of Alpha Plot's useful graphics fsatures. Compare with other graphic utilities at any prics—

HI-RES DRAWING: Crsate hi-res pictures and charts with text, on both pagss; all Optional Xdraw cursor (see lines before drawing). Mix colors & Reverse (background opposite). Circlss, Boxes, Ellipses; filled or outlined. **Compress Hi-Res to 1/3 disk space.** Relocate any portion of an imags anywhsre on sithsr pags. Superimposs too & convsrt hi-res to lo-res for colorful abstracts!

HI-RES TEXT: Beautiful uppsr/lowsr case with dsscsnders (no hardwars required). Color and revsrse charactere positionabls anywhere (no vtab/htab limitations). Profssional-looking **proportional spacing** and adjustabls character height and letter spacing. Sideways typing for graphs too!

$39.50 ☐ Unprotected disk (48K min.) ☐ Beagle Bros Apple Tip Book #4 ☐ Peeks & Pokes Chart



NEW!

Beagle Bag!

12 Games on One Big Disk by Bert Kersey

Twslve great games from our classic Beagle Bros collection—TextTrain, Slippery Digits, Wowzo, Magic Pack, Buzzword... Almost all of our "Game Pack" games have besn updatsd and re-relsased on ons jam-packed unprotected disk! **ALSO INCLUDED** is our "Beagls Msnu" greeting program (description under "Typefaces" disk on this pags).

Compare Beagle Bag with any 1-game locked-up disk on the market today!

All 12 games are a blast, the price is right, the instructions are crystal clsar, AND the disk is copyable! You can evsn list ths programs to see what makss them tick!

$29.50 Unprotected. Paddles NOT required. Beagle Menu works with all normal-DOS disks. Includes Peeks/Pokes Chart.

Frame-Up

Graphics Display Utility by Tom Weishaar

Frame-Up is a very-high-speed Apple "slide projector" utility that lsts you create profssional-looking displays of intermixed hi-res, lo-res and text pagss **on any Apple.** Frame-Up is very sasy-to-use and above-all **FAST,** allowing you to load hi-rss pictures, for examplo, in **2½-seconds;** that's five-times faster than normal! Paddles or keyboard ars used to changs imagss in forward or reverss order, skipping pagss if you want. OR presentations may bs left unattended, with **each page individually timed** to appear and rsmain on the screen from 3 to 99 seconds, as you choosa.

Frame-Up includes a sophisticated black and white **text screen editor** that lets you create text "slides" as part of your show. You can even add type "livs" on ths screen during your presentations. Up to 17 hi-res or 136 lo-res/text pagss may be stored per disk. Ons or two drivss are supported. Ths order and timing of your graphics and text imagss may be easily (and instantly!) arranged and rearrangsd. Frame-Up includes a **display module which may be copied** and distributed to your associates so they can run your display, as you designed it, on thsir Apple or ANY Apple!

Frame-Up is ideal for store displays, presentations to the boss, club programs, trade show boothe, product demos, promotions, seminars, convsntions, classes, and so on.

$29.50 Machine language. Unprotected. 48K minimum. Peek/Poke Chart included.

BEAGLE BROS DISKS ARE UNLOCKED AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



Beagle Bros™ MICRO SOFTWARE

4315 Sierra Vista, San Diego, Ca 92103
714-296-6400

"APPLE" is a registered trade mark of You-Know-Who.

Apple® Mechanic

Shape Writer/Byte-Zap Utility by Bert Kersey

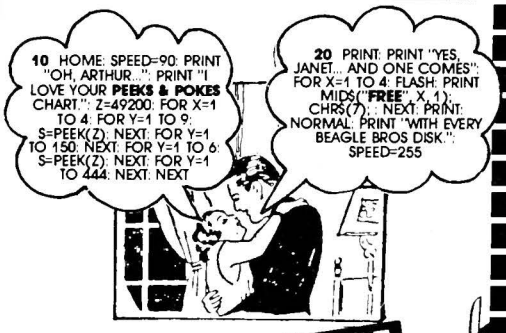
Another best-selling multiple-utility disk—Nine useful, listabls, copyabls and customizabls programs—

SHAPE EDITOR: Put professional hi-res animation in your programs. Keyboard-draw any shape and let your Apple write a shape tabls and store it on disk. Design largs and small **custom typefaces** too, with special charactere. 6 fonts on the disk. LISTabls demos show how to use shaps tablss to animate games, graphic displays, and attractive Charts & Graphs. A valuabls time-saving utility/learning tool.

BYTE ZAP: A MUST utility. Rewrite any byte on a disk by loading a sector onto the scresn for inspection. **Hex/Dec/Ascii** display optional. Examine bytes via cursor control; snter hex, dec or ascii to changs. Create illegal filsnames, restore deleted filss, changs greeting program names, repair/protect disks, changs DOS, sxamine program filss. Clsar illustrated instructions show how disk data is stored and how to access it. Very educational.

MORE: A disk PACKED with useful music, text and hi-res tricks **for use in your programs.** A grsat dsmo-writer program, useful hi-res utilities and educational, sntertaining documentation.

$29.50 ☐ Unprotected disk (48K min.) ☐ Beagle Bros Tip Book #5 ☐ Peeks & Pokes Chart



NEW!

Typefaces

for Apple Mechanic

Hsre are more hi-res fonts for Appls Mschanic's Xtyper and Hi-Writer programs—26 of them at last count, both large and small, all **proportionally-spaced** and positionable anywhere on sither hi-res scresn. Most are **full 96-character fonts** many with special graphic charactere. Each character (from "!" to "□") of svsry font (from "Acs" to "Zooloo") is, of course, editabls with Appls Mschanic's Font Editor.

BONUS: Here's BEAGLE-MENU! A unique greeting program that displays **only the catalog file names you want** on the screen (for examplo, only locked-Applesoft filss, or only Binary filss) for one-key cursor selection. Just hit Return to Run, Brun or Exec the program at the cursor. Many other fsatures— Space-on-Disk, Load/Bload option, forward and backward catalog "scrolling" for sasy fils location, and optional sector-number slimination. PLUS ths ability to **swap file names** in your catalog!

$20.00 Unprotected. Beagle Bros' Apple Mechanic disk is required to utilize the type fonts. Beagle-Menu works with all normal-DOS 3.3 disks.

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros, 714-296-6400, **OR** his favorite software distributor.

If you don't find our products at your Apple Dealer, tell him to phone Beagle Bros, 714-296-6400, **OR** his favorite software distributor.

NEW!

Flex Text

70-Column Text Utility
by Mark Simonsen

Flex Text is a unique utility that lets you print variable-width text on Apple's hi-res screens in normal 40-column format, 20-column expanded or 56- and **70-column condensed** characters. Character widths may be mixed as you like for emphasis. Flex Text understands **normal Applesoft** Basic commands, including Home, Inverse, Normal, Vtab 1-24 and **Htab 1 through 70**! It also supports text window pokes and scrolling, so you can program normally, but with the **ability to add text to graphics**, or graphics to text! You can even run your existing programs using these features!

Flex Text is easy to use; just boot it and go! You can now display **upper and lower case** characters in any width without hardware. Every keyboard character may be redefined as any symbol you like with a custom text **character editor.** You may toggle between the "normal" text screen and both hi-res pages if you like. Flex Text is **completely compatible** with Neil Konzen's Program Line Editor and G.P.L.E.

$29.50 Machine language. Unprotected. 48K min. Peek/Poke chart included. Condensed character display requires a monitor (instead of a tv) for best results.




```
10 REM HI-RES NUMBER GENERATOR
20 SIZE=5: SCALE=SIZE: REM NUMBER-HEIGHT
30 HGR: HOME: POKE 232, 0: POKE 233, 3: ROT=0
40 FOR A=768 TO 830: READ B: POKE A, B: NEXT A
50 N=N+1: N$=STR$(N): X=99: Y=0
60 FOR A=1 TO LEN(N$): HCOLOR=0: DRAW 8 AT
   X, Y: HCOLOR=3: DRAW VAL(MID$(N$, A, 1))
   AT X, Y: X=X+SIZE+SIZE: NEXT A: GOTO 50
70 DATA 20, 0, 24, 0, 27, 0, 31, 0, 35, 0, 39, 0, 44, 0,
   49, 0, 52, 0, 57, 0, 53, 62, 36, 0, 49, 38, 0, 53,
   55, 61, 0, 53, 23, 37, 0
80 DATA 46, 38, 52, 0, 61, 46, 62, 5, 0, 61, 54, 37, 7,
   0, 53, 38, 0, 54, 37, 60, 46, 0, 53, 39, 53, 62, 5, 0
```

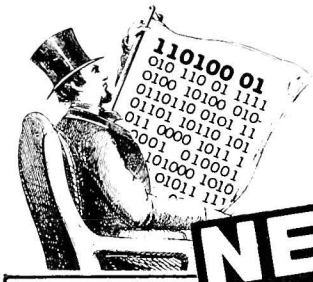
DOS Boss

Disk Command Editor
by Bert Kersey & Jack Cassidy

A classic Apple utility you will ENJOY! Rename DOS commands ("Catalog" can be "Cat", etc.). PROTECT PROGRAMS; any unauthorized save- attempt produces a "Not Copyable" message. Also **List-prevention** and 1-key program-run from catalog. Custom catalogs: Change Disk Volume message to your title; Omit or alter file codes. Rewrite error messages: "Syntax Error" can be renamed "Oops!!" or anything you want! **Two books included**— Fascinating documentation and hours of good Apple reading!

Dos Boss's change features may be appended to your programs so that anyone using your disks (booted or not) formats DOS as YOU designed it.

$24.00
- ☐ Unprotected diek (32K/48K)
- ☐ The Dos Boss Book
- ☐ Beagle Bros Apple Tip Book #2
- ☐ Peeks & Pokes Chart



NEW!

Before you buy any Apple game disk, compare features:

Is there more than one game? Beagle Bag features TWELVE unique games on one disk PLUS a bonus greeting-program utility for use on all of your existing 3.3 disks.

Can it teach programming skills? Beagle Bag games are listable so you can see what makes them work. You can even CHANGE each game's features if you want.

Is the disk copyable? Beagle Bag can be backed-up with ANY copy program. Don't buy software that can't be backed up!

Is the disk unlocked? The Beagle Bag disk can be catalogged, loaded-from, saved-to and Fidded, making it more flexible and more FUN than any locked-up One-Game disk on the market today.

Is the disk priced right? Counting the bonuses, Beagle Bag costs less than $2 per program. This is a disk that will "earn its keep" as long as you own your Apple!

BEAGLE BAG $29.50
(See description on previous page.)

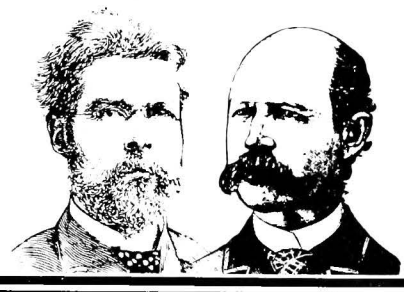
Tip Disk#1

100 Tip Book Tips on Disk
by Bert Kersey

100 programs from Beagle Bros' Tip Books 1, 2, 3 and 4— Fascinating tricks to make your Apple do things it's never done before! All 100 programs are listable, copyable and changeable; and each teaches another fascinating Apple programming technique. **Two different charts are included.**

$20.00
- ☐ Unprotected (32K/48K)
- ☐ Peeks & Pokes Chart
- ☐ Apple II Command Chart

BEAGLE BROS DISKS ARE UNLOCKED AND UNPROTECTED. THIS MEANS EVERY PROGRAM IS INSPECTABLE, CUSTOMIZABLE, IF YOU WANT, AND COPYABLE, GIVING YOU THE MOST FOR YOUR SOFTWARE DOLLARS. DON'T SETTLE FOR LESS.



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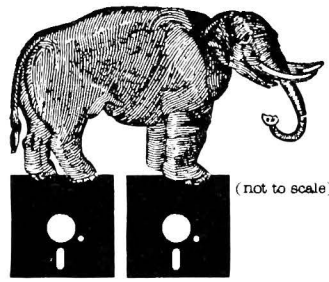
Utility City

21 Utilities on One Disk
by Bert Kersey

A best-seller since it hit the market, and a MUST for your program-development library. Take a look at the features— **List Formatter** makes properly-spaced & indented listings with page breaks; each statement on new line, if-thens and loops called out; a great de-bugger! **Multi-Column Catalog** in any page-width to any printer or CRT. Auto-post Run-Number and last-used Date in programs. Put INVISIBLE working commands in your listings. Access program lines in memory for repair & illegal alteration. Alphabetize & store info on disk. Run any program while another stays intact. Renumber to 65535. Save inverse, trick and **invisible file names**. Convert dec to hex & binary, or Integer to FP. Append programs. Dump text screen to printer...

21 LISTABLE UTILITIES TOTAL!

$29.50
- ☐ Unprotected disk (48K min.)
- ☐ Beagle Bros Apple Tip Book #3
- ☐ Peeks & Pokes Chart



(not to scale)

GOTO Your Apple Dealer.

Most dealers carry our software. If yours doesn't, he can have our disks in his store for you **within 2-3 days** by calling us or his favorite software distributor.

Or Order by Phone:

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Visa/MasterCard/COD* orders, call
Nationwide: **1-800-854-2003** ext.827
California: **1-800-522-1500** ext.827
Alaska/Hawaii: **1-800-854-2822** ext.827
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Electrohome Limited, Ontario, Canada

1302-2 Color Data Display Monitor. Thirteen-inch color data monitor for North American markets. Designed especially for the professional business and personal computer market. Features the latest in advanced circuitry. Design is directly compatible with an Apple III and most other personal computers. With an NTSC interface module (optional) it performs with composite video signals. $729.

1302-1 Color Data Display Monitor. Thirteen-inch color data display monitor designed especially for the professional business and personal computer market. Latest in advanced circuitry, RGB inputs, and is directly compatible with an Apple III and most other personal computers. With an NTSC interface module (optional) it performs with composite video signals. $399.

Gold Disk, Glen Arm, MD

Compu-Turn, by Hytek. A unique turntable platform that enables you to rotate your Apple, disk drives, and monitor to any position you desire. It also creates easier game-playing situations when two or more players participate. $39.95.

H.A.L. Labs, Riverside, CA

Gizmo, by Brian Fitzgerald and Greg Autry. An inexpensive device that interfaces an Atari-compatible joystick to your Apple (Wico joystick recommended). It's as fast as the keyboard, extremely reliable, and comes with software patches for your own use. $15.

Happ Electronics, Oshkosh, WI

Hi-Fi Adaptor. Connects Apple speaker output to stereo or hi-fi. Game sounds become exciting. Create your own computer music or do voice synthesis inexpensively. Unit features isolation circuit, switchable mode, and adjustable output level. $25.

Game Socket Extender #GS-1. Connect your paddles to a zero-insertion force socket that mounts on the outside of the Apple. Changing between paddles, joysticks, and other I/O devices becomes a snap. Helps prevent damage to equipment if paddles are pulled during an exciting game. $14.95.

Game Socket Extender #GS-2. Same as #GS-1 but with an extra female socket on the male plug end (inside Apple case). $19.45.

High Order Micro Electronics, Chagrin Falls, OH

Repeaterrrr. Two enhancements: auto repeat and high speed repeat (two speed, keyboard selectable). Repeats any keypress after adjustable delay. Perfect word processing, programming, and *VisiCalc* aid. Excellent for scrolling or long cursor moves on sixty-six to eighty column displays. Unique, highest quality, plug-in unit; compatible with all software, hardware, and Apple warranty. Revision seven motherboard or greater. $24.95.

High Technology, Oklahoma City, OK

Applejuice. The threat of lost data is no longer a problem. The *Applejuice* reserve power supply supplies instantaneous back-up power to operate your Apple and Apple-powered peripherals during power outages. $325.

Hutton Industries, Tacoma, WA

Qwk Cover. A distinctive, high-impact, rigid black plastic keyboard cover, contour molded to the Apple. Protect your investment from dust and debris with a professional-quality cover. Holds itself snugly in place on padded arms while allowing machine operation. $12.95.

Innovative Measurements, San Clemente, CA

IMI Realclock. This real-time clock/calendar card for the Apple provides the user with date and time values for numerous purposes, with a resolution of one millisecond. Interrupts, ranging from milliseconds to months (in four modes of operation)—all under software control—provide the ultimate in flexibility. $190.

IMI Hibernator. Adds A.C. line power switching. Turn the A.C. line power on and off to the Apple in which an IMI Realclock is resident. $95.

Intermedia Systems, Cupertino, CA

192K Memory Expansion Module. Parity; one year warranty. $579.

256K Memory Expansion Module. Parity; selectable address space; one year warranty. $729.

192K Memory Plus Two Asynchronous Channels. Fully compatible with DOS Plus Basic; expandable to 448K; one year warranty. $795.

256K Memory Plus Two Asynchronous Channels. Fully compatible with DOS Plus Basic; expandable to 512K; one year warranty. $895.

256K Memory Upgrade Module. Adds an additional 256K of memory to either the 192K with two asynchronous channels or the 256K with two asynchronous channels; complete tested assembly (not a set of chips); one year warranty. $695.

Intra Computer, Kew Gardens, NY

Printer Switch. Centronics compatible; permits hard copy to be routed to a letter-quality daisy wheel or dot matrix printer. The interface cable from a single parallel board within the Apple is plugged to a connector on the printer switch. Each of the two built-in six-foot cables is attached to the selected printers. $150.

Share-A-Printer Switch. Centronics compatible; allows two Apples to share one printer. The interface cable from a single parallel board within each Apple is plugged to a connector on the Share-A-Printer. One built-in six-foot cable is attached to the printer. $150.

Share-A-Printer Four-Way Switch. Centronics compatible; allows four Apples to share one printer. The interface cable from a single parallel board within each Apple is plugged to a connector on the Share-A-Printer. One built-in six-foot cable is attached to the printer. $250.

Kensington Microware, New York, NY

System Saver. The piece Apple forgot. A super-popular peripheral that features cooling fan, line surge suppressor, front-mounted power switch with pilot light, two rear-mounted outlets. Extends the life of the Apple; adds operating convenience. Fits on the side of an Apple or monitor stand. $89.95.

Kraft Systems, Vista, CA

Kraft Joysticks. Combines two modes of operation in one unit: free floating and spring centering. External switches allow easy change of mode. Linear potentiometers and patented gimbal mechanics provide accurate cursor control and rapid, continuous motion. Engineered for comfort, backed by a limited one-year warranty. $64.95.

Kraft Paddle Pairs. Designed with linear potentiometers rather than standard switch-movement controls. This feature provides accurate cursor control and rapid, continuous motion. Tested to over 2,000,000 cycles, they carry a one-year limited warranty. Kraft has over twenty years of experience manufacturing similar products for industrial and hobby applications. $49.95 per pair.

Last Electronics, San Andreas, CA

Plexa-Lok II. Acrylic protective cover for the Apple. Slips over keyboard, protecting it from spills, dust, and unwanted little fingers. Apple can be left on for extended periods without worry of overheating. Enhances the look of that expensive investment. $19.95. Frosty Apple: $1.50 extra.

LJK Enterprises, Saint Louis, MO

Lower Case Character Generator. True two-dot descenders generated to video screen. Manual includes listing of software for full support. Detailed installation instructions plus shift key modification allowed. Revision seven motherboard or greater. $24.95.

Lobo Drives International, Goleta, CA

Lobo 8202CA (5202CA). Dual eight-inch floppy disk drive systems for the Apple. Model 8202CA includes two single-sided drives; 5202CA includes two double-sided drives. Double density recording stores 577K

per side. Interface card (included) supports up to four drives. DOS 3.3 patches included; CP/M additional. Sold factory direct with one year limited warranty. 8202CA: $1,625; 5202CA: $1,925.

Lobo 3101 (3101I). Plug-compatible, add-on minifloppy disk drives for the Apple. Model 3101 stores up to 143K (sixteen-sector format). Model 3101I includes interface card. Lobo or Apple drives will connect interchangeably to Lobo or Apple interface cards. Sold factory direct with one-year limited warranty. 3101: $385; 3101I: $455.

Lobo 950A and *1850A.* Hard disk systems with built-in high density floppy backup. 5¼ inch model 950A combines 5 megabyte Winchester with 737K floppy drive. Eight inch model 1850A has 8 megabyte Winchester, 1.2M floppy. Both include interface card and DOS 3.3 patches; CP/M additional. Sold factory direct with one year limited warranty. 950A: $2,675; 1850A: $3,459.

Mark Four Imports, San Gabriel, CA

Cool-Mark II Fan Unit. Protects your Apple against overheating caused by plug-in boards and prolonged use. Mounts inside your Apple in seconds, without hardware. Features a precision ball bearing fan that provides high-performance air flow, low noise level and long service life. One-year warranty. Quantity discounts are offered to user groups. $34.95.

Micromax, Del Mar, CA

Viewmax-80. Finest eighty-column video card for the Apple. Works with *WordStar, EasyWriter, Apple PIE, Apple Writer, Letter Perfect,* and so on. Compatible with CP/M SoftCard, *VisiCalc,* Pascal, *ASCII Express,* and other software compatible with Videx's Videoterm. Offers true descenders, seven by nine dot matrix, built-in soft 40/80 switch, shift key support, and inverse video characters. $219.95.

Keymax-96. Lower-case chip for the Apple (revision seven and up). Permits generation of entire ASCII set of ninety-six display characters from standard Apple keyboard, plus screen editing and cursor movement functions using Basic escape sequences. Complete with disk containing patches for Pascal, CP/M, and Apple DOS. Cursor flash rate adjustable. Shift lock definable. $29.95.

Z-80 Processor Card. Hangs Z-80 on the Apple bus. May be used for development and numerous other applications. Runs user-supplied CP/M operating system on Apple. $149.95.

Printer/Graphics Card. Graphics-compatible parallel printer card for the Apple. Comes with or without graphics option. Can be field-upgraded to support graphics by customer. $89.95; with graphics option: $149.95.

Microproducts, Ramona, CA

Data Acquisition and Distribution System. This gold-plated, solder-masked board contains two independent fifteen-microsecond analog-to-digital converters and two independent two-microsecond digital-to-analog converters. Programming of this board is extremely straightforward in Basic as well as assembly language. With free music synthesizer program. $249.95.

EPROM Programmer for Five-Volt 2K EPROM. Used to program 2716s for use in the Apple motherboard with socket adapters or any peripheral or other computer utilizing five volt 2K EPROMs. $99.95.

General Purpose Eight-Bit Latched Parallel Port. An eight-bit latch that accepts data from the Apple and retains this information while the external device is using it. Used mainly to control external processes from user-produced software. Can be utilized with any Apple configuration. $39.95.

EPROM, ROM Memory Module. This extremely versatile board holds either six 2K EPROMs or ROMs. The number and type of device is selected by on-board dip switches. Bank switching is controlled by an on-board switch or software and can be run in any Apple slot. Can be utilized with any Apple configuration. $99.95.

Mimco, Columbus, OH

Mimco Stick. Superb self-centering joystick for control of fast-action games. The smooth bidirectional axes and three push buttons enhance

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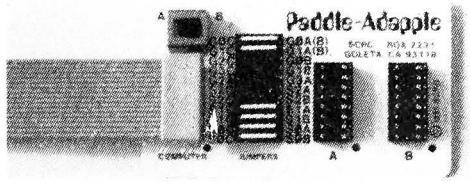
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THE KEYPAD

- Converts APPLE™ keyboard to one of eight 10-key or hexadecimal keypads
- Hardware conversion—compatible with **ALL** software • Decals provided
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- Lowest priced numeric keypad available—**$79.95**

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- At the flip of a switch, select between standard "QWERTY" 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
I/O EXPANSION ADAPTOR



- 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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user abilities. Flipping a switch transfers control from joystick to external port allowing connection of paddles and other accessories without going inside the Apple. $59.95.

Omega Microware, Chicago, IL

Ramex-128. Adds 128K of additional RAM to your Apple. Used with *VisiCalc* and *Super Expander* to increase work space to 136K. Imagine loading a full 136K *VisiCalc* file into memory in twenty seconds, saving it back in twenty seconds, and spending your time working on the template instead of waiting fifteen to twenty minutes as required with other large memory cards. No strapping; software included. $499.

Ramex-16. The one 16K memory expansion card for your Apple that requires no unnecessary surgery. Just plugs in with no strap or additional connections. Complete with a one year limited warranty. $139.95.

Orange Micro, Anaheim, CA

Grappler+. Replaces the best-selling Grappler Apple printer interface. Features graphic and text screen dumps with keyboard commands—no software needed. New features include dual hi-res graphics, dip switches for printer selection, mixed-mode screen dump, and Apple III compatibility. Twenty-three commands in all, including numerous text formatting commands. $175.

Output, Plymouth, MI

Two Boot Double DOS Bootswitch. Flip a switch and boot either DOS 3.2 or 3.3. Eliminates the need for the Basics disk or *Muffin* program when changing from thirteen to sixteen sector programs. $24.95.

Outport and *Twinport.* Tired of disassembling your Apple every time you plug in your joystick or paddles? Simplify the process with one of these twenty-inch game port extenders. The Outport features a zero insertion force socket; the Twinport includes two conventional sockets and a slide switch. $19.95 each.

Port Authority. Improve your Apple game port by adapting Atari joysticks with this digital joystick interface and zero insertion force port extender. Compatible with Sirius Joyport joystick games. $34.95.

80 Out. The newest and least expensive eighty-column board for the Apple. By using CMOS and LSI technology, Output has engineered a board that consumes less power and produces less heat. Standard features include upper and lower case display, full keyboard shift, and a built-in software video switch. Compatible with Basic, machine language, Pascal, and CP/M. $199.

Passport Designs, Half Moon Bay, CA

Soundchaser Computer Music System. Includes a four-octave music keyboard and the Mountain sixteen oscillator synthesizer cards. New performance software, *Turbo-Traks*, allows sixteen-track recording and enables the user to draw waveforms to create sound with one to sixteen oscillators per voice. Optional software for transcription (*Notewriter*) and music education (*Music Tutor*) is available. $1,190.

Personal Computer Products, San Diego, CA

Appli-Card. For use with four or six megahertz Z-80 microprocessor with 64K on-card memory. One-card solution to execute CP/M application programs for the Apple. Features 2K EPROM expandable to 8K, seventy columns using hi-res graphics, expansion interface port for added extra memory for future CP/M and to support other Z-80 peripherals. Call for special offer: Appli-Card with *PlannerCalc* or *FMS 81.* $445; 6 megahertz: $595.

Practical Peripherals, Westlake Village, CA

Microbuffer II. Allows you to print and process simultaneously. You don't have to wait, just dump printing data directly to Microbuffer and continue processing. It stores the data in its own memory buffer and takes control of your printer. Centronics-compatible parallel or RS232-C serial versions, on-board firmware for text formatting, and advanced graphics dump routines. 16K: $259; 32K: $299.

RC Electronics, Santa Barbara, CA

Applescope. State-of-the-art digital storage scope interface for the Apple. Samples real time at 3.5 megahertz. Dual channel unit with bnc, ext, and scope driver software. $695; additional data analysis software available.

Bus Rider. Logic analyzer for Apple development system, silently rides on peripheral bus and allows real-time tracking of program. Software sets up trace parameters from keyboard and read-back of disembled code with four external inputs. $395.

Vantec 80. Eighty-column video board, hi-res graphics for the Apple. Eighty-column video mixes directly onto video output; either hi or lo-res graphics or forty-column text may be combined with the eighty-column display. Special: $299; list: $389.

Applescope—HR12. High quality digital storage oscilloscope interface with twelve-bit accuracy and sample of 1 megahertz. Expandable to four channels, allows operation comparable to a high-priced oscilloscope. HR-12 and software. $695.

RH Electronics, Buellton, CA

Super Ram II. 16K RAM extension; five RAM-ROM options, selectable DIP switch. $125.

Super Fan II. Cools your Apple; includes two 120 volt outlets. $74.95. With Zener Ray true power surge suppression, $109.

Guardian Angel. Uninterruptable power source. Alarm. $595.

RKS Industries, Scotts Valley, CA

Surge Sentry. A series of power line conditioners that protect your Apple and all of its peripherals from high voltage impulses and dropouts that cause program errors and hardware malfunctions. Several models that plug into standard AC outlets provide up to six receptacles for your equipment. $6 to $134.

Sage Enterprises, Mountain View, CA

Owl Logic Analyzer PI-1160. Interfaces to the Apple II, providing hardware buffs with the ability to look at sixteen data channels with depth of sixteen words at speeds of ten MHz. Uses Apple to provide timing diagram state tables (binary, octal, or hex format) and vector map displays. $950.

Sierra Software, Las Vegas, NV

The Sierra Sound Effects System. Reproduces the finest arcade sounds with incredible loudness and bass response. Sixteen registers program the system. Produces sound effects independent of the microprocessor; one poke in Basic or machine language enables the sound. Reproduce ocean waves, rain, explosions, trains, cars, and much more. Complete with software. $199.95.

Sorrento Valley Associates, San Diego, CA

App-L-Cache RAM Memory Card. Speed up your program operation two to twenty times. Use the Cache in its disk-emulation mode to replace a second or third minidisk drive. With *VisiCalc* get a 252K work sheet with full-save capability. $1,200.

Eight-Inch Drive System. Completely compatible with Apple DOS, Pascal, and CP/M (Microsoft and Appli-Card). Will expand your system up to 4.4 megabytes. IBM-3740 format creates standard disks so they are transportable to your other computer systems. $1,995.

Southern California Research Group, Goleta, CA

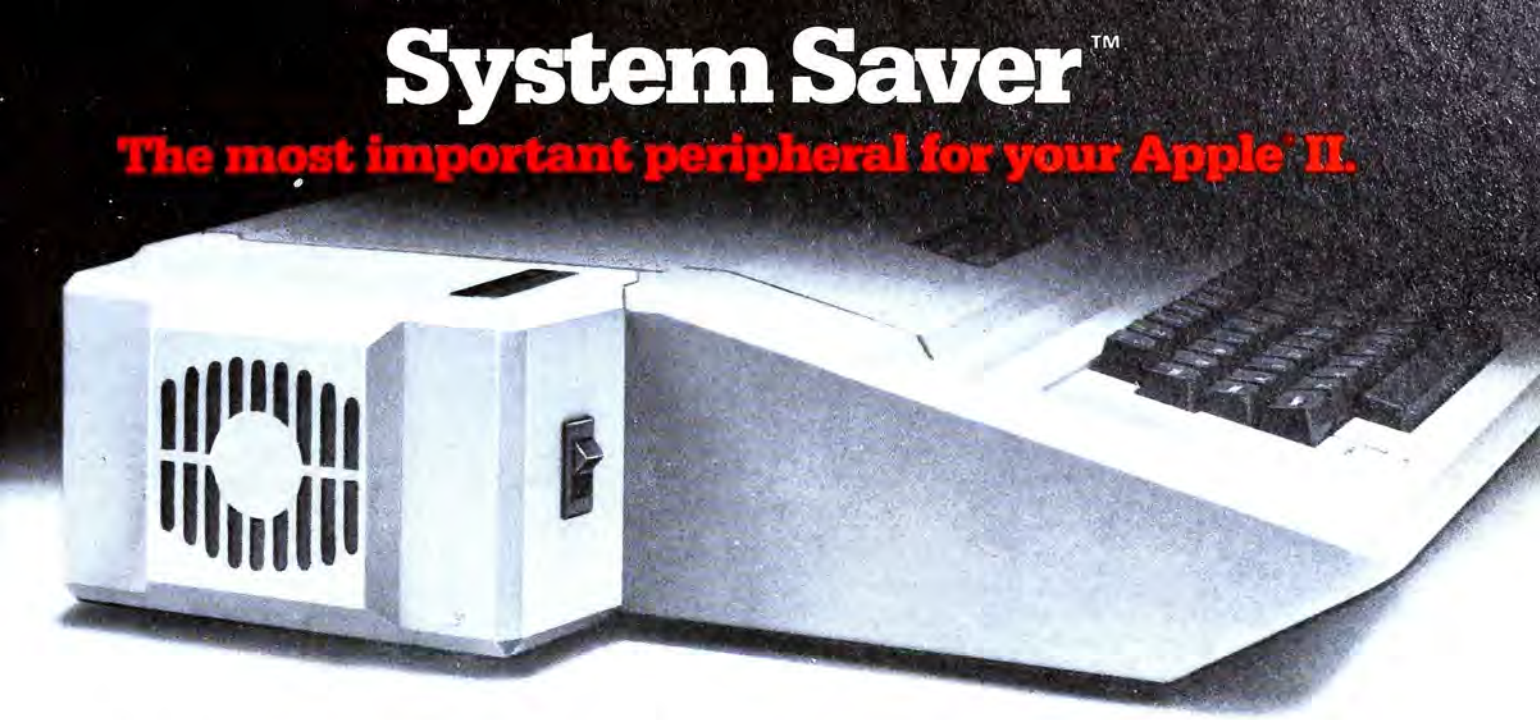
Paddle-Adapple. Versatile extender/expander for the game I/O. Plug in a set of paddles and a joystick simultaneously, use them together, or switch between them. Four push-button inputs are available to the Apple. Eighteen-inch cable is included. $29.95.

Extend-A-Slot. An eighteen-inch extension cable allowing the user to change peripheral cards on the outside of the Apple. Works well with all low to medium speed peripheral cards. Connectors are gold-plated for reliability. Invaluable aid to owners of PROM programmers and experimenters that need access to the card while in operation. $29.95.

The Keypad and *The Magic Keyboard.* Allow you to remap the Apple keyboard to give you alternate arrangements. Both allow you to choose one of four ten-key numeric keypads, or one of four hexadecimal keypads. The Magic Keyboard also gives a choice of seven alternate al-

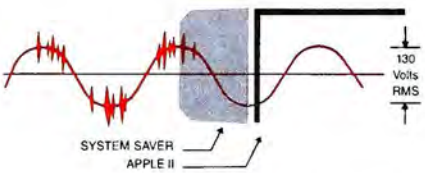
System Saver™

The most important peripheral for your Apple® II.



For Line Surge Suppression

The SYSTEM SAVER provides essential protection to hardware and data from dangerous power surges and spikes.

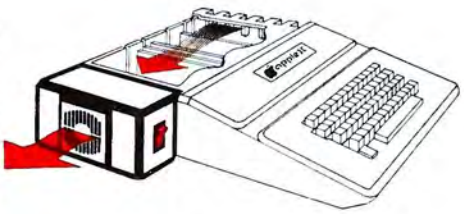


By connecting the Apple II power input through the SYSTEM SAVER, power is controlled in two ways: 1) Dangerous voltage spikes are clipped off at a safe 130 Volts RMS/175 Volts dc level. 2) High frequency noise is smoothed out before reaching the Apple II. A PI type filter attenuates common mode noise signals by a minimum of 30 dB from 600 khz to 20 mhz, with a maximum attenuation of 50 dB.

For Cooling

As soon as you move to 64K RAM or 80 columns on your Apple II you need SYSTEM SAVER.

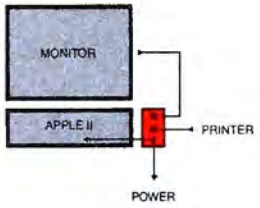
Today's advanced peripheral cards generate more heat. In addition, the cards block any natural air flow through the Apple II creating high temperature conditions that substantially reduce the life of the cards and the computer itself.

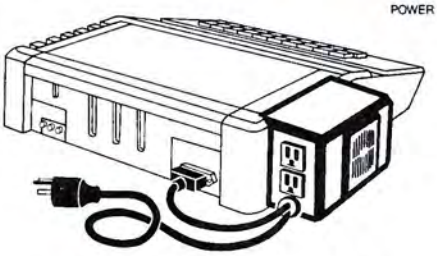


SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.

For Operating Efficiency

SYSTEM SAVER contains two switched power outlets. As shown in the diagram, the SYSTEM SAVER efficiently organizes your system so that one convenient, front mounted power switch controls SYSTEM SAVER, Apple II, monitor and printer.

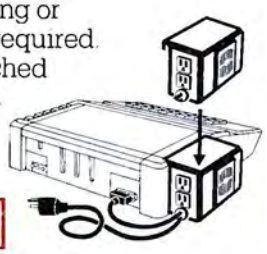




The heavy duty switch has a pilot light to alert when system is on. You'll never use the Apple power switch again!

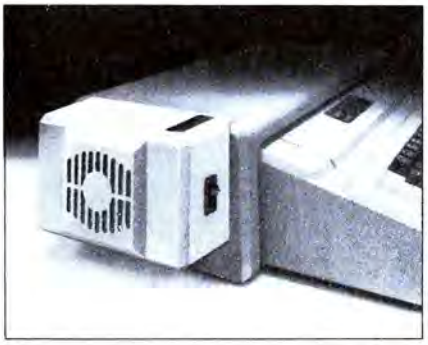
Easy Installation

Just clips on.
No mounting or hardware required.
Color matched to Apple II.



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Compatible with Apple Stand



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For phone or mail orders include $2.50 for handling. New York State residents add 6¼% sales tax.
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KENSINGTON MICROWARE

phabetic arrangements such as Dvorak simplified, American simplified, one-handed, alphabetical order, and so on. *Keypad*: $79.95. *Magic Keyboard*: $89.95.

SouthWest EdPsych Services, Phoenix, AZ

Cassette Interface. Start and stop a tape recorder under program control with this handy device. A quick, inexpensive, high quality voice with unlimited applications in education, business, and home. No extra-cost software, no wiring, no extra chips, and no complicated machine language timing programs required. $49.95.

Slot Swappers. Interchange any two slots (except 0) with the flip of a switch. Reduced inconvenience, loose connections, and costly burned-out chips because software and hardware are slot-dependent. Great for hard and floppy disk controllers and for multiple printers. No wiring or chips needed; it just plugs in. $79.95.

Star Logic, Canoga Park, CA

Star Logic Disk Drive. A complete Apple-compatible drive. Price includes 5¼-inch disk drive with half-tracking, cable, and cabinet. Handles 3.3 DOS, Pascal, and CP/M programs. Apple disk controller card. $250.

Stellation Two, Santa Barbara, CA

Pascal Speed Up System. Accelerates all Apple Pascal and Fortran applications. A combination hardware-software enhancement utilizing the 6809 coprocessor from Motorola. A perfect gift for anyone who uses Pascal. Includes a printer-spooler and math floating-point enhancement on disk. $299.

Strawberry Tree Computers, Sunnyvale, CA

Dual Thermometer. Thermometer card complete with two probes, comprehensive software, and manual. Use for energy monitor and control in home or building, frost warning, laboratory, engineering, and manufacturing. Display and datalog on disk or printer; temperature, high, low, and difference; alarms and time. $260.

Expander. Connects eight probes (not included) to one Dual Thermometer or eight relay outputs to control heating, cooling, and other equipment. Includes software to operate any combination of probes or relay outputs, plus all Dual Thermometer program capabilities. Requires Dual Thermometer. $325.

Home Controller Program. Controls heating, cooling, and other equipment through BSR controller (no added wires) using Dual Thermometer to measure temperature. Includes all Dual Thermometer program capabilities. Requires Dual Thermometer, clock card with BSR interface, BSR controller and modules. $35.

Modem Program. Reports failure of furnace, freezer, or other temperature when away. Calls you or another computer at preset temperature or time. Or call in to get a temperature report. Includes all Dual Thermometer program capabilities. Requires Dual Thermometer and Micromodem II. $29.

Hygrometer Program. Measure humidity and dew point. Includes all Dual Thermometer program capabilities. Requires Dual Thermometer. $35.

Street Electronics, Carpinteria, CA

Echo II Speech Synthesizer. Plug-in card that provides an unlimited speaking vocabulary using four hundred grammatical rules. Your Apple can pronounce most any correctly spelled word. Select from sixty-three pitch levels, control intonation within words, vary the rates of speech and volume, and even pronounce punctuation. With speaker and software. Apple III in emulation mode. $150.

Syntauri, Palo Alto, CA

MetaTrak, by Scott Gibbs. Totally digital sixteen-track synthesizer recording system with independent instrument, vibrato, and volume control. Includes changing playback speed without pitch change, punch in/out, fast forward, and erase for quick musical corrections. For use with five-octave alphaSyntauri system. $250.

MiniTrak. Same features as *MetaTrak,* providing four independent tracks. Works with the four-octave alphaSyntauri system. $100.

Studio Pro. Five-octave alphaSyntauri digital synthesizer with eight-voice polyphonic velocity sensing keyboard, including foot pedals for sustain and portimento, Mountain Computer MusicSystem, interface card, and shielded cable. Software for a sixteen-track digital recording system is standard as well as alphaPlus for original sound generation, instant waveform changes, and special effects modes. Additional software and components available. $1,995.

Entertainer. Four-octave alphaSyntauri digital synthesizer; eight-voice polyphonic keyboard includes sustain and portimento foot pedals, Mountain Computer MusicSystem, interface card, and cable. Software includes an independent four-track recording system to record real-time music with control over envelope changes, instant waveform generation, special effects capabilities, and one hundred preset sounds. Additional software and components available. $1,195.

Taurus Computer Systems, West Newton, MA

Taurus 8. More storage space and up to three times faster data transfer. Mitsubishi eight-inch disk drive, interface card, custom power supply, and case—all with a one-year warranty. Interface software included. Both 8-inch and 5¼-inch drives can be used concurrently. Drives can be accessed either by drive or volume number, a feature that allows the use of software that limits the number of drives that can be used. $888.

TG Products, Plano, TX

Joystick. High-quality, made by the oldest and largest manufacturer of game and graphics input accessories. Made from custom-designed components to be completely linear over the entire input range. Two large buttons, molded cable, and exclusive trim to perfectly match your Apple. $59.95. Apple III: $64.95.

Trak-Ball. Exciting new game and graphics input device consisting of a ball that is rolled with the palm of the hand to quickly and accurately position objects on the screen. Designed for years of reliable play and produced from quality components. $64.95.

Paddles. Made from the highest quality components. Includes extra long sixty-foot cables and potentiometers tested for over one million cycles. Two large push buttons work equally well for right and left-handed players. $39.95.

Select-A-Port. Allows multiple devices to be connected to the game socket. Five switchable sockets isolated by diodes to prevent device-to-device interference. Comes in an attractive case that matches the Apple. $59.95.

Thunderware, Oakland, CA

Thunderclock Plus. Clock/calendar card for your Apple. Just plug it in and your programs can read month, date, day, and time (to the second), in any of Apple's languages. Works with *DB Master, VisiDex, Micro-Courier,* and many more. Time and date stamp your DOS files. Control lights and appliances on schedule. $150.

T.J. Electronics, Arlington, TX

Quietline 6. Noise suppressor that plugs into your wall outlet, transforming it from a two-plug into a six-plug outlet. Its electronic circuitry monitors your power line and shunts to ground-damaging electrical spikes and surges on your power line. This prevents spurious data, reboots, and so forth. $49.95.

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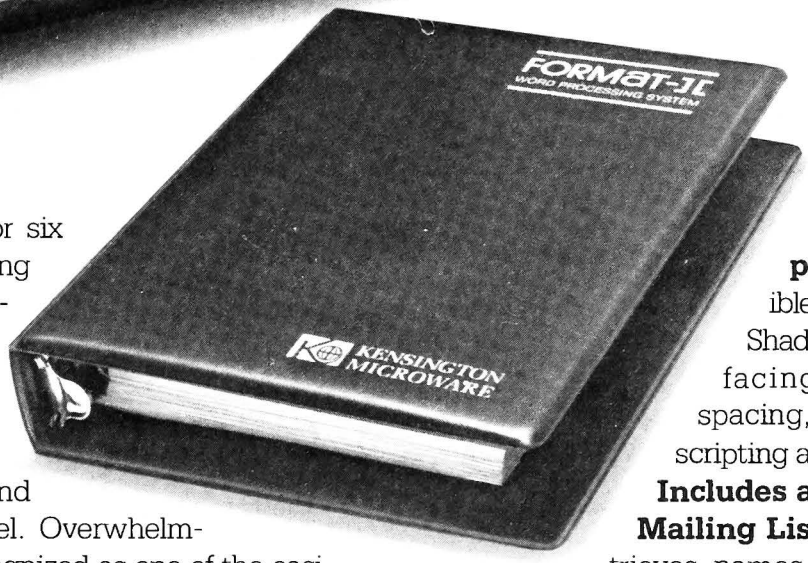
Floppy Fingers. Where multiple disks are required, *Floppy Fingers* eliminates that messy pile of disks that always seems to obscure the one sought. Each of six disks—5¼-inch or 8-inch—is held vertically and separately for immediate, random retrieval. Handcrafted solid oak. $31.95.

The Bridge. Designed to house up to three 5¼-inch disk drives and a monitor, The Bridge fits conveniently over a variety of microcomputers to allow easy access to individual components. The sides are shaped to allow air circulation for those computers with side vents. Handcrafted solid oak. $79.95.

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System Requirements: 48K Apple® II Plus with 80 column card

cess drawer, this unit can store up to 340 5¼-inch disks. The random access drawer (on top) pulls out and then drops down to an inclined position, enabling the user to select any one of up to twenty disks at a glance, with each label visible. The bulk drawers, with four inclined compartments each, are suitable for those disks used less often or for storage of game paddles, joysticks, and so on. Handcrafted solid oak. $279.95.

Floppy Drawers Add-On. Same features as Floppy Drawers. Connects to create a cabinet with six, nine, twelve, or fifteen drawers, limited only by available desktop space. Handcrafted solid oak. $239.95.

Floppy Drawer. This unit contains one random-access drawer and room for three disk drives, or books and manuals. The decorative side cutouts are functional, allowing for ventilation when used in conjunction with The Bridge. Handcrafted solid oak. $189.95.

Videx, Corvallis, OR

Character Fonts. There are several character fonts available for the Videoterm: German, Spanish, French, Symbol (math and Greek), underline, high/low intensity, and many others. These character fonts are easily installed on your Videoterm and are compatible with several word processors. Videoterm. $29.

Soft Video Switch. Used in conjunction with a Videoterm, this will automatically switch between the forty and eighty column display through program or computer control. Videoterm. $35.

Enhancer II. Utilizes a powerful microprocessor providing many of the advanced features not originally built into your keyboard: function keys, 128-character type-ahead buffer, true typewriter-like operations with shift and shift lock, auto repeat and fast repeat on all keys, and redefinable keyboard (the keys may have functions assigned to them for use with popular programs like *VisiCalc, Apple Writer II,* and *WordStar*). Compatible with all programs. Revision 7 or greater. $149.

Function Strip. A companion to the Enhancer II that allows you to have sixteen additional keys which can take advantage of the Enhancer II's macro capabilities. Enhancer II. $79.

Lower Case Chip. Allows you to see all ninety-six displayable characters, including lower case with descenders. Revision 7 or greater. $29.

Micromodem Firmware. Although the Micromodem and the Videoterm are compatible with each other, the Micromodem transmits its prompt lines only to the forty column Apple display. This version of the Micromodem corrects this problem and transmits the prompt lines to the Videoterm. Videoterm, Micromodem. $29.

Videoterm. Increases your Apple display to a full-capacity eighty columns. Proofreading text problems are a thing of the past. Text is displayed in upper and lower case with true descenders. Compatible with most word processors and available with alternate character fonts. $345.

Votrax, Troy, MI

Votrax Personal Speech System. Equipped with both serial and parallel interface, allows virtually any computer to talk. Employs a highly articulate text-to-speech translator, achieving a translation accuracy rate of at least 95 percent for conversational vocabulary. Additionally, the system, with built-in speaker, is capable of providing simultaneously either speech and sound effects or speech and music. Cable. $395.

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West Side Electronics, Chatsworth, CA

Superclock II. Clock/calendar board for the Apple. No hardware or software required, but works with most programs designed to use a clock. Provides one-hundred year calendar including day of week; timing precision down to the millisecond. DOS, Pascal, and CP/M compatible. $159; optional time-clock program: $20.

Rapid-Fire. Turn your antique muskets into rapid-firing machine guns with this simple attachment. Installs between any paddle/joystick and the computer. Works with almost all games and single shot operation is still possible. Saves wear and tear on buttons and fingers. $19.95.

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Prom Programmer. Complete hardware-software system for programming EPROMs. Easy to use with no programming knowledge required. Programs two EPROMs simultaneously; complete instructions included. Includes several fun projects that use programmed EPROMs. $99.95.

Computer Security Lock. Hardware for programmed EPROMs that allows you to lock your computer so only those operators knowing the code (that you program) can use it. Companion product to *Prom Programmer.* $23.95.

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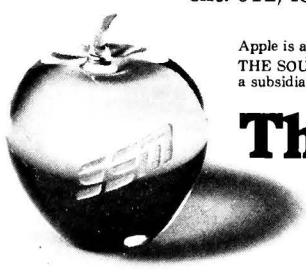
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Smith Micro, Box 604, Sunset Beach, CA 90742; 213-592-1032.
Soft CTRL Systems, Box 599, West Milford, NJ 07480; 201-728-8750.
Softalk Books, Box 60, 11160 McCormick, North Hollywood, CA 91603; 213-980-5074.
Softdisk, 3811 Saint Vincent, Shreveport, LA 71108.
SoftHouse, 3806 Fifteenth Avenue, N.W., Rochester, MN 55901; 507-285-9121.
Soft Images, 200 Route 17, Mahwah, NJ 07430; 201-529-1440.
Softschool, 1367 Irene Road, Lyndhurst, OH 44124; 216-449-8859.
Soft Science, 49 Gould Terrace, Clifton, NJ 07013; 201-779-5050.
Softspoken, Box 7000-863, Redondo Beach, CA 90277; 213-375-8567.
Softronics, 6626 Prince Edward Place, Memphis, TN 38139; 901-755-5006.
Soft Touch, Box 7200, Costa Mesa, CA 92626; 714-645-8800.
Software Dimensions, 6371 Auburn Boulevard, Citrus Heights, CA 95610; 916-722-8000.
The Software Farm, 3901 South Elkhart Street, Aurora, CO 80014; 303-690-7559.
Software Publishing Corporation, 1901 Landings Drive, Mountain View, CA 94043; 415-962-8911.
Software Solutions, 9124 Highway 17, Scotts Valley, CA 95066; 408-438-2433.
Software Technology, Box 428, Belmont, MA 02178; 617-923-4334.
Sorrento Valley Associates, 11722 Sorrento Valley Road, San Diego, CA 92121; 714-452-0101.
Source Telecomputing, 1616 Anderson Road, McLean, VA 22102; 703-734-7500.
Southern California Research Group, 7709 Bradford Drive, Goleta, CA 93117; 805-685-1931.
SouthWest EdPsych Services, Box 1870, Phoenix, AZ 85001; 602-253-6528.
Southwestern Data Systems, Box 582, Santee, CA 92071; 714-562-3221.
Spectrum, 142 Carlow, Box 2084, Sunnyvale, CA 94087; 408-738-4387.
Spinnaker, 215 First Street, Cambridge, MA 02142; 617-868-4700.
S P Software, 6832 Rockview Court, San Jose, CA 95120.
SSM Microcomputer Products, 2190 Paragon Drive, San Jose, CA 95131; 408-946-7400.
S.S.R., 1600 Lyell Avenue, Rochester, NY 14606; 716-254-3200.
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Synergistic, 830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216.
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Systems Design Lab, 2612 Artesia Boulevard, Suite B, Redondo Beach, CA 90278; 213-374-4471.
Taurus Computer Systems, 52 Cherry Street, West Newton, MA 02165; 617-527-3919.
Telephone Software Connection, Box 6548, Torrance, CA 90504; 213-516-9430.
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Thunderware, Box 13322, Oakland, CA 94661; 415-652-1737.
T. J. Electronics, 2300 Baird Road, Box 5427, Arlington, TX 76011; 910-890-5125.
TMQ Software, 82 Fox Hill Drive, Buffalo Grove, IL 60090; 312-520-4440.
Ultrasoft, 24001 S.E. 103rd Street, Issaquah, WA 98027; 206-392-1353.
United Software of America, 750 Third Avenue, New York, NY 10017; 212-682-0347.
Universal Systems for Education, 2120-E Academy Circle, Colorado Springs, CO 80909; 303-574-4575.
Venice Woodworking, 12810 Venice Boulevard, Los Angeles, CA 90066; 213-390-4885.
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Village Software, 31220 La Baya Drive, Suite 110, Westlake Village, CA 91362.
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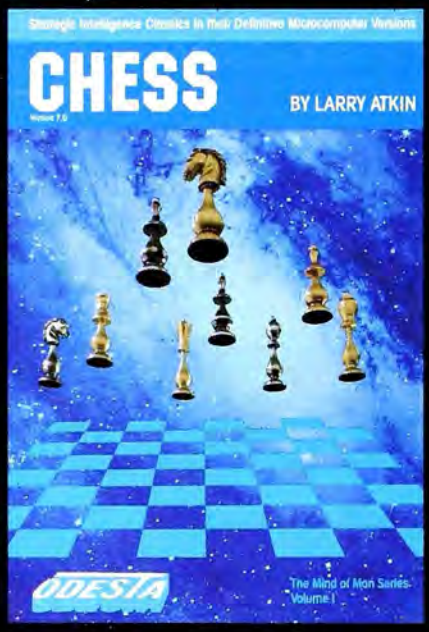
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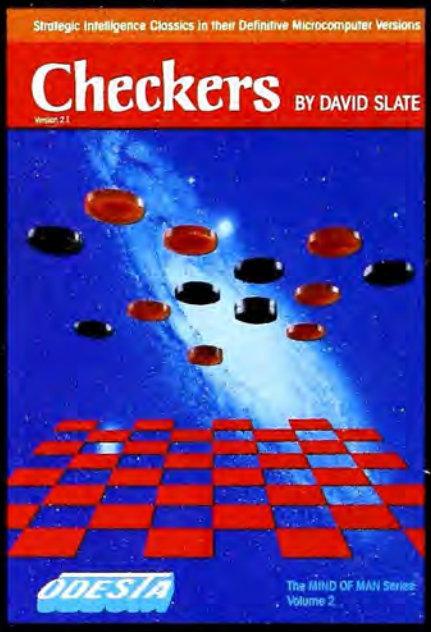
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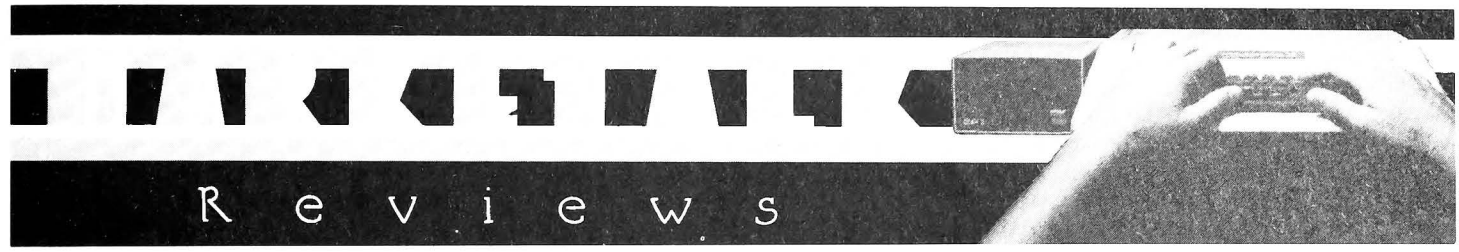
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Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

RAMdisk 320. By Harold M. Lee and Guil Banks. Way back when the Apple II first came out, a lot of people kept their initial cost down by using a cassette recorder to store programs. The wait for any load or save procedure was annoyingly long; you could go out and make a sandwich while it loaded a large program. So those early Apple owners usually decided pretty quickly that the extra money for a disk drive would be well spent.

With a disk, they reveled in their new speed of access, but, as they discovered more uses for their machines and started to take advantage of DOS's more sophisticated capabilities, they found once again that they spent too much time waiting. But what could they do?

Well, the price of RAM went down, and people started putting out add-on memory cards for the Apple. This development led to the pseudo-disk card with 128K or more, and from there to the RAMdisk 320.

Axlon's RAMdisk 320 gives the Apple 320K of extra memory. Because the 6502 can address only 64K, this much additional storage can't be used directly; it requires some sort of operating system. The RAMdisk's quite reasonable solution, one that not only provides the peripheral with a ready-made set of sophisticated uses but also makes it instantly compatible with a huge body of extant software, was to use DOS.

Actually, as DOS is designed to operate a physical read/write device rather than a totally electronic one, Axlon added code to DOS so that it could handle both kinds of I/O. That won't make any difference to most end users because once the RAMdisk DOS System Master has been booted the software is there; you won't have to think about it anymore. The only limitation is that subsequently booting a disk with an unmodified DOS wipes out the modified one. This makes the RAMdisk incompatible with software that must be booted to be run.

The RAMdisk itself is encased in a metal box the same size, shape, and color as a disk drive. The most obvious differences are the lack of a slot for the disk to go in and the addition of extra lights on the front. Two lights are in-use lights for the two pseudo-disks. They flicker on and off so fast for most loads that if you blink you might miss it.

The other lights relate to the power supply. Because RAM is volatile, it has to have power at all times or the data is lost. The RAMdisk has its own power supply, which means it can keep programs in memory while the Apple is off. It also has a three-hour rechargeable battery to guard against brownouts and blackouts. Recharging is no hassle; it takes place whenever the RAMdisk is on and plugged in.

The RAMdisk's strongest asset is, of course, its greatly increased speed. Programs come as soon as you call them. Binary files containing hi-res screens are thirty-four sector monsters that are usually a bear to wait for. With the RAMdisk they appear in less than three seconds. A dealer demo based on Apple's old Magic Lantern slide show demonstrates how, with special fast loading techniques, hi-res pictures can come up at the incredible rate of three per second.

For anyone who spends too much time listening to the old Disk IIs whirring and clicking, this device is an amazing asset. In DOS 3.3, Pascal, and CP/M environments, it allows you to save often without spending a lot of time doing it. For a price slightly more than that of two disk drives, you can have two disks full of frequently used programs at your fingertips—*fast*. DD

RAMdisk 320, by Harold M. Lee and Guil Banks, Axlon (170 North Wolfe Road, Sunnyvale, CA 94086; 408-730-0216). $1,395.

Spitfire Simulator. By Ted Kurtz. Your airplane is a Supermarine Spitfire Mk1, sporting a 1,030 horsepower Rolls-Royce Merlin II engine and boasting maximum level flight speed of 360 miles per hour. Sound familiar? Probably not, if you've only used other flight simulators.

Although it's similar in many respects to *AirSim-1*, *Spitfire Simulator* takes you into a whole new world. Your options include simply flying around over a grid map and learning to land, attempting aerobatic maneuvers, or pursuing any of eight different types of target aircraft gloriously displayed in three dimensions.

Spitfire Simulator includes lots of options to make your flying more enjoyable. You can move your Spitfire around by using the control-T command, which magically places your plane at the coordinates you select. This can be extremely handy for locating the elusive nonfiring target aircraft you will no doubt be chasing. Despite the chase and shoot sequence, *Spitfire Simulator* is not a war game. The target chase option is provided mainly to test your flying ability. You'll be handsomely rewarded if you can destroy a target, return to the aerodrome, and land safely.

Next on the list of nifty options is the ability to alter the sensitivity of the ailerons and elevators with the touch of a key. This is a valuable asset when you need to make drastic changes in altitude or to break quickly out of a turn.

On the subject of turns, the wings can be leveled with a single key press. This makes it much easier to line up with the runway for landings and also to chase target planes. Of course, Mind Systems didn't forget the all-important pause command, which is so essential to the average micro-pilot.

All told, if you don't own a flight simulator but the idea intrigues you, put this on the top of your list. For those who're already flying aces, *Spitfire Simulator*'s super features offer a new challenge. And, if you happen to own *AirSim-1* already, *Spitfire* can read the scenery data on the *AirSim-1* disk. Whether you're a serious flyer or it's all in fun, *Spitfire* covers the bases. DAD

Spitfire Simulator, by Ted Kurtz, Mind Systems Corporation (Box 506, Northampton, MA 01061; 413-586-6463). $40.

Frogger. By Olaf Lubeck. Who are they trying to kid? This may be the *official* version of the popular arcade game *Frogger*, but it has about as much soul as month-old lettuce in the Sahara.

That may sound a tad angry, but in perspective it should be quite understandable. This program has been ballyhooed since mid or early summer, and it marks a strange departure from (then) On-Line's policy of thumbing its corporate nose at Atari and its ilk by putting out tongue-in-cheek copies of popular arcade games. Some pretty wonderful games came out of that stage of On-Line's trek to big business stardom; *Jawbreaker*, *Pegasus II*, and *Cannonball Blitz* come to mind immediately. These games were marked by state-of-the-art graphics and a good deal of irreverence and style.

Frogger sounds the death knell for that touch. The graphics border on being abysmal. Wit has been traded for irony. After forcing another company's clone off the market and belittling that particular version (named after a frog's distinctive vocal signature), On-Line has put out a game that is graphically no better than the subject of its ridicule.

Make no mistake about it, *Frogger* is a good game. It was popular in the arcades and it's destined to be popular in the home. It's quite addictive. You are a frog, trying to get home. Between you and your hangouts are roads swarming with relentless vehicles and a fast-flowing river with turtles, logs, alligators, and sea monsters. You must dodge the traffic and then hop onto the backs of turtles that submerge from time to time, onto the logs that zip by, and ultimately onto the far shore and

home. One misstep and it's bye-bye tadpole. Bonus points are accumulated by eating the occasional insect that pops up in your home or by hopping onto a lady frog who passes by on a log and escorting her home. As one progresses to higher levels in the game, the traffic becomes heavier and faster, and more and more hazards crop up. Even the median strip between the highway and the river, at first a resting place, begins to be patrolled by a snake (nearly invisible in this version) who is loathe to pass up a tasty frog.

The game is elegant in its simplicity. You move up, down, left, or right. You make it across or you get mashed, eaten, drowned, or whatever. It takes perhaps five seconds to learn how to play, yet it's maddeningly habit-forming.

But that is the game *Frogger*, not the *official* version from the folks in Coarsegold. The difference is the graphics. In the Apple version, your frog resembles a chess pawn with vestigial wings. The logs in the river look like they just escaped from the Oscar Mayer factory. When your "frog" hops on a "log," it appears to have stuck its webbed foot into an electric socket; it positively vibrates.

Despite the lackluster graphics, this game is fun to play. But for Apple owners it constitutes a slap in the face. Sierra On-Line's Atari version of the same game is great. The graphics sparkle, the sound is wonderful, and the game is certainly in the forefront of that particular market. Why did they release such a mediocre implementation for the market that put On-Line where it is now?

In what is probably another unintended irony, *Frogger* is doubly entertaining. Aside from playing the game, it allows Apple folks to speculate endlessly on what goes on in Coarsegold. Have we been forsaken? Was On-Line feeling bad about the seemingly interminable delays and just eager to get a product to market, before it was ready? Had they all just been watching a 3-D movie and forgotten to remove their plastic glasses? What happened?

We choose to look at this offering as an aberration. We believe On-Line is a solid company with its consumers' interests at heart. Its people have consistently put out good games and in many ways have set standards in the Apple field. They have exhibited class and humor in many of their endeavors and have been a bastion of quality in a sea of mediocrity. Either *Frogger* is a mistake, or it's a betrayal. We prefer to believe the former. You'll have to make up your own minds. DA

Frogger, by Olaf Lubeck, Sierra On-Line (36575 Mudge Ranch Road, Coarsegold, CA 93614; 209-683-6858). $34.95.

Hello Central! By Bruce Kallick. The most satisfying feature of *Hello Central!* is its user friendliness. Though it doesn't offer much more than other communications programs on the market, it is easier to use.

Hello Central! bypasses any confusing control or escape codes by guiding you through the program via menus. Menu commands are executed either by inputting the number of the desired command or by use of an arrow-controlled cursor.

The most frequently used function, downloading the buffer, offers some features that have been longed for in a terminal program. The first of these is the option for lower-case display. When you first use *Hello Central!* you'll need to configure the program to your hardware. If you have a lower-case adapter, fine; the option to display upper-case letters in inverse provides for easier reading and editing on upper-case-only Apples.

Incoming text can also be displayed in a way that avoids having to split words on your screen. An extra carriage return is inserted (but not stored in the buffer) when a line reaches the end of the screen and it's in the middle of a word.

The download mode also has an error-detection function that lets you know visually if an error has occurred during transmission. If an error such as noise interference occurs, you'll see an exclamation point and a line feed after the character in doubt.

The buffer itself is large enough to capture and hold text files of a reasonable size (seventy-one sectors) and will automatically save to disk while putting the sending source "on hold."

Uploading files to the modem has several options as well, allowing you to send entire files at a time (with an option to wait for a prompt) or one line at a time. This comes in handy when trying to reduce on-line time with bulletin boards and other message-related sources.

Need an answering service? With a Basic command or two, the program will display a message to whoever calls up on modem, and it will let them leave a message for you. As many different messages can be displayed and recorded as you can store on a disk.

Hello Central! includes a utility for receiving Basic or machine language programs in a text file. The text version can be transmitted and then executed to re-create the original program. The reverse process is possible, naturally. All you need in order to create a text file from the original program are the starting and ending line numbers (for Basic) or the beginning and ending addresses (for machine language).

All functions related to receiving and sending data are easy to use even if you've never opened the manual. However, this isn't true when you're trying to use the editor. The editor will let you trim down what's in the buffer and keep what you want, provided you can figure out how to use it. Searching for strings' occurrences, inserting and deleting text, and moving around from place to place in the editor are awkward, and you'd be better off organizing things using a word processor you're familiar with that stores files as Apple text files.

One aspect of *Hello Central!* that deserves mention is the manual. It's short, to the point, and easy to understand. If you're having trouble with anything in the program, finding the right place in the manual for help is a snap.

Hello Central! is a great terminal program for routine sending and receiving of files and is completely modifiable. If you're tired of poring through reams of printed documentation just to perform a few simple activities, consider this one.

Be sure to take price into account when you do. MTV

Hello Central! by Bruce Kallick, Advanced Operating Systems (450 Saint John Road, Suite 792, Michigan City, IN 46360; 219-879-4693). $99.

How To Operate the Apple II Plus. By Howard Manthei and Lee McFadden. Okay, the age of the printed word has passed. You've got your Apple and you just want to set it up and make it go, and you're not going to read the manual—not really. But you can at least listen to it.

Assuming absolutely no knowledge of the Apple (or of anything else vaguely resembling a computer), *How To Operate the Apple II Plus* is a set of three audio cassette tapes containing about five hours of instruction on loading, running, saving, copying, protecting, modifying, calculating, and virtually any other nonprogramming function that can be performed on an Apple.

This is, of course, invaluable as an educational tool and is designed in a manner that makes it ideal for use in schools. There is a quiz at the end of each lesson, and the operator's guide consists of a summary of key ideas for the course. The spoken instruction is painstakingly detailed, telling you what it's going to tell you, telling you, and then telling you that it told you; a preliterate child who used this program could master the computer before having mastered Dick and Jane.

These are FlipTrack training tapes, so named for their niftiest feature: in-depth instruction on several of the subjects covered is available by flipping over the tape, setting the tape counter to zero, and playing the optional tutorial. Stopping, flipping the tape again, and rewinding to zero puts you back in the main lesson. This feature is also used for alternate instruction in the operation of a printer and the use of a color monitor, game paddles, and a second disk drive.

As the responsibility for computer literacy looms larger over the nation's educational establishment, a couple dozen of these programs in a city school system would free teachers from the necessity of taking a night school crash course to learn something about the subject they should be teaching. Teachers could learn right along with their students. There is also the obvious application in computer-wary businesses that are looking for a fast, sure way of familiarizing their employees with the strange new machines on their desk tops.

As the operator's guide points out, this is more conversational than a manual or printed tutorial, and it leaves your eyes and concentration free for the screen and the keyboard. Unlike a disk tutorial, it leaves your computer free to try out what you are learning when you learn it. And unlike a live tutor, it lets you learn what you want, when you want to, and won't rap your knuckles when you get it wrong.

And the ad copy writers are right. This product is exactly what they say it is: a superior way to learn about an Apple. AC

How To Operate the Apple II Plus, by Howard Manthei and Lee McFadden, FlipTrack Training Tapes (526 North Main Street, Box 711, Glen Ellyn, IL 60137; 312-790-1117). $49.95.

Free Fall. By Mark Turmell. Have you ever had one of those dreams where you're floating through the air, slowly, gently, as if you could flout the law of gravity? *Free Fall* is like that.

The game resembles *Frogger* in a way. Your character must fall from the top of the screen down through a variety of objects and escape through one of the four holes at the bottom. When your character escapes through a hole, the hole gets filled in. When all four holes have been filled in, the screen changes. Should a hole be orange when you go through it, you'll earn an extra man.

Your main nemesis in the game is a needle that pierces up from the bottom of the screen. Should it impale your falling body, the dream dissolves, as does your falling bod.

As you fall, you can change your direction by using game paddle or joystick. And if you can get both of your hands over a horizontally traveling girder you can grab hold of it and it will transport you in the direction it is going.

Should you leave the left side of the screen, you lose one of your three men; depart on the right, and you're elevated back up to the top again.

In the first screen, girders transport not only you, but also prizes and bombs. If your dangling feet strike a prize, you win extra points. The bombs won't hurt you unless they explode. To put the boom back in the bombs, there's a freely bouncing ball. When that hits a bomb—take cover.

It takes a bit of dexterity to wiggle your character through the holes in the floor. At times, it's impossible to make it and you lose your character. At other times, you can't miss.

The second screen features Bip-Bops and needles. The Bip-Bops don't explode, but the bouncing ball does when it touches anything other than the girders. The ball, needles, and explosion debris can hurt you in this screen. The girders bounce off the edges of the screen.

Screen three—Gunners—is much like the first screen with the addition of two large guns. The guns move independently up and down the left side of the screen, firing only when their paths cross. If you're hanging from a girder when a gun fires, you're safe from the projectile.

Negotiate passage through all three of the screens and you'll start over again at a more difficult level. There are three levels of difficulty for each screen. DA

Free Fall, by Mark Turmell, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $29.95.

ASCII Express: The Professional. By Mark Robbins and Bill Blue. *ASCII Express Pro* offers features galore for everyone from the beginner to the most experienced modem user. Its only weakness is its documentation.

First the good points: *AE Pro* is compatible with all printer interfaces, eighty-column boards, external terminals, and the forty-column screen.

Speed flexibility is a strong feature. *AE Pro* supports all serial interfaces at all baud rates up to 9,600 baud, provided that your modem interface and your screen display can handle such high speeds. At the slower end, the program supports the deaf TTY standard (Baudot), 45.5 baud when it's interfaced with the Novation Apple Cat modem.

It can perform terminal emulation with eighty-column cards, has an extensive macro capability, and holds a catalog of up to twenty-six computer telephone numbers and the associated data necessary to sign on those hosts.

Add to all this its own text editor, memory manager (for RAM cards), and autosave to disk with numbered extensions. If, for example, you begin saving under *File,* subsequent saves go automatically to disk under the names *File2, File3,* and so on.

AE Pro can send files a block, a line, or a character at a time and has the Christensen error-checking protocol. As a result, you can transfer any size or type of file to another *AE Pro.*

You can also use the remote option to operate the machine while you're at a distant location. Finally, there is a remote answer-back function for electronic mail.

If all you ever plan to use this program for is to check into a local 300-baud community bulletin board, it is probably more than you need. However, if you check into several bulletin boards every day, you could use *AE Pro* to create a range of macros that would dial the number, then sign you onto different portions. You could even have conditional macros: if there's electronic mail waiting, *AE Pro* would get it; otherwise it might check the bulletins.

Perhaps you always check Dow Jones for a particular stock you're interested in. You could set up a disk (the program is copiable) specifically for that. *AE Pro* could then act as a turnkey program, dialing the number and signing you on automatically, then searching for your subject whenever you boot that particular disk.

Once you're on-line, you can jump in and out of *AE Pro.* Let's assume, for example, that there's a long message for you on a BBS. Simply hit control-Q, which propels you into *AE Pro.* From there select R, which turns the copy buffer on, and you're back on-line. Call the message back up, and *AE Pro* will store it in memory in the buffer for you to save to disk or print out later.

You might want to edit the message you received. Use the editor for this purpose. Or use it to compose a message to leave on several BBSs around town.

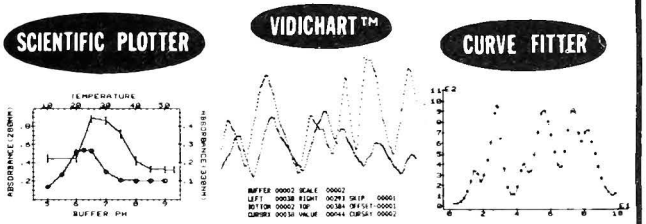
So the good news about *AE Pro* is its many capabilities. The bad news is that the documentation doesn't make it easy for you to take advantage of them. And there's no index, although SDS reports that Bill Blue is working on one.

It gets awfully frustrating when you're trying to find something you know the program is capable of doing but you don't know where to begin to look. Most business users, who would find this program invaluable, would have to spend precious time uncovering the information they need. (Hobbyists who are enamored of working with software probably wouldn't suffer as much.)

There should be a prompt card explaining what the various commands do. A page in the manual showing what the original nonconfigured program looks like would also be helpful—it's easy to hit a key accidentally and unwittingly change some aspect of the configuration.

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AE Pro has two main menus, plus four secondary configuration menus that can be adjusted to your specific machine. And that doesn't count the menu to change the macros or the one for the text editor.

Make a copy of the program immediately and keep the original unsullied. Then if you need to verify that there's a difference between the copy you use and the original, you'll be able to.

Taken all in all, *AE Pro* is a diamond in the rough. It holds tremendous promise but needs a fair amount of polishing.

The publisher, of course, supports all its programs, and a telephone call to them will often serve to clarify an obscure point. DA

ASCII Express: The Professional, by Mark Robbins and Bill Blue, Southwestern Data Systems (Box 582, Santee, CA 92071; 714-562-3221). $129.95.

Fred III. By Robert Pritchett. Here is a clever menu-driven home budget program to fulfill the needs of those of us who want to maintain a budget without having to spend an inordinate amount of time and effort learning to use a program.

Fred is an extremely user-friendly program that allows you to set up to thirty budget categories and twelve savings or investment accounts per data disk. The entire program is stored in RAM, and any entries you make are not updated on the data disk until you actually exit the program. This feature greatly speeds up the entire operation since you don't have to wait for each submenu to load before entering data. Another advantage of this feature is that you can play with what-if type projections and see what your financial status might be without having to save all the data to disk.

Fred allows the user to see what bills are due, the total amount still owed, the current monthly payment due, and the date that the payment is due. You can also see when the last payment was made. *Fred* does not allow you to maintain an audit trail of entries made prior to your last entry. *Fred* is primarily set up to enable you to keep cumulative totals of your income and expenses. If you want to track specific checks and/or expenditures, another program such as Continental's *Home Accountant* would be better suited to your needs.

Fred has several useful features, one of which is the ability to calculate simple interest on savings and other investments. Interest can be computed by number of years, number of months, number of days, or number of quarters.

Another feature is the cash-metering option. *Fred* takes the amount of money you enter, computes the number of days left in the current month (from the system date you enter when you first boot the program), and divides that sum by the number of days remaining in the month to show you how much you can spend each day and still stay within your budget.

The only glaring omission in *Fred* is that no provision is made to allow a hard copy printout of your budget. All in all, *Fred* is a good money management program that could be ideally suited to the needs of small clubs, organizations, or small businesses that need a tool for tracking accounts payable and cash on hand. MM

Fred III, by Robert Pritchett, Creative Mind Workshop (Box 3017, Columbus, OH 43210; 614-252-2593). $30.

Space Cadette. By Dan Illowsky. For those arcade enthusiasts who find *Crossfire* and *Labyrinth* insufficiently challenging, Funtastic offers its first entry into the Apple arcade.

Space Cadette starts with eleven ships and twenty-four torpedoes that replenish rapidly throughout the game; bonus ships are earned for every one hundred points. Modifiable keyboard controls allow saving to disk—a feature that does help take the sting out of the fact that there is no joystick control—good news for all those Apple gameplayers who still don't own one.

Space Cadette is a simulator game designed to test the "identification of strengths and weaknesses of hostile alien ships during an attack, construction and maintenance of force shields during an attack, and quick reactions and endurance under actual battle conditions." This means that, as a cadette in a battle simulator, the player must fly his ship around a blocklike maze pursuing, or being pursued by, enemy ships. Like the old game of boxes, as the cadette ship passes the blocks, it leaves behind force fields in its path. The shields do not slow down enemy ships, as one might expect, but intercept the enemy torpedoes. The enemy ships take great pleasure in blowing the pogees out of player shields and replacing them with their own. Deploying the player's shields while de-

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Unfartunately, due ta U.S. Postal limitatians, the translated versian af the game and manual have been last in transit. S.D.S. therefare asks yaur assistance in determining the actual rules for the game, by translating the alien text af the instructions presented during game play.

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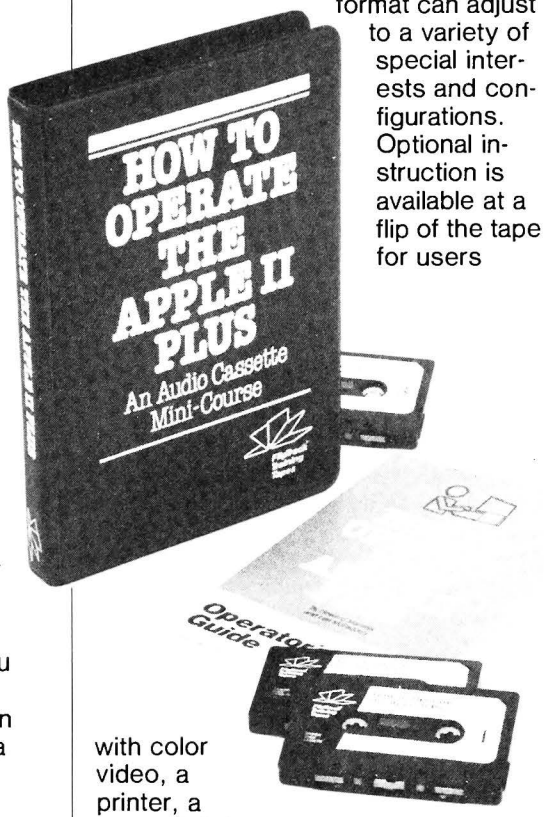
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stroying the enemy's allows for a bit of strategy and lots of fireworks, especially in the higher levels.

As the game progresses, characteristics of the different types of enemy ships will soon force even an experienced arcade player to adopt different strategies for handling them. The reflector ships may only be hit on the sides that do not have the reflectors; otherwise, a cadette will fall victim to his own fire. Kamikazes are fast and will ram a retreating cadette before he can escape. The Berzerker ships . . . well, sooner or later all good cadettes must see what they are made of.

At any time during the game, players have the option of selecting new skill levels; they may earn the next higher level with their scores. It takes at least three hundred points to advance to the next level. Be warned: in the upper levels, the sound of enemy fire most resembles a geiger counter atop a load of plutonium. The blocklike maze never changes, but the graphics are smooth, flickerfree, and fast. Enemy ships, cadette ships, and explosions are top quality, recognizable even in black and white.

Space Cadette also features a somewhat unique and definitely intimate (keyboard) two-player mode, which requires an entirely different strategy. Using a color monitor does lessen the confusion that exists in this "free-for-all" mode. It's a nice way to lose friends and influence aliens.

A less polished version of this game was released through Data-Most, but author Dan Illowsky recalled, revised, and reissued *Space Cadette* as the premier release of his own software company. HAS

Space Cadette, by Dan Illowsky, Funtastic (5–12 Wilde Avenue, Drexel Hill, PA 19026; 215-622-5716). $34.95.

Inventory Manager. By Joe Marinello. If you've ever struggled with a database program trying to get your retail inventory up to snuff, then you'll certainly appreciate Synergistic Software's newest offering. Retailers and distributors take note: this program alone may well justify the purchase of an Apple, and it may make your life just that much easier.

Inventory Manager comes equipped to handle your inventory of up to 2,700 items (1,200 for single disk drive owners). It keeps records of your current level of inventory and the sale price, wholesale price, vendor, stock on order, reorder point, and markup for each inventory item. The program can print a list of suggested orders for all items whose quantity in stock has fallen below the reorder point. It will also print a list of all your inventory items and their prices, quantity in stock and on order, your markup percentage, and the vendors who supply the products to you.

Inventory Manager remembers and will print a list of all items currently on order. You can even tabulate and print a list of the total amount of orders over any time period you choose (monthly, quarterly, annually, or whatever). It can store and print a list of all vendors who supply your stock, up to a maximum of ninety-nine, including names and addresses.

Other options include printing a list of your inventory and orders sorted by vendor; printing purchase orders, sorted by vendor, each with a unique purchase order number; and printing a data worksheet to aid in record keeping and assist you in entering new information.

The program will also print a list of sold stock, sorted by the gross profit realized on your sales for each item of inventory, making it a valuable management tool. And a list detailing the percent of gross profit provided by each of thirteen inventory categories defined by you can also be printed.

Included within *Inventory Manager* is a utility program called *IM-Retail*. This is basically a scaled-down version of the *Inventory Manager* program. Your employees can use it to enter data for your program's use. Users are allowed to access only three of the main routines: Update Inventory and Sold List, List Vendor Codes, and Category Search. Sensitive pricing information is inaccessible from this program, so you're protected from unwanted disclosure.

Inventory Manager is among the most complete programs of its type on the market today. Marinello seems to have left no stone unturned. If you do business with vendors or in retail marketing, you cannot afford to miss out on this one. DAD

Inventory Manager, by Joe Marinello, Synergistic Software (830 North Riverside Drive, Suite 201, Renton, WA 98055; 206-226-3216). $149.95.

Anova II. By Stephen Madigan, Ph.D., and Virginia Lawrence, Ph.D. *Anova II* is a general variance analysis program for the Apple II. If you don't know what analysis of variance (ANOVA) is, you probably won't purchase this program. It is most useful to students, both undergraduate and graduate, enrolled in statistics or research courses that involve the comparison of differences between groups on a number of independent dimensions.

The program allows for the creation of data files or direct keyboard input of data. Three major classes of analysis of variance are possible: factorial designs, split-plot (between-within) types, and randomized block (repeated measures) designs. While not as general a program as SAS's *PROC GLM* or SPSS's *Manova, Anova II* nonetheless covers a wide range of designs. It would be nice to see a future version that would allow nested factors and specification of random effects variables, but for the moment *Anova II* is the most powerful analysis of variance package available on a personal computer.

The program uses an unweighted means algorithm for missing data. This is an extremely important feature since data without missing values is nearly impossible to come by these days. *Anova II* also allows the inclusion of covariants, provides descriptive statistics, and includes an excellent graphical display package.

Testing the program with a number of example problems proved it to be computationally correct. Being menu driven, it is relatively easy to use for a program of this level of sophistication. The time between entry of data for an unbalanced split-plot factorial design and the output of a solution is less than with a time-shared IBM 3033.

The manual is adequate for those users well versed in analysis of variance. Others are going to have to work hard to understand how to use the program. Repeat, the ease of use of this program will be directly proportional to the user's knowledge of variance analysis.

The use of *Anova II* by working researchers is not recommended because of the structure of the data files. It is common for research data files to contain the data for all subjects (cases) on all variables; thus a file for a research project that has two hundred subjects and fifty variables

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would contain ten thousand separate values. *Anova II* would break up the data file into at least fifty files, depending on the method of data storage selected. Further, each file might contain a different number of values, due to missing cases, and could require a different set of parameters to be input into the program. This is unacceptable to the working researcher.

However, *Anova II* is an excellent tool for the investigation of analysis of variance by students in the social, biological, and health sciences. *Anova II* would allow the student to work on problems at home that could take hours to compute using an electronic calculator. PE

Anova II, by Stephen Madigan, Ph.D., and Virginia Lawrence, Ph.D., Human Systems Dynamics (9249 Reseda Boulevard, Suite 107, Northridge, CA 91324; 213-993-8536). $150 ($75 for owners of *Anova I*).

InvisiCalc. By Isaac C. Nahtink. Could you use an electronic spreadsheet program with unlimited parameters? One that anticipates your needs and acts to meet them? One that is actually faster and easier to use than *VisiCalc*? Well, wait no longer, because the folks at Slipshod Software (Bad Nation, SD) have done it again with *InvisiCalc*.

Don't be surprised when you boot *InvisiCalc* and are greeted with a blank screen. This versatile accounting package was written in Slander (Spreadsheet Language Algorithm for Non-Displayable Electronic Readout), which automatically bombs the Monitor and resets lomem to take over all areas of graphics and text storage, freeing up a full seventy-two pages (18K) of memory. And that's not all.

Pioneering new frontiers in system transportability, Slipshod's Uriah Stukk developed the Kick-Ass Operating System for *InvisiCalc* when he discovered he couldn't get DOS to download to the cpu in his microwave oven. The display routines in KAOS were designed for the Amanda SonaRange's three-digit LED readout. Stukk couldn't figure out how to transport them back up to the more complicated Apple, so he threw them out. This led somewhat circuitously to the development of Slander. These guys don't believe in doing things halfway.

By the elimination of all output routines, additional memory is made available on zero page and in the upper reaches of ROM, which is somehow overwritten by KAOS.

Slipshod president George Spelvin asked Nahtink to write *InvisiCalc* for two reasons: to display (well, not literally) what he felt was the enormous potential of KAOS and Slander and to interface with *Cropduster* (reviewed in the February 1982 *Softalk*) in place of *VisiCalc*, which was drawing a certain amount of unwanted legal attention from VisiCorp. Spelvin had just emerged from hiding after successfully avoiding a previous suit for the six month period of Bad Nation's statute of limitations (recently enacted by Bad Nation's new mayor, Peter Spelvin, no relation). Having discovered that vigorously denying one's existence is bad for business, Spelvin didn't want to start the whole process over again.

Nahtink is a died-in-the-wool proponent of the "That's not a bug, it's a feature; did we charge you for the deluxe version?" school of computer programming, and it shows in the quality of his work. *InvisiCalc* has (or claims to have, but who's to know?) features that Frankston and Bricklin never even conceived of.

First of all, the spreadsheet is n-dimensional, which implies a set of parameters for each answer cell that you'll be glad aren't displayed. Second, the Y axis can be toggled between the left and right sides of the spreadsheet, making *InvisiCalc* more comfortable to left-handers and readers of Hebrew. This feature is only available in two-dimensional mode. Attempting to invoke it otherwise will result in all the data in memory undergoing an *exclusive-or* operation with the EBCDIC values of the letters of Nahtink's name. This seems to be part of Slipshod's unique software protection scheme.

Perhaps the most impressive feature of the program is the unlimited memory, which Spelvin admits is jury-rigged. As the user moves the cursor into previously unused areas, KAOS initializes new sections of memory. When it runs out of RAM, it moves previous sections of the spreadsheet to the disk. When it runs out of disk space, it overwrites

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earlier material under the assumption that if the user really needed it he wouldn't have moved the cursor so far away. Caution is advised.

Overall, this is a revolutionary accounting tool. Whether the advantages outweigh the disadvantages is a matter for the user to decide. For instance, it is great for keeping a second set of books for tax evasion purposes, even though it seems to subtract a random amount from negative nonintegers. The South Dakota Bell System, of which Spelvin is still chairman of the board, reports the satisfactory use of *InvisiCalc* by its customer service department to explain billing discrepancies.

Slipshod reportedly has great plans for the future implementation of Slander and KAOS. Keep an eye out for Slipshod's new hi-res utility, rumored to be called *The Blind Man's Graphics Tablet.* BF

InvisiCalc, by I. C. Nahtink, Slipshod Software (General Delivery, Bad Nation, SD). Price withheld by request.

Computer Acquire. By Steve Goss. *Acquire*, one of Avalon Hill's top selling bookshelf games, is a natural choice to bring to the microcomputer. It is a nongraphic game of hotel empire building, with some of the elements of bingo. Up to six people can play on any one of five levels of difficulty, or you can play solo against the computer. You can bone up by having the computer play against itself and studying the various strategies as they unfold.

Each player is given six thousand dollars and six randomly selected hotel tiles. In turn, players place tiles on the alphanumeric grid board. If you join two or more tiles together, you form a hotel chain, for which you must choose one of seven names; the names incorporate the class of your hotels. As founder of a chain, you receive a bonus share of its stock. Each turn, all players may buy stock in their own or other chains.

More tiles placed adjacent to a chain increase the chain and the value of its stock rises sharply. If you can place a tile so that it joins two or more chains, then the smaller chains are merged into the bigger chain and stock is exchanged, two shares of the old for one of the new. Only when a chain has at least eleven hotels in it is it deemed a "safe chain," which cannot be taken over. The game ends either when all the chains on the board are safe or when one chain has more than forty hotels in it. The winner is the player who has amassed the greatest fortune.

Acquire is a fast-paced game for families or friends. RRA

Acquire, by Steve Goss, Microcomputer Games/Avalon Hill (4517 Harford Road, Baltimore, MD 21214; 301-254-5300). $25.

Sorcerer of Siva. By Gene Rice. Epyx has added a pure magic user's game to their fantasy role-playing line-up. In *Sorcerer of Siva*, you are a wizard with a whole range of different level magic spells. Fantastic graphics show fireballs and lightning bolts as they are hurled from your fingertips at salivating monsters. This scenario transports you into the Mines of Siva—a five-level dungeon. Your goal is to slay the evil Sorcerer, snatch up as much treasure as possible, and escape from the mines before sunset. Nineteen different types of monsters try to prevent you from leaving alive, and some of the treasures are cursed.

The time factor in this game becomes the overriding consideration in playing; rarely will an adventurer be able to exit the mines successfully within the allotted time frame. *Sorcerer of Siva* has eight degrees of difficulty and monster speeds of one through ten. At the highest settings for both, the game shifts into intense arcade action, where reflexes are everything.

Your wizard has seven major spells and two minor spells available at the beginning of the game. The evil Sorcerer will not attack you directly, but he will appear randomly (usually when you are busy fighting one of his minions) and zap you with a forget spell. A forget spell means you can no longer use that major spell unless you can find one of the magic touchstones, which are very rare. Another interesting feature, besides the normal problem of fatigue, is the introduction of energy levels. Not only do you have to have the knowledge to cast a major spell, but you must also have sufficient mystical energy. The current level of your aura is indicated by colors—from blue down to black.

With more than three hundred rooms on five levels, this game will be a challenge for any adventure-loving player, and a real delight for magic users. RRA

Sorcerer of Siva, by Gene Rice, Epyx/Automated Simulations (1043 Kiel Court, Sunnyvale, CA 94086; 800-824-7888). $29.95. ■

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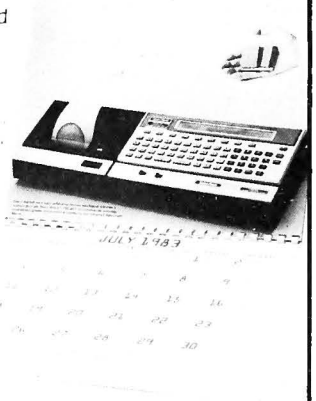
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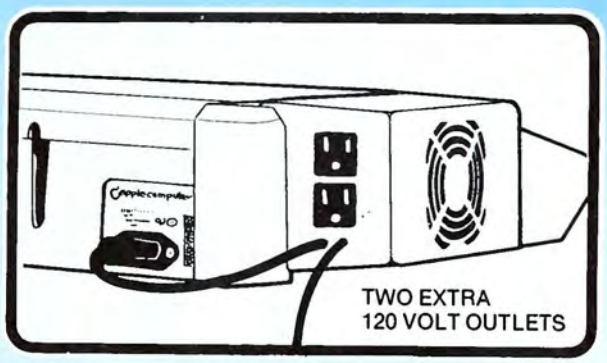


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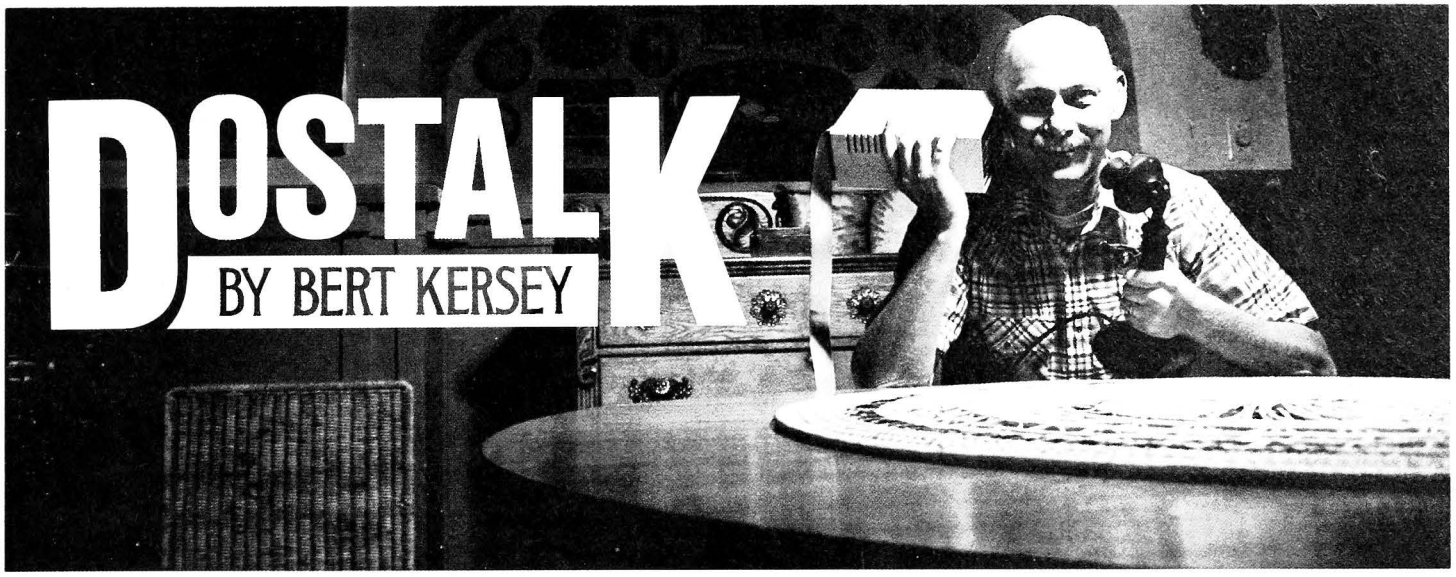
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Undoubtedly the most requested DOStalk article or series of articles would be on the topic of copy protecting software for marketing and unprotecting purchased Apple disks for back-up purposes or whatever. Well, sorry, gang, nothing doing. The main reason is that you could fit everything I know about copy protection on a write-protect tab. The next reason is that anything learned about disk protection today is subject to becoming obsolete next Tuesday. This is truly a fascinating subject for some; others just can't get into it.

A Catalog Columnizer. Let's continue our series of catalog utilities with a little program that fits an entire catalog on the text screen at one time. This program by itself isn't a real earth shaker, but with just a little additional work, it could become a nifty greeting program for one-key program selection.

Apple's DOS fortunately lets catalog names be a generous thirty characters long. You might not fully appreciate this until you see CP/M work for the first time with its measly eight-plus-three–character file name limit and crowded catalog. Unfortunately, Apple's forty column screen prevents more than one file name per line, so a catalog often occupies several screens full of file names.

To fit more file names on the screen, we need to come up with a multiple column catalog that abbreviates file names that are too long. The more columns we need, the shorter the file names. It will also be helpful, spacewise, to eliminate the three-digit file-size code and all spaces to the left of each file name. Total space used on the disk is more important than individual file sizes, so we'll include that feature instead.

Here is the program; the explanations come later. No writing is done to the disk, so you can have (almost) no fear of ruining a disk. Still, it is best to run the program with an expandable disk the first couple of times.

Catalog Columnizer

```
110  POKE 768,32: POKE 769,227: POKE 770,3: POKE 771,76:
     POKE 772,217: POKE 773,3
120  TRK = 17:RW = 1: POKE 47083,0: POKE 47084,TRK: POKE
     47091,0: POKE 47092,RW
130  LOC = 8192: POKE 47088,LOC - INT (LOC / 256) * 256: POKE
     47089, INT (LOC / 256)
140  TEXT : HOME : PRINT "STAND BY..."
150  FOR SE = 15 TO 1 STEP - 1: POKE 47085,SE: CALL 768: FOR
     X = LOC + 11 TO LOC + 221 STEP 35:P = PEEK (X): IF P > 0
     AND P < 255 THEN NF = NF + 1:USED = USED + PEEK (X +
     33) + PEEK (X + 34) * 256
160  VTAB 2: PRINT "SECTOR:";SE: PRINT " USED:";USED: PRINT
     " FILES:";NF: IF P THEN NEXT : NEXT
170  DIM T$(64):T$(0) = "T":T$(1) = "I":T$(2) = "A":T$(4) =
     "B":T$(8) = "S":T$(16) = "R":T$(32) = "A":T$(64) = "B": REM
     FILE CODES
180  L = 30: IF NF > 21 AND NF < 43 THEN L = 17: REM L=FILE
     NAME LENGTH
190  IF NF > 42 AND NF < 64 THEN L = 10
200  IF NF > 63 AND NF < 85 THEN L = 7
210  IF NF > 84 THEN L = 5
220  COL = L + 3: IF L = 30 THEN COL = 40: REM COL=COLUMN
     WIDTH
230  HOME : INVERSE : PRINT SPC( 40): FOR V = 2 TO 22: FOR H =
     1 TO 40 STEP COL: VTAB V: HTAB H: PRINT SPC( 1): HTAB 40:
     PRINT SPC( 1): NEXT : NEXT
240  VTAB 23: PRINT SPC( 40);: VTAB 1: HTAB 3: PRINT
     "CATALOG: ";NF;" FILES, ";496 - USED;" FREE SECTORS"
250  FOR SEC = 15 TO 1 STEP - 1: POKE 47085,SE: CALL 768:
     FOR X = LOC + 11 TO LOC + 221 STEP 35: IF PEEK (X) = 0
     THEN 300
260  IF PEEK (X) = 255 THEN 290
270  N = N + 1: VTAB 1 + N - INT ((N - 1) / 21) * 21: HTAB 1 + COL
     * INT ((N - 1) / 21):P = PEEK (X + 2): P = P - 128 * (P > 127)
280  INVERSE : PRINT T$(P);: NORMAL : PRINT CHR$ (32 + 11 *
     ( PEEK (X + 2) > 127));: FOR Y = X + 3 TO X + L + 2: PRINT
     CHR$ ( PEEK (Y));: NEXT Y
290  NEXT X,SE
300  VTAB 23: END
```

Line 110 pokes our now famous jump to DOS's Read-Write-Track-Sector routine into location 768 (hex 300). See October's DOStalk for more details.

Line 120 selects the catalog track (TRK) 17 and tells DOS to read from (RW=1), not write to (RW=2), the disk. These values are poked into appropriate locations in DOS's I/O Control Block, along with a couple of zeros to accept any disk volume and read an entire sector.

Line 130 arbitrarily selects location 8192 (hex 2000) as our disk data temporary storage area, dissects that number (LOC) into two bytes, and pokes it into locations 47088 and 47089.

Line 150 counts the number of active files on the disk by first reading the entire catalog, from sector (SE) 15 down as far as necessary. If the first byte (P) of each file record is not 255 (deleted) and not zero (unused), then the number of files (NF) is increased by one. While we're there, we might as well count the number of sectors used (variable USED) by adding the value of byte 34 to byte 35 times 256.

Line 160 tells our sector-reading routine to continue as long as we haven't encountered a value of zero for the first byte of any file.

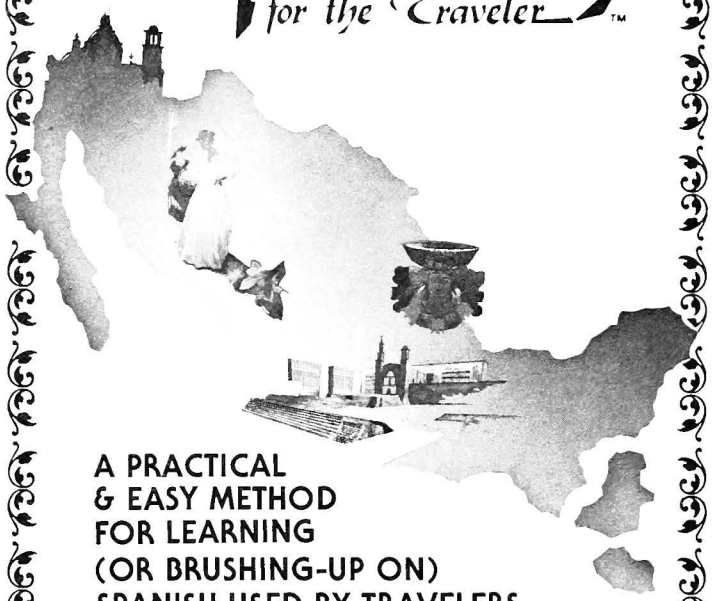
Line 170 uses string array T$(64) to convert DOS's numerical file-type codes (byte 3 of each file) into alphabetical characters for screen display. We're all familiar with "BAIT" by now (Binary, Applesoft, Integer, Text). The "BARS" file codes are rarely, if ever, seen. The alternate "B" and "A" file-type codes may never have even been used.

Lines 180 through 210 determine the allowable length, L, of our file names according to the number of active files, NF, in the catalog.

Line 220 sets variable COL to determine where to place vertical dividers between catalog columns.

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Lines 230 and 240 draw inverse borders and a title.

Line 250 again reads the catalog, putting each sector's data temporarily into locations LOC through LOC+255. If byte one of any file (or peek(X)) is zero, that's the end of the catalog.

Line 260 looks for deleted files (with peek(X)=255) and skips them. Remove this line and the "and P<255" in line 150, and you will display deleted file names.

Line 270 first determines where on the text screen each file name will be printed, according to its number. Then it looks at the third byte of each file, the file type byte, and subtracts 128 if the file is locked to get the correct file type value.

Line 280 prints the file type in inverse type and a lock/unlock code in normal. Using "+" for locked instead of the usual asterisk causes less screen clutter. This command requires at least a Basic explanation:

```
PRINT CHR$(32+11*(PEEK(X+2)>127))
```

This just means, "Print the character whose ASCII value is 32 (space) or, if peek(X+2) > 127 (file-locked), print the character whose ASCII value is 32+11, or 43 (plus sign). Change the 11 to a 10 if you want the normal asterisk to indicate a locked file.

Now we can finally print each file name by peeking at its fourth byte and the bytes that follow, until our maximum length, L, is reached.

Line 300 puts the cursor to the bottom left of the screen. This is where that nice file menu program you are about to write takes over.

File Locker. And now (at no extra charge) a utility that will lock or unlock all of the files in a catalog, fast. The System Master disk's FID program already does the same thing, but it's written in machine language, so you can't easily see what makes it work, and besides, this Applesoft routine is faster and more fun to watch.

Watch out—this program *writes* to the disk, so test it on a friend's disk before you risk your own. . . .

File Locker

```
110  POKE 768,32: POKE 769,227: POKE 770,3: POKE 771,76:
     POKE 772,217: POKE 773,3
120  TRK = 17: RW = 1: POKE 47083,0: POKE 47084,TRK: POKE
     47091,0: POKE 47092,RW
130  LOC = 8192: POKE 47088,LOC - INT (LOC / 256) * 256: POKE
     47089, INT (LOC / 256)
140  TEXT : HOME : PRINT "LOCK OR UNLOCK? (U/L):";: GET L$:
     PRINT L$
150  FOR SEC = 15 TO 1 STEP - 1: POKE 47085,SEC: POKE
     47092,1: CALL 768: REM READ SECTOR SEC
160  FOR X = LOC + 11 TO LOC + 221 STEP 35:P0 = PEEK (X):P2
     = PEEK (X + 2)
170  VTAB 10: HTAB 1
180  IF P0 = 0 THEN POKE 47092,2: CALL 768: GOTO 240
190  IF L$ = "L" THEN POKE X + 2,P2 + 128 * (P2 < 128): PRINT
     " LOCK: ";
200  IF L$ = "U" THEN POKE X + 2,P2 - 128 * (P2 > 127): PRINT
     "UNLOCK: ";
210  FOR J = X + 3 TO X + 23: PRINT CHR$ ( PEEK (J));: NEXT :
     PRINT
220  NEXT X: POKE 47092,2: CALL 768: REM WRITE SECTOR SEC
230  NEXT SEC
240  HOME : PRINT CHR$ (4); "CATALOG"
```

The key to this program is in lines 190 and 200, which add 128 to (lock) or subtract 128 from (unlock) the third byte of each file. Line 210 is optional; it prints each file's name on the screen as it is encountered.

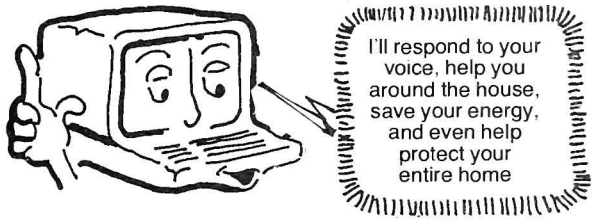
Line 220 writes to the disk. You might want to install a rem in front of the *call 768* until you are pretty sure things are working correctly.

And Finally . . . Tom Weishaar from Kansas City, and his daughter Molly, want to know what question *call 46800* answers. ◨

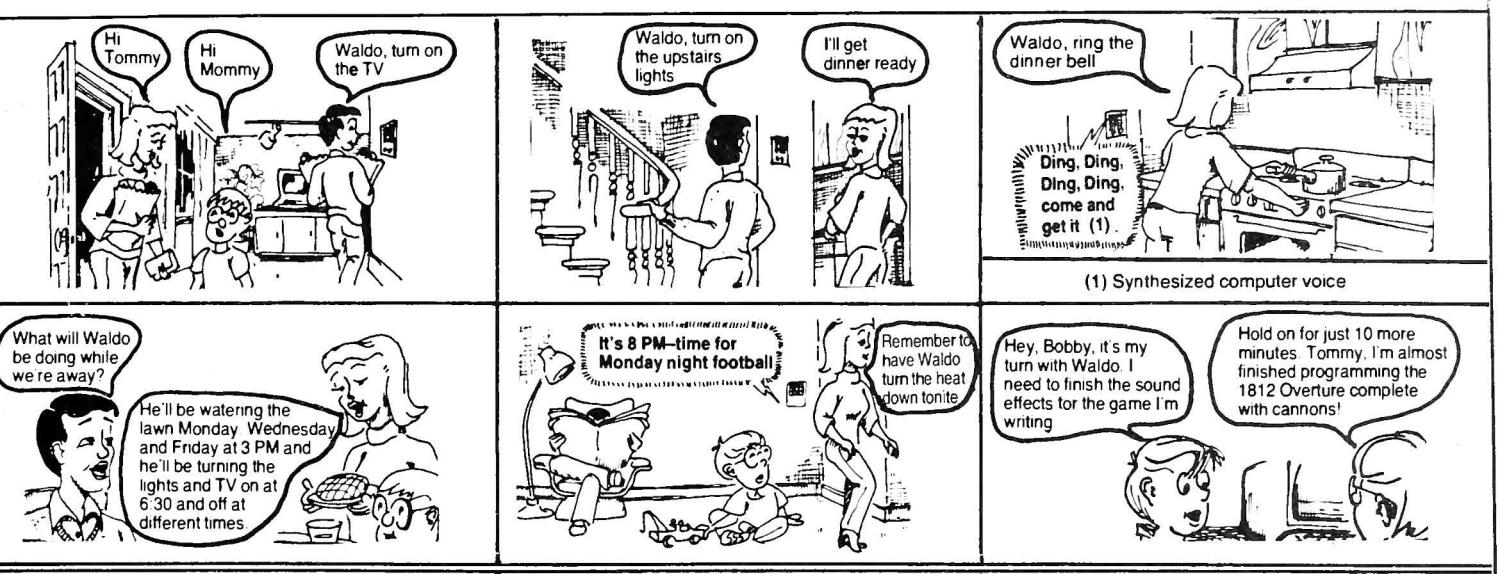
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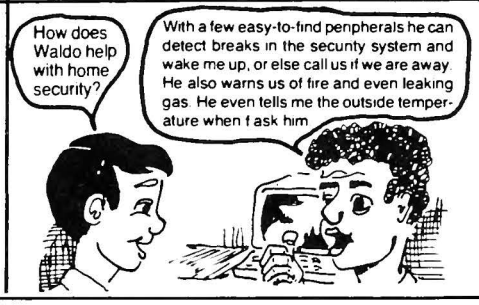


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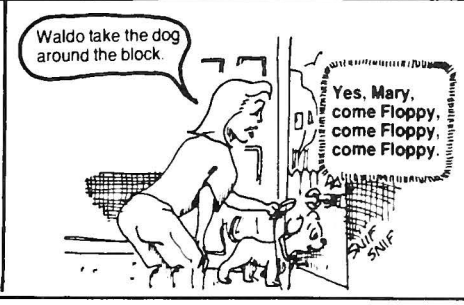
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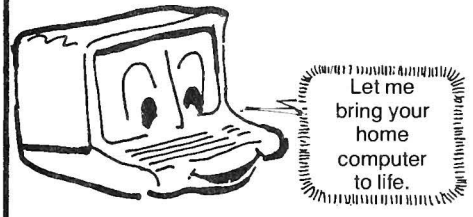
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The Schoolhouse Apple

by Jean Varven

"In each of us, there rests tremendous power waiting to be liberated. . . . The primary wealth of the future will come from the human mind."

These remarks were made by California Governor Edmund G. Brown, Jr., in his keynote address at EdCom, the computers in education conference held at the Los Angeles Convention Center in late October.

In January of this year, Governor Brown signed into law California's Investment in People program. The $25.7 million program emphasizes the importance of recognizing and developing human potential and putting it to wise use as we make the transition into the Information Age. The program is founded on the assumption that 50 percent of future new jobs will depend, directly or indirectly, on new technologies, and people of all ages and backgrounds would do best to be prepared.

Investment in People addresses five general areas: improving the quality of math and computer education in elementary and high schools, establishing training programs at the community colleges, attracting and maintaining qualified engineering and science faculty at the university level, implementing employment development aimed at training or retraining California workers, and linking with private industry to ensure that training programs prepare people for actual jobs.

At the elementary and high school levels in particular, teacher training is a real concern. The plan is that fifteen teacher education and computer centers will be established around the state to provide teachers with training and resources. One of these fifteen centers will become a software clearinghouse and evaluation center for the entire state. Existing computer centers in Santa Clara, San Mateo, and Alameda counties have been used as models for the centers that are being created now.

Teachers will be able to take advantage of in-depth institutes during the summer and in-service training sessions during the school year. There will be sessions designed to give science, math, and computer teachers a "crash course" to help them be better prepared to instruct their students. And there will be other courses aimed at helping teachers of all subject areas become more comfortable around and knowledgeable about computers. Money has also been set aside to make it financially feasible for junior high schools and high schools to send teachers to such events.

Funds are also available to educational and private institutions for the creation of innovative model programs to train teachers and motivate students. Requests for funding will be considered by the newly formed Advisory Council on Technology Education, established by the State Department of Education.

It's obvious California will be one of the states to watch and learn from during the coming year. Various educators and groups, including San Jose based Computer Using Educators and the Santa Clara County Office of Education, are actively involved in making sure that Investment in People pays off.

College Board Update. A great many people are eager to learn more about the College Board sponsored Advanced Placement Computer Science course. So many teachers, parents, and students have contacted the College Board in recent months that the organization has published a preliminary edition of the booklet that describes the course.

Available from the Educational Testing Service (Princeton, NJ 08541; 609-921-9000; $2), the booklet explains how the College Board's advanced placement system operates. It also provides addresses and phone numbers of the organization's regional offices, whose staff can be contacted for further information and guidance.

The booklet includes a description of the course goals and a topic outline, along with sample multiple choice questions (with answer key) and free response questions (with suggested responses). It responds to such issues as who can offer the AP course, what the student prerequisites are, and what equipment and facilities are needed and why. The issue of why Pascal was chosen over Basic as the language students must know is also addressed.

Not everyone knows exactly what's covered in a college-level course in computer science, so not everyone will be familiar with the terms used in the course outline. In recognition of this, the College Board has included helpful explanatory information about programming methodology, the features of programming languages, data types and structures, algorithms, the applications of computing, computer systems, and the social implications of computer use. A bibliography is also provided.

Still More Company Capsules. Let's look now at two more companies that produce educational software for the Apple.

Encyclopaedia Britannica Educational Corporation, 425 North Michigan Avenue, Department 10A, Chicago, IL 60611; (800) 554-9862; in Georgia, call collect (404) 257-1690.

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Many of Britannica's programs are scheduled for release sometime in the coming year, and a few, including *Problem Solving in Algebra*, *Biology—Energy and Life*, and *Biology—The Cell* are due this month.

Produced for the company by John Haugo of EduSystems, *Problem Solving in Algebra* is intended for use by junior high and high school students. The package consists of five disks, supplemented by a teacher's manual that explains the instructional appoach taken. Topics covered include functions, variables, number sentences, equality, translating verbal and math sentences, solving equations with one, two, or three unknowns, and systems of equations.

Biology—Energy and Life is designed to be used by high school biology students who are studying the interrelationship between energy and organisms. Energy sources, energy pyramids, chemical pathways, and aerobic and anaerobic respiration are covered, and the material is presented by means of hi-res graphics simulations, interactive tutorials, and drill and practice reinforcement exercises.

William Claiborne and the Sorus Group produced this two-disk program for Britannica. It comes with a teacher's manual and its special features include branching, three levels of difficulty, and a glossary of terms and concepts. In addition, the cause/effect relationship between energy and organisms is explained by means of moving graphics.

Also produced by William Claiborne and the Sorus Group, *Biology—The Cell* is a two-disk program that covers cell theory. Major topics discussed include cell biology, cell organization, the structure and function of organelles, the macromolecules of the cell, and viruses. Like *Energy and Life*, this program features multiple skill levels, glossary, graphics simulation, and a teacher's manual.

McGraw-Hill Book Company, Webster/EDL/McGraw-Hill, 1221 Avenue of the Americas, New York, NY 10020; (800) 223-4180.

This particular division of McGraw-Hill produces educational software intended primarily for use in schools. Programs include *Introduction to Microcomputers*, the *Math Drill and Practice Series*, and the *Search Series*.

Using the Apple version of *Introduction to Microcomputers*, teachers of third through sixth graders can introduce their students to simple computer terminology, the parts of the computer, and basic keyboarding skills. Developed by John Haugo of EduSystems, the program employs a game format to help students learn about the computer.

The *Math Drill and Practice Series*, also by John Haugo, consists of *Math Skill Games*, twelve drill and practice programs at three skill levels in addition, subtraction, multiplication, and division; *Math Word Games*, a six-program package that helps students develop skill in solving math word problems; and *Math Regrouping Games*, a ten-program drill and practice package that promotes the development of regrouping/renaming skills in addition and subtraction.

The *Search Series* was created by Thomas F. F. Snyder of Computer Learning Connection. These five simulations challenge students at the older elementary school and high school levels to develop problem-solving and communications skills. Usable in classroom situations where there is only one computer, the programs also require students to read supplementary materials and to develop good note-taking abilities.

Topics covered in the *Search Series* include geography, geology, community, energy, and archaeology. Each program in the series comes with student workbooks, which can be reordered, and a teacher's manual that contains helpful suggestions about how to structure the searches and numerous suggestions for supplementing the lessons.

Read All About It. If you aren't a regular subscriber to the *Apple Education News*, you may want to consider becoming one.

Published quarterly, *Apple Education News* contains short, informative articles about people using Apples in schools and other educational settings. Included in the current issue (volume 3, number 3) is information about Apple Horizons, a new "get acquainted seminar" for educators and trainers who want to learn more about the Apple. The seminar's four one-hour modules cover how to operate the Apple, educational applications, software selection guidelines, and what factors to consider when you're thinking of purchasing a microcomputer.

For more information about the seminar, contact your local Apple dealer. And to become an *Apple Education News* subscriber, write to Apple Computer Inc., 20525 Mariani Avenue, Cupertino, CA 95014. Subscriptions are free for the asking.

Speaking of publications, the second volume of the *Apple Journal of Courseware Review*, published by the Apple Education Foundation, is as good as the first. Stop by your Apple dealer or a major bookstore and take a look at it.

Centering In. They go by names like microcomputer learning center, computer resource center, and computer education institute. And they're cropping up all over the place—in libraries and community centers, on school and college campuses, as nonprofit corporations, and as private enterprises. But wherever they're located and whatever they're called, places where people can learn about and use computers are becoming more and more a part of the national landscape.

What's the setup of a typical computer learning center? Is there such a thing as a typical center? What resources can you expect to find there? And what do you learn when you visit such a place? How do classes intended for adults and classes designed for kids differ? Is anyone offering courses where adults and kids learn together?

Who are some of the people who teach at or have established a computer center or education institute? What prompted them to get involved in this aspect of education?

These are some of the questions we'll consider in a future installment of this column when we take a look at computer learning environments of various sizes and purposes in different parts of the country.

Meantime, if you're affiliated with such a center, why not write in and tell us something about it? Your input will help us get a balanced picture of the kinds of computer education that are being offered at present. And if you haven't ever visited or attended classes at a computer learning center, why not write in anyway to describe some of the things you'd like to see in such a place. Write to: Softalk School, Box 60, 11160 McCormick Street, North Hollywood, CA 91603.

Plato on the Apple. Control Data Corporation has announced the release of the first nine pieces of Plato software for the Apple. Included are elementary/junior high school math programs on number facts, whole numbers, decimals, and fractions, as well as foreign language vo-

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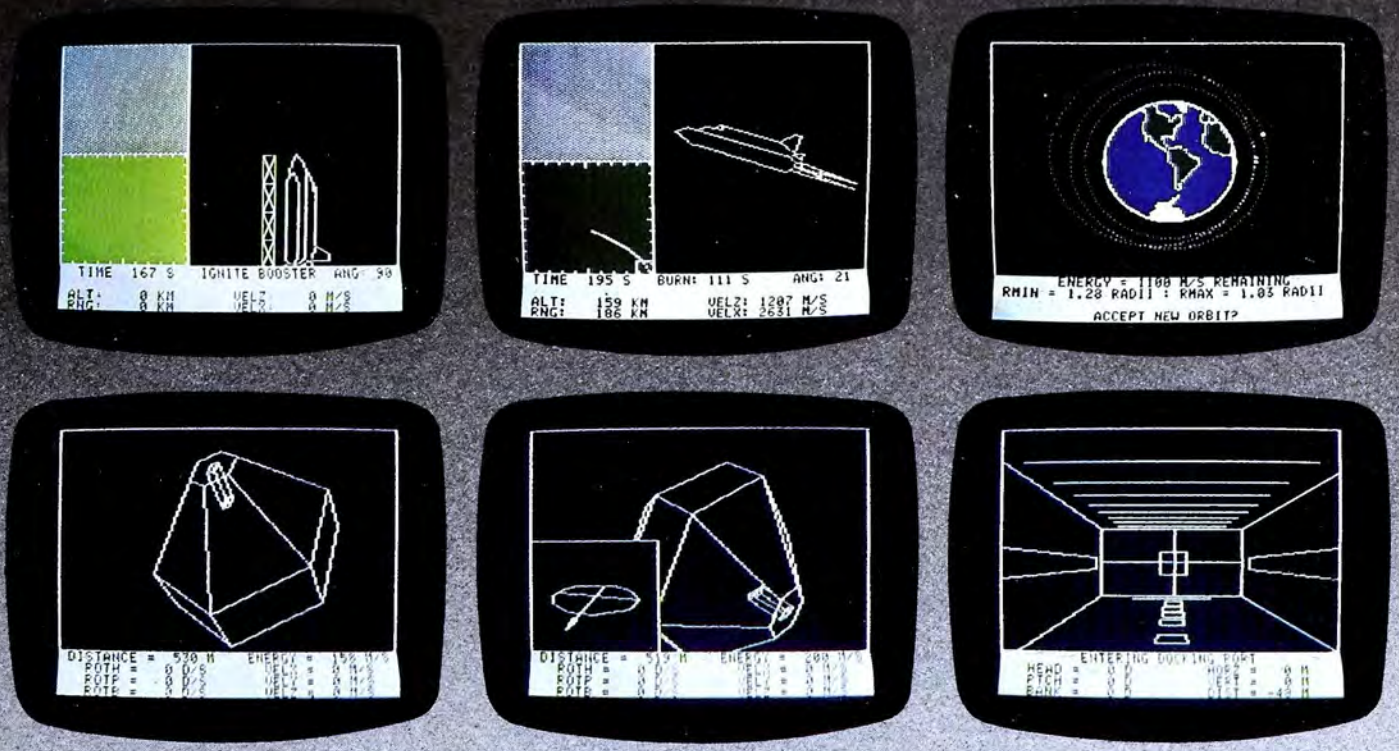
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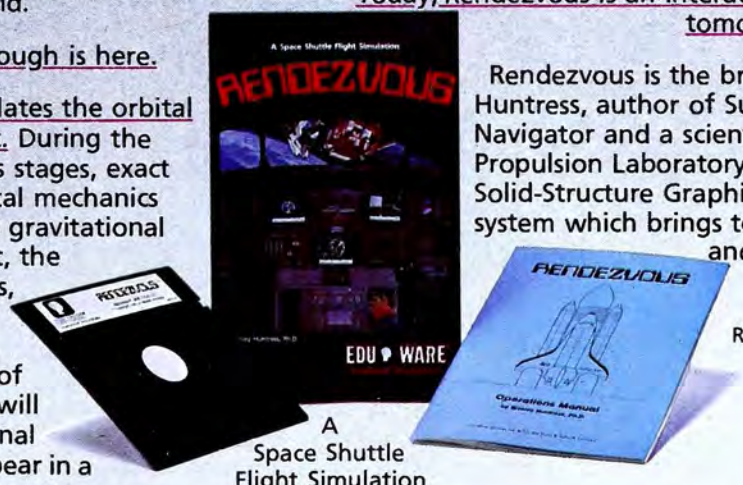
Breakthroughs occur once in a great while, when a product emerges that goes beyond imagination. It defines new territory. If that product is a computer simulation, it will leave the crowded field of carbon-copy Space Invaders far behind.

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A Schoolhouse Apple Tutorial

LOGO The Voice of THE TURTLE

BY JIM MULLER

A certain bit of magic seems to fill the air when a hyperactive child is poring over a computer console. To the uninitiated, the intensity of concentration can be mind-boggling—they find it totally incomprehensible that a child whose attention span rarely exceeds ten minutes elsewhere will sit at a computer console for an hour or more.

Such is the magic of Logo.

Hyperactivity is among the more easily discernible learning disabilities that seem to set certain children apart as "different." They may be classed as "discipline problems." Or maybe they just "don't pay attention."

There are other young people who don't seem to fit into any of the discernible categories. They are best described as "shadow children." These children may not be quite as intelligent as others when measured by standardized tests. Some may have behavior problems. Others just don't seem to be able to learn. These are the children who live in the shadows of the academicians, the athletes, the student council leaders—you know, the popular ones.

Over the past decade, some innovative teachers have helped some of these kids come out of the shadows. It doesn't happen very easily. Most certainly, it doesn't happen very quickly. It comes one small triumph at a time, and the process is often painfully slow. But the results can bring tears of joy to your eyes.

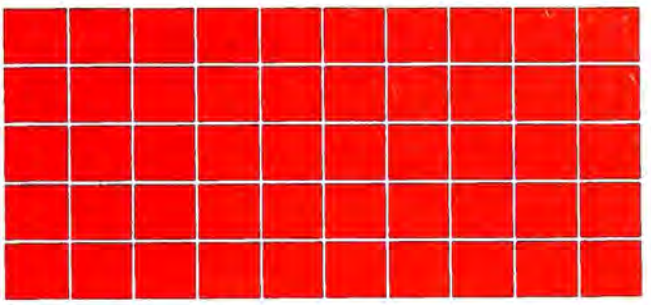
One of the most serious problems shadow children face concerns their image of themselves. They seek to learn, but not to be ridiculed or embarrassed in front of their peers. They long to learn with other youngsters, but their lifelong sense of fear, frustration, shyness, confusion, intimidation, and, in some cases, panic, makes this exceedingly difficult.

In the seventies, some teachers began to use the calculator as a learning aid for slow learners. Lessons were individualized to meet the specific needs of each child. Each child was thus challenged and motivated to move ahead at his or her own pace. More important, each was in control of the learning process. Thus, these children got what was for some their first taste of self-confidence, their first exercise in decision making and problem analysis.

Ever since the computer began to move into the classroom, these same innovative teachers have tried to expand their horizons, looking to the amazing processing power of the computer for help. However, the transition from calculator to computer has not been as easy as you might expect.

Calculators use unique single-keystroke languages to translate numerical inputs into Binary-Coded Decimal (BCD) calculations. There's no high-level language to learn. You define the problem, press the few required keys in a logical order, and the result appears in the display.

Unfortunately, learning to use a microcomputer is not quite that simple. Until recently, the learning of high-level computer languages has posed a serious challenge to young people, especially the shadow children. *Init*, *goto*, *gosub*, *chr$*, *mid$*, *hgr*, and similar words are not part of the everyday vocabulary. Simple programs can be written in Basic, of course. But these are not the imaginative, interactive procedures Logo makes possible. What types of challenges do Logo procedures offer?



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Shadow children often develop a very personal relationship with the computer. They work one-on-one with a very patient and tireless machine that provides immediate feedback and reinforcement. Instead of being embarrassed in front of peers or the teacher when they give an incorrect answer, they simply try again. And when they choose, their success can always be shared by showing the computer display to any and all in the class.

But what have they really learned?

When a child with cerebral palsy is able to control her hands well enough to hit the keys required to draw a square on the computer screen, it's easy to applaud her concentration. But what of a shadow child? If that child has been left alone to explore the computer by means of self-directed study, then how will the teacher know what went on when all she can see is the completed square. Was that square put there by random selection or by choice? How many steps did it take the child to put that square on the screen? How many mistakes were made? Did the child understand the lesson? Was the child able to translate other experiences from real life to the computer screen? What really happened?

The beauty of Logo is that single-keystroke procedures can be written that allow a student to scribble, to doodle, or to create geometric masterpieces. Every step is remembered by the computer and retained for later recall. Because of this, the teacher can measure how well the student has been able to structure the thought processes that are necessary to make the logic of Logo work.

The student creates a unique micro-learning environment in which he or she becomes the decision maker. One small triumph at a time, a child learns to look at problems analytically; to break each into components that can then be reassembled to solve the seemingly insurmountable problem.

The tendency of many teachers would be to look over the student's shoulder. But this would most likely intimidate the child they were observing. Shadow children need all the help they can get to build confidence in themselves. They desperately need that sense of accomplishment coupled with the practice of structured problem-solving. They don't need constant scrutiny.

Better that there would be a procedure that would remember all the steps the student took and then play them back later for unobtrusive analysis.

A new friend from Canada recently submitted just such a single-keystroke procedure to the Young Peoples' Logo Association Software Exchange. It's a significant first step toward helping very young children and those who are physically and mentally disabled. It has the capacity to remember all entries and then later to recall these on command.

This procedure has been introduced to a school for the learning disabled in Dallas, Texas. Educators in other settings have expressed an interest in the procedure and are receiving updates for their use. It's offered here for consideration and possible use by any and all. If you should find useful adaptations or perfections of this procedure, keep in touch with *Softalk* and the YPLA so your success can be shared with others.

```
TO RUN.ALL :CMDS
IF :CMDS = [ ] [STOP]
RUN FIRST :CMDS
RUN.ALL (BF :CMDS)
END

TO MENU2
TEXTSCREEN
CLEARTEXT
PR [YOU CAN PRESS THESE KEYS, TOO!]
PR [ ]
PR [W: MAKE THE PEN WRITE]
PR [E:  MAKE THE PEN ERASE]
PR [ ]
```


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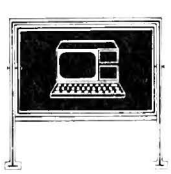
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```
PR [D: PUT THE PEN DOWN]
PR [U: PICK UP THE PEN]
PR [I:  SHOW THE TURTLE]
PR [O: HIDE THE TURTLE]
PR [ ]
PR [PRESS ANY KEY TO CONTINUE DRAWING]
OP RC
END


TO MENU1
TEXTSCREEN
CLEARTEXT
PR [PRESS ANY OF THESE KEYS:]
PR [ ]
PR [S:  SHOW THIS DRAWING]
PR [H: SHOW THIS HELP]
PR [ ]
PR [F:  MOVE THE TURTLE FORWARD 10 STEPS]
PR [B:  MOVE THE TURTLE BACK 10 STEPS]
PR [1 - 9: MOVE THE TURTLE FORWARD 1 - 9]
PR [STEPS]
PR [ ]
PR [R:  TURN RIGHT 30 DEGREES]
PR [L:  TURN LEFT 30 DEGREES]
PR [T:  TAKE AWAY THE LAST COMMAND]
PR [ ]
PR [C:  CLEAR THE DRAWING]
PR [ ]
PR [N: GIVE THE DRAWING A NAME AND SAVE IT]
PR [A: ADD A DRAWING TO THIS ONE]
PR [ ]
PR [Q: QUIT DRAWING]
END

TO PROMPT :NEXT
COMMAND :NEXT
PROMPT READCHAR
END


TO UNDO
IF :HISTORY = [ ] [SPLITSCREEN PR [THERE'S NOTHING TO TAKE
   AWAY] STOP]
SPLITSCREEN
TYPE [TAKING AWAY:] PR LAST :HISTORY
CS
MAKE "HISTORY BUTLAST :HISTORY
PD ST SETPC 1
RUN.ALL :HISTORY
END


TO S
REPARSE
HOME
CLEAN
CLEARTEXT
MAKE "HISTORY [ ]
SETPC 1 SETSCRUNCH 1
PROMPT MENU
END


TO R
CLEARTEXT CS PD
SETPC 1
RUN.ALL :HISTORY
PROMPT RC
END


TO LEARN
SPLITSCREEN
PR [WHAT DO YOU WANT TO CALL THIS DRAWING?]
MAKE "PROC RL
IF :PROC = [ ] [STOP] [MAKE "PROC FIRST :PROC]
IF DEFINEDP :PROC [TYPE [THERE'S ALREADY A DRAWING
   NAMED] PR :PROC STOP]
DEFINE :PROC FPUT [ ] :HISTORY
SAVE :PROC
```




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```
TYPE :PROC PR [WILL BE THE NAME OF THIS DRAWING]
END

TO MENU
TEXTSCREEN
CLEARTEXT
SETCURSOR [0 0]
MENU1
PR [ ]
PR [( PRESS "M" FOR MORE HELP )]
MAKE "CMD RC
IF :CMD = "M [MAKE "CMD MENU2]
OP :CMD
END

TO UNDOALL
IF :HISTORY = [ ] [STOP]
MAKE "HISTORY [ ]
CS PD
END

TO ASK
SPLITSCREEN
PR [WHAT DRAWING DO YOU WANT TO ADD?]
MAKE "PROC READLIST
IF :PROC = [ ] [STOP] [MAKE "PROC FIRST :PROC]
IF NOT DEFINEDP :PROC [PR [THERE'S NO SUCH DRAWING!]
    STOP]
LOAD :PROC
EXEC LIST :PROC
END

TO EXEC :ACTION
FULLSCREEN
RUN :ACTION
MAKE "HISTORY (LPUT :ACTION :HISTORY)
END

TO COMMAND :C
CLEARTEXT
FULLSCREEN
IF NUMBERP :C [EXEC SE "FD :C STOP]
IF :C = "A [ASK STOP]
IF :C = "B [EXEC [BK 10] STOP]
IF :C = "C [UNDOALL STOP]
IF :C = "D [EXEC [PD] SPLITSCREEN PR [PENDOWN] STOP]
IF :C = "E [EXEC [PE] SPLITSCREEN PR [THE PEN WILL ERASE]
    STOP]
IF :C = "F [EXEC [FD 10] STOP]
IF :C = "H [COMMAND MENU STOP]
IF :C = "I [EXEC [ST] STOP]
IF :C = "L [EXEC [LT 30] STOP]
IF :C = "N [LEARN STOP]
IF :C = "O [EXEC [HT] STOP]
IF :C = "Q [TEXTSCREEN THROW "TOPLEVEL]
IF :C = "R [EXEC [RT 30] STOP]
IF :C = "S [FULLSCREEN STOP]
IF .C = "T [UNDO STOP]
IF :C = "U [EXEC [PU] SPLITSCREEN PR [PEN UP] STOP]
IF :C = "W [EXEC [PD] SPLITSCREEN PR [PEN DOWN] STOP]
SPLITSCREEN
PR [THAT KEY DOESN'T DO ANYTHING]
END

TO DRAW
PRINT [ENTER "S"]
END
```

This procedure is neither a beginning nor an end—it's merely an idea. Like Logo itself, it is imaginative; it may just ignite another idea that eventually will provide someone else with another idea that may just help someone somewhere. And that is just the type of thing that makes it fun to get out of bed in the morning.

This listing contains two procedures that are especially worth mentioning. The first of these, UNDO, erases the last command, while the second, UNDOALL, erases the entire drawing. A teacher who wants to be able to see all the steps a student has gone through in completing a drawing may wish to delete these procedures. But physically disabled students who don't have the dexterity to type in all the letters required in Logo are likely to find these procedures quite helpful. ■



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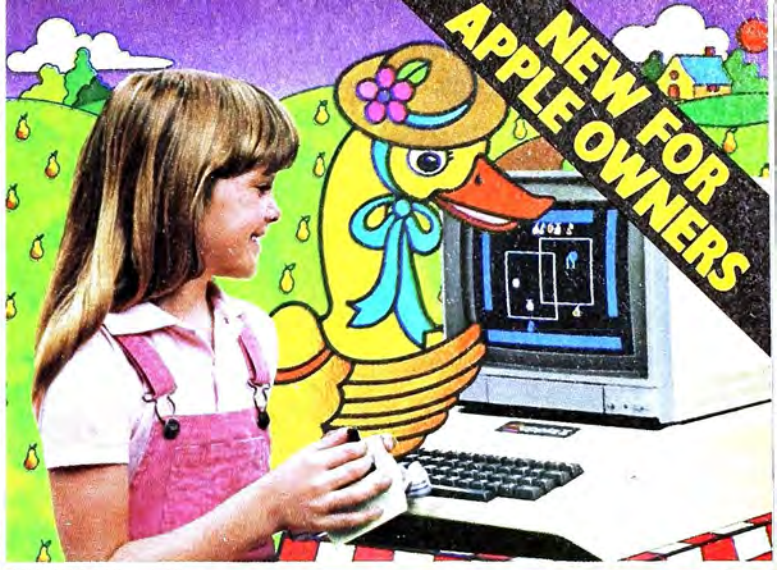
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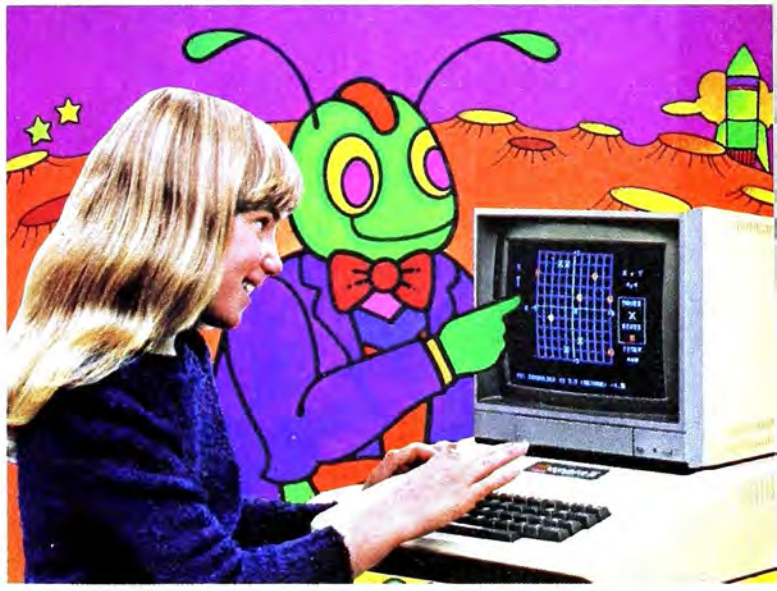
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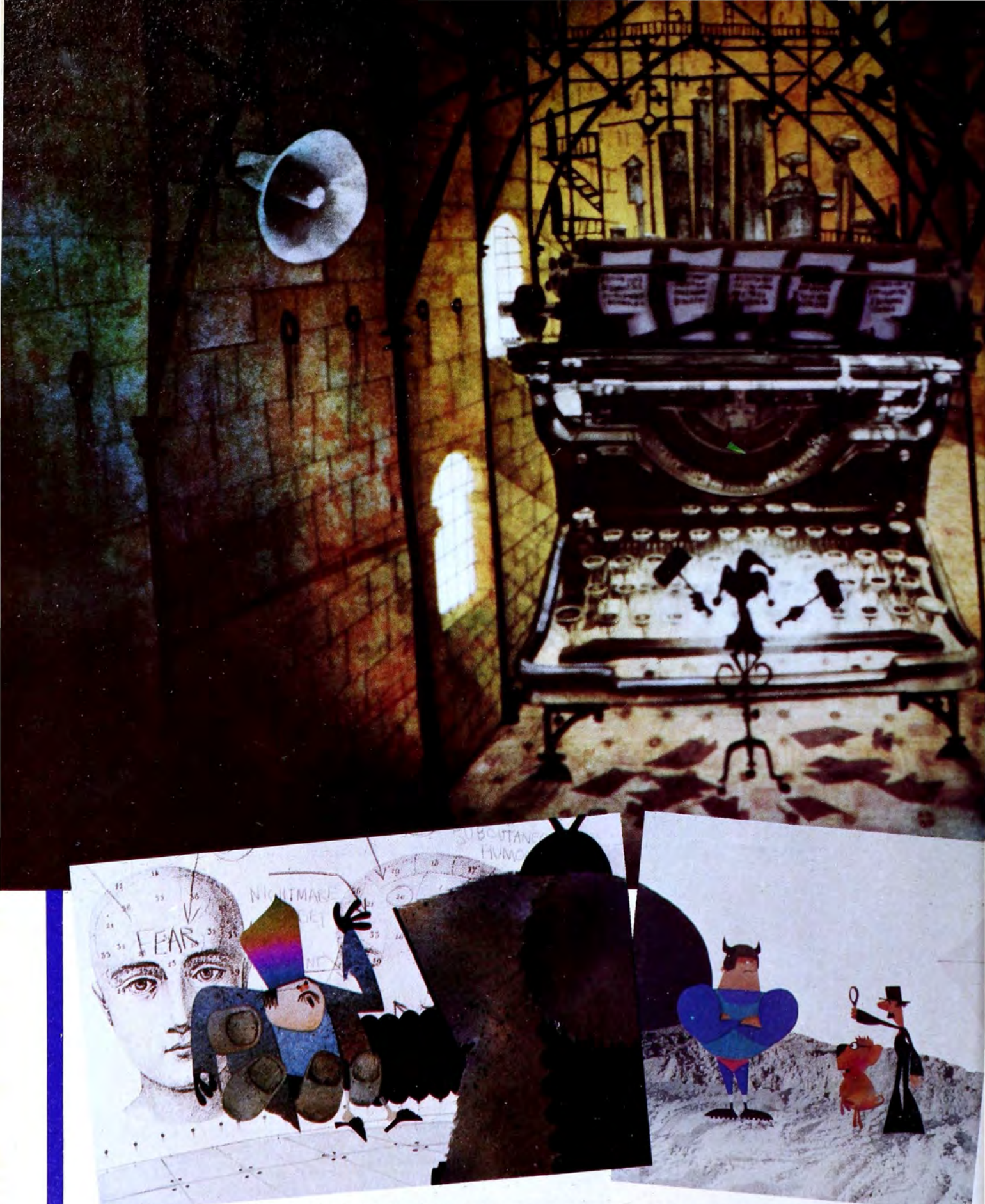
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Top: Scuzzbopper, chief screamwriter for the villain Botch, knocks out more screamplays on the royal tripewriter in the land of Murk. Bottom: the villain Botch consults with Ibor, who speaks only in old television cliches; middle, newly arrived superhero Rod Rescueman is inspected by the two heroes, Ralph, an all-purpose animal, and Mumford, a Harpolike human character; right, the man who created all this, John Korty—codirector and cowriter of *Twice Upon a Time*.

Once Upon an Apple



TWICE UPON A TIME

You guys have screwed up in a royal way.
—The Fairy Godmother

Feature filmmaking has changed in the last two decades. In the twenties, thirties, and forties, Hollywood was the undisputed film capital of the world. Gradually the emphasis has shifted away from Los Angeles and the big studios. Hollywood and feature filmmaking have become a state of mind, transportable to other environments.

Across the Golden Gate Bridge in the beautiful coastal mountains of northern California's Marin County, the spirit of Hollywood is strong. The mighty prince of the area is George Lucas, whose Lucasfilm Ltd. is based in San Rafael. Academy Award-winning filmmaker John Korty works out of nearby Mill Valley. Not coincidentally, the two have joined forces on a film project that is a maverick, a step out of line. It's called *Twice Upon a Time*.

The Revenge of Marin County. The feeling around Hollywood is that you shouldn't do a full-length animated film unless you choose a classic story that everyone knows. Original stories are not presumed to be a be a good bet for drawing an audience. One has only to look at animated films from the last few years to see this philosophy being tested. Let's see, there was *Watership Down, Lord of the Rings, The Secret of NIMH,* and *Metamorphoses* (which was based on Greek mythology).

John Korty, "against everybody's advice," has just finished a feature-length animated motion picture based on an idea he first thought of more than ten years ago. Korty had a childhood fantasy that he believes is fairly common.

"It was that if I blinked my eyes, maybe everything would suddenly change." Ever since, Korty has been refining this notion into a story. This spring people all around the country will have the chance to share his fantasy.

"*Twice Upon a Time* is not just another cartoon," Korty explains, while lounging on the front porch of the gray Victorian mansion that is the hub of his company, Korty Films. "The cartoon world is supposed to be better than the real world—escapist. The old way was to create an idyllic fantasy land. I feel that something animated must allow your imagination to have fun. That happens in *Twice Upon a Time*, but you also come away with the feeling that the real world is the best we'll ever get."

The Divine Animated Comedy. In the film there are three worlds. There is the world of the Murkworks, where nightmares are hammered out on a gigantic typewriter. Ralph and Mumford, the two heroes of the film, come from Frivoli, a world where sweet dreams are baked like pies. And the harried people who receive these two kinds of dreams are the Rushers of Din. That's us here in the real world.

Paunchy and raunchy Synonamess Botch is the maniacal ruler of the Murkworks Nightmare Factory, and he's jealous of Greensleeves, an eccentric old leprechaun who delivers nice dreams.

Botch convinces Ralph and Mumford to freeze time in Din by releasing the Magic Spring from the Cosmic Clock. Ralph and Mumford's fairy godmother, complete with Brooklyn accent, berates them for the "mucho imbalance" they've caused.

The major portion of the film follows Ralph and Mumford's efforts to retrieve the Magic Spring before Botch's minions drop thousands of nightmare bombs on Din. Along the way, our heroes meet Flora Flauna

BY DAVID HUNTER





The top picture was taken from the back of one of the Apple-controlled animation cameras. At the top of the picture is the mirror reflecting the artwork to be animated. The camera is just to the left, out of view. The bottom picture shows the artwork on its movable bed, right side up, as the animator would see it. Since the camera is in an inaccessible spot, a video link-up is used to see how the image looks through the camera. One person can operate the whole system, exploring different possibilities and thus taking the risk out of heretofore expensive multiplane animation.

an aspiring movie star and the heroes' heartthrob. The fairy godmother calls for assistance from Rod Rescueman, a recent graduate (D− average) from Superhero School. Other characters include Ibor, half-gorilla, half-robot; Ratatooie, Botch's pet rat/armadillo; and Scuzzbopper, Botch's head Screamwriter.

Like any good fantasy story, *Twice Upon a Time* has unlikely heroes, a quest, lots of magic, and a happy ending—the cosmic balance is restored.

Luminously Lucky. The story behind the making of *Twice Upon a Time* is magical and miraculous, befitting the spirit of the holiday season. It cost a miraculously low sum of money—around four and a half million dollars—to make. A new style of animation dubbed Lumage (luminous image) is introduced in the film and Apples are a crucial part of the process.

Lumage is an appealing cutout style animation that uses top and bottom lighting. There is full character movement on several different planes. Multiplane shots are done economically, using an Apple to control the movements of the camera.

When megabuck magician George Lucas saw Korty's short trial film using Lumage animation, he was so impressed that he agreed to approach powerful lords of filmdom for financing. Korty and Lucas, who have been friends for more than a decade, went down to the ancient mysterious film capital in late 1979.

"We screened a trial reel for the Ladd Company. A month later we had a production deal signed. For Hollywood that's fast," Korty says.

Lucas assumed the role of executive producer on the film and has been a fatherly figure, offering advice, criticism, and technical support. *Twice Upon a Time* is the first feature-length animated film project that the three companies—Lucasfilm, Korty Films, and the Ladd Company—have ever been involved with. It's a gamble, but one that should pay off.

You may not see his name on the "one sheet" (Hollywood's name for the typical twenty-seven inch by forty-one inch theater poster), but John Baker can take a lot of credit for the success of Lumage. Baker, technical director of *Twice Upon a Time,* designed the animation cameras. He used Apples to do it and wrote the software that allows Apples to control the finished product. He also lent to the production his talents as a photographer.

A frequent feature of the film is animation against the backdrop of a black and white picture. Animated figures appear to walk through a frozen, colorless world.

In one scene, the two heroes wander through a bar occupied by giant,

statuelike humans, halted in time. The photographs used in achieving this effect, and, in fact, many of the photographs that appear as black and white backgrounds in the film, were taken by Baker.

Baker majored in physics and mathematics at the University of New Orleans, but eventually he became heavily involved in photography. In 1975, he came to Korty Films as a freelance photographer.

Before he finished his stint with the film company, Baker became interested in Korty's ideas for an animation camera. Someone jokingly told Baker that he might be back someday to help design that camera. Several years later, while working as a physics researcher at Lawrence Berkeley Lab, Baker got the call.

By this time he was the owner of an Apple and had taught himself to program in Applesoft and assembly language.

The atmosphere at Korty Films in late 1979, at the beginning of the *Twice Upon a Time* project, was hectic. The money had come in. Korty wanted to start filming in five months. He wanted a camera that could do specific things, and it had to fit in a Victorian bedroom without tearing down the walls.

Baker spent about two weeks writing a program that would calculate and display different camera designs. This called for determining many factors involving the placement of mirrors and how light rays would fall.

Most animation systems have the film camera suspended above the material being photographed. The lens points straight down onto the artwork. The distance between camera and artwork reaches astronomical proportions—more than twenty feet in the case of Disney's famous multiplane cameras.

Victorian Dreams in the Third Dimension. In order to fit the system into one of Korty's not overly spacious Victorian bedrooms and still achieve the effect of three-dimensionality that's possible with multiple planes, Baker had to develop a scheme of reflecting mirrors. The Apple helped him select from the multitude of possible geometries when different variations are used in the placement of key elements. Baker's computer-aided design program allowed him to move mirrors around in relation to the camera and artwork, while varying the intensity and direction of light.

Baker never seemed to have any doubts that the system would work. "When they found out over at Lucasfilm what we were up to, they shook their heads, 'Oh boy.' They thought it couldn't be done."

The final product is difficult to describe (see pictures), but it works.

The artwork is placed on two large rectangular beds, or axes, and one squarish, floating axis. These parts of the system are at waist level and are the most accessible to animators.

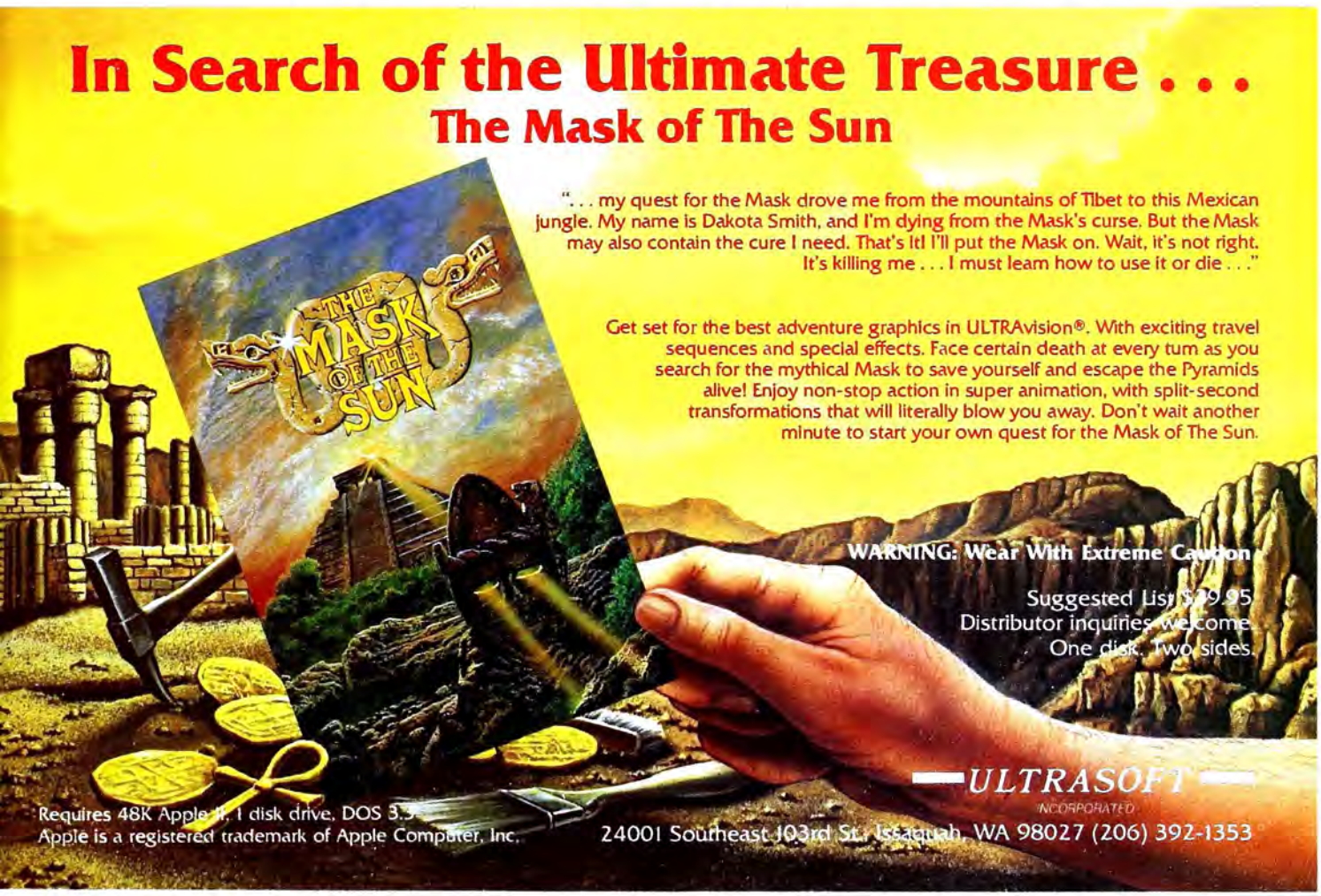
The camera sits back behind the rectangular beds and points toward the ceiling, where it picks up the illuminated image through a series of mirrors hanging over the artwork.

The two large rectangular beds, referred to as the top and bottom east/west axes, are close together but move independently of each other. The one floating axis is smaller than the other two but can move anywhere in the image area. The camera itself can rotate and zoom, providing two additional axes of movement. The mirrors scan across the artwork providing the north/south axis.

Operating the whole thing fast and simply is accomplished using an Apple II Plus equipped with two disk drives, a printer, a camera controller with an external input, and a modified, single-frame Sony videotape deck. Baker had an I/O board custom-built that controls the analog relay between the Apple and the camera controller. The computer's keyboard is color coded, and the important keys are labeled for specific operating functions.

Supervising animator Brian Narelle is candid when he talks about using the Apple. An experienced animator who has worked on segments of "Sesame Street" and "The Midnight Special," Narelle had never used a computer-controlled camera before working on *Twice Upon a Time.*

On the one hand, he says, it takes pressure off the animator. "Before,







Left: What the animators see when they're in the driver's seat. The Apple's keyboard is color coded for easy use. Above that is the camera controller and a monitor showing the video link-up. The monitor at right displays the programming options available to the animator. Above: Animator John Armstrong, supervising animator Brian Narelle, and technical director John Baker. Baker designed the Lumage cameras with an Apple II and wrote the software that enables an Apple to control the camera's movements.

I used a calculator to plan all the movements in a shot. But the computer also causes some anxiety at first because it's so foreign."

Apparently the operating manual Baker wrote wasn't much help, at least not to the computer-illiterate. "Look at this," says Narelle. "It's all text and no clear instructions on what's most important."

Narelle, besides being an animator, is an actor (he played the wacky spaceship captain in Dan O'Bannon's *Dark Star*) and enough of a writer to put together "An Animator's Guide to Computer Operation." Punctuated with humorous drawings and illustrations, Narelle's guide is meant for those present and future animators at Korty Films who are unfamiliar with microcomputers.

This Way to Animated Apples. Once the artwork is in place on the axes, booting up and getting started means flipping a lot of switches. After that, it's possible for one animator to work the entire system fast and simply. For instance, if you want to move one or more axis you first hit the GOTO key, in this case the key B. Then you enter the axis desired, let's say the east/west top. Then enter the position you want the camera to move to on an x, y grid. Then hit return and the space bar, or go bar. The whole plane moves, somewhat noisily, powered by stepping motors. Through the video feed, it looks like the camera is moving left to right.

Suppose you're actually planning out a move for a shot. You want to have a specific axis position for a particular frame of the shot. First you hit C, or the position key. Then you enter the axis desired, let's say the north/south axis, which is the S key. Then you enter the position and the frame number that you want. You can punch the O key, or text key, to check your entry. Hit text again and it returns you to the input mode.

All animation is done frame by frame. In *Twice Upon a Time*, every second of animation is made up of twenty-four separate images. One terrific feature of this system, from the animator's standpoint, is that the computer can take over the execution of a shot. You can tell the camera to move from one spot to another spot in as many frames as you wish, and the computer will automatically execute the move. The animators just sit back and decide if they like how it looks.

The video feed and the computer's ability to show any part or parts of the shot makes the animator's job free of guessing and risk taking. Before, the wait to see the results of a complicated shot might have been as long as two weeks. Baker's system promotes trial and error but makes it a speedy process.

Some complicated shots require several passes with the camera. With Baker's system you make the first pass and then the shot's movements are stored in the computer for later recall.

Suppose you have a scene where a character walks behind a boulder. You make one pass showing the character walking along, but when he gets to the boulder it's been blacked out with a sheet of paper. The film is then backed up in the camera and you make another pass without the sheet of paper over the boulder.

Enterprising Space Opera. In big budget special effects films like *The Empire Strikes Back* or *Star Trek: The Wrath of Khan,* filming a spectacularly lit spaceship flying against a star field is a complicated procedure involving many individual pieces of film. In order to expose properly all portions of such a scene, the ship would be photographed once with only its outside lights on. A second piece of film would track the same movement, but this time only the interior lights would be lit, and so on. The end result is usually several pieces of film that have to be sandwiched together on one final print in the lab.

Baker's system gives the same look of uniform lighting and layered effects, but only one piece of film is used. Thanks to the Apple's ability to remember the movements of a shot, innumerable repetitions can be made without resulting in an unsynchronized, unmatched mess. Some effects, such as a slow dissolve (one scene fading into another), still have to be done in the lab, though Baker's system even has a provision for that.

When writing the programs for operating the camera, Baker's biggest problem was space. He rapidly ran out of memory for storing the combined Applesoft and assembly language programs. Saturn's 32K expansion board solved that problem. His finished program includes 6K or 7K of assembly language and around 30K of Applesoft. The Saturn board stores DOS, the assembly language programs, and any large arrays for a specific shot. The second disk drive is reserved for storing shots to be used at a later time.

One of Baker's goals is to translate the programs into Forth, the standard language nowadays for motion control. "I don't want to do it though," he says, grinning. "I think I'll find someone to do it for me."

Baker's camera also includes a joystick mode. Custom-built by Baker, two joysticks side by side control the camera and the various axes. This makes it even easier for an animator to look at various possibilities for a shot.

Multiplane shots are the highpoint of any animated film, and *Twice Upon a Time* has quite a few. One, involving an old-fashioned steam engine racing through an urban landscape, took about two weeks to film

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in its entirety. Close to fifteen passes were made to get all the effects right. Even so, two weeks is nothing.

"Other people stay away from those kinds of shots, because there's too much risk involved," explains Narelle.

Once Upon a Preview Glimpse. It's tough to tell how successful Lumage is before seeing *Twice Upon a Time* on the big screen. On a twenty-inch color video monitor in producer Bill Couturie's office, segments of the finished film looked refreshingly original compared to most recent American animation. The style is reminiscent of eastern European animation—Hungarian or Czechoslovakian. No attempt has been made to be painstakingly realistic, a standard that tends to bog down Disney's best efforts. Instead, the film is meant to look and feel like a fantasy.

Both in the look and movement, codirector Charles Swenson and Brian Narelle have created characters that are comical and crazy, but not overly cartoonish. One of the heroes, Ralph, is an all-purpose animal. Ralph has the ability to change into any animal he wishes, but he hasn't mastered the trick yet.

One scene in the film has Ralph, who normally looks something like a dog, being chased by one of the villain's flying vulture minions. Ralph is running to avoid sharp talons and yells, "Duck!" Well, he turns into a quacker, much to his disadvantage. The scene is superbly animated and very funny.

The spectacular multiplane shots should do justice to the big screen. The steam engine shot is one of the high points of *Twice Upon a Time.* Another beautiful shot of a submarinelike creature in the dismal landscape of Bone Mountain has luscious aqua hues and eerie luminous lighting. The movement of the camera following the creature is flawless. As Narelle is fond of saying, "You can take your yellow submarine and stuff it."

Twice Upon a Time is long on visual splendor, but it is also an audio pleasure. The score was composed by Dawn Atkinson and Ken Melville. Ms. Atkinson is the second woman to conduct the London Symphony to date.

The Dolby Empire Strikes Back. Sound effects also play a large part in the film. The Keatonlike Mumford is heard through funny sounds, like Harpo and his bicycle horn. When Scuzzbopper pounds the tripewriter keys with mallets, the sound is thundering. The sound mix for *Twice Upon a Time* was the first project to be done at the brand-new Lucasfilm sound studio in San Rafael. *Revenge of the Jedi* is next in line.

The content of *Twice Upon a Time* is worth all the lavish care that is being given. Original stories like this one make the millionaire masterminds of Hollywood reconsider their elaborate think-tank strategies.

Korty created the basic characters and situation, while a number of people take credit for writing the actual screenplay. Codirectors Charles Swenson and Korty, producer Bill Couturie, and associate producer Suella Kennedy all contributed to the writing of *Twice Upon a Time.* Even Baker contributed the name Murkworks.

Korty's original idea has turned into quite a work of art. He wanted to make a sophisticated family film.

"Last year I went to see *Time Bandits.* I looked around the theater and realized how long a time it had been since I'd seen families together at the movies."

Personal Best. When you do a movie, it never ends up the way you first saw it. That first vision is but a start, to be changed depending on who gets involved. "I guess *Twice Upon a Time* got more commercial than how I first imagined it," Korty laughs. "You always want every movie to do everything. It's not as personal a film to me as it was years ago, but it's very good and entertaining."

Korty has great admiration for Baker's talents. The tall, lanky native of Louisiana will have to get used to such praise once the world gets a load of Lumage. It's not surprising, when you think about it, that a Baker and Apples would make a healthy combination.

Korty and company would very much like to make another animated feature using Lumage. Everyone there feels that a second film would be made richer and even better than the first. Let's hope Hollywood gets the message. ■

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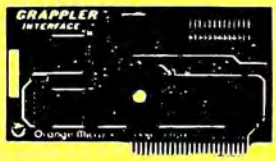
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When the Apple II was first introduced, there wasn't much software available for it. What little there was usually came on a cassette that you could load from once every three tries, if you were lucky. To provide software for Apple owners, Apple Computer encouraged its early customers who knew how to program (almost all did in those days) to submit their better programs to the Apple Software Bank so that others could use them also.

About fifty of the best of these submissions were issued in five volumes of contributed programs and made available to Apple owners without charge through their dealers. All you had to do was to bring in a disk for each volume you wanted or, preferably, purchase a box of disks from your dealer and use the dealer's Apple and twin drives to copy the programs onto your new disks. For a few dollars extra, you could buy two instruction manuals, *Contributed Programs Volumes 1 and 2* and *Contributed Programs Volumes 3–5: Bonus Issue*.

You may recognize the names of the authors of some of these programs. Paul Lutus, creator of *Electric Duet* and GraForth, contributed three programs, including one for Morse code training and another that converts among decimal, hex, and binary numbers—enter one, and in a moment you'll see the other two. Mike Markkula, president of Apple Computer, wrote a four-function math drill with a color display that required only 8K of memory so it would fit the 16K machine that was then Apple's standard product.

Then there's *Mastermind*, a version of the very popular game in which your opponent (in this case, the computer) chooses the colored pieces and the order in which they are hidden and lets you do the guessing and deductions. This program was contributed by Steve Wozniak, the youthful inventor of the Apple. And an unknown with the nom de plume of J. Apple Sede (rumor has it that Markkula might have had a hand in this, too) wrote a database package that is still useful today.

A number of these programs are now unquestionably obsolete. Most were written in Integer Basic, which still comes on every Apple's System Master but requires a language card or RAM card to load. And most are horribly slow compared to today's hi-res machine language programs. One shoot-'em-up game between a battleship and some submarines requires eight jerky moves and sixteen seconds for your ship to charge across the screen; it also has a full two-second lag between the time you push the button and the time your depth charge is dropped. Can you imagine *Hadron* or *Alien Rain* played that way?

Some of these programs are still very much worth having, especially when you consider the price and especially if you're a beginner. One nice full-color game, for example, is *Othello* (also known as *Reversi*). This is a two-player version in which you use the game paddles for positioning your markers. While you can't play against the computer, the program does make sure that none of the markers that should be turned over is missed. On the same disk are a blackjack game, a slot machine, *Yahtzee*, pinball, and *Hammurabi*. The pinball game's no *Raster Blaster*, but for a lo-res Basic program with a square ball, it's impressive.

Besides being free, these contributed volumes had another wonderful feature. Except where machine language was needed for execution speed, they were written in Basic and saved on unprotected disks. And some of them had plenty of rem statements describing what a program was doing so they could serve as examples for the beginning programmer. In fact, Apple Computer encouraged people to list and examine them as a way of learning programming. To help users study them, some of the programs in volumes three and five were given line-by-line commentary in the accompanying manual.

These contributed volumes are still available and—although sometimes hard to find—still free and yours for the price of a disk. Apple Computer confirms that Apple dealers are still supposed to let their customers copy these programs onto their own disks. Because the programs go back at least four years, they were all supplied on DOS 3.2 disks. If your dealer's disks haven't been upgraded to 3.3, use *Muffin* rather than *Copy* or *CopyA* to bring your copy up to 3.3 automatically so you won't have to boot the Basics disk before you use them. Incidentally, it's only common courtesy to buy the blank disks you use from that dealer.

If your dealer fails you, look to a local user group. Many user groups will still have the contributed volumes around. Both the instruction manuals are out of print, however, and are generally unavailable, although you might try a user group's library. This doesn't matter at all for volumes 1, 2, and 4 (the last two of which are only slide shows of still hi-res pictures anyway), whose instructions are displayed on the screen on booting.

Many of the programs included in volumes 3 and 5 also have internal instructions. Others simply add Applesoft features to Integer Basic (hi-res graphics, for example), which makes them obsolete now.

But at least one of these programs is still very useful today. It's a database management system—sort of a poor man's *Data Factory* or *Personal Filing System*. Although its limited storage capacity probably precludes its use without modification for business or professional applications, it provides an excellent introduction to database systems. The program is on volume 3 under the name *File Cabinet*, and, since it's written entirely in Applesoft, you can list it for study and modification.

Because you probably won't be able to find a copy of the instruction booklet for volumes 3 through 5, we'll go through a short tutorial here showing how to use *File Cabinet* to keep a phone list with the names sorted alphabetically and to create a sales analysis by day of the week for a retail store.

After you have obtained copies of the contributed volumes, use *FID* to copy *File Cabinet* from volume 3 onto an initialized but otherwise blank disk and label the disk *File Cabinet*. Because the program generates additional files, devote a separate disk to it. Now run the program. At the top of your screen, there should be a prompt asking for the name of your new database file. If so, that's fine.

It's possible, by the way, that someone at your dealer used the program for a demonstration and that it already has some files on it. If it does, you'll see the file creation and deletion menu instead. At the bottom will be the choice, "Delete a database." Select that option by number and then delete the old database files by number answering Y for yes when prompted. After deleting the last one, you'll see the familiar

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prompt and be asked for the new file name.

Now type *phone list*. When you're asked for a header for column 1, type *name* and for column 2 type *phone number*. Hit return twice to go to the main menu.

Hit 3 to get into the enter mode and, when prompted, type the names and phone numbers of three or four people you call frequently. Enter their names at random, rather than in alphabetical order, and, when you're through, hit N for no more names and return to the menu. Type 9 to examine the names and numbers. After returning to the menu, hit 6 for sort and, when prompted, indicate that you want to sort by name and alphabetically. Save the sorted file when you're prompted again.

The next step is to design a format for your report so that the names and numbers will line up neatly in columns and rows. Choose option 5, Report, from the main menu and answer Y for yes to indicate you want to create a format. The program will then tell you that your file contains three possible header titles for the columns: the record number (0), name (1), and phone number (2). When it asks how many headers you want, answer 2. When it asks which one should be first, select 1 for name. It'll then ask you for a tab, the column on the screen at which the name column should begin. Type 0. Then it will ask whether or not you want the column added up and the total printed. Since this is a list of names, type N for no.

When the program asks for the second column, select 2 for phone number, 24 to begin printing in the twenty-fifth position on your screen, and N; you don't need to total the phone numbers either. You will then be asked to select records by header in case you don't want to display all columns of the list. Type return to get the entire report. You should see a neatly formatted phone list on your screen.

If you have a printer, you can make a hard copy of your phone list by selecting 7 from the main menu to turn on the printer and selecting the appropriate carriage width (40, 80, or 132 columns wide) for your printer. Now, when you hit 5 for Report, output will go to the printer rather than to the screen. Unfortunately, you may have a problem. *File Cabinet* was originally written for a Centronics interface card. If you have a different one, you may find that line feeds are suppressed and that all the lines print one on top of the other. The Silentype does fine, though; in fact, you don't even have to turn it on, if your report tabs to more than forty columns.

If you have an Epson printer, doing the following should fix the problem. Load *File Cabinet* and list lines 5260 and 5290. Unless somebody at your dealer or user group has already made the necessary change, you should see *print "K80N"* and *print "K132N"*, respectively. What isn't evident is that ahead of each K is an invisible control-I. Unfortunately Epson uses control-I followed by a K to suppress the line feed. To get rid of the K, type very carefully:

```
5260  PRINT CHR$(9);"80N";CHR$(29)
5290  PRINT CHR$(9);"132N"
```

If you don't have an Epson or this doesn't work, ask your dealer for help. The fact that you can supply the offending line numbers out of this 530-line program means it should be easy for your dealer to assist you.

Now let's use *File Cabinet* as a business planning tool. Let's assume that you have a retail store selling widgets or whatever. When you look around, it seems that your employees are loafing in a half empty store on Mondays and Tuesdays throughout the year and on almost every day during the first week of each month. Perhaps you should rearrange work schedules so that you have more people on duty during the busy times and fewer people working during slack periods. Question: Given daily sales figures, which are the slack and which are the busy days on the average? Although this problem's simple enough that a glance at the raw data would tell you, it illustrates the capabilities of the program.

Begin by naming your database Sales Analysis. Choose as your headers −M−, −T−, −W−, −T−, −F−, and −S−. The dashes are just for looks, to jazz up the output. This time we'll work out the format before entering data. In addition to the six daily columns, we'll need a column for the totals.

Let's assume that we have a retail store whose sales usually range from $100 to $900 a day and never exceed $9,999 for a week. We'll need to allow five positions per column including a blank separator space and

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seven spaces for the totals. This time, after choosing option 5 from the main menu, select headers 1 through 6, give them tab settings of 1,6,11,16,21, and 26, respectively, and then select 33 when asked for a tab for the totals.

Even though the report has no numbers, you'll be able to check the headers to make sure they're where they belong. Then, when prompted, save this format under the name Sales Report Format. Then go to enter mode via the main menu and enter the following numbers for Monday through Saturday of week 1 and then of week 2, and so on. The slash here ends each week for convenience: 152 105 352 245 411 221/ 395 112 476 609 561 793/ 247 257 102 275 636 680/ 135 334 611 328 891 737.

Again, select Report from the main menu and then select Sales Report Format. Return or shift-P will select all headers. This time your report will have the totals of the rows at the right. It may or may not have the column totals at the bottom. There was a bug in the original program that your dealer or user group may or may not have fixed. Let's see if you can spot it here in line 3130 if you know that A$ is the tab position you chose for the horizontal total:

```
3130  IF LEN(A$) = 0 THEN K(0) = 0. T9 = 1..
3360  ON T9 GOSUB 3540
```

The subroutine beginning at line 3540 prints a dotted line and the column totals, but there's no way that you'll ever see them. When you selected tab position 33 for the row totals, you set the length of A$ at something other than zero. Everything after the if condition in line 3130 is ignored. The variable T9 is never set to 1, so in line 3360 the program fails to branch to the subroutine that prints the column totals.

In addition, simply selecting the report option from the main menu runs the program past the line

```
2950  T9 = 0
```

so that T9 is initialized every time you select the report option. This means that a format whose column totals printed one time might not print the next even though the machine was never turned off.

Check to make sure your program still has line 2950. If the line is still there, delete it. Then add the following line:

```
3085  IF L$ = "Y" THEN T9 = 1
```

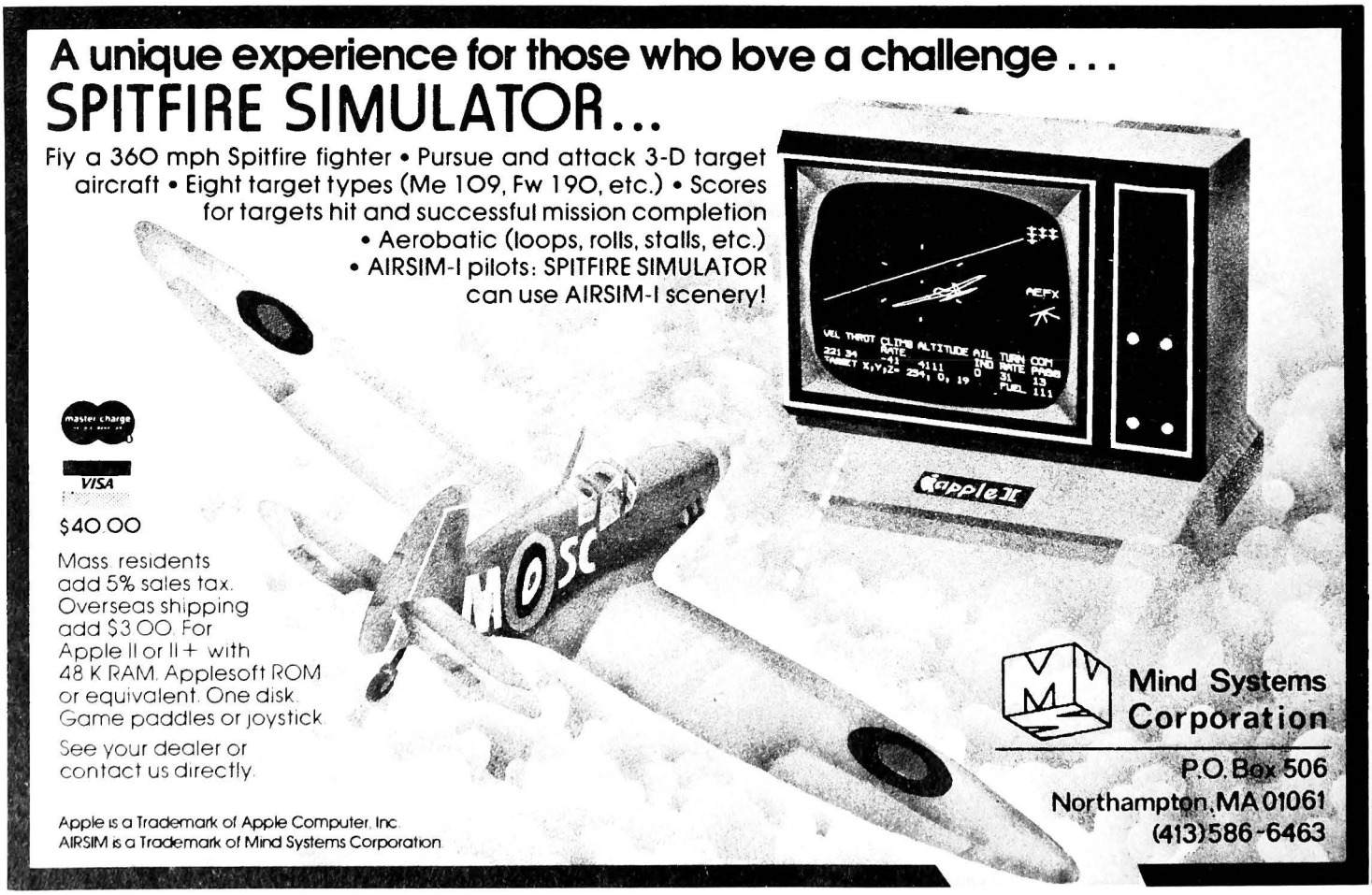
This addition uses a bit of overkill in resetting the flag to branch to the subroutine that prints the column totals every time you hit Y, but it gets the job done. Because we deleted the initializing line 2950, which was doing its job too effectively, it may be necessary to rerun the entire program to set T9 back to zero if you don't want column totals.

Unfortunately, the flag to print the column totals isn't saved as part of the format, so you'll lose it when you exit the program. Still, you won't have to reenter the data each time, although you might need to reenter the format. In addition, there seems to be a bug that'll nip you if you save only part of a file and then try to delete it. If, for example, you enter a database name and the header names but no format and then try to delete the whole thing, the program acts as if onerr—resume were on. When it can't find a format file name on the disk, it just keeps on spinning. If you have that problem, delete the excess files yourself.

Note also that if you're asked something about headers or files and hitting return by itself doesn't work, shift-P probably will. It's the character that *File Cabinet* uses to indicate "all." Also note that you can enter a minus sign in front of your data if you want the data to be subtracted. This may affect the neatness of your report, but the arithmetic will be correct.

In a later issue, we'll look at ways to modify *File Cabinet* so that it will link cells mathematically somewhat in the way that *VisiCalc* does. You'll still be limited to twenty columns and 104 rows (or one column and 2,080 rows, and so on), and you'll have to do some reprogramming to change the functional relationships, but you will get some idea of the power offered by electronic worksheets of this sort. Since the capacity of this program will be so limited, perhaps VisiCorp won't object if we call it *MicroCalc*. . . .

So long till next year. ■



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All About Applesoft

by Doug Carlston

Up until now we have skipped over one of the most powerful features of the Applesoft language—its ability to compute, to handle numbers. Applesoft is just loaded with special commands designed for number crunching; perhaps we have avoided them so long only to prove the point that computers can do much more than mere math.

So this month we'll tackle a variety of math function commands and try to think of some amusing and bizarre things to do with them. Here are the new Applesoft commands for the month:

COS(X)	SQR(X)	SIN(X)	SPC(X)
DEF FN(X)	TAN(X)	ATN(X)	

First, though, let's take a quick look at last month's homework assignment: to design a routine that creates random but pronounceable names. The easiest way to do this is to create two strings, one full of vowels and the other filled with consonants. Then pick random elements out of each, going back and forth from one to the other until you have your name. Here's one of many solutions:

```
10  CNSNT$ = "BCDFGHJKLMNPRSTVWXZ" :VOWELS$ =
    "AEIOUY"
15  INVERSE : PRINT "PASSENGER LIST": NORMAL : PRINT
20  FOR X = 1 TO 2 + RND (1) * 4
30  NAME$ = NAME$ + MID$ (CNSNT$, RND (1) * LEN (CNSNT$) +
    1,1) + MID$ (VOWELS$, RND (1) * LEN (VOWELS$) + 1,1)
40  NEXT
50  ON RND (1) * 3 + 1 GOTO 60,70,80
60  PRINT "MR. ";NAME$: GOTO 100
70  PRINT "MRS. ";NAME$: GOTO 100
80  PRINT "MS. ";NAME$
100  NAME$ = " ":K = K + 1: IF K < 21 THEN 20
110  GOTO 110
```

The only tricky part is line 30, which does all of the work. The MID$ commands only look complicated because of the second parameter in them, which says (basically), "Find out the length of the string and then pick a random number between zero and that length. Then add one to it and this will indicate which character we will pick from the string." (You have to add one because otherwise you might find yourself trying to pick the "zeroth" character, which won't do—all words start with the first character.)

If you wanted to stress some consonants over others, you could just add them into the string CNSNT$ more often.

Now let's leave behind word mangling and direct some abuse at computer math. Those who remember any math from school have a great advantage over the author, who has learned what little math he knows from his Apple. Many of these routines will, therefore, seem absurdly simple-minded to the true math aficionado. Nevertheless, we will persevere.

Everybody knows how to do the four basic math operations on the Apple by now, although some of us may still be tempted at times to use the X instead of the asterisk for multiply. If you want to take a power of a number, you can't write a superscript, so you'll have to use the upward caret that you get by typing shift-N.

3^2 becomes 3 ∧ 2

To take the square root of a number you can use a built-in function of Applesoft:

$\sqrt{2}$ becomes SQR(2)

Here is a quick little program that prints out a table of squares and square roots:

```
10  FOR X = 1 TO 10
20  PRINT X,X ∧ 2,SQR(X)
30  NEXT
```

This sort of thing is much more fun in hi-res graphics, however, so here's how we'd plot squares to the screen:

```
10  HGR : POKE 49234,0
20  FOR X = 1 TO 279
30  Y = ((X - 140) / 10) ∧ 2 + 96:Y1 = 192 - Y
40  IF Y < 0 OR Y > 192 THEN 100
50  HCOLOR= 1: HPLOT X,Y
60  HCOLOR= 2: HPLOT X,Y1
100  NEXT
```

Look at line 30 for a minute. Basically, all we are doing is squaring the value of X and setting Y equal to that. However, we have to make some adjustments in order to get the range of numbers to plot on the screen. By subtracting 140 from X we get a range from −140 to +140 instead of from 0 to 280. This gives us both sides of the curve. We divided this value by ten before we squared it because otherwise most of the values of Y would be so big that they wouldn't plot on the screen (after all, remember that the screen has only 192 rows, so Y has to stay within the 0 to 191 range).

We added 96 (which is exactly half the number of rows on the screen) in order to shift the curve downward so that we could plot the inverse curve (in a different color) right above it. This made it more aesthetically appealing, we thought. Opinions on this may differ.

Notice the test we put in line 40. Without this test the program won't work at all, since illegal values of Y will immediately appear (X can't become an illegal value since it is controlled by the for−next loop and runs from 1 to 279).

Now let's try out our brains a little. See if you can use the SQR function, along with the INT function, to write a program that prints out all of the prime numbers up to 1,000. Prime numbers, you may recall, are those numbers that can be divided evenly only by one and themselves. The first six prime numbers are 1, 2, 3, 5, 7, and 11.

Here are a couple of things you might keep in mind that will make your program run faster. First of all, if you have tried dividing a number by everything up to its square root without success, you can stop. Nothing larger than the square root will divide evenly unless something smaller than the square root does too. And second, if you have tried dividing

by two and failed, it is not necessary to try dividing by any other even numbers, as they will also fail.

Okay. Read no further until you have written your program. If it works, you win—it doesn't have to look anything like the program that follows. If you just can't make it function, here is one solution:

```
5   PRINT 1;SPC(3);2;SPC(3);3;SPC(3);
10  FOR X = 5 TO 1000 STEP 2
20  FOR Y = 3 TO SQR (X) STEP 2
30  IF X / Y = INT (X / Y) THEN Y = SQR (X):FLAG = 1
40  NEXT Y
50  IF NOT FLAG THEN PRINT X; SPC(3);
60  FLAG = 0
70  NEXT X
```

Line 5 is what is known in the trade as "cheating"—it prints out the first three primes since the routine doesn't work on primes less than five. The command SPC(X) is just a simple way of inserting spaces between the numbers being printed; otherwise, they would all run together and be very hard to read.

Applesoft has loads of other functions built in. Some of the most useful are the trig functions—they are invaluable for calculating and plotting curves. Here are the (very logical) names of the four functions:

SIN(X)	is	Sine
COS(X)	is	Cosine
TAN(X)	is	Tangent
ATN(X)	is	Arctangent

The value of X is expressed in radians, not degrees. (For those who almost remember what a radian is, it's the length of the radius of a circle—if you measure the circumference of the circle, you always come out with approximately 6.28, or 2 pi, radians.) If you don't know any trigonometry, you aren't likely to get much mileage out of these. However, here is a simple little plotting program that shows graphically what the four functions are like:

```
10  HGR : POKE 49234,0
20  FOR X = 1 TO 279
30  Y = SIN (X / 30) * 50 + 96
40  Z = COS (X / 30) * 50 + 96
50  T = TAN (X / 30) * 50 + 96
60  A = ATN (X / 30) * 50 + 96
80  HCOLOR= 1: HPLOT X,Y: HCOLOR= 2: HPLOT X,Z: HCOLOR=
    5: IF T > 0 AND T < 192 THEN HPLOT X,T
90  HCOLOR= 6: IF A > 0 AND A < 192 THEN HPLOT X,A
100 NEXT
```

Now try one on your own. Let's see you draw a perfect circle on the screen. After you have given it a crack, take a look at the following listing. This little loop will draw a circle on the screen. Depending on your television, the circle may look more like an oval. Try to modify the program to make the circle perfectly round.

```
10  HGR : HCOLOR = 3: POKE 49234,0
20  FOR R = - 3.14159 TO 3.14159 STEP .05
30  X = COS (R) * 40 + 140
40  Y = SIN (R) * 40 + 96
50  HPLOT X,Y
60  NEXT R
```

In this example, the circle has its center at 140,96 and has a radius of 40.

The last set of Applesoft commands we are going to play with this month are the *function* and *define function* commands. A function is a little bit like a subroutine; once you have defined it, you can refer to it from anywhere in the program, using the same code over and over. However, while a subroutine can be a whole miniprogram in itself, containing dozens of instructions, a function can only consist of a single instruction.

A function is defined, usually at the beginning of a program, using the DEF FN command. For example, here is how we define a function that gives us only the fractional part of a number (we'll call the function RMDR, short for remainder):

```
DEF FN RMDR(X) = X - INT (X)
```

Here is how you would use it in a program:

```
10  DEF FN RMDR (X) = X - INT (X)
20  FOR A = 1 TO 50
30  Y = SQR (A)
40  PRINT INT (Y);"    ";FN RMDR (Y)
50  NEXT A
```

You can even use functions inside of functions. Try this:

```
10  DEF FN A(A) = INT (SQR(A))
30  FOR X = 10 TO 1000000 STEP 300
40  PRINT X;"   ";FN A(X);"   ";FN A(FN A(X))
50  NEXT X
```

Now try this. Go back to the routine you wrote to draw a circle and use DEF FN to define the values of both X and Y. Then compare it with this last example:

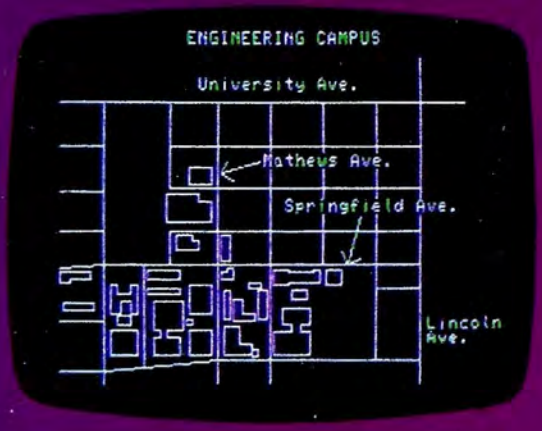
```
10  HGR2:HCOLOR=3
20  DEF FN A(X) = COS (X) * 40 + 140
30  DEF FN B(X) = SIN (X) * 40 + 96
40  FOR R = - 3.14159 TO 3.14159 STEP .05
50  X = FN A(R):Y = FN B(R)
60  HPLOT X,Y
70  NEXT R
```

That's about it for this month. Have a happy holiday. Next month we will begin to talk about saving and retrieving data files, and we'll start designing our own file management system. ■



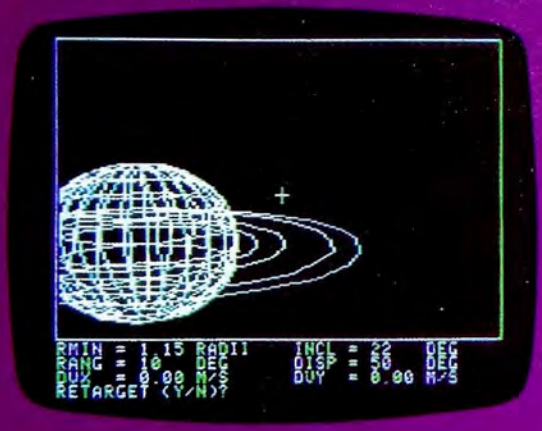
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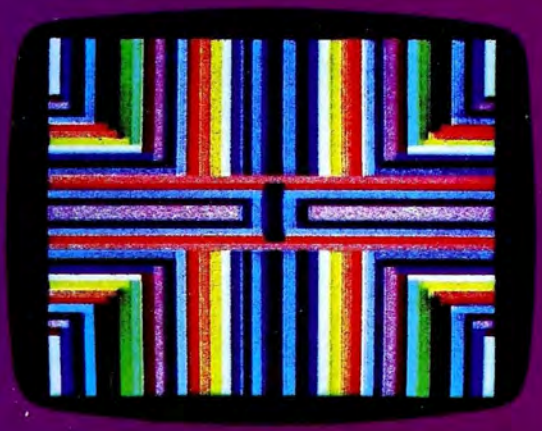
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□ **Christmas in August?** American Express likes to do nice things for their customers. When innovative new ideas surface, this company tries to give customers a preview glimpse. In May, they were the first to have the Sinclair handheld computer. Late this summer American Express mailed to cardholders what are best described as "electronic greeting cards."





An electronic greeting card looks like any other greeting card at first. It's only when you open it that the difference becomes apparent. The card offered by American Express plays a two-song medley of "We Wish You a Merry Christmas" and "Silent Night."

Utilizing a CMOS-LSI chip, a button-sized battery, and piezo-electric transducer for a speaker, this new breed of greeting card is a logical follow-up to watches and calculators that play musical tones. A simple contact switch causes the music to play when you open the card. Closing the card sets the program back to the beginning. The eighth-inch thick battery provides up to eight hours of continuous play.

Stan Krangel, a merchant in American Express's New York office, says the cards have been very successful and have generated a lot of interest among those lucky enough to see one. "We figured that people were going to be real curious about how the cards worked. So we decided to include a brief missive explaining how they function."

At this time only customers of American Express can get these musical cards, though that will change in the future.

American Greetings is currently working on a whole line of electronic greeting cards that should be appearing sometime this spring. Twelve different cards are on the docket, including six that play "Happy Birthday." There will also be five friendship cards that play such tunes as "These Are a Few of My Favorite Things" and "Let Me Call You Sweetheart."

According to a recent *Los Angeles Times* article, Hallmark Cards Inc. has also been examining the potential of microcomputer-aided greeting cards. Meanwhile, American Express is now looking at other possible marketing applications for microchip technology. The next innovation may be talking cards that electronically whisper words of endearment to your loved one.

□ **"And on That Farm He Had a Computer."** Old MacDonald has entered the information age. Although personal and portable computers have been part of farming for years, their presence is just now being felt on a large scale. No manufacturer is going after this new, fertile market with more gusto than Tandy, purveyors of the TRS-80 and owners of the successful Radio Shack chain of electronic stores.

All farms, no matter how small, are businesses, and it has long been predicted that computers would have a significant impact on productivity and information management once farmers warmed up to the idea. With the state of the economy the way it is, farmers are being pushed harder than ever to adapt better means of production and more competitive selling techniques. Up-to-the-minute information about production costs and market prices is essential to the modern farmer's survival. Traditional methods have proven to be slow and frequently unreliable. The promise of instantaneous information waiting at their fingertips has spurred quite a bit of interest among farmers and software publishers, as well as among hardware manufacturers.

Tandy has an agreement with Raintree Publications in Milwaukee, Wisconsin, to sell a videotex system for farmers, called AgriStar, in

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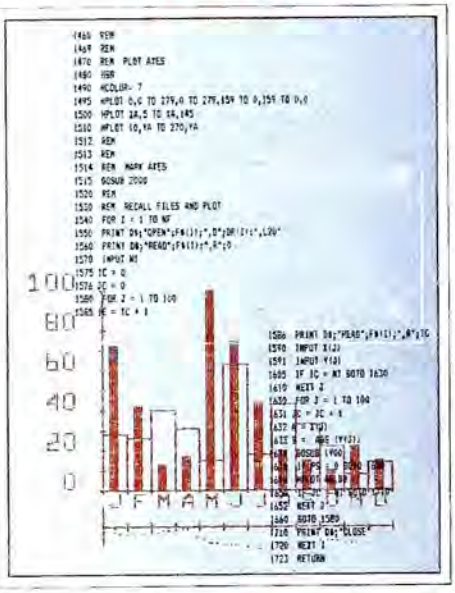
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the thousands of Radio Shack stores across the country. Raintree's Richard Weening, the creator of AgriStar, said in a recent article published in *Barron's*: "Farmers know how to produce, but not how to sell."

AgriStar's main feature is a twelve thousand-page database that includes everything from crop prices to commodity analysts' reports, provided by the Commodity News Service. Up-to-the-minute weather information is provided by NASA. Also available are a shopping service, an electronic mail service, and an on-line computing farm management program. Of course, you need a computer to take advantage of all these nifty features.

When a farmer goes to a Radio Shack, he has an option. He can buy one of Tandy's computers to run AgriStar or he can lease a dumb terminal for less than four hundred dollars a year. A dumb terminal is only capable of receiving information and is incapable of actual computing functions. Needless to say, Tandy is hoping to sell a few more machines because of AgriStar.

One potential problem that's already been noted about AgriStar is its poor graphics capabilities. Utilizing Prestel, a cost-effective British system for transmitting data, AgriStar will be short on visual presentation of information. According to the *Barron's* article, Weening is not convinced that graphics are all that important. He contends that farmers are more interested in hard facts than in how a healthy corn crop looks.

AgriStar joins the ranks of other ambitious videotex projects such as Canada's Grassroots, which supplies market information from Winnepeg's commodities exchange. Seeing the potential benefit in this kind of system, the Canadian business community is doing its part to cut costs for Grassroots. The Royal Bank of Canada sponsors Grassroots weather reports.

In the meantime, the *Bakersfield Californian*, a rural newspaper, is embarking on an ambitious videotex system for farmers in the San Joaquin Valley.

CompuServe has also announced the availability of Farm News Express. Founded by Leonard Timm, a former reporter for the United States Department of Agriculture's daily *Market News*, FNE claims to be the largest database of produce information in the country. Using CompuServe's computer network, FNE distributes information about nineteen city produce markets and thirty growing-area produce markets.

According to Timm, the FNE videotex service is a faster and cheaper way to obtain daily market reports than the USDA's printed *Market News*, which is sent through the regular mail. Timm plans to expand the service to include city and growing-area markets for poultry, grain, and livestock. FNE already includes electronic mail and bulletin board access to enable subscribers to communicate among themselves.

With farm management software pouring into the market and with videotex systems becoming commonplace, farmers now have several ways to seek computer aid in these troubled times. "A computer here and a computer there. . . ."

☐ **Ready, Aim, Ignite!** Suppose you're a nurse who works nights on the sixth floor of a hospital. It's dangerous at night on the street where your car is parked. It's also cold out there.

So when you're about ready to leave, you pull out a transmitter, as small as a pack of cigarettes, with a seven-inch antenna. Aiming the transmitter through a window in the direction of your car, you push a button. The motor starts, the heater turns on, and then the headlights come to life. Five minutes later you exit the hospital, get in the warmed-up car, and drive away in comfort.

Except that by the time you get to your car, a crowd has gatherered and wants to know where you got the gizmo that made the car start unattended.

The little black box is called TransStart, and it's part of a system made by TransStart of Provo, Utah. It retails for less than $400. For an additional $100 you can have the whole kit professionally installed.

The entire system consists of the transmitter, a two-by-four-by-six-inch receiver that attaches under the dash of your car, and solenoids that attach to the starter and any other electrical device you want turned on automatically. To prevent the device from affecting your neighbor's car, if it also happens to have TransStart installed, each system has a personal frequency code that programs one system only.

When you push the button on the transmitter, the microcomputer in the receiver under the dash activates the starter, sends back a message that it has started, then kicks out eight seconds later. It lets the car run eight minutes before turning it off unless it receives further instructions. That way, in case you are delayed in leaving, you don't waste gas while your car sits idling without a driver.

The mind of man always seems to be racing ahead of what technology can actually do. In the case of Gene Thall, coinventor of TransStart, the idea had a twenty-year lead on its realization.

Back in 1958, Thall thought there's got to be a better way to start your car than running out to it, getting in, and starting it cold, especially on winter mornings.

"I was born and raised in Wyoming, and it gets awfully cold there," he says. "Sometimes it'll reach thirty below and stay there for six weeks."

So Thall and his son, Steve, began to formulate a system to start a car by remote control back when a gallon of gas cost less than a copy of a big city newspaper does today.

"The theory was strong, but we had to make it work," says Thall. The idea was eventually knocked out of their minds: no suitable technology existed at the time.

The notion remained parked in the back of the tinkerers' minds for twenty years, until 1978, the year the proper chips and diodes reached the marketplace. Thall and son hauled out their sketches and brought their starter into the

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microcomputer age.

"We put together a rough prototype and made it work on a Dodge pickup. That's when we decided to have a go at the thing full time," Thall explains. "We hired some engineers and set up shop."

So far TransStart has marketed about seven thousand of the units in the western states and they're "moving east," says Thall. "It's available mostly through car dealerships right now."

The success of the auto starter has inspired TransStart to investigate new products, according to Thall. "Mostly items no one has heard of." Let's hope the Thalls won't have to wait twenty years between the idea and the execution of any gizmo their imaginations cook up.

☐ **Corporate Convenience Stores.** American business is striving to adjust to the personal computing revolution. A growing corporate trend is to establish a staff-only microcomputer center, managed by personnel from the data processing department. Stocked with desktop machines that the company acquires at a quantity discount from area stores, the center sells machines to employees at the same discount.

Take the curious case of Boston's First National Bank, for instance. William R. Synnott, head of the information systems and services division, was quick to spot both the potential and the possible hazards of widespread personal computer use in a large institution of high finance. If employees were going to buy and use micros on-site or at home, it seemed like a good idea to have the bank involved.

"We sought management support for the idea that our division should be given responsibility for controlling the growth of microcomputer usage throughout the organization, under the aegis of a personal computer center," says Synnott. "It would function as both a store and a laboratory, where managers could come in and use the machines by appointment for getting help in solving business problems as well as instruction on the use of popular software programs like *VisiCalc.*"

A manager can borrow a computer, try it out, and buy it at the 20 percent discount the bank receives from Boston area stores. First National is not, however, a computer retailer in the normal sense. Employees who wish to buy a machine must complete a form stating the use to which they intend to put it and why they need to take it from the center. In this way, Synnott's information division keeps tabs on who's got what and why. It's like registering a gun. The company knows you have it, and if something bad happens they know where to start looking.

"If they want it for a use that will affect the books, we refer them to the auditor for approval. If they want to access a corporate database, we refer them to the purveyors of that database and to the bank's security officer for approval."

Training at the personal computer center is provided by the information systems staff, who work the center on a rotating basis. Full-time staffers alternate with half-day volunteers as consultants. The most popular computer at First National is the Apple ("it has the most software"), followed by the IBM Personal Computer ("coming on strong"), with the TRS-80 in third place.

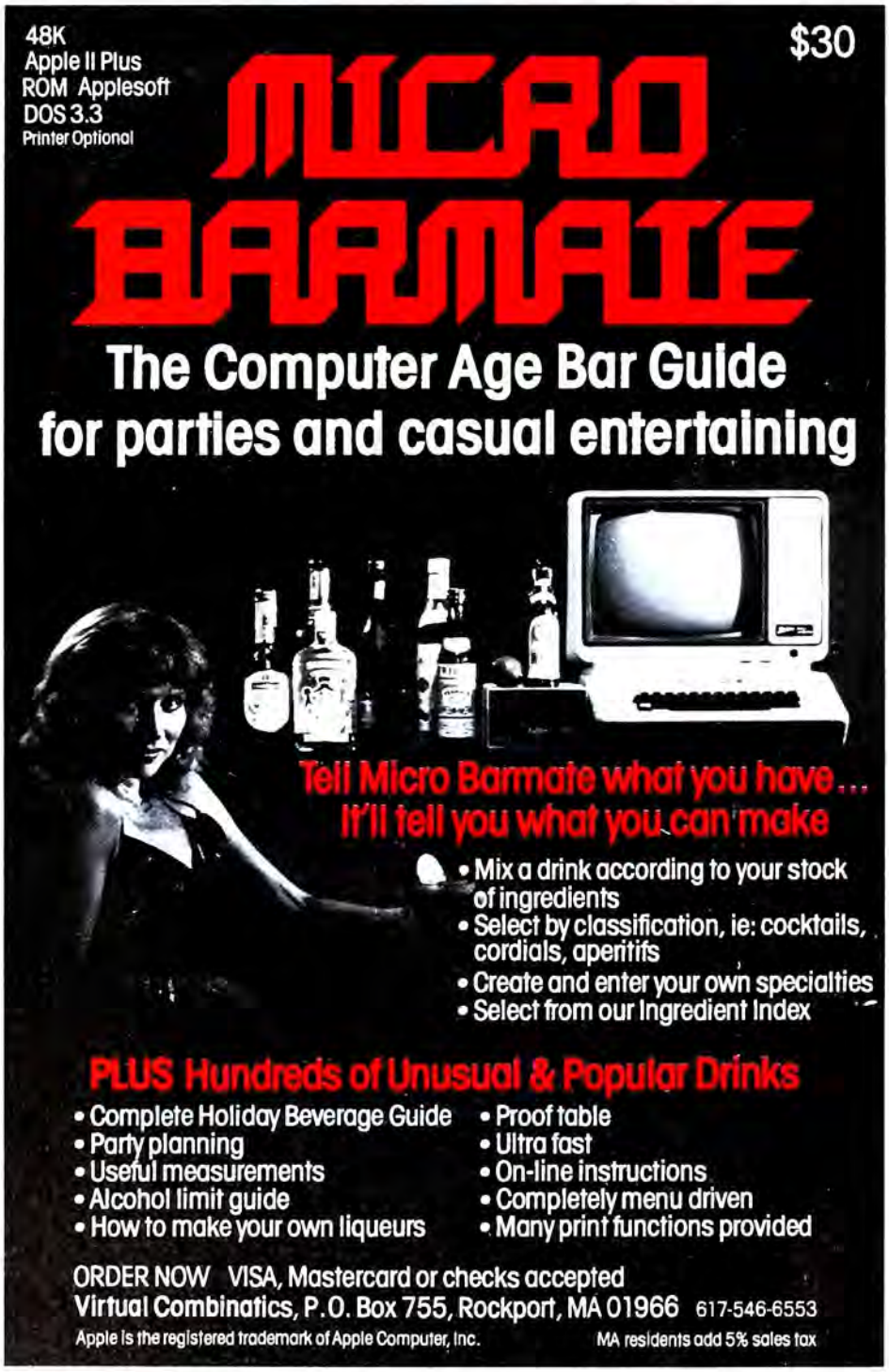
The center has a software library, which Synnott encourages employees to add to.

"If people in the bank develop software that we think has universal appeal, we will include it in the library after testing. One employee is currently developing a 'Monte Carlo' simulation program to analyze oil and real estate investments. Most programs developed are of the *VisiCalc* variety, from telestaffing models to asset liability management, financial analysis, loan analysis, portfolio management, tax planning, stock performance, and statistical modeling.

"We just teach them how to use the machines and give them some training in *VisiCalc*, but we don't write their programs. This is a do-it-yourself business."

☐ **CompuScam.** The personal computing world, though still young, innocent, and excitable, is subject to all the thousand shocks that flesh is heir to. As yet, it still counts first-time users and very young people, rather than seasoned business users, among the greater portion of its population. All the openness and enthusiasm that characterizes this world makes it particularly vulnerable to the speculation of less-than-scrupulous individuals.

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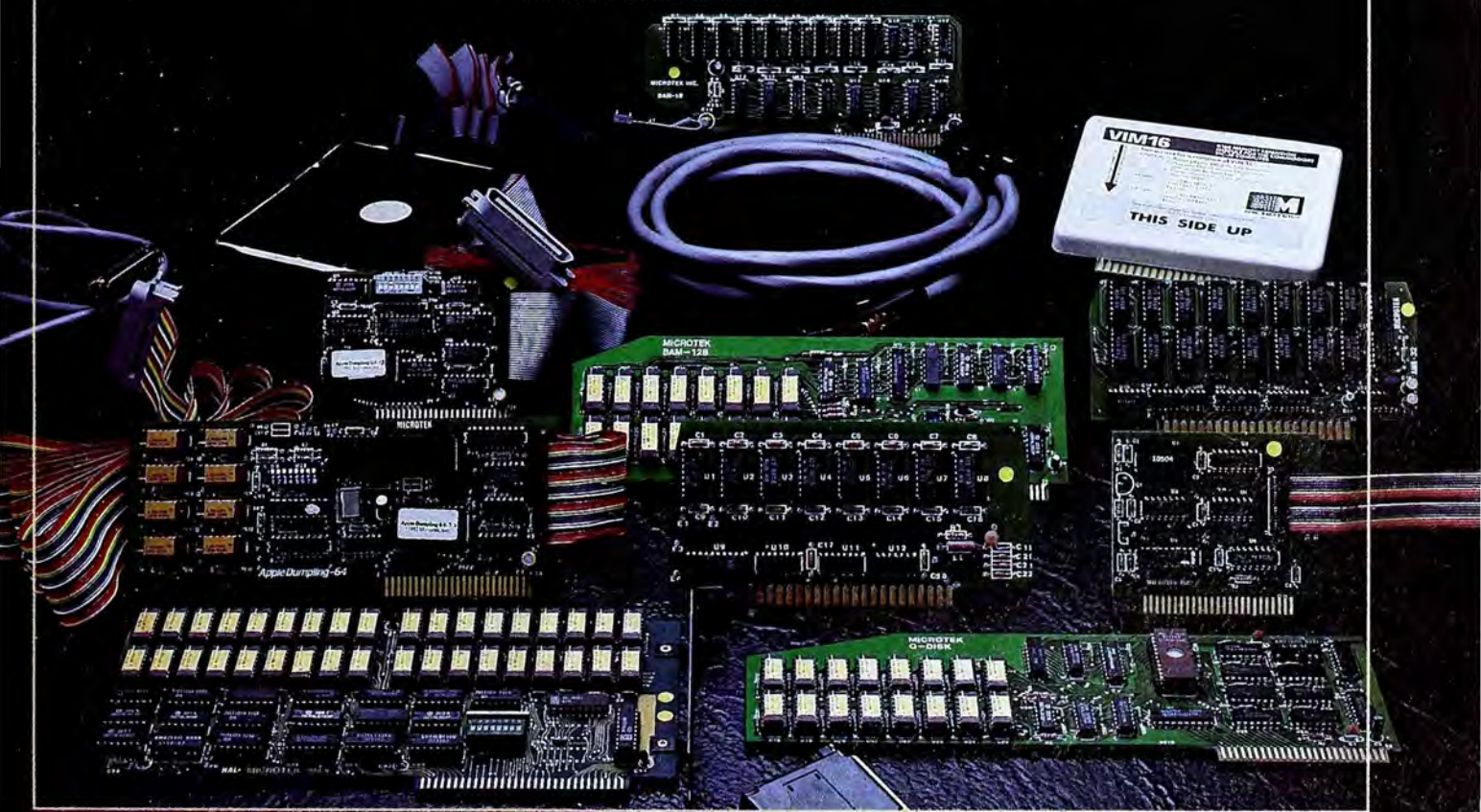
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The Demon's Forge

By Brian Fargo

"Death to him, your majesty! He killed four of your guards in a tavern brawl!"

The king stands, peering down at your bruised and battered form. You meet his eyes, snarling in defiance and trying to break free from the grip of heavy chains and manacles. The monarch laughs at your efforts.

"You are a renowned gladiator," he says, "and have fought often in my pay. For these past services I give you your life—but to prove your worthiness for freedom, you need find an exit from the Demon's Forge. Guards, remove him!"

You reason that you may as well have been executed. The Demon's Forge, an infamous dungeon network, has an exit as well as an entrance, but no one in past centuries has escaped alive.

You laugh bitterly, planning revenge as they cast you within, with nothing to aid you save a package of rations. Perhaps you will surprise them yet...



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your door, or comes to your office. He's a businessman with a problem. He says he's just purchased a quantity of Apples/IBMs/modems/printers/disk drives. His clients have put down a 50 percent deposit, but now they can't come up with the rest and he's stuck. If you move fast, you can take a lot of valuable equipment off his hands at half price. Just give him $1,200 to $1,800 per batch of five units, and he'll use it to pay off his distributor, saving two or three machines for you.

You do so. After some time has elapsed, you give him a call. There's been a delay; the items were misrouted. More time passes. Now the man reveals that the manufacturer is checking to see if the equipment is stolen goods. Months go by. And suddenly your entrepreneurial partner is nowhere to be found.

This may have happened to you, or it may in the future. And the man's name may be William Bozarth.

Bozarth faces charges of felony grand theft and falsely representing an Apple dealer in the California counties of Santa Cruz, Solano, Marin, Concord, and Monterey. His case has produced so many jurisdictional problems that the five counties are considering turning the matter over to the California state attorney general's office. If you have any information about Mr. Bozarth, contact the district attorney's office of these counties.

The ability of the native American bunco artist—the gentleman who once sold deeds for the Brooklyn Bridge to arriving immigrants—to adapt to sophisticated technology is a matter of record. In the recent case of the fictitious Arizona World Enterprises company, the individual responsible was finally caught, tried, and convicted. He subsequently moved to a neighboring city and pulled the scam again.

The advent of the computer age has failed to render obsolete the oldest tenet of business: *caveat emptor*—let the buyer beware.

☐ **DODDS Ataris.** The Atari home computer has been chosen for exclusive use by the Department of Defense Dependent Schools (DODDS). Approximately fourteen hundred Atari 800s have been ordered for educating dependents of United States military and civilian personnel stationed overseas.

The Atari "came out on top technically over all the others in a competitive bid," according to Dennis L. Bybee, educational computing coordinator with DODDS. Bybee was not able to reveal the names of the other microcomputers involved.

Thomas M. McDonnough, senior vice president of sales and marketing for Atari's home computer, remarked, "It is gratifying to us to know that this contract award was made after thorough evaluation of competing computer systems on the basis of available application software, hardware, systems software, documentation, maintenance, and personnel training."

The Ataris will be used in the DODDS programs in computer literacy, computer-aided instruction, computer science, and also in administrative support for the schools. Each system will include an Atari 800 (with 48K), disk drive, interface module, eighty column printer, and color monitor. Atari will provide training for DODDS personnel.

"We were looking for a machine that would help us teach kids about computers with computers," Bybee explains. "The Atari had several attractive key features: sound, color graphics, and durability. It has Basic and Pascal for our secondary schools and Pilot, with turtle graphics, for our elementary schools.

"To pass our college entrance placement test, students must test out on a computer language. We prefer Pascal, with its structured program logic."

The only drawback the DODDS found with the Atari was its lack of instructional software, notes Bybee. "More schools in the U.S. are adopting the Atari, and we're looking forward to more major educational publishing companies getting involved. We have received a positive reaction from a large variety of vendors about this."

DODDS manages 272 schools located in twenty-four countries around the world, with an enrollment of around one hundred forty thousand students. Bybee says the DODDS expects to have at least twelve hundred Ataris up and running by September of next year, after a year of installation and training. ■

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This program makes your APPLE* teach you assembler! We assume you know BASIC already, and now you'd like to learn APPLE* assembler. You need three things (two heavies and a friend)...

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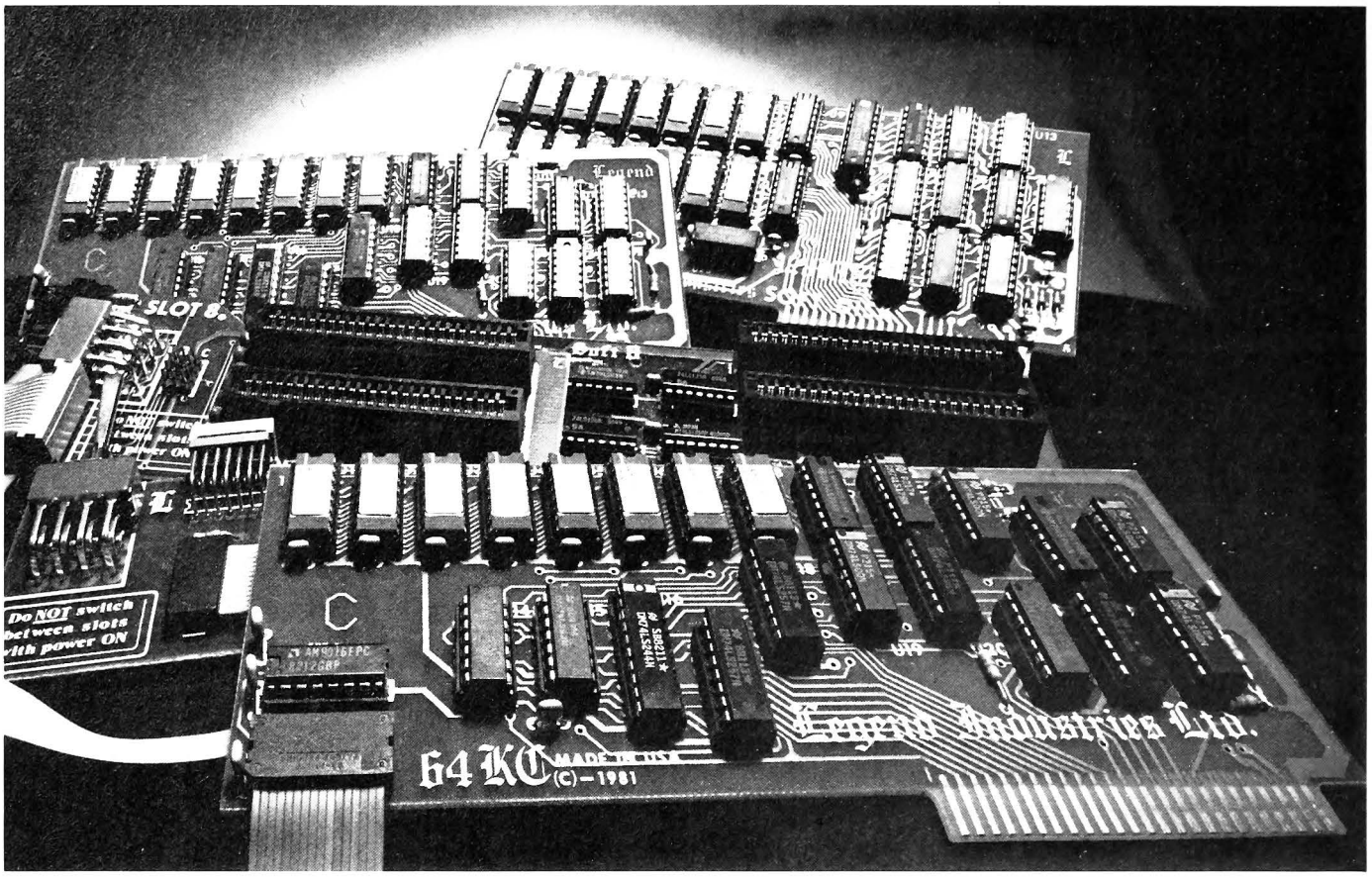
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HARD TALK

BY JEFFREY MAZUR

Despite its "old age," the Apple is still one of the best selling computers. The amount of software and hardware that has been developed for this machine is truly amazing. And the list grows longer every day.

Over the past eleven months, this column has covered quite a lot of the hardware side of the Apple II. Along the way, we've looked at many of the peripherals available for your computer. But on this account, we have seen only the tip of the iceberg.

If you were to line up all of the peripheral boards available for the Apple, you'd need more than fifty computers just to have enough slots to put those devices in. With this kind of support, it's no wonder that many people have reached, or are about to reach, the limit of their eight-slot Apple.

As the slots fill up, the operating temperature inside the Apple also increases. This can cause the computer to start doing "funny things." It may only be a matter of time before you need a fan to ensure reliable operation of your machine. If you're concerned with the monitoring of temperature for lab work, industrial control, and so on, you might also be interested in a dual thermometer board for the Apple. And, after you have your Apple running cool, we'll take a look at ways of adding a ninth peripheral board.

Keeping Your Cool. The subject of fans for the Apple has created quite a controversy among Apple "experts." Such topics as heat flow, "scrubbing action," forced air versus exhaust, inside mounting versus external, and so on dominate the usual discussion. But we'll avoid getting into all the technical details, taking instead a logical approach to selecting a fan.

The first question to ask is, "Do I really need a fan?" This question is a fairly simple one to answer, and the way to begin is by studying the reliability of your computer. If you've had the computer for a reasonable amount of time and have never seen it do something crazy, then you definitely do not need a fan. (What you *do* need is a ticket to Las Vegas, which is where someone with your luck should be.)

When something goes wrong, the first thing to determine is whether the problem is a software bug or a true hardware malfunction. This is not always obvious, but here are a few clues worth knowing. A problem that occurs at the same point within a program or in response to keyboard input is probably a software bug. Problems that occur at random times, or only after the computer has been on for a while, or only since you added that new peripheral card, point toward some sort of hardware failure.

Hardware problems tend to fall into three categories: outright failures, mechanical intermittents, and thermal sensitivity. An outright failure is the easiest kind of problem to diagnose since the difficulty can be observed and traced using standard servicing techniques. When your paddles stop working (see October 1982 Hardtalk) or the video screen goes completely blank, it's a good bet that some part of the hardware has "gone south."

Mechanical intermittents are probably the hardest kind of problem to track down because they usually don't happen often enough to isolate the problem area. Typically, the problem surfaces every few days, with the computer operating flawlessly in between. Mechanical intermittents tend to show up in two areas in the Apple. These areas are the peripheral connectors and the IC sockets found on the motherboard. Without getting into a complete diagnosis procedure for ailing Apples, suffice it to say that most intermittent problems are solved by reseating the peripheral boards or sometimes by reseating one or more ICs on the motherboard. If a problem comes or goes when you gently bang on the computer or wiggle any of the cables attached to it, then it's time to look for mechanical intermittents.

Thermal sensitivity usually means that the computer operates perfectly when it is first turned on. After a while, the temperature inside the computer goes up as a result of the heat generated by the various electronic components. Depending on other factors, such as the room temperature, most thermal problems show up after the computer has been on at least twenty minutes. The quickest way to determine if you have a heat problem is to remove the Apple's cover and let the computer cool down for a few minutes. When the computer consistently malfunctions more often with the top on than off, you've got a thermal problem.

When you're testing to see whether your machine has a thermal problem, waiting for the Apple to heat up before it "konks out" can be quite tedious. Therefore, for the purposes of verifying a suspect thermal problem, you can try covering the computer with a heavy towel or blanket (yes, cover the air vents on each side). This will cause the temperature inside the computer rapidly to exceed its normal value. This "worst case" test will show up any heat-related problems you may have. If the computer continues to operate normally after ten to fifteen minutes, look for other explanations for your intermittent problems.

By the way, some mechanical intermittents and internal IC failures are also sensitive to increased temperature. For example, you may have one IC that works fine at room temperature but begins to fail as the Apple warms up. This may really be the fault of the IC, but in lieu of tracking down the exact chip, adding a fan to reduce the temperature rise may be a simpler solution.

There is no question that the number one cause of overheating is adding peripheral cards. But even when you finally fill up that last empty slot and the computer begins to act up, you shouldn't automatically assume it is a heat problem. Other factors to consider are power supply drain and bus loading. These are also directly related to the number and type of boards that are in your machine.

If you have information on the power requirements for each of your peripheral cards, you can determine if insufficient power is a potential problem. Here's how to go about it. First, add up the currents for all of the boards on each of the Apple's four supplies. Next, add in the power consumed by the motherboard. These figures can be found on page 104 of the *Apple II Reference Manual.* Then check your totals against the power supply's capacity as given on page 92 of the manual. These figures are quite conservative, however; if your boards are drawing considerably more than the maximum on any one of the supply voltages, you should consider getting a heftier power supply such as the Sup'R Switcher from M & R Enterprises. This unit sits outside the Apple and is very easy to install. All that's required is that you disconnect the Apple's power supply and plug in the cord from the Sup'R Switcher in its place. This arrangement should be sufficient to power any combination of boards within your computer.

Data and address bus loading can also become a problem as your Apple fills up. Each of the signal lines in these buses is designed to feed a limited number of other circuits. If too many other devices are connected directly to these lines, the important signals they carry can get distorted, causing erratic, if not total, malfunctions. Older revision Apples are especially prone to this problem.

Many peripheral boards incorporate "buffer" ICs to minimize the load on the data bus. These ICs also increase the *drive* capability when the peripheral board is "talking" on the bus. Similar specifications for bus loading are given in the reference manual. Unless you are fluent at reading schematics and IC data books, however, it may be quite hard to determine the exact loading/drive characteristics of any given board. The only cure for bus problems, aside from trading in an old motherboard for a newer revision, is to use different peripherals.

But before you buy new peripherals or trade in your motherboard, you should get your Apple—especially the address and data bus driver ICs on the motherboard—checked, so you can be sure that it is not at fault.

When it comes to heat problems, peripheral boards pose a triple threat. First, they generate some amount of heat that gets added to the heat that's created by the Apple itself. Since most boards draw power from the Apple's power supply, they also cause it to run hotter, further increasing the temperature inside the Apple. Finally, to add insult to injury, each peripheral board acts as a barricade to convective air flow, causing the hot air to stagnate to an even greater extent within the computer.

If, after ruling out all the other causes for intermittent failures, you feel the problem is heat-related, you should consider adding a fan to your computer. Even if you don't have a heat problem, there are several good reasons for adding a fan. One is that having a fan will certainly add to the overall reliability and life expectancy of your computer. Another reason is that several fans are available that also add other conveniences, such as switched outlets and surge protection. The Super Fan II from RH Electronics and System Saver from Kensington Microware are two examples of fans that provide additional conveniences of this sort.

In or Out? Once you decide to add a fan to your computer, the next choice you must make is whether to mount the fan inside or outside. As you mull over this decision, consider whether the fan will be used to blow air *into* the computer or to exhaust air *out* from it. Both mounting methods and air flow designs have a lot of pros and cons associated with them. As we agreed earlier, let's avoid conflict as to which scheme may be technically superior. The reason for sidestepping this discussion is quite simple—in all but the rarest of cases, it proves irrelevant.

Even when an Apple is loaded, the need for a fan is usually quite marginal; that is, the heat build-up within the computer can be significantly reduced by the slightest movement of air. Thus, almost *any* fan will suffice to eliminate heat-related malfunctions.

Therefore, let your fan selection be dominated by several other "convenience" factors. For example, internally mounted fans are less obtrusive, quieter, and less expensive. The disadvantages to internally mounted fans are having another AC cord to contend with and the possibility that an existing device, such as a modulator, will have to be relocated. External fans offer simple installation and usually include a new power switch and one or more switched outlets. Their main disadvantage is that they cannot be used with some of the monitor and disk stands for the Apple that are so popular. If you don't plan on using one of these stands, and if you can use such added features as extra outlets and surge protection, then an external fan is probably the better choice.

As you may have noticed, we've placed the least importance on whether the fan blows in or out. This is partly because your decision on fan placement usually dictates the air flow design. Almost all internal fans blow cool air into and across the motherboard. External fans draw the hot air across and out of the computer. Since internal fans tend to be mounted on the right side and external fans on the left, the direction of air flow is essentially the same.

Another significant difference in the two kinds of systems concerns the way air is drawn into the computer. With the external fan, cool air enters through the slots on the right side, back, and bottom of the computer. This allows the air to enter slowly and smoothly from several large areas. In the case of the internal fan, the air intake is directly next to the fan. This creates a greater amount of suction just to the right of the computer, increasing the amount of dust and dirt that can get blown into the machine. This shouldn't cause any great concern, but it can lead to other problems.

A good example of an internally mounted fan is the Cool-Mark II from Mark Four Imports. This unit comes complete with double-sided foam adhesive and sells for $34.95. Do-it-yourselfers will find a real value in the Pee Wee Boxer Fan from Jameco Electronics. It is just the right size for the Apple and sells for only $12.95.

The Super Fan II (RH Electronics) and the System Saver (Kensington Microware) are excellent choices for external fans. Both products feature Apple-compatible color and styling, quiet operation, lighted power switch with two external outlets, and transient voltage suppression (optional on the Super Fan II).

Installation of either of these fans is extremely simple. First, you slide the unit onto the left side of the computer. Two hangers fit into the air vent slots to support the fan and make a tight seal. Then you remove the power cord that plugs into your Apple's power supply. You can put this cord away; as long as you have the fan connected, this cord is no longer needed. It is replaced by a short cable that exits from the back of the fan and then plugs into the Apple. The two extra outlets can then be used to power your monitor, printer, or whatever. The lighted switch on the front of the fan will then control your entire system. The final feature, transient protection, is another plus you can add to increase the reliability of your computer. This just reduces the possibility of a computer "crash" due to voltage spikes, which are often present on the power lines.

The Super Fan II sells for $109 ($74.95 without transient suppressor). The System Saver is priced at $89.95.

Fans and Stands. Several integrated monitor/disk stands with fans are also available. These combine the cooling function of a fan with the convenience of a complete center for your entire system. Two examples of such products are the Cool Stack from FMJ and the Apple Center from Doss Industries. These are priced at $69.95 and $249.95, respectively. The Apple Center also includes a key locking on-off switch, three convenience outlets, and a transient suppressor.

Tovatech Ventop. At the other end of the scale, there is an elegantly simple, passive solution to the heat build-up problem. This is the Ventop from Tovatech. The Ventop is nothing more than a replacement cover for the Apple. It is made of metal and has a generous number of air slots cut into it. Although the Ventop doesn't cool the computer as well as a fan will, it does an impressive job without the expense, noise, and hassle of adding a fan.

On the average, it appears that the Ventop reduces temperature rise within the computer about one-half as effectively as a fan. Of course, for this device to be of any use, you must not overload the top of the Apple or cover the vents with papers, disk drives, and so on. The Ventop retails for $45.

Strawberry Tree Dual Thermometer. While we're on the subject of temperature, there's an excellent peripheral board available for the Apple that allows the computer to monitor temperatures. It is the Dual Thermometer from Strawberry Tree Computers.

As its name implies, this unit supplies two independent temperature sensors that can be read by the computer. Each sensor is actually a tiny thermistor probe connected to the peripheral cards by a ten-foot cord. The probe cable can also be extended up to five hundred feet with no loss in accuracy. The thermometers have a useful temperature range of −55 to +125 degrees C (−67 to 257 degrees F). Within the range of −20 to 50 degrees C (−4 to 122 degrees F), the board's manufacturer claims accuracy to within 0.4-degree C.

The thermometer is quite simple to use. First, you attach the probe cables to the connectors on the peripheral board. Then the board is ready to be installed into one of the Apple's slots. If more than two probes are needed, multiple thermometer boards can be plugged into several slots. A dummy plug is also provided when only one sensor (or any odd number of sensors) is being used. You could just leave the input unconnected, but this slows down operation of the board. This is so because of the manner in which the Dual Thermometer converts the variable resistance signal from the probe into digital form for the computer—a process very

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similar to the way the Apple reads game controllers. The conversion process takes longer when reading cold temperatures (high resistance). Therefore, an unconnected input (infinite resistance) takes the maximum amount of time to read. The dummy plug simply puts a small resistance in place of the probe to eliminate this delay.

The most impressive aspect of the Dual Thermometer is the software that accompanies it on disk. Several programs are provided that let you set up the Apple as a monitoring station.

The *Therm* program is the most useful and is divided into two parts: setup and display. The setup portion lets you configure the system to your needs. Each probe can be named, given high and low alarm trip points, and set up to record minimum and maximum values over any given period. The program also supports time of day and calendar features. This information can be read from a clock board if you have one; otherwise, a timer on the thermometer board is used after you've preset the time and date by hand.

Once all the probe parameters have been set up, the Apple can be placed into display mode. Once you've set up your parameters, all the pertinent information for each probe is shown on the screen. The current temperatures are updated every few seconds. The high and low temps are also displayed, along with the last time they were reset. The status of the alarms is also given. If they are enabled and the probe's temperature exceeds its limit, the computer begins to beep and an appropriate flashing signal is displayed to indicate this condition.

At any time, you can cause the data that's presently in memory to be stored on disk or sent to the printer. If you prefer, the program can also be configured to store or print data automatically at any given time or at regular intervals. Many other features that can be tailored to your needs are also available. This program is certainly quite versatile, and it is also (easily) expandable. You may wish to add other features such as the ability to control external devices according to temperature. While this would entail adding some extra hardware, the small software routine could be added to the *Therm* program. What makes this exceptionally easy is the fact that the program is written in Applesoft and is completely documented in the user manual. Speaking of this manual, it is excellent (isn't that a change?)! In addition to the operating instructions, the manual provides a complete description of the hardware, a listing of the *Therm* program (including a complete list of variables used), assembly language listings, and a wealth of useful information in an appendix.

The Strawberry Tree Dual Thermometer sells for $260.

Legend Slot 8 and Soft 8. Now that your Apple's slots are full and you have a fan to keep things running cool and a thermometer board to keep tabs on the temperature, Legend Industries has a couple of devices that allow you to add yet another peripheral card to your Apple. When you need just one more slot for your Apple, these units are low-cost alternatives to a complete expansion chassis such as the one offered by Mountain Computer.

The Slot 8 is a small board that plugs into slot 7 of the Apple. Mounted on this board are two peripheral connectors similar to those in the Apple. Thus, you can plug two peripheral boards into the Slot 8 and have both of them occupy a single slot. These boards sit horizontally, one above the other, at the extreme far right of the computer. If you had a modulator or fan mounted there, it would have to be moved to a different slot.

Of course, only one board can be used at a time. There is a large switch to select which board is active, and the computer must be turned off whenever this switch is changed. Therefore, the main advantage of the Slot 8 is that it eliminates the need for removing one board and replacing it with another. This also saves wear and tear on the peripheral connectors. Furthermore, the Slot 8 provides a most convenient place to store that "ninth board" as opposed to putting it on a shelf or replacing it in its protective packaging.

Typical uses for the Slot 8 would be for selecting between two alternate CPU cards—such as Z-80, 6809, and 8088 boards. Any pair of peripherals that would be incompatible with each other are also likely candidates. Devices such as the Applethrottle (June 1982), which may not command a permanent position in your Apple, become much more useful when installed in the Slot 8. They can then be available instantly with just the flip of a switch.

For added convenience, there's also a Slot 8 extension switch available. This attaches by way of a small ribbon cable and offers remote slot selection without having to remove the Apple's cover. Using double-sticky foam, this board can be attached to a convenient spot on the outside of the computer. Just above the remote switch is a small display that reads out "7" or "8" to let you know which board is active.

The other device offered by Legend is known as the Soft 8. This device also allows two cards to be placed in one slot, but offers software selection of the active board. This means you can switch between boards without turning off the computer and even from within a program. A small patch for DOS is also included on disk. This patch enables you to access the boards in Soft 8 with familiar commands, such as PR#7, PR#8, and so on.

The process of installing the Soft 8 is similar to that for the Slot 8. There are no switches on the board, however. Instead, one IC is removed from the Apple's motherboard and replaced with a jumper cable from the Soft 8. Two LEDs on the board indicate which slot is active.

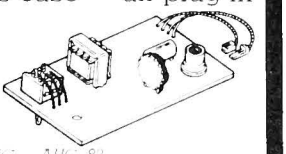
One major difference between the Slot 8 and Soft 8 is how the peripheral boards are powered. In the Slot 8, only one board is electrically powered at a time. Therefore, the power drain and heat generated come only from the active board. With the Soft 8, both boards are powered simultaneously and this adds to the power consumption and temperature rise. If your computer can tolerate this extra load, then the Soft 8 is probably a more useful addition. The Slot 8 sells for $75, and the Soft 8 for $85. ■

Doss Industries, 1224 Mariposa Street, San Francisco, CA 94107; (415) 861-2223. FMJ, 23520 Telo Avenue, Torrance, CA 90503; (213) 325-1900. Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002; (415) 592-8097. Kensington Microware, 300 East 54th Street, New York, NY 10022; (212) 486-2802. Legend Industries, Box 112, Pontiac, MI 48056; (313) 674-0953. M&R Enterprises, 910 George Street, Santa Clara, CA 95050; (408) 980-0160. Mark Four Imports, Box A, San Gabriel, CA 91776; (213) 287-9945. RH Electronics, 566 Irelan, Buellton, CA 93427; (805) 688-2047. Strawberry Tree Computers, 949 Cascade Drive, Sunnyvale, CA 94087; (408) 736-3083. Tovatech, 1903 Fordham Way, Mountain View, CA 94040; (415) 968-0392.

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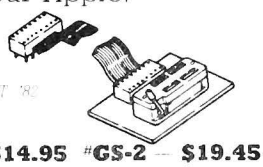


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☐ **SoftLink** (Santa Clara, CA) has received $1.5 million in venture capital funding from U.S. Venture Partners and Rothschild Incorporated. The company will utilize the infusion of funds "to turn its resources toward further development of the *SoftLok* encryption program and other projects that could revolutionize software distribution," says **Reid Rutherford,** president and cofounder of the business applications software firm.

Robert Katz, former director of marketing and sales for **SKU Distributing,** has joined the company as marketing director. He is responsible for coordinating all marketing and sales plans and for the development of SoftLink's sales force.

☐ **Software Dimensions** (Citrus Heights, CA) has adapted a new distribution policy for its *Accounting Plus* product line. Formerly distributed exclusively by Systems Plus, with the result that many dealers don't know that Software Dimensions is the developer of the business accounting system, the company's products are now distributed through a network of regional and national distributors who will provide Software Dimensions with the name identification and control it desires.

☐ **Fay** and **Eric Popejoy** (of *Tunnel Terror* fame) can be found the first Sunday of every month at the Hollywood Science Fiction and Comic Book Convention at the Ambassador Hotel, Los Angeles. Both are members of the Academy of Science Fiction Fantasy and Horror Films, and they bring a large collection of movie stills and memorabilia to the monthly convention. They also bring along an Apple and some well-chosen games, which draws a lot of business to their part of the room. "The kids love the games," says Fay, "and everyone else always asks us what kind of computer they should buy," to which she gives the obvious answer.

☐ **Ken Landis** has joined the management consulting department of the Saint Louis office of Peat, Marwick, Mitchell & Company, an international accounting and management consulting firm. He was previously partner and founder of Interface Associates, New York City, a microcomputer distribution and consulting business. Landis remains partial to buttonwood trees.

☐ **Universal Systems for Education** (Colorado Springs, CO) has opened its first PAL learning Center in the Denver suburb of Aurora, Colorado. The Center uses Apples and the PAL (Personal Aid to Learning) software developed by USE to teach reading to elementary school children. "Reading is the area of education that concerns parents most," says **Dr. Dale Foreman,** vice president of curriculum development. "We developed the PAL reading software to capitalize on how fascinated cildren are with computers. Working with the computer can be very motivating for children who need to improve their reading skills. With the Learning Center, we can now offer that option to parents who don't have a computer at home." USE plans to open additional centers in Denver and Colorado Springs, expanding to a national franchise by late 1983.

☐ **dilithium Press** (Beaverton, OR) will introduce the first products of its new software division in January 1983, sold in sets with dilithium Press computer books. The packages will be sold through bookstores. **Merl K. Miller,** founder and part owner of dilithium Press, has been elected chairman of the board. **Patricia Miller,** formerly vice president of the firm, is now president, and **Dan Ford,** former distribution and operations manager, has been named vice president of operations. **Paul McGilvra,** owner of the Times-Litho printing company and part owner of dilithium since 1980, is the company's new secretary/treasurer.

☐ **Michael B. Shane,** chairman of **Leading Edge Products** (Canton, MA), has announced that one cent from the sale of every Elephant disk sold in the world will be donated to the Jimmy Fund, founded to aid the parents of children with cancer. The fund makes contributions to the Sidney Farber Cancer Institute to aid children who are the victims of cancer.

☐ **Richard S. Sunderland** has been named executive vice president and chief operating officer of **Sierra On-Line** (Coarsegold, CA). The appointment was announced by company president **Ken Williams,** along with the appointment of **T. Eugene Stroud** as vice president of marketing. Sunderland comes to the company from Informatics, where he was vice president of software technology. He will be responsible for the overall successful operation of Sierra On-Line. "In acquisitions, we are planning to release at least two games and one business product each month in 1983, including conversions to different computer systems," says Sunderland. "Sierra On-Line is also devising a revolutionary educational software line designed to be a teacher, not just a primer." Stroud, previously with a Los Angeles film supplies and equipment distributor, will oversee the advertising, promotion, public relations, and sales efforts of the company.

Licensing agreements have been successfully completed with **SBD Software** (Richmond, Surrey, England) to produce the company's software in the United Kingdom, and with **Starcraft** (Tokyo, Japan), for production and distribution in Japan.

And for those who have wondered why On-Line changed its name, Sunderland says, "We're the progeny of Alvin Toffler's *The Third Wave*, a high-tech company nestled in the Sierra Nevada mountains. We believe our new name reflects that combination."

☐ **Jim Warren,** director of **Computer Faire** (Woodside, CA), has formed a video group to produce and market videotape tutorials on microcomputer programs. The first tapes will cover *VisiCalc, SuperCalc, WordStar,* CP/M, and a basic introduction to microcomputing. "The product tutorials will follow the same theme as the Impatient User's Guides series that we began in *DataCast* magazine a year ago," says Warren, "providing essential information to get the eager new user up and running quickly." The group will also take over production of the PBS television series "The Computer Chronicles." Following the signing of underwriters for the expanded-format show, it will be distributed to PBS and ETV networks nationwide, and may be available to other nonprofit groups.

☐ **Brillig Systems,** software consultants, has moved from its Burke, Virginia, location. The new address is Box 2847, Springfield, VA 22152. The new telephone number is (703) 569-1338.

☐ **Atasi** (San Jose, CA), manufacturer of 5¼-inch disk drives, has received $3.25 million in second-round financing. Participants include first-round capitalists U.S. Venture Partners and the Sprout Fund, a venture subsidiary of Donaldson, Lufkin, and Jenrette. They are joined by new investors Memorial Drive Trust and First Chicago Investment Corporation. The funds will be used as working capital for Atasi's manufacturing and shipping activities involving its 20, 33, and 46 megabyte 5¼-inch Winchester disk drives.

☐ **Information Unlimited Software** has relocated to an expanded facility in Sausalito, California, moving from its former Berkeley headquarters to the 17,000-square-foot facility to accommodate expansion in research and development and marketing. The company is now located at 2401 Marinship Way, Sausalito, CA 94965; telephone (415) 331-6700. The company has signed a distribution agreement with Sears whereby Sears will be allowed to purchase IUS business packages for sale in the chain of forty-six new Sears Business Systems Centers.

☐ **Phoenix Software** (Lake Zurich, IL) has introduced *Copy Cruiser*, a utility that allows the Apple software publisher to format and write a

sixteen-sector, thirty-five-track disk in sixteen seconds. According to program author **Dav Holle,** "Many systems offer fairly fast copying, but in a commercial environment it is even more important to offer complete verification as well. *Copy Cruiser* has an option to verify all 560 sectors during the write cycle to ensure a perfect copy every time. The complete verification process adds just seven seconds to the total copy time. In addition, each time *Copy Cruiser* is used, the RAM is first tested to ensure that memory chips are functioning correctly. Once the original is read in, the RAM contents are monitored to catch memory-related errors that could occur during extended duplicating sessions."

☐ A one-day seminar on improving industrial engineering with microcomputers will be held by the **Institute of Industrial Engineers** in San Jose, California, on January 24; in San Diego, January 25; and in Denver, Colorado, on January 26. **Gary Whitehouse,** industry consultant on operations research, computer applications, and network modeling, will lead seminars on equipment comparisons, case studies, Basic programming language, and a discussion of long-term implications of microcomputer usage in industrial engineering. Enrollment forms and information are available from IIE Conference Department, 25 Technology Park, Atlanta, Norcross, GA 30092.

☐ **Jamie Johnston,** previously of Ithaca Intersystems and Euro Micro, has been appointed director of sales with **Micro Peripherals** (Salt Lake City, UT). She will be responsible for sales training and marketing of PrintMate dot-matrix printers and *Ap-Pak* applications packages, and she'll use her telemarketing expertise in MPI's telephone marketing program, promoting direct contact with dealers, distributors, and OEMs.

☐ **Business and Professional Software** (Cambridge, MA), developer of *Apple Business Graphics*, has completed its first venture capital finance agreement, from which it will receive in excess of $300,000 from Eastech Associates of Boston. BPS president **David Solomont** announced that the company has also arranged a $400,000 line of bank credit with the Arlington Trust Company of Arlington, Massachusetts. **Peter Gyenes,** marketing consultant and former vice president at Prime Computer, and **Dr. Fontaine Richardson**, visiting lecturer at the Massachusetts Institute of Technology and cofounder of Applicon, have been named to the BPS board of directors.

☐ **Link Systems** (Santa Monica, CA) has appointed **Rick Gibson** vice president of sales and marketing. Gibson most recently headed sales and marketing for KLH, a consumer electronics manufacturer.

☐ **Axiom Corporation** (Calabasas, CA) has signed Indeserv to handle depot repair of their printer line. By calling (800) 343-0875, Axiom customers will be able to find the service depot nearest them, determine a flat rate repair charge, and have complete repairs in three to five working days.

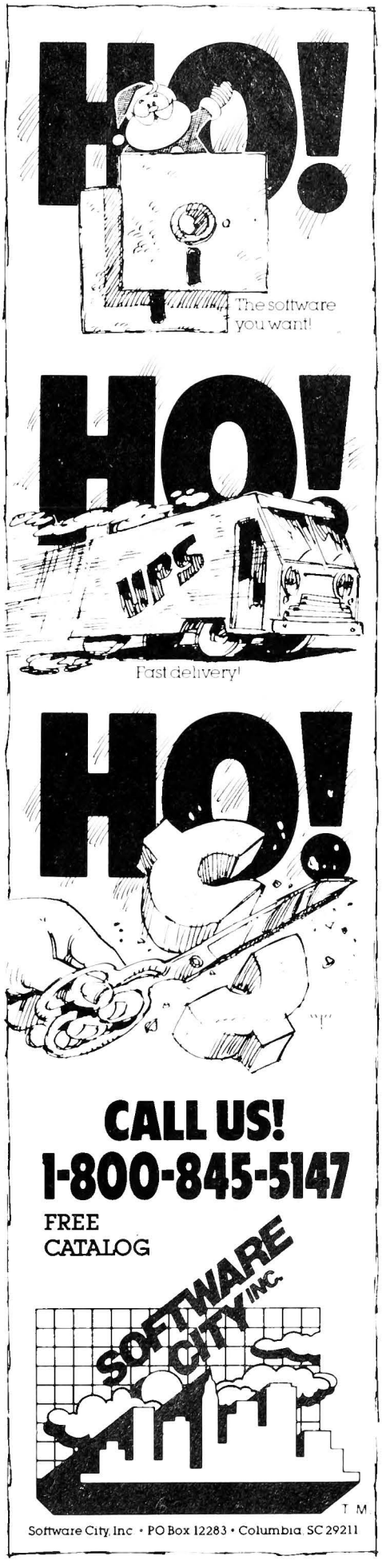
☐ **Computerland** (Hayward, CA), the world's largest network of retail computer stores, has opened its three hundredth store in Baton Rouge, Louisiana, and its three hundred-first in Panama. Franchisees are licensed to open stores by the end of 1983 in Norway, Denmark, Finland, Spain, and Italy. Computerland is adding stores at a rate of fifteen per month, and anticipates reaching the four hundred mark by year's end. Sales are expected to exceed $400 million, up 75 percent from 1981. "Our challenge," says president **Ed Farber,** "is to create on five other continents the kind of awareness and demand that exists in the United States and Canada."

☐ The recorder care division of **Nortronics** (Minneapolis, MN), manufacturer of magnetic read/write heads, has introduced a line of maintenance products for personal computers. Introduced at the November Las Vegas Comdex show, the new line will be distributed to computer retail stores, catalog houses, and OEM accounts.

☐ **TDK** (Port Washington, NY), having announced its entry into the floppy disk market, has appointed **Frank Kramer** national computer products manager. He will supervise marketing and sales strategies for the company's initial release of five types of floppy disks. Most recently director of European sales for Syncom, Kramer has been involved in magnetic media computer products since 1964.

☐ An advanced electronic mail service now available to subscribers of the **Source** (McLean, VA) is the first to meet the National Computer Based Message Systems standards developed by the National Bureau of Standards. As electronic mail services upgrade their services to meet CBMS standards, it will become possible to exchange electronic mail among different systems. The SourceMail service is the first electronic mail to be wholly owned by Source Telecomputing rather than leased from a facility manager. "Having our own electronic mail not only gives us a superior product, but allows us to upgrade and fine-tune SourceMail continually, plus tailor it for specific custom demands," says **George Grune,** chief executive of the company. "Our subscribers now have access to one of the most advanced personal communication services ever developed; soon they will belong to a nationwide, then worldwide, linking of similar communication networks."

☐ **Dave Wertzberger,** vice president of marketing and sales with **SSM Microcomputer Products** (San Jose, CA), has signed agreements with three new distributors: Sigma Distributing, one of the original Apple distributors, will be handling SSM's Apple hardware and software products in the Northwest; Computime, carrying the full line of Apple and S-100 products, will be marketing in the Midwest; and Micro D, longtime SSM Apple hardware and software distributor, will do business in the Southwest through a new localized Texas distribution center with its own sales and support staff.



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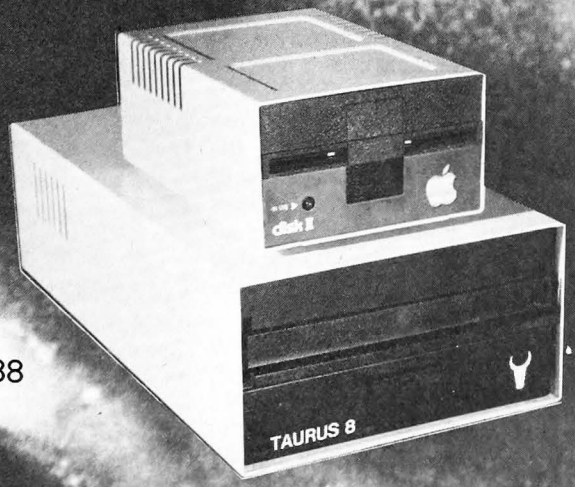
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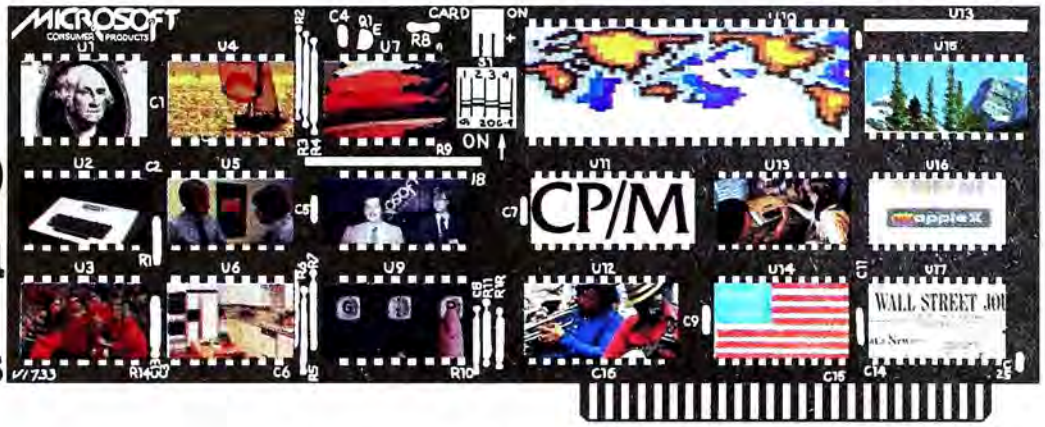
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SOFTCARD Symposium

by Greg Tibbetts



Once again we're nearing the end of another year. This month we'll complete our discussion of the SoftCard boot process with an examination of the Z-80 boot code.

As you'll remember from last month, the boot process up to the point at which the system is completely loaded into memory runs entirely in 6502 code. In the course of this period, three separate loaders execute, the presence of the SoftCard is determined, and various vectors required by the 6502 and/or other Apple hardware are initialized.

With the exception of the loaders, little of this process has much to do with CP/M itself and its initialization. Rather, most of it is aimed at establishing the existence of a SoftCard and, if a SoftCard is present, at reconfiguring the Apple to create the special environment needed by CP/M. These two things determine whether or not it is safe to activate the operating system, and only when they have been established is the Z-80 awakened and the true CP/M boot code executed. While the 6502 portion of the boot routines (except for the loader, of course) have no real counterpart on other CP/M systems, this Z-80 module is, as we shall see, very similar in purpose if not in content to the boot routine found on every CP/M system.

Typically, the CP/M boot process in most systems consists of a 128 or 256 byte loader (its size depends on the sector size of the disk format in use) called the Cold Start Loader plus a very short module labeled BOOT. This module initializes the stack pointer to 100H, prints the familiar sign-on message on the screen (after clearing the screen, of course), and sets the current disk to 0 for drive A. Once these functions are completed, BOOT branches to a routine (usually labeled GOCPM) that initializes all of the temporary variables used by CP/M to their proper starting points and performs any necessary hardware initialization.

GOCPM is usually a part of the CP/M warm boot routine and is called after the CCP and BDOS have been reloaded from disk during the warm boot process. The SoftCard Z-80 boot code, hereafter called Boot, begins at the end of the various BIOS routines and is comprised of 333 bytes of Z-80 code. It is somewhat larger than the boot routines on other CP/M implementations because it is required to do considerably more things.

Boot begins at address 0DEA8H for 56K (0AEA8H for 44K since the 44K BIOS begins at 0AA00H as opposed to 0DA00H for 56K). The additional tasks that the boot code is required to perform are primarily a result of the flexibility of the Apple II. The Apple II is unlike other systems in that its hardware can be modified easily by simple rearrangement or substitution of peripheral cards.

Boot must be capable of completely reconfiguring itself during every cold boot cycle. In other CP/M systems this is not required, since these systems do not have expansion capability in a standard way. Some are simply not expandable other than by the addition of the manufacturer's printer and drives, in which case CP/M always knows what the hardware will look like. Other CP/M systems are infinitely expandable, but there is no standard protocol for hardware, so no matter how big Boot and the BIOS code were, they could not hope to recognize and deal with all the various peripherals that could be connected. In such systems, no reconfiguration of the BIOS is allowed without altering the source code and reassembling it.

The Apple II is unique: expansion of the system is easy, and although peripherals are made by many different manufacturers, each manufacturer must follow a set protocol. The standard protocol makes it relatively easy for the 6502 loader code to build a table, which Boot then uses to reconfigure the BIOS.

Specifically, Boot first loads the Stack Pointer with the address 0100H as a default during its operation. This gives it stack space equivalent to the last 128 bytes of the temporary workspace area between 0 and 100H. This is done simply to initialize the location of the stack to someplace where there is no code or data that may be overwritten during the operation of Boot. The location used is not really important since the stack won't be there long. This stack space will only be used during the execution of Boot and GOCPM (perhaps two to six bytes used, maximum), since the CCP reserves sixteen bytes within itself as its own eight-level stack, and BDOS reserves forty-eight bytes within itself as its own twenty-four-level stack.

Once it has positioned the Stack Pointer, Boot's next job is to destroy the jump vector to itself. This vector is the only means by which Boot can be accessed. You should remember from last month how we arrived at the Z-80 boot code—by means of a jump to the beginning of BIOS (0DA00H or 0AA00H), placed at location 0000H, and a jump to the actual boot code placed at the beginning of BIOS. Boot destroys the route to itself by overwriting the JP instruction (0C3H) at the beginning of BIOS with a RET instruction (0C9H); this substitution of an RET for a JP causes any calling program simply to return, with no activity having been performed. The obvious question, though, is why does Boot want to cover its tracks?

The answer lies in the fact that certain code, such as the initial placement of the Stack Pointer and, in some systems, the initial configuration of interrupts, has to be executed only once—on cold boot. Once executed, these routines would simply be taking up valuable space if they were allowed to remain. By destroying the jump vector to itself, Boot enables the operating system to overwrite these no longer essential routines and make room for data storage. In this way, CP/M makes maximum use of the available memory by not allowing Boot to occupy and waste valuable space indefinitely. In our later discussions on the BIOS organization, we'll be covering some of the data space needed by the system.

We left off with Boot just as it had made sure it would never again be found. Boot's next task is to set up in the default IOBYTE at location 0003H in the temporary workspace. You'll remember from last month that locations 0000 to 0002 were the jump vector, first to Boot, then to warm boot; and that location 0003 was the IOBYTE, 0004 was the current disk, and 0005 to 0007 was the jump vector to BDOS.

Boot is now setting up the IOBYTE in its initial configuration. This concept of the IOBYTE is derived from and corresponds to the Intel standard method of device mapping. The IOBYTE is a single location in memory that provides a constant indication of the particular assignment of physical to logical devices. This subject was originally discussed a number of months ago in a column on the IOCB, but since so much time has passed, let's take a short look at what it means specifically.

As we mentioned then, CP/M is designed to be organized into a

standard interface to users and their programs and a custom interface to the hardware—a logical side and a physical side, if you will. To deal with I/O in the system, the logical module or BDOS must always work through the physical module or BIOS. Since the BIOS could really consist of anything and the system could be hooked to any type of hardware, and since the BDOS must organize this somehow, BDOS is set up to deal in terms of devices. From the standpoint of BDOS, these are logical devices capable of handling only input or output in a very general form, while from the standpoint of BIOS, they are physical devices that give input and receive output in specific ways.

For the purposes of conserving memory and keeping things simple, the BDOS is set up to handle three kinds of input and two kinds of output through four logical devices. They are CON:, which handles both input and output and stands for console; RDR:, which is input only and stands for paper tape reader; PUN:, which is output only and stands for paper tape punch; and LST:, which is output only and stands for list. There are, therefore, five types of requests that BDOS can make to BIOS for I/O. These are the BIOS functions CONIN, CONOUT, LIST, PUNCH, and READER. While the two console requests and the list request generally deal with their namesakes, that is, the console and the printer, the punch and reader may be any type of device, providing that punch is output and reader is input.

In many systems, these four devices and five types of I/O may be sufficient to handle the actual hardware contained in the system. In other systems, however, there may be considerably more physical devices connected that are capable of the same type of I/O. For example, the computer system may have two printers, or it may have a printer and a paper tape punch, or it may simply have a CRT and a printer. In each case, output of data could be directed equally well to any of these devices, and at various times the user may wish to arrange things various ways. A means was set up, therefore, to allow the user to alternate between such devices by assigning the four logical devices (kinds of I/O) to more than that number of physical devices. This is done by means of the IOBYTE; the BIOS checks the IOBYTE before determining which physical device to use for the I/O. Each physical device can only be assigned to certain

Device	Name	Can be assigned to
TTY:	teletype	console, reader, punch, or list
CRT:	cathode ray tube	console or list
UC1:	user console dev 1	console only
PTR:	paper tape reader	reader only
UR1:	user reader 1	reader only
UR2:	user reader 2	reader only
PTP:	paper tape punch	punch only
UP1:	user punch 1	punch only
UP2:	user punch 2	punch only
LPT:	line printer	list only
UL1:	user list 1	list only

Table1.

of the logical devices. In some cases this is for good reason (you wouldn't want to assign an output physical device to an input only logical device), but in others it appears to be rather arbitrary.

The number of physical devices allowed was also established by the designers of CP/M. It may still not be equal to the number of devices the system actually contains, but it will no doubt come closer than the mere four allowed in BDOS itself. The physical devices and the logical devices to which they can be assigned are shown in table 1.

The permissible assignments are summarized as follows:

```
CON:  =  ÷TTY:,     CRT:,  UC1
RDR:  =  ÷TTY:,     PTR:,  UR1:, UR2:
PUN:  =  ÷TTY:,     PTP:,  UP1:, UP2:
LST:  =  ÷TTY:,     CRT:,  LPT:, UL1:
```

The IOBYTE, then, merely keeps track of which devices on the right of the equal sign correspond to which BDOS I/O functions shown at the left. When BDOS makes a call to LIST, for example, to perform the LST out function, the BIOS can examine the current value of the IOBYTE to determine which of up to four devices to use. The assignments via IOBYTE are made by means of the STAT program, and assigning LST = CRT, for example, causes any output from *PIP LST:=filename.typ* to appear on the screen. Likewise, any control-P causes an echoing of both the CONOUT and LIST output to appear on the screen (very confusing).

Boot's responsibility is to set up the initial value of IOBYTE.

It should be noted that we have talked only conceptually about the IOBYTE assignment and not practically. We will cover practical matters more fully in a later column on interfacing. For now, keep in mind that the only time the IOBYTE is set is during a cold boot, so if this value is somehow destroyed or significantly altered, there may be some bizarre I/O until the next cold boot.

Boot's next job is to take the now known address of the SoftCard (remember that writing to this address in Z-80 mode is what reactivates the 6502) and place it into the general-purpose 6502 activation routine in the BIOS. This routine, known as CALL65, is the way in which various 6502 routines are called. It is located at 0DB3BH (or 0AB3BH for 44K), and to use it you simply place the address (in 6502 terms) of the 6502 routine to be called in the HL register and call CALL65. The routine handles setting up the 6502 vector and turning off the Z-80, returning to the caller routine when the 6502 is finished and the Z-80 has been reactivated.

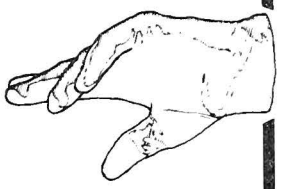
The BIOS, as it is loaded, contains zeros in the address field of the 6502 activation instruction (an LD (0000),A). In this instance, Boot is simply putting in the proper address, now that it's been discovered by the Z-80 finder.

Next, Boot loads a temporary location in the temporary workspace (called CDISK) with the value 00. This is location 0004H, which, as we said earlier, is the place BDOS and CCP always look to find the currently logged disk. Boot places a 00 there to indicate drive A, since the drives proceed in numeric order, that is, A,B,C,...P = 0,1,2,...15.

This completes the initialization of CP/M temporary variables. Aside from the loading of the SoftCard address, this procedure is the same on all CP/M systems that implement the IOBYTE function. Most of the rest of Boot's functions will be Apple-specific.

The first of these remaining tasks is to determine what type of peripheral card (if any) is installed in slot 3. To do this, Boot accesses the slot types table SLTTYP, which was set up in the IOCB by the cold load-





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by Bob Nacon

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** Set, clear, or toggle ANY bit or bits anywhere in RAM memory...

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er code as it examined the cards in each slot.

In SoftCard CP/M, slot three is reserved for an eighty-column card or an external terminal interface. As such, the only card types CP/M recognizes here are Apple Communications Cards, serial cards, or eighty-column cards (which usually appear as serial cards). If an external terminal or eighty-column board is found here, Boot uses the card type byte (implicitly combined with the slot) to select the address of the appropriate read and write routine in the BIOS needed to communicate with the card.

The BIOS contains all three output routines, for serial cards, parallel cards, and Apple Communications Cards; and both input routines, for serial and Communications Cards. It finds the appropriate addresses and installs them in the address fields of certain jump instructions in the BIOS CONIN and CONOUT routines that are called by BDOS. At the same time, the warm boot code is modified in a special way. Normally, the warm boot code alters the CCP every time it loads it, so that when directories are printed to the screen they are only two columns wide and fit on the Apple's forty-column screen. If an eighty-column device is found, Boot patches the warm boot code so that a value indicating the normal four-column directories is installed in CCP.

Boot's next task is to determine if a peripheral card exists in slot 1. It does so using SLTTYP in the same way as it did for slot 3. Since slot 1 is reserved for a printer interface (an output-only device), and since any of the cards Boot can recognize will perform output, any card recognized in this slot is treated as such a device. Again using the card-type byte, Boot selects the address of the appropriate write routine for that type of card and installs this address into a jump vector in the BIOS LIST routine.

The final bit of peripheral configuration occurs with slot 2, which is reserved for reader and punch devices. Using the same technique as before, Boot determines whether a card is present. If a card is found, the address of the proper write routine is placed into the jump vector in the PUNCH routine, again since all peripheral cards recognized by Boot will perform output. If the card is not a serial or an Apple Communications Card, however, it won't be able to handle input, and so the reader function won't be implemented.

To follow the general guidelines of Digital Research, the reader routine is altered in these cases to return immediately with the value 1AH, the ASCII end-of-file character. This is to prevent the system from hanging, either because of waiting for input or because it's receiving a constant flow of garbage from a nonexistent device; the latter problem may occur if the user attempts to access the RDR: device using PIP, for example. The same patch is made to the reader code if no card is discovered in the slot.

At this point, Boot has taken care of the four necessary logical devices by patching their associated routines so they access the correct hardware. The next step is to initialize the hardware devices.

Unlike parallel cards, serial and Apple Communications Cards require that the serial I/O chip on the card be initialized to the proper values before the cards will work. Initialization sets such things as baud rate, parity, number of stop bits, and so on. Boot does this by calling the general initialization routine, IOINIT, located in the BIOS. IOINIT is also called by the warm boot code when it is executed.

IOINIT functions by counting down the slots, identifying serial and communications cards, and resetting the hardware to the proper values—and then calling the serial card init routine. When all such cards have been initialized, IOINIT returns control to Boot.

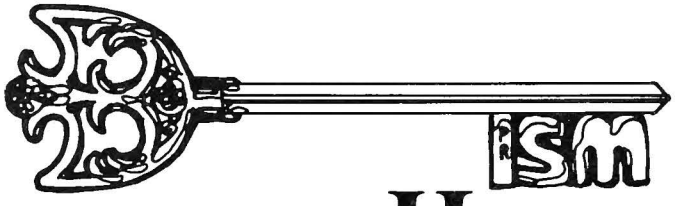
Boot then finishes up by printing the sign-on message. This is accomplished by first finding the software screen-function character in the IOCB for clear screen (Boot looks it up each time, since this code may be permanently altered by the user with CONFIGIO) and then outputting it (with its lead-in character, if necessary) by calling the BIOS console output routine that Boot itself just patched. Once this has been done, the actual sign-on message is printed one character at a time in the same fashion.

In early versions of the BIOS, the software screen-function character for lo-lite (that is, noninverse) was also sent just before the sign-on message. This was to make sure that CP/M did not start up in inverse or hi-lite mode if the user had last been in either of those modes. This se-

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quence, however, was not handled well by Hazeltine terminals; consequently, version 2.20B was patched to skip this routine.

After the printing of the message, Boot transfers control to the routine we called GOCPM, which is itself a part of the warm boot code. We will examine this routine next.

The warm boot code, not to be confused with the warm loader about which we spoke last month, is a routine in the BIOS that reloads the CCP and BDOS and reinitializes the CP/M temporary storage locations. Its actual label in CP/M is WBOOT, so we'll refer to it as Wboot from now on. When it's entered at GOCPM, three things in Wboot are bypassed: setting the stack pointer to 80H, loading the CCP and BDOS using the warm loader, and calling IOINIT.

Aside from those three things, which have already been done during the boot process, Boot's access is no different from a standard warm boot. In version 2.20B, there is an additional function that doesn't get performed. It relates to the application note passed out by Microsoft, called *Turnkey*. This program allows a user to install an auto-run capability to CP/M such that whenever the system is booted, a certain program or sequence of characters will be executed as if it had been typed in at the keyboard. Since this command line is stored directly in the CCP, it is executed every time the CCP is loaded and branched to (that is, with every warm boot).

In 2.20B, therefore, there is a routine that zeros the command line length in CCP after reloading it during warm boots, thereby telling CCP that no command exists. In versions prior to 2.20B, the *Turnkey* utility did not exist, and therefore this routine was not in the warm boot code. Using *Turnkey* with the early version makes the command line execute on both warm and cold boots, which is generally undesirable. Obviously, this routine must be bypassed in 2.20B when we enter at GOCPM or the auto-run feature will not function.

The first action of GOCPM is the zeroing of two flags in the disk access code that the BIOS uses to block and deblock the 256-byte Apple disk sectors into 128-byte CP/M sectors. These flags essentially reset the disk access code to a start-up condition that indicates there is no valid unwritten data in the disk buffers and no in-process deblocking taking place.

The next task is the installation of a jump instruction and the address BIOS+3 (a jump instruction to Wboot) into the vector at location 0000. It was this location that originally contained the address of the beginning of BIOS, which was the jump to Boot. It now points three bytes beyond that address, to the jump to Wboot. This makes it easy for applications programs to exit and reload the CCP by simply performing a branch to location 0000H.

Third, GOCPM places a jump instruction and the address of BDOS into the vector at location 0005. It is this location that is called by applications programs when they wish to perform a BDOS function call.

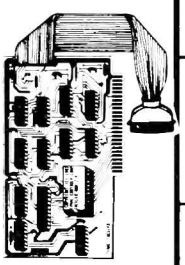
Fourth, GOCPM sets the default DMA address to 80H by calling the BIOS SETDMA function. The DMA address is the location at which 128-byte CP/M sectors will appear in memory if a disk read is requested and the location from which such sectors will be taken if a disk write is requested. Applications programs may set this anywhere they wish within the TPA, but it is always set to 80H as a default for standard CCP loads.

Finally, GOCPM patches the directory width value in CCP to either 1 or 3 to indicate two or four column directories based on the width of the display device, and this completes its operation. At this point it branches to the beginning of CCP and the system is operational.

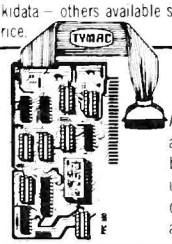
This examination of the boot process was intended to be informational. While its practical aspects are limited, knowing how the Boot process works will come in handy as we begin our in-depth examination of the BIOS routines and our discussions of the BDOS and CCP operation. Until next month. . . .

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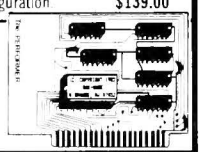
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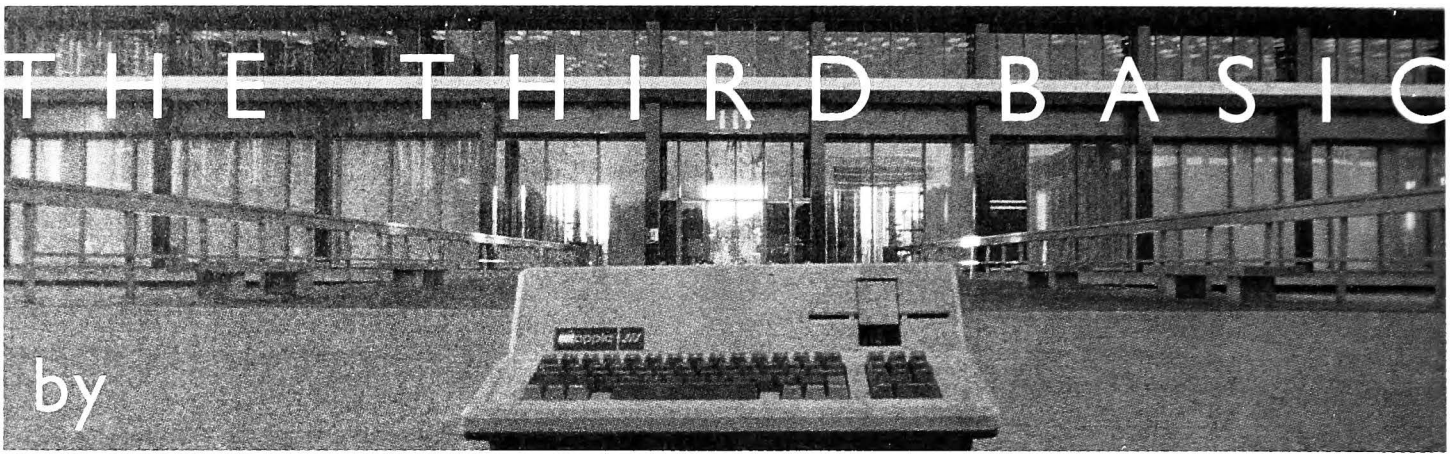
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THE THIRD BASIC



by Taylor Pohlman

Exploring Business Basic, Part 15

Lots of exciting things have happened on the Apple III frontier since we last talked, and if any of you haven't heard about the new products Apple announced at Comdex, you should really check them out at your dealer's. One other product is worthy of note as well, a new piece of software from Quark Engineering, the *Word Juggler* people. The program is called *Catalyst*, a perfect name for the package, since it can control the start-up and execution of all your Apple III programs from a single command menu. This means that you can load all your application programs and language interpreters onto mass storage devices (such as the ProFile). Once you've booted the *Catalyst* program, going from *Apple Writer* to Basic to *VisiCalc* to *Senior Analyst* to Pascal to *System Utilities* is as easy as hitting a special key and picking the application off the menu. Yes, even protected programs like *VisiCalc* are provided for! If you haven't seen this program yet, zip down to your dealer for a demo or get in touch with Quark; it's really something.

One more note: The version of the console driver on the *Catalyst* disk implements several new events and allows the normal "read with wait" request to the console to accept interrupts. This means that things like generalized device spooling and some limited task switching are now possible for clever programmers. Rack up another first for Apple III and SOS!

Sifting through the Sorts. Last month we started exploring sort techniques, covering the simple but slow bubble sort, the Shell sort, and a somewhat esoteric sort that was referred to as an inverted list sort, good for situations where there are a large number of items but only a few values. Although the inverted sort is generally used for string data, such as state codes, sex codes, and so on, it is also very useful on numeric data where the same principle (lots of items, only a few unique values) applies. This month we will look at a faster version of the Shell sort, called the *quick sort*, and a new sort technique called the *binary tree sort*. Let's look quickly at the quick sort (heh, heh), and then explore the binary sort in some detail.

The Big Shuffle. For simplicity, we'll start with the routine we used last time to generate random numbers to sort in an array called sarray. The actual sort routine will be contained in a subroutine. The main program looks like this:

```
100 DIM sarray(1000),stack(100)
110 INPUT"Sort Routine. Number of
    elements to generate: ";a$
120 n=CONV(a$):IF n<2 THEN 200
130 FOR i=1 TO n:sarray(i)=RND(1):NEXT
135 PRINT"Start of Sort"
140 GOSUB 1000
150 PRINT"Sort complete. First 10 elements
    are:"
160 FOR i=1 TO 10:PRINT sarray(i);"    ";
    :NEXT
170 PRINT:PRINT:GOTO 110
200 END
```

As you can see, line 130 generates a set of random values in sarray, and then a gosub is performed to sort the array. As we discussed last time, one way to improve the performance of "exchange" type sorts (the name that the bubble, Shell, and quick sorts share) is to make the exchanges cover as much territory as possible in one swap. Quick sort algorithms go this one better by first guessing the midpoint of the values to be sorted and then swapping other values based on this hypothetical middle value. Furthermore, the initial swaps are performed on the opposite ends of the array. The quick sort gets further speed by successively partitioning the sets of values into smaller groups and working on each group until it is small enough to be sorted by simple swaps. While this makes for a much more complicated group of instructions, far fewer iterations of the code have to be performed. Faster performance is therefore possible. Here's the routine:

```
1000 REM Initialize begin and end points
1005 a=1:stack(1)=n+1:m=1
1010 j=stack(a):i=m-1
1020 IF j-m<3 THEN 1100
1030 mid=INT((i+j)/2)
1040 i=i+1:IF i=j THEN 1060:ELSE:IF
     sarray(i)<=sarray(mid) THEN 1040
1050 j=j-1:IF i<>j THEN IF sarray
     (j)<sarray(mid) THEN SWAP sarray(i),
     sarray(j):GOTO 1040:ELSE:GOTO
     1050
1060 IF i>=mid THEN i=i-1
1070 IF j<>mid THEN SWAP
     sarray(i),sarray(mid)
1080 a=a+1:stack(a)=i:GOTO 1010
1090 REM Check for cases of 1 or 2 elements
1100 IF j-m<2 THEN 1130
1110 IF  sarray (m)>=
     sarray(m+1) THEN SWAP
     sarray(m),sarray(m+1)
1120 REM Set begin and end points and
     check for completion
1130 m=stack(a)+1:a=a-1:IF a > 0
     THEN 1010
1140 RETURN
```

Several things are worthy of note here. First, it is necessary to use the same code to operate on each of the partitions of data that will be sorted. In some programming languages, this would be handled by means of a technique called *recursion.* Recursion simply means that a routine can call itself, without limit. Basic not only has limits on how many times a gosub can be executed without a return, it also has the attribute that all variables are global; in other words, each occurrence of a subroutine uses the same variables over again, forgetting their previous state. For those reasons and others, the previous routine uses the *stack* array to maintain information about each partition of the array and to work its way through each partitioned set until all are sorted. Note also the extensive use of the swap command, to exchange values in the most efficient manner possible.

The quick sort algorithm is generally faster than the Shell sort, except in those circumstances where the data is already sorted, or nearly so. Shell sorts will work through such arrays faster than the quick sort, which takes almost as long to arrange sorted data as it does to arrange data that's in random order.

It would be appropriate to consider the last example of quick sort. The example given earlier used the direct sorting of numeric data as an example. Quick sort can be used just as easily to sort string data, or simply to create sorted pointers to any type of data array. The next example takes string data from a file and performs a pointer sort. Remember that it is generally more efficient to swap numeric pointers than to swap strings. Voila:

```
100 DIM sarray(1000),stack
    (100),sort$(1000)
110 INPUT"Sort Routine. Filename to sort:
    ";a$
120 IF a$="" THEN GOTO
    200:ELSE:OPEN#1 AS INPUT,a$
125 ON EOF#1 LET sarray(0)=
    i-1:n=sarray(0):GOTO 140
130 PRINT TIME$;" Start of sort"
135 FOR i=1 TO 1000: sarray(i)=i:INPUT#1,
    i;sort$(i):NEXT
140 GOSUB 1000
145 PRINT TIME$;" End of sort"
150 INPUT"Sort complete. Do you want to list
    the sorted records?";a$
160 IF a$<>"Y" AND a$<>"y" THEN 110
170 FOR i=1 TO sarray(0):
    INPUT#1,sarray(i);a$: PRINT a$:NEXT
180 GOTO 110
200 END
```

The main routine has been changed considerably. Sort$ has been added as a string array for holding the values to be sorted. The string values are to be read from a random access text file instead of being generated by the program. In addition, line 125 sets up the *on EOF* statement, which will detect the end of data, set the appropriate values, and start the sort. Note also that the time$ function is being used. If you don't have a clock chip, you can time this yourself.

One of the advantages of using a file for input is that you can make multiple runs under the same conditions to test the efficiency of particular sorting algorithms. Line 135 uses sarray as a pointer array to the actual position of the sort$ values. The subroutine at line 1000 has been modified to use sarray as a pointer array so that the string won't have to be swapped directly.

```
1000 REM Initialize begin and end points
1005 a=1:stack(1)=n+1:m=1
1010 j=stack(a):i=m- 1
1020 IF j-m<3 THEN 1100
1030 mid=INT((i+j)/2)
1040 i=i+1:IF i=j THEN 1060:ELSE:IF
     sort$(sarray(i))<=sort$ (sarray(mid))
     THEN 1040
1050 j=j-1:IF i<>j THEN IF sort$
     (sarray(j))< sort$(sarray(mid)) THEN
     SWAP sarray(i),sarray(j):GOTO
     1040:ELSE:GOTO 1050
1060 IF i>=mid THEN i=i-1
1070 IF j<>mid THEN SWAP
     sarray(i),sarray(mid)
1080 a=a+1:stack(a)=i:GOTO 1010
1090 REM Check for cases of 1 or 2 elements
1100 IF j-m<2 THEN 1130
1110 IF sort$(sarray(m))>=sort$(sarray(m+1))
     THEN SWAP sarray(m),sarray(m+1)
1120 REM Set begin and end points and
     check for completion
1130 m=stack(a)+1:a=a-1:IF a > 0 THEN
     1010
1140 RETURN
```

Note changes in lines 1040, 1050, and 1110

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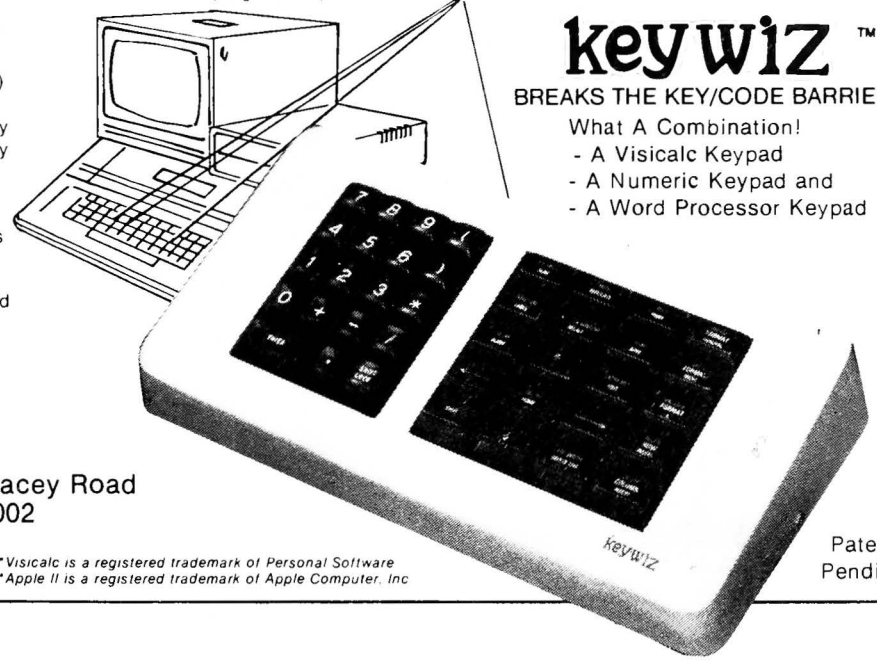
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that allow the if statements to test the proper element of sort$ and to swap the pointers if necessary. After the sort is complete, the pointer values in sarray are used in line 170 to look up the records in sorted order.

To use this program effectively as it stands, you need a program that will generate text files to be sorted. The next program will create a file of random junk that is useful for testing the sort routines and will come in handy later on in this article. It looks like this:

```
 5  OPEN#1,"JUNKFILE",12
 6  INPUT"NUMBER OF RECORDS TO
      CREATE: ";N
10 FOR I= 1 TO N
15  A$=""
20  FOR J=1 TO 5
30   A$=A$+CHR$(65+INT(6*RND(1)))
35   NEXT J
38  A$=A$+" "
41  FOR K=1 TO 4
42  A$=A$+CHR$(48+INT
      (10*RND(1)))
43   NEXT K
45  PRINT A$
47  PRINT#1,I;A$
50   NEXT I
60 CLOSE
70 END
```

This routine is designed to create random strings with the following properties: ten characters long, the first five characters consisting of random occurrences of the letters A through F, then a space character followed by a random four-digit number. Examples of the records produced look like this:

```
DEACF 2319
ABDDC 4982
FFBBA 1965
```

A slightly fancier version would prompt for the name of the file to be created, the record length, and so on, but this will serve nicely for the examples to follow. Generating two hundred records should be sufficient for testing the sort routines. Any more would slow things down unnecessarily without proving anything; any fewer would make it difficult to measure the consequences of changes to the program. For example, running two hundred records through the quick sort routine should finish in about forty seconds.

Note: Don't forget to turn the screen off during sorting! This can be done by a control-5 from the keyboard or by programatically printing an ASCII 14 to the console. The Apple III will still write information to the screen, but having it turned off during the sort speeds up operations by as much as 30 percent. This can make quite a difference when you're sorting or calculating, especially when you usually don't need to see the results until the operation is complete. This is also a favorite trick of *VisiCalc* users during recalculates or loads. The console driver automatically turns the screen back on when the next input request occurs.

Living in a Tree. Although the Shell and quick sort algorithms are quite efficient, they share one disadvantage that makes them difficult to use in some circumstances. There are occasions in processing data when *multilevel* sorts are desired. That is, somebody wants an address list arranged alphabetically by zip code. This means that the printout will group all people with the same zip code together and list them alphabetically within each zip code group.

To accomplish this multilevel sort, you must first sort alphabetically, and then sort by zip code the alphabetical list obtained. This implies that each sort must preserve the physical order of the previous sort. Unfortunately, the very fact that speeds up Shell sorts and quick sorts—the swapping of data over long distances—destroys the original order of the data, making multilevel sorts impossible to implement. Our old friend, the bubble sort, does preserve order, but it is impossibly slow. There are several sort techniques that solve this problem, but the one chosen for this article is the binary tree sort. This sort has the added virtue of very rapid insertion of additional records once the existing records are sorted, making it also a very suitable access method.

Before getting into the routine itself, an examination of the principles behind a binary tree data structure is a worthwhile exercise.

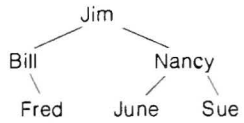
First, let's consider a list of names that we'd like to arrange in order:

```
Jim   Bill    Nancy  Fred   Sue
June  George  William Martha Frank
```

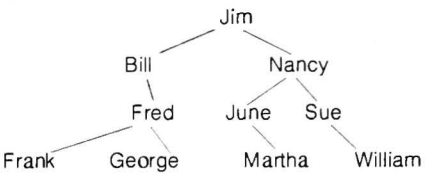
To arrange these names into a binary tree structure, we take the first name on the list as our starting point, or *root*. For the sake of simplicity, we'll consider this to be an upside-down tree, with the root at the top. To build branches off the tree, we take each element of the list, one at a time, and decide whether it should be connected on the right or left side of the root. For example:



Since Bill is evaluated as less than Jim (based on alphabetical value rather than on a character judgment), it is placed on a branch to the left. The next name, Nancy, goes on a right-hand branch, since it is greater than Jim. Following this logic, let's add Fred, Sue, and June. The tree now looks like this:



To review the process quickly, it went something like this: Fred was less than Jim, but there is already an entry on the right branch, so that entry (Bill) was examined. Since Fred is greater than Bill, Fred was attached to a right-hand branch below Bill. In the same way, Sue is greater than Jim, so Nancy is checked, and since Sue is still greater than Nancy, Sue is placed on a right-hand branch. June, however, while greater than Jim, is less than Nancy, and therefore goes to the left-hand branch. Constructing the rest of the tree with George, William, Martha, and Frank gives a final result like this:



While all this seems lovely and can certainly be accomplished with very few comparisons, what does it have to do with sorting? Good question! In a sense, it shares something of the technique used in quick sort, since we have partioned the data into very small groups that have a relationship to each other. It is these interrelationships that permit building a sorted list from this structure very quickly.

Two things should be obvious. No matter what value is used as a starting point, the value on the extreme left-hand side of the tree is the smallest, and the value on the extreme right-hand side is the largest. To assemble the list in ascending order, then, you must first go to the left until there are no more branches leading left. In this tree, that value is Bill. Bill becomes the first item in the sorted list. Next, we go down Bill's right branch, to its leftmost value. That's Frank, the next item in the list. Fred is next, because it must be greater than Frank (since Frank was to the left of Fred), and George is next, since it is the last item remaining on the left-hand side of the tree. That takes



us up to the top of the tree, where Jim gets added to the list, and the right-hand side is explored for its smallest (leftmost) value. Following the branches, June is added as the next list item, and then Martha. Since that branch is exhausted, Nancy is next, and when Nancy's other branch is explored no additional left-hand branches are found. That finishes the list, with the addition of Sue and William.

All that now allows us to say that the sorted order is:

Bill
Frank
Fred
George
Jim
June
Martha
Nancy
Sue
William

Although this seems like an awful lot of trouble to go to in order to sort a list of ten names, you should notice a few things that make this technique powerful. First, we are ordering the data as it is initially examined, and once we find a place for an item, it is never moved again. Further, if the tree is relatively well balanced (more on that later), it doesn't take many comparisons to establish a place for an item. Once the tree is built, a sorted list can be obtained easily, and without re-examining the item values, since the position in the tree structure itself is enough to establish the order. Furthermore, if we store pointers in the tree, instead of the actual items themselves, it's not necessary to move the items at all. To show how this would work, consider the original list of names, with their associated pointers.

1 = Jim
2 = Bill
3 = Nancy
4 = Fred
5 = Sue
6 = June
7 = George
8 = William
9 = Martha
10 = Frank

We can assemble another list next to this one that contains all the binary tree information simply by indicating for each item what items are immediately below it in the tree. If we were to use zero to indicate that the particular branch is empty, the new list would look like this:

Item Number	Item Value	Left Pointer	Right Pointer
1	Jim	2	3
2	Bill	0	4
3	Nancy	6	5
4	Fred	10	7
5	Sue	0	8
6	June	0	9
7	George	0	0
8	William	0	0
9	Martha	0	0
10	Frank	0	0

Graduation from B-tree University. This long-winded explanation was designed to make you so ready to examine this month's program that your fingers itched to type it in. Wait no longer.

```
5 REM File sort based on binary tree
  algorithm
10 DIM parray%(1000),sortpointl%(1000),
  sortpointr%(1000)
20 DIM slist%(1000),sort$(1000),
  stack%(200)
25 z=0:o1=1:o2=2
```

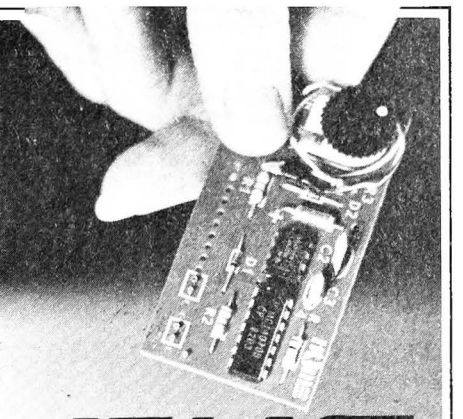
These lines do the initialization. Note especially the sortpoint1% and sortpointr% arrays. These will hold the left and right pointers we just described. Parray% will hold the sorted list of pointers, and slist% holds the initial list of pointers as read from the file. Sort$, as you might expect, holds the sort keys to be examined, and stack% holds temporary pointers used in assembling the binary tree structure into a sorted item list. Next comes the user input and setup section:

```
30 HOME:PRINT"Prepare a sorted list"
40 PRINT:INPUT"Name of file to sort: ";a$
45 IF a$="" THEN 400
50 IF LEN(a$)>11 THEN PRINT"Filenames
  must have a maximum of 11
  characters":GOTO 40
55 OPEN#1 AS INPUT,a$
60 PRINT:INPUT"Choose the beginning and
  ending columns to sort on: ";b,e
65 IF b<1 OR e<b THEN
  PRINT:PRINT"Invalid choice, try
  again";bell$:GOTO 60
70 ln=e-b+1
75 OPEN#2,a$+".key"
80 READ#2,0:IF TYP(2)<>2 THEN 90
85 INPUT"Do you wish to sort using the
  existing sorted order? ";a$
90 a$=MID$(a$,1,1)
95 IF a$<>"y" AND a$<>"Y" THEN
  slist%(0)=1000:FOR i=1 TO
  1000:slist%(i)=i:NEXT:ELSE:READ
  #2;slist%(0):FOR i=1 TO
  slist%(0):READ#o2;slist%(i):NEXT
```

Notice that this section has a couple of interesting features. The limitation of eleven characters in the file name allows the creation of a *key* file, which stores the current sorted list. This, together with the feature that allows sorting on a subset of the whole record, permits multilevel sorting to be done. Line 75 opens this file, and line 80 checks to see if there is valid data there. Line 95 then initializes the pointer array slist%; depending on whether the sequence to be used is serial from the mail file or from the previously sorted list.

Next, let's look at the rest of the main routine:

```
130 PRINT TIME$
150 GOSUB 500:REM build the b-tree
270 PRINT:PRINT
275 PRINT TIME$
300 GOSUB 800:REM create the sorted list
340 PRINT:PRINT"Storing sorted list"
350 WRITE#2,0;parray%(0)
360 FOR i=1 TO parray%(0):WRITE#o2;
  parray%(i):NEXT
370 PRINT"Sorted list stored."
375 INPUT"Print sorted records? ";a$:IF
  a$<>"y" AND a$<>"Y" THEN 40
```

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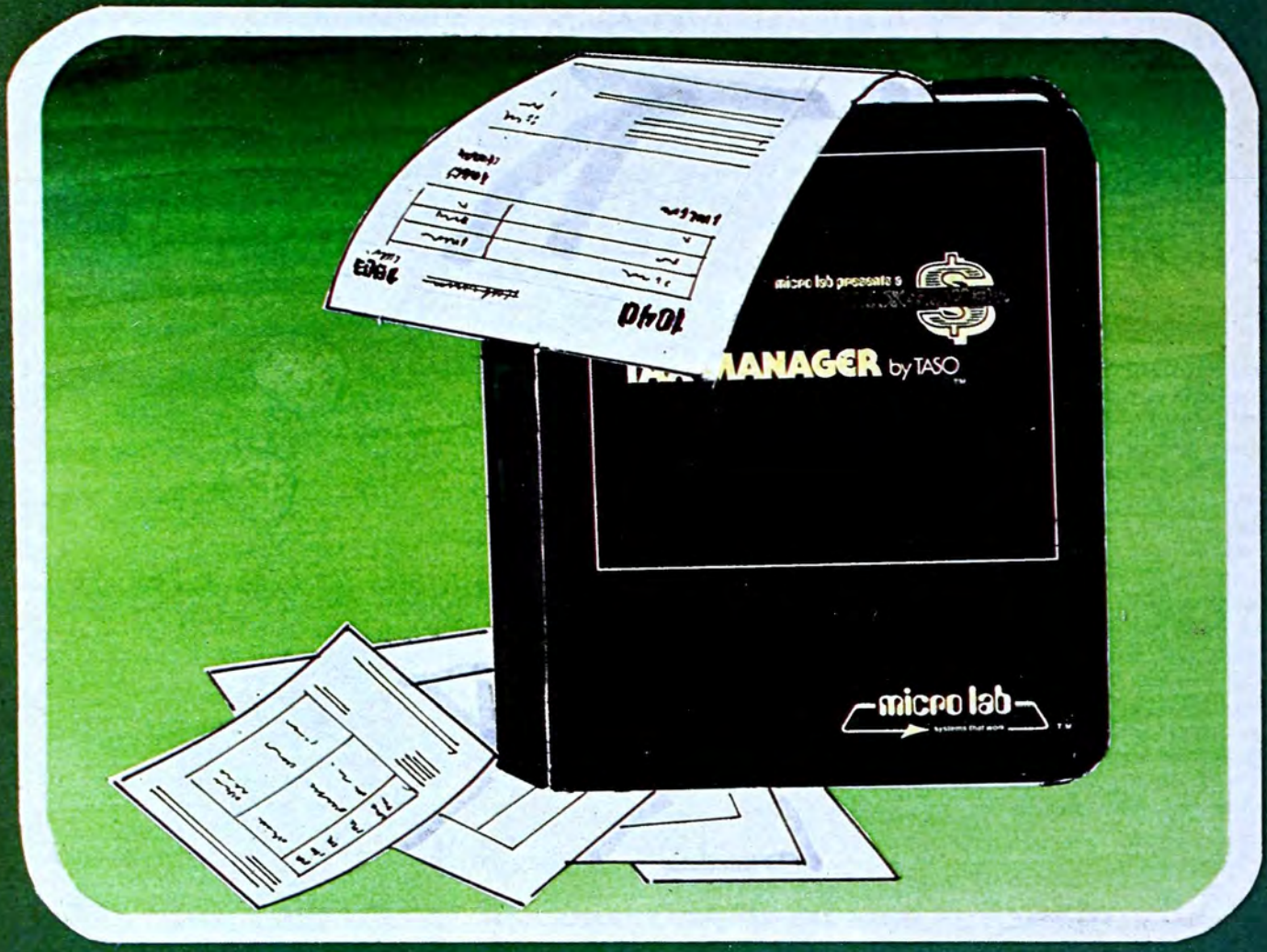
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```
380 FOR i=1 TO slist%(0):INPUT#o1,parray
    %(i);a$:PRINT a$:NEXT:GOTO 40
400 PRINT:PRINT"End of sort program."
410 CLOSE:END
```

As you can see, the main operations of the program are handled in the subroutine at line 500, which reads records and constructs the binary tree structure, and the subroutine at line 800, which builds the sorted pointers in the parray% array by decoding the structure in the tree. After that, the list of sorted pointers is stored in the key file, and the user is given the option of listing out the records. Note that although the user may have chosen to sort only on a small portion of the record, the routine at line 380 reads and prints the entire record. Next, let's examine the binary tree build routine:

```
490 REM Routine to build the B-tree
500 ON EOF#1 LET
    slist%(0)=rec-1:POP:RETURN
510 rec=1:GOSUB 700
520 FOR rec=2 TO slist%(0)
530 GOSUB 700
540 IF sort$(rec)>=sort$(testrec) THEN 570
550 IF sortpointl%(testrec) THEN testrec=
    sortpointl%(testrec):GOTO 540
560 sortpointl%(testrec)=rec:NEXT:RETURN
570 IF sortpointr%(testrec) THEN
    testrec=sortpointr%(testrec):
    GOTO 540
580 sortpointr%(testrec)=rec:NEXT:RETURN
690 REM Read a record and initialize the
    search
700 INPUT#o1,slist%(rec);a$:sort$(rec)=
    MID$(a$,b,ln):PRINT".";
710 sortpointl%(rec)=z:sortpointr%(rec)=
    z:testrec=o1
720 RETURN
```

Notice that a subroutine at line 700 is actually used to read the data and construct the sort key. This is done to simplify changing the program to fit other data or file structures. Line 710 sets the current locations in the pointer arrays to zero and sets the initial test record to one, since testing always begins at the top of the tree.

Note also the use of real variables z and o1 here. Not only is it faster to use variables than it is to use integer constants, but since Basic's expression evaluator works with real numbers and converts to integers only when doing the assignment to the integer variable, it is faster to use real number variables for the assignment. Using z%, for example, would require Basic to convert z% to a real number ("float" it) and then convert that quantity back to an integer ("fix" it) for assignment. Now you know.

After getting the value into sort$, lines 540 through 580 scan the binary tree structure for the appropriate place for the value. Note the double use of the next statement. Executing either statement will take the next value in the loop and eliminates the need to execute a goto. Because it is impossible to know which *next* will be executed last, both need to be followed by return statements. It's a good idea to study the action of this routine with the binary tree data example given earlier, to be sure you follow what is happening.

After the tree structure is built, the routine at line 800 decodes it and builds the sorted pointer array parray%. That routine looks like this:

```
800 parray%(0)=slist%(0)
810 recpntr=0:stackpointer=0:rec=1
820 IF sortpointl%(rec) THEN stackpointer=
    stackpointer+o1:stack%
    (stackpointer)=rec:rec=
    sortpointl%(rec):GOTO 820
830 recpntr=recpntr+o1:parray%(recpntr)=
    slist%(rec)
840 IF sortpointr%(rec) THEN rec=
    sortpointr%(rec):GOTO 820
850 IF stackpointer THEN rec=stack%
    (stackpointer):stackpointer=
    stackpointer-o1:GOTO 830
860 RETURN
```

Notice how this routine duplicates the algorithm we studied earlier. First, it works its way down the left side of the tree, saving records on the stack as it goes. When the left-hand pointers finally run out, that record becomes the first entry in the list (line 830), and the right side of that branch is checked (line 840). If right branches have also run out, the routine exits one level up, takes the top value off the stack (line 850), decrements the stack pointer, and puts that record in the list (back at line 830). Then the process continues until all values are exhausted and the return is taken at line 860. This one is worth working through too!

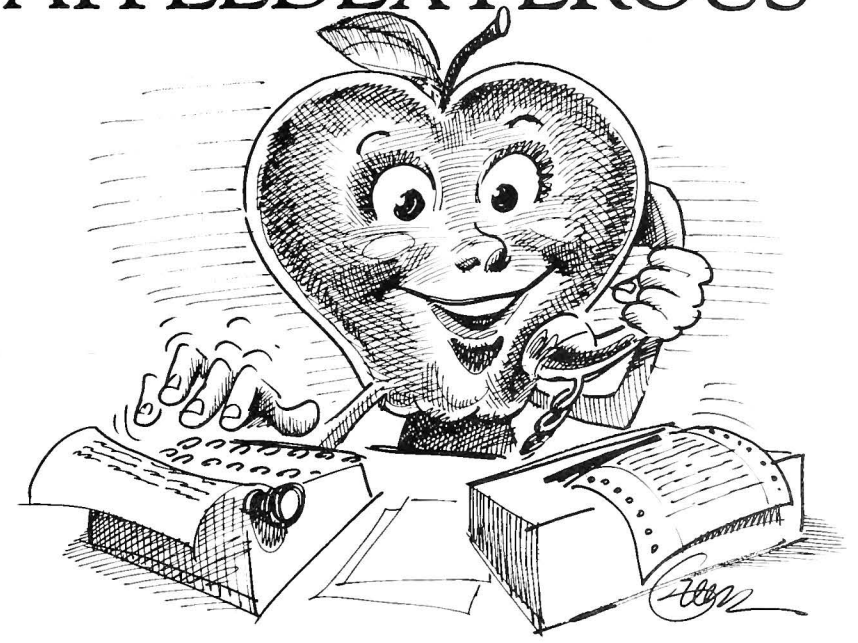
To B-tree or Not To B-tree. Well, that concludes our look this time at binary sort techniques and binary trees. Next month we'll look at how to use this technique to create an access method that has several advantages over our hash algorithm from a previous episode. It's worth noting that variations on the binary tree scheme are the basis for sophisticated access methods on large machines.

The *Apple III Record Processing Services* package uses a highly modified version of this technique as the basis for its eight-key access method. It's described as "highly modified" because the routine just given, while fast and efficient for most data, has a severe problem when confronted with data that is already sorted, or nearly sorted. This is because the tree works best (needs the fewest compares) when it is relatively balanced; that is, when the data is in random order and thus falls to the left and right branches relatively equally. If the data is read in in sorted order, the result is a very long linked list, since each value will be greater than the one prior to it and the lists will consist of all right pointers.

There are techniques for balancing trees to solve this problem, but they were left out this time for simplicity. One technique completely outside the usual approaches is to modify the routine in line 700 to do pseudorandom reads of the data, perhaps simply starting at the middle and alternating left and right until the records are all read. Anyway, try some things out and see what you think. The *Junkfile* program will allow all the practice at using this routine that you can stand.

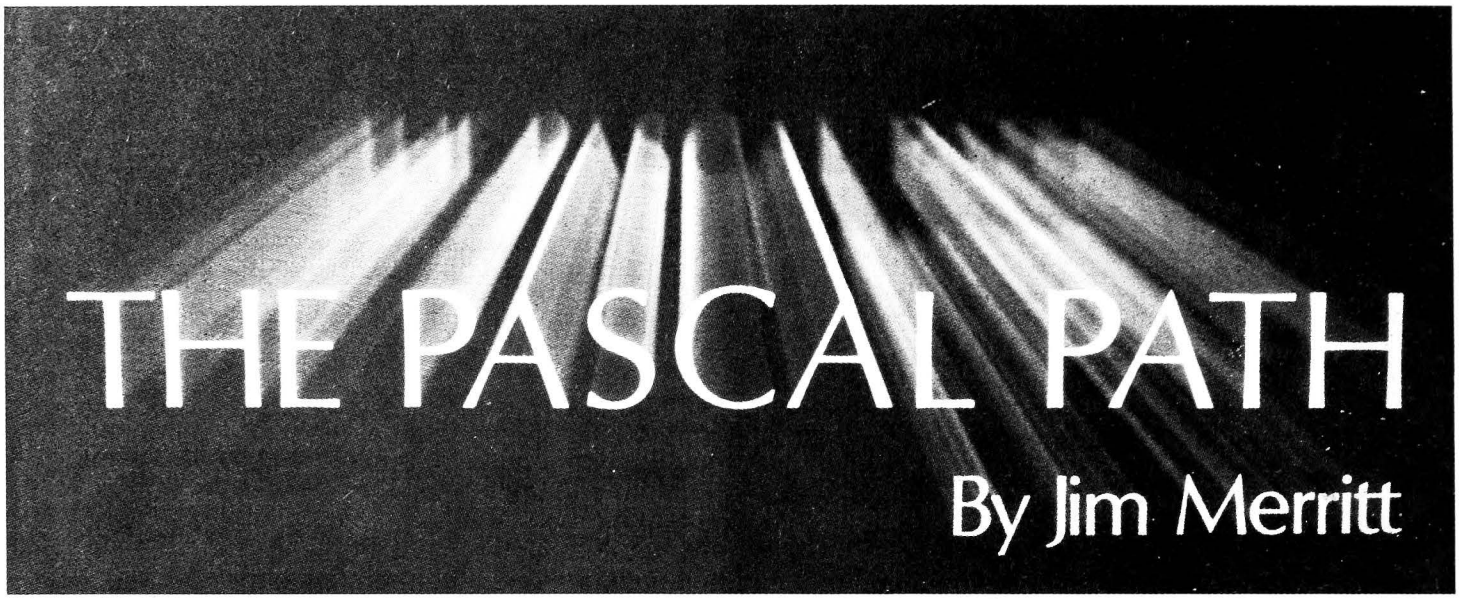
Until next month, then, tell your friends that you can't leave the house because you're too busy climbing trees. That'll perplex 'em for a while!

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Tools of the Craft, Part 18

The perceptive reader of last month's column surely noticed the absence of the customary programming challenge. Instead of being enjoined to design and write the routines IntToString and GoodInteger, you were merely encouraged to give them a try. Do not think for a moment that this implies a lack of confidence in your competence! However, good programming is a slow process, and the careful building of tools such as GoodInteger and IntToString may easily require more free time than you have.

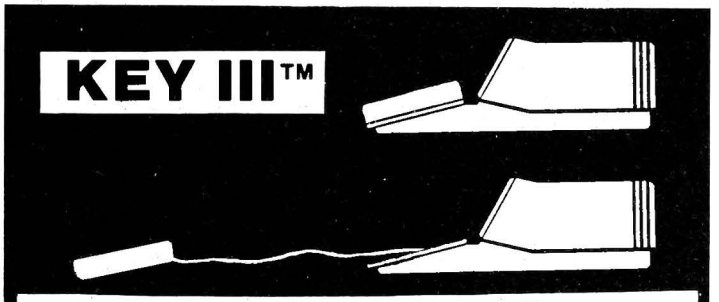
Full-time students of computer programming at our colleges and universities are not only permitted but often required to spend most of their waking hours in communion with their machines. Fortunately, they soon discover that bending a computer to one's will produces a unique euphoria, the pursuit of which justifies any and all time and effort that is required for success.

Like the full-time programming students, you may also know the joys of "programmer's high." Unlike them, however, you probably have very little time to spend on the Pascal Path, what with your responsibilities to work, school, and family (not to mention those holiday preparations)! There's certainly no dishonor in waiting for the "official" set of conversion routines. If you were successful in developing your own, so much the better! Still, we'll look carefully at the versions shown here, analyzing their methodologies and style. If you wrote your own routines, you should make a special point of comparing yours to these.

Here, then, is the latest edition of *Cable*, including complete copies of NewTown, IntToString, and GoodInteger:

```
PROGRAM
  Cable;
(* DESCRIPTION: Permit the interactive establishment and maintenance
  of records concerning a Cable Television franchise's subscribers. *)
  CONST
    Header=      'CABLE DATA BASE (V1.2 01-Oct-82)';
    Empty=       '';
    (* 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;
    CComType=              (* Cable program commands *)
      (Change, Display, Quit);
VAR
  Smallville
    :Town;
  UserQuits
    :Boolean;
FUNCTION
  Capital (Ch
             :Char)
    :Char;
(* Return Ch, converted to upper case
  (capital), if Ch is lower case. *)
BEGIN (* Capital *)
  Capital := Ch; (* No change unless lower case *)
  IF ((Ch >= 'a') AND (Ch <= 'z'))
    THEN (* it's a lower case letter—transform it! *)
      Capital := Chr(Ord(Ch) - Ord('a') + Ord('A'));
    (* Otherwise, it's not a lower case letter, so leave it alone. *)
END  (* Capital *);
PROCEDURE
  IntToString(Source: Integer;
              VAR Dest: String;
              MinFW: Integer;
              LPad: String );
(* Build the character-string representation of decimal Source, such
  that it contains at least MinFW characters. Pad on the LEFT using
  Pad string, if necessary to achieve the Minimum Field Width,
  MinFW. Concatenate the final, padded representation of Source
  onto the right of Dest. *)
  CONST
    Radix=   10;
  VAR
    Sign
      :String[1];
    TDest
      :String;
BEGIN (* IntToString *)
  TDest := Empty;
  IF (Source < 0)
    THEN
BEGIN
  Sign := '-';
  Source := -Source; (* make positive *)
```

```
    END
  ELSE
    Sign := Empty;
REPEAT
  (* These next two lines are made necessary by the fact that String
    and Char are two separate and distinct data types. In particular,
    you cannot use a value of type Char as an argument to Concat,
    which deals exclusively with Strings. This common method of
    "Concatenating" a Char to a String involves concatenating a
    "dummy" one-character string (such as a Blank) to the victim
    string and then accessing that character position directly, using
    Char ARRAY syntax. *)
   TDest := Concat(Blank,TDest); (* blank char at front *)
  (* Now, replace the blank with appropriate digit char *)
   TDest[1] := Chr(Ord('0') + (Source MOD Radix));
  (* Conceptually, "lop off" least significant digit and slide each
    survivor over one to the right. *)
  Source := Source DIV Radix;
UNTIL (Source = 0);
TDest := Concat(Sign, TDest);
IF ((Length(TDest) < MinFW) AND (LPad <> Empty))
  THEN
    BEGIN (* Apply leftward padding *)
      WHILE (Length(TDest) < MinFW) DO
        TDest := Concat(LPad,TDest);
      (* In case Length(LPad) > 1, make sure padding process
        doesn't overshoot the mark. *)
        TDest := Copy (TDest,Length(TDest) - MinFW +
              1,MinFW);
    END;
  (* Now, we have final string representation; shove it on the end of
    Dest as specified. *)
  Dest := Concat (Dest, TDest);
END  (* IntToString *) ;
FUNCTION
  SkipBlanks(VAR S: String; VAR SP: Integer)
    :Integer;
  VAR
    OriginalSP
      :Integer;
(* On entry, assume Length(S) > = SP > = 1.
  On exit, SP points to the first nonblank character at or after the
  original SP position. If all characters from original SP onward are
  blank, SP contains Length(S) + 1 on exit. In all cases, return as
  function value the number of blanks actually skipped (possibly 0). *)
BEGIN (* SkipBlanks *)
  OriginalSP := SP;
  (* Skip any blanks: *)
  (* NOTE: In the following loop, the expression Copy(S, SP, 1) is
    used instead of S[SP] to avoid value-range errors in extreme
    cases. Don't alter this expression unless and until you know why it
    is "safe." *)
  WHILE (Copy(S,SP,1) = Blank) DO
    SP := SP + 1;
  (* Compute and return number of blanks skipped: *)
  SkipBlanks := SP—OriginalSP;
END  (* SkipBlanks *);
FUNCTION
  GoodInteger(VAR S: String;     VAR SP: Integer;
              VAR Dest: Integer)
   :Boolean;
(* Return True if character sequence in S, starting at position SP,
  represents a valid Integer (ignoring leading blanks). If so, SP
  becomes SP + < length of sequence >, and Dest acquires the value
  of the corresponding Integer. On False return, SP and Dest remain
  untouched. *)
CONST
  Radix=          10;
  VAR
    (* Again, we work with temporary string pointers, dest variables,
      until we know we have a winner; then, everything is made
      permanent. *)
  TSP,
  TDest
    :Integer;
  SyntaxOK,  (* True if Good Integer so far. *)
  Sign       (* True if Dest should be neg *)
    :Boolean;
  SignChar   (* A "holding tank" that lets us  *)
    :String[1];(* convert easily between String *)
                (* and Char. Made small to *)
                (* conserve memory space. *)
BEGIN (* GoodInteger *)
  SyntaxOK := False;
  TSP := SP;
  IF (SkipBlanks(S, TSP) = 0)
    THEN
      (* No problem—either 0 or nonzero is okay. *);
  (* Just gimme some kinda sign, yeah! *)
  (* OneChar is used for convenience only *)
    SignChar := Copy(S, TSP, 1); (* Get possible sign *)
    Sign := (SignChar = '—');
    IF ((SignChar = '+') OR (SignChar = '—'))
     THEN (* look beyond it *)
       TSP := TSP + 1;
  (* At this point we had better be looking at a digit, or else say no go,
    no-oo, oh I can't go for that, no can do ... *)
  TDest := 0;
  WHILE ((Copy(S, TSP, 1) > = '0') AND (Copy(S, TSP, 1) < = '9'))
        DO
    BEGIN (* Looks a lot like IntegerInput *)
      SyntaxOK := True;
      TDest := (TDest * Radix) + (Ord(S[TSP]) — Ord('0'));
   TSP := TSP + 1;
    END;
  GoodInteger := SyntaxOK;
  If SyntaxOK
    THEN
      BEGIN (* make everything permanent *)
        Dest := TDest;
        If Sign
          THEN
            Dest := —Dest;
        SP := TSP;
      END;
END     (* GoodInteger *);
PROCEDURE
  NewTown(Var T: Town);
(* DESCRIPTION: Ready the model of a new town by "emptying" all
```

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```
  its houses. This routine optimizes speed of initialization—clears first
  street in Town house by house, then uses "whole array" assignment
  to clear each succeeding street in a single step. *)
  VAR
    HNow
      :HouseNumber;
    SNow
      :StreetName;
BEGIN (* NewTown *)
  FOR HNow := 1 TO MaxHNum DO
    T[Redwood][HNow] := NoSubscriber;
  FOR SNow := Succ(Redwood) TO Driftwood DO
    T[SNow] := T[Redwood];
END   (* NewTown *);
PROCEDURE
  ChangeTown(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 corresponds 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 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.
  Pressing 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 *);
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 *).
```

Out of Thin Air. Besides the data-converson routines, which we'll examine momentarily, there are two other new global objects in the listing just given: the String constant Empty and the function SkipBlanks. As we work more and more with String variables, we'll tend to use the empty string about as often as the blank character, if prior experience is any indication of the future. To improve readability of programs that use the empty string frequently, we'll use the identifier Empty to stand for that constant. Of course, we must declare Empty in a CONST section, and it seems wisest to do so in the global area. This way, the constant may be used in all parts of the program.

The definition of GoodInteger stipulates that the routine ignore blanks that precede the character representation of an Integer. The code that accomplishes this could have been made part of the body of GoodInteger, but it is implemented here as a separate function, SkipBlanks. Why?

Pascal's facilities for defining procedures and functions give the lazy programmer an excellent opportunity to avoid a great deal of future drudgery by investing a small amount of time and thought when building software. Any good programmer (especially a lazy one) develops an instinct for recognizing parts of a program that might be useful in future projects.

Acting on that instinct, such a programmer establishes these parts as self-contained procedures or functions that can be extracted from the current program and dropped into another one without undue difficulty. Eventually, after building up a "library" of such routines, a programmer will find that the major portion of many an important program is already written—all that is necessary is to assemble the proper "standard" parts. You'll develop the "tool builder's" instinct much more quickly if you resolve, this very moment, always to look for and isolate the "universal" routines that are sure to be a part of every program you write. In *Cable*, one such routine is SkipBlanks. You can see that this function is required by GoodInteger. If you think about the definition of a street address, you can also see that "leading blanks" should be tolerated before a StreetName. Thus, the function performed by SkipBlanks is useful not only to the routine that recognizes an Integer, but also the one that recognizes a StreetName. Rather than replicate redundant code at several spots within a program, it is usually better to implement that code as a general tool, in the form of a procedure or function, as was done here with SkipBlanks.

Anatomy Lesson: SkipBlanks. SkipBlanks takes two VAR parameters: the String S and the Integer SP ("String Pointer"). Under normal circumstances, SP will contain an Integer number not less than one and not greater than Length(S). In other words, SP will normally be an index into a legal character position within S. It's very possible, however, that the initial content of SP could be an illegal index, so SkipBlanks must be capable of dealing with this situation, also. The first thing SkipBlanks does is remember the starting SP value by storing it in the local variable OriginalSP. Then, a WHILE-loop is used to increment SP, so long as it still refers to a blank character position.

In writing the loop, you might have been tempted to use "S[SP] = Blank", instead of "Copy(S, SP, 1) = Blank" as the continuation condition. Unfortunately, the nature of the WHILE-loop would ensure that executing SkipBlanks would often result in a "value range error" at run-

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time, and hence, contribute to the untimely abortion of your program! To see why, consider the situation where the initial content of SP is greater than Length(S). (The simplest instance of this would perhaps be if S contained the empty string; then, any value contained by SP would be out of range.) Under these circumstances, the character position S[SP] does not logically exist and thus cannot be accessed! Any attempt to use the expression S[SP] causes the Pascal system to reject the access, abort the program, and complain of a value range error. In other words, the index "value" (SP) has exceeded the bounds of its permissible "range" (1 to Length(S)). This same problem would present itself when all the character positions from S[SP] to S[Length(S)] are blank. In this case, even if SP is initially within range, it eventually becomes just one greater than Length(S), as a result of the action of the WHILE-loop. Use of the expression S[SP] at this point would also cause a value range error.

To avoid all these complications, the WHILE-loop in SkipBlanks tests against a single-character substring of S, constructed using the Copy function. Remember that the constant Blank may be taken as either a Char value or a single-character String, given the ambiguities between Char and String types that we discussed last month. So, it's just as valid to compare Blank with Copy(S, SP, 1) as to the more dangerous S[SP]. Copy is safer to use here than Char-array indexing, because it returns the empty string when SP is not within the proper range. The empty string is clearly not Blank, so the continuation condition for the WHILE-loop always makes sense, and there is never any danger of causing a value range error.

Now that you understand SkipBlanks, here's a thorny question for you: how would you write the routine's complement, SkipNonBlanks? It's not quite as simple as changing the function name and substituting a <> for the = in the original WHILE-loop continuation condition! Do you know why?

More Conversions: IntToString. The initial comments for IntToString, as given in the listing of *Cable*, sum up the behavior of this procedure and need not be repeated. Here, we're interested in examining the routine's interior in order to understand how the plain-language functional specification has been translated into working Pascal code.

When we developed IntegerOutput, several months ago, we were forced to display leftmost characters before rightmost ones. This meant that we had to scan the Source once before display in order to determine the leftmost digit position, and so the starting point for the display scan. In IntToString, we do away with the need for this preliminary scan by using the local String variable TDest as a repository for the character representation of Source. This frees us to build TDest, digit by digit, scanning in the easiest direction: from the least significant (rightmost) digit of Source, to the most significant (leftmost) one. To illustrate, IntegerOutput would display the digits of the number 12,345 in order: 1, 2, 3, 4, and, finally, 5, by virtue of its left-to-right scan. IntToString, on the other hand, scans right-to-left and would build up TDest as '5', '45', '345', '2345', and, finally '12345'. Of course, it doesn't matter at all whether TDest is constructed backward, forward, or sideways, since only the final, correct value will ever be used to modify Dest.

IntToString Observed. Rather than launch into a theoretical dissection of IntToString, let's take the role of the P-machine and "execute" IntToString for a representative example. That is, we'll simulate the procedure's execution by hand, using pencil and paper to keep track of the parameters and local variables as they change. Suppose, upon entry to IntToString, that Source contains −237, Dest contains the string value 'The Answer is: ', MinFW contains 5, and LPad contains Blank.

The first thing IntToString does is empty TDest, readying it for subsequent computation. Next, Source is checked for negativity. If Source is negative, then the special, one-character String, Sign (declared as a local variable), acquires the value of the "minus sign"; otherwise, it is set empty. Note that any negative Source is converted to positive before any more operations are performed upon it because it is easier to isolate individual characters from a positive Source than from a negative one. Furthermore, since Source is a value parameter, its value can be changed without affecting anything in the external environment; the conversion of Source from negative to positive is a "safe" one. In our specific example, Source is indeed negative, so Sign contains −, and Source contains (positive) 237 just before the REPEAT loop is executed.

The essence of the REPEAT loop is simple: a single-character String—corresponding to the rightmost Source digit—is concatenated to the left side of TDest. Then, the corresponding digit is "sliced away" from Source. This process repeats until Source contains no more digits.

If you remember IntegerOutput, it's easy to see that the assignment "Source := Source DIV Radix" does the "slicing," but you may be a bit confused by the code just above it, which handles the digit conversion.

In SkipBlanks, we used the ambiguity between Char and String to our advantage in order to write some compact, elegant code. In IntToString, however, that very same ambiguity is our nemesis. To be specific, we know how to convert an Integer digit to a Char value, but we cannot use the Concat function to add a Char value to an existing String, since Concat accepts only String values as arguments. In IntToString, we work around this limitation by first concatenating Blank (a legal String) to the left side of TDest. We may then turn around and treat TDest as a Char array, accessing the place-holding blank on the left side as TDest[1]. Since TDest[1] is of type Char, we may apply our standard digit-to-Char conversion expression to it.

To summarize, we add a "dummy blank" to the left side of TDest with the assignment "TDest := Concat(Blank, TDest)." Then, we convert the rightmost digit in Source to a character, playing it on the leftmost side of TDest, with "TDest[1] := Chr(Ord('0') + (Source MOD Radix))." Finally, we "slice away" Source's rightmost digit with "Source := Source DIV Radix."

In our example, TDest is initially empty. In the first REPEAT-loop iteration, a blank is concatenated to the empty string and is subsequently replaced by the digit '7'. After "slicing," Source contains 23, which is nonzero, so the loop iterates a second time. Another blank is placed on the left-hand side of TDest, and is then replaced by the digit '3'. Next, Source is "sliced" again.

Now, at the end of the second iteration, TDest contains '37' and Source contains 2. Because Source is still nonzero, the loop body must be executed yet a third time. After this third sequence of "concatenate, convert, and slice," TDest contains '237' and Source contains 0, so the termination condition for the REPEAT-loop finally holds.

After the REPEAT-loop, the Sign of the original Source is added to the left side of TDest. In this case, the value of Sign is −. Had the original source been positive, the empty string would have been concatenated to TDest at this point, leaving Dest unchanged.

Next, IntToString must "pad" TDest on the left, using the pattern in LPad so long as Length(TDest) is less than the minimum field width, MinFW. Since TDest is only four characters long in our example and MinFW is 5, some padding is indeed required. Note that the IF statement that guards the "padding" loop not only checks to see if padding is needed, it also determines if padding is safe. This is necessary because the "padding" loop checks Length(TDest) to determine when no more padding is required on the assumption that, with every concatenation of LPad to TDest, the length of TDest will increase. If this assumption is invalid—if, for instance, LPad is empty—the "padding" loop will never terminate and the program using IntToString will freeze, dead in its tracks, until the user resets the Apple! To avoid this nasty occurrence, IntToString ensures that LPad indeed contains at least one character before trying to use it in padding TDest.

With TDest equal to '−237' upon entering the "padding" loop, only one loop iteration is necessary to satisfy the minimum field-width requirement. Finally, TDest contains ' −237'.

There is no law that says the "padding" pattern need be only a single character (although this is what usually happens in practice). Suppose LPad had contained [ ] instead of a Blank. Still, exactly one iteration of the "padding" loop would have occurred, but the resulting TDest would have been longer than the specified minimum field width. IntToString was written on the assumption that, should the character representation of Source actually need padding in order to satisfy the minimum field width, the final string should not exceed that specified length. On the other hand, if the length of the unpadded representation meets or exceeds the minimum, no padding is necessary and TDest remains unmolested. To ensure that the minimum field width is not exceeded when padding has occurred, TDest is truncated to the specified length immediately after the "padding" loop by means of the Copy function. Look

carefully at the parameters used in this call to Copy. In general, so long as any arbitrary String MyString is guaranteed to contain at least *n* characters, you may use the function call:

Copy(MyString, Length(MyString) − *n* + 1, *n*)

to extract the *n* rightmost characters. (What happens if MyString contains less than *n* characters? Take a guess, then write a small program to test your hypothesis!) You can see that excess padding characters on the left of TDest are sliced away and discarded. This makes sense; if we truncated on the right, we would often throw away one or more of the digits of the converted Integer!

Finally, TDest is fully constructed, including all digits, a minus sign, and the required padding. In this instance, TDest now contains ' −237'. At its exit, IntToString concatenates TDest to Dest, leaving the value 'The answer is: −237' in Dest. Note that there are two blanks between the colon and the minus sign. The first was part of the original Dest, while the second exists because of IntToString's padding activity.

When IntToString Fails. There is only one situation in which IntToString will fail to do its duty, and that is when the padded character representation of Source is too long to fit on the right-hand end of Dest. For instance, suppose that Length(Dest) is 76 on entry to the routine and that Length(TDest) is 5 on exit. Remember, that the type String is equivalent to String[80], meaning that any such variable can contain no more than eighty characters. At the end of IntToString, the String produced by Concat(Dest, TDest) will have a length of 81! This value is too long to fit into Dest, and the program using IntToString in this case aborts with a "string overflow error."

Unfortunately, it's impossible, using the unadulterated Apple Pascal language, for the routine to guard itself against this all-too-likely situation. IntToString must be written and used in the optimistic belief that the concatenation of TDest to Dest will not overflow the memory space allocated to Dest. This assumption holds in the case of *Cable* (in its current incarnation) but may be overly naive in other situations. When these conditions rear their misshapen heads we will deal with them, using sophisticated techniques that are best left unexplained for now.

Note that a variation of the problem just described occurs when the actual parameter corresponding to Dest has not been initialized properly, before the call to IntToString. Then, that variable holds arbitrary garbage, which could quite possibly appear to the P-machine as a String value that is too long (or almost too long) to be contained by Dest. In this case, the final concatenation of TDest to Dest would also cause a string overflow, to the mystification and frustration of all concerned. You've heard it before, but it's worth repeating: when using IntToString, it is your serious responsibility to ensure that no uninitialized String variables are used as parameters.

GoodInteger. One of the more complex routines we've yet developed, GoodInteger is based on the concept of "all or nothing." To be more specific, its operation produces either complete, correct results (and a True function value) or no results at all (other than a Boolean function value of False). If GoodInteger finds the character representation of a valid Integer constant in S, beginning at position SP, then the corresponding Integer is returned in Dest, and SP is updated to refer to the character position that comes just after the Integer sequence. Thus, SP could conceivably acquire a value that is one greater than the length of S, provided that the Integer sequence scanned by GoodInteger extends through the last character in S. If it doesn't find a valid literal representation, it leaves both Dest and SP untouched.

In order to exhibit "all or nothing" behavior, GoodInteger must work with "provisional" copies of SP and Dest during the scan of S; these are the local variables TSP and TDest. The routine must also maintain a Boolean variable, SyntaxOK, which contains the status of the scan at any point. If, at the end of the scan, SyntaxOK is True, then the temporary values of TSP and TDest are placed into SP and Dest, respectively, and the function value is likewise set True. A False value of SyntaxOK signals GoodInteger to return a False function value without updating the permanent values of SP and Dest.

Getting a Good Integer. In order to illustrate GoodInteger's operation more effectively, let's again assume the role of the P-machine and execute the routine. Assume that, on entry, S contains 'The answer is: −237' and that SP contains 16. The initial content of Dest is irrelevant.

To initialize the scanning process, SyntaxOK is set False, and TSP is set to the value of SP. Throughout the scan, TSP, and SP, will be the "string pointer." Only if everything turns out all right will the content of SP be updated.

At the beginning of the scan, leading blanks are skipped by means of a call to SkipBlanks. TSP goes into SkipBlanks with the value of 16 (one position before the minus sign) and comes out containing 17. The function value returned by SkipBlanks—in this case, 1—is ignored, since we really don't care how many blanks are skipped. (In future routines, however, we may be very concerned about this, so it's a good thing that SkipBlanks returns this information to us; the number of blanks skipped may be superfluous now, and it may be a bother to ignore it, but it is better to be able to ignore this information now and use it later than not to have it at all!)

Next, we determine whether the Integer is positive or negative. As we did in IntToString, we use Copy to extract a single-character substring from S, rather than using array indexing to acquire a Char value in order to avoid value range errors. And what if TSP is out of range? Right! SignChar receives the empty string, rather than the single-character substring we expect it to get. Since, in this instance, TSP contains 17, and this refers to a legal character position, SignChar acquires the value of that character position, the minus sign.

Note that there is nothing forcing us to declare or use the single-character String variable SignChar here. Everywhere we use SignChar, we could substitute the function call "Copy(S, TSP, 1)". That, however, would make the program wordier and perhaps less easy to read. Less apparent, it takes more time for the P-machine to evaluate the call to Copy than it does to fetch the value stored in SignChar. So, SignChar contributes to both the readability and the execution speed of GoodInteger without costing us much in terms of extra code or storage space.

The Boolean variable Sign is set True, since SignChar contains −. Had the sequence started with any other character, the design of the assignment to Sign ensures that this variable would have been set to False. Since the literal begins with a sign character (in this case, "minus"), we



must increment TSP and so move past the sign in order to begin scanning the digits. TSP now holds the value of 18.

At the start of the digit scan, TDest is set to 0. Next comes a WHILE-loop that is very reminiscent of the one we wrote for IntegerInput some months ago. For the third time, we use the Copy function so as to avoid value range errors. One of Apple Pascal's interesting anomalies is that single-character Strings compare exactly, as do Char values, but they cannot be compared with Char values! In our WHILE-loop's continuation condition, the literals '0' and '9' are treated as Strings, because they are compared with values returned by the String function, Copy.

After the body of the WHILE-loop has been executed at least once, GoodInteger has found a valid character representation of an Integer literal, so the first thing done in the body is to set SyntaxOK to True. Next, we build up TDest, using the "shift and add" technique pioneered in IntegerInput. Finally, we increment TSP, so as to be looking at the next character position during the next loop iteration. Remember, at the beginning of the loop, TSP contains a value of 18. Copy(S, TSP, 1) is therefore '2', which is definitely within the range of '0' to '9'. Consequently, the loop body is executed for the first time. SyntaxOK is set True, the current value of TDest is replaced by the old value times ten (remember, zero times ten is still zero!), plus the Integer value of the current digit, 2. TSP is incremented to 19.

At the end of the first iteration, TDest holds the value 2. Copy(S, TSP, 1) is now '3'—again a digit character—so the loop body is executed again. Once more, SyntaxOK is set True. Granted, this assignment to SyntaxOK within the loop is redundant after the first iteration, but it doesn't hurt anything, and we can't really avoid it. Next TDest is updated to contain the value (2 * 10) + 3, or 23, and TSP is incremented to 20, marking the end of the second iteration. Copy(S, TSP, 1) is now '7' and another redundant assignment to SyntaxOK occurs. TDest becomes (23 * 10) + 7, or 237. And, at the end of the third iteration, TSP becomes 21. Now, Copy(S, TSP, 1) returns the empty string, since TSP is 21 and Length(S) is only 20. The WHILE-loop continuation condition fails, since the empty string compares as less than '0', and the loop terminates.

Once past the digit-scanning loop, GoodInteger sets its own function value equal to SyntaxOK, which is True for our example. And since the routine was successful in recognizing an Integer literal, TDest and TSP are made permanent by being assigned to Dest and SP, respectively. It is at this time that GoodInteger remembers to adjust Dest for proper sign, based on the value of the Boolean variable Sign. All of its business having been completed, GoodInteger now terminates with a function value of True. Dest contains the Integer value −237, and SP contains 21.

Parting Shots. Once upon a time, this month's itinerary included the complete examination of DisplayTown and even of ChangeTown. But, of course, as you can see, presenting and explaining even the rudimentary data conversion routines has taken up the entire space.

In order to speed discussion of the remaining code in *Cable* and finish it all next time, we'll let the program listing do most of the talking. This will pose no difficulty for you as long as you study, and thoroughly understand, the principles behind SkipBlanks, IntToString, and GoodInteger. In particular, you should spend some more time as the P-machine, simulating the execution of all three routines, especially for bizarre cases of input data. For instance, what happens when you feed the empty string to GoodInteger?

If you don't want to wait until next month to finish *Cable*, then ac-



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cept as a year-end gift the following declarations for all of the remaining routines. With the completed versions, you can make quick work of writing both DisplayTown and ChangeTown on your own. Indeed, the daring reader will do so.

```
PROCEDURE
  SCapitalize(VAR S: String);
(* Capitalize all lower-case letters in S *)
FUNCTION
  Alphanumeric(Ch: Char)
    :Boolean;
(* Return True if Ch is a letter or a digit *)
PROCEDURE
  SNToString(StName: StreetName;
             VAR Dest : String;
             MinFW: Integer;
             RPad: String );
(* Build the character-string representation of StName such that it
  contains at least MinFW characters. Pad on the RIGHT using Pad
  string if necessary to achieve the Minimum Field Width, MinFW.
  Concatenate the final, padded representation of Source onto the
  right of Dest. *)
PROCEDURE
  DisplayHome(VAR T: Town;
              StName: StreetName;
              HNum: HouseNumber );
  (* Displays Home information in one line, thusly:
       NNN SSSSSSSSSS    Acct: AAAAA
    where NNN is three digit HouseNumber, left padded with blanks;
    Examples:
      23 Redwood          Acct: 01234
     567 Sandalwood       Acct: 98765
       1 Driftwood        Acct: 00009
     123 Tanglewood       Acct: None *)
FUNCTION
  GoodAddr(S: String;          VAR SP: Integer;
           VAR StN:  StreetName;
           VAR HNum: HouseNumber)
    :Boolean;
(* Return True if character sequence in S, starting at position SP,
  represents a valid Home Address. If so, SP becomes SP + <length of
  sequence>, and StN and HNum are set to the corresponding values.
  On False return, SP, StN, and HNum remain untouched. *)
FUNCTION
  GoodHNum(VAR S: String; VAR SP: Integer;
           VAR Dest: HouseNumber)
    :Boolean;
(* Return True if character sequence in S, starting at position SP,
  represents a valid HouseNumber. If so, SP becomes SP + <length of
  sequence> and Dest acquires the value of the corresponding
  HouseNumber. On False return, SP and Dest remain untouched.*)
FUNCTION
  GoodStreet(VAR S: String; VAR SP: Integer;
             VAR Dest: StreetName)
    :Boolean;
(* Return True if valid StreetName is found in S, beginning at position SP;
  False otherwise. On True return ONLY, SP will point to the character
  position just past the end of the StreetName (possibly Length(S)+1),
  and Dest will contain the value of the StreetName found. On False
  return, SP and Dest remain unchanged. StreetNames are assumed to
  be rendered in capital letters; it's therefore a wise precaution to use
  SCapitalize on S before calling this procedure. Leading blanks are
  skipped. StreetName may be terminated with any punctuation
  character (NOT alpha, NOT numeric). *)
```

If you accept the challenge of going ahead on your own, keep in mind the models we've already developed and pay particular attention to the interdependencies, if any, between the various routines. Which routines should be global? Could any routines be local to others and thus hidden from parts of the program? Should any? We'll reconvene in thirty days to discuss the answers! But don't waste the entire month worrying about Pascal. It is a time for merrymaking, after all, and we all deserve a little rest and relaxation; don't you agree? With that in mind, please accept sincere, well-structured, and infinitely nested wishes that you have the best holiday season ever! ■

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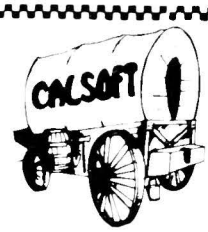
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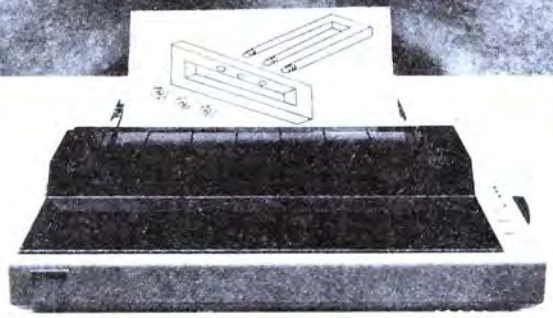
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Word Processing:



A Prescription for Juggling Words



BY JONATHAN MILLER

The middle-aged patient in Room 723 was as typical as he was special. He was among the ten million Americans who suffer from asthma, but he had it in a bad way. What is for most people a mild and easily controlled respiratory disease was for this man a crippler—an acute, chronic lung disorder that literally left him gasping for air.

Common allergic asthmas are treated by pediatricians and family practitioners as a part of the regular routine, but this was a nonallergic variety that could only be controlled with sophisticated drugs. Which is why, on the day in question, pharmacist Martin Lefkowitz was reviewing the patient's prescription chart on the screen of his Apple III.

"We don't get the Primatene Mist cases here," says Lefkowitz, pharmacy director for the National Jewish Hospital/National Asthma Center in mile-high Denver.

Reviewing prescriptions is a routine part of Lefkowitz's job, but there was nothing routine in the data on the patient in Room 723. Prescriptions of theophylline, a muscle relaxant that frees up constricted air passages, were varying significantly as the doctor, a physician in training, tried to stabilize the patient. The doctor was altering quantities and timed-release formulas in an effort to find the optimum blood level of the drug—a level that was both safe and effective. "He was looking for the therapeutic window," Lefkowitz recalls, "but he wasn't finding it."

A Delicate Balance. Rocketing a missile through its earthly escape window requires numerous mathematical calculations. So does figuring proper drug dosages for asthma patients. Age, asthmatic history, drug metabolism rate, and lung efficiency all interact in framing the window. A physician can locate the opening by trial and error, of course—altering medications one at a time, then measuring effects by taking blood samples. This method yields results—usually within two or three days—but it's a trial that both patient and care facility can do without.

"The fewer times you have to draw blood, the better the patient likes you and the quicker his course through the hospital," says Lefkowitz.

The quicker way is made possible today through the *VisiCalc* of pharmacology—a sophisticated drug dosing program that lets the computer suffer the trials and errors of window shopping. Factor in the standard variables, hit a control key, and voila! An S-shaped curve appears on the screen, a linear regression-type mathematical model upon which the therapeutic windows for a series of "what-if" questions posed by the pharmacist are instantly calculated. What if he increases the dosage? What if he lowers it? And what if he gives more medication but in a slower, time-released form?

The accumulation, dissipation and movement of drugs in the body follow certain mathematical rules, but those rules are not of the two-plus-two, household variety. More can often mean less in this pharmacokinetic world.

"There comes a point where twice as much drug doesn't do twice as much good," explains Lefkowitz. "By knowing where the flat portion of the S-curve is, we know the safe range. Go beyond it and you run the risk of making the patient toxic. At the very least, that leads to nausea and vomiting, and at the very worst, to convulsions and respiratory arrest where you have to take heroic measures to keep the patient alive."

Computer Consultant. Computers, those master number crunchers, were made for this kind of logarithmic drudge work. They have raised proper patient dosing from an expensive art to an efficient science. In 80 percent of cases, says Lefkowitz, a program he wrote has pinpointed the therapeutic window.

Which is why, on the day in question, he

was at the looking glass of his Apple III scrutinizing the prescription chart for the patient in Room 723.

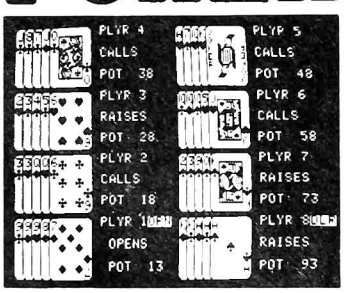
A hospital pharmacist today does more than pay homage to the four verities—counting, pouring, licking, and sticking. He or she is a licensed professional whose hospital role is expanding in an era in which soaring health care costs are coupled with the development of allied and para-health professions. Whenever physicians alter their patients' drug regimens, today's activist pharmacists don't just fill the orders, they review them.

"We're becoming more highly visible," says Lefkowitz. "We make rounds. We see the doctor's patient as our patient, too, so we now exercise the prerogative to comment and consult on the therapy a patient is under as far as drugs are concerned."

On a routine level, that has meant refusing to accept drug orders from physicians that vaguely advise the patient to take "as directed" or "as needed." "A month from now, the patient could have three or four different drugs in his medicine cabinet, all labeled 'as needed,' " says Lefkowitz. "At two o'clock in the morning, you want explicit directions."

And when a physician-in-training varies orders for theophylline without therapeutic effect, today's pharmacist takes his cue. Which is what Lefkowitz did after reviewing the chart on the patient in Room 723. He dispatched an assistant pharmacist to introduce the young physician to the marvels of computer model making.

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The assistant pharmacist's mission was to confer with the doctor and present him with the very antithesis of the doctor's handwritten prescription—a legible report. Coming up with such a report was a matter of dumping the model dosage data into a text file and watching the department's word cruncher, the *Word Juggler* word processor from Quark Engineering, type and format an easy-to-follow memo.

"You just don't give a doctor a bunch of numbers," says Lefkowitz. "You add them up."

Information Inventory. A hospital pharmacist is only as good as what he knows and what he has on the shelf, and nearly every year he's asked to increase his stocks of both.

"We not only dispense drugs, we dispense information," says Lefkowitz. "Very few departments within a hospital deal with as many different people as we do."

In addition to monitoring patient drug use and progress, Lefkowitz inventories two thousand special medications, constantly updates data on drug interactions for dissemination among the hospital staff, creates bibliographies of medical articles, answers inquiries from doctors and pharmacists across the country, and prints drug lists setting ground rules for prescription ordering. Then, of course, he publishes a newsletter, generates reports for Uncle Sam on experimental drug testing, and, if he hasn't hyperventilated in the interim, finds time to handle the normal administrative chores of budget preparation and staff scheduling.

"All this," he says with noteworthy understatement, "is too much to keep in one head."

In matters of information storage and rapid retrieval, two heads are better than one, especially when one is a computer. This bit of contemporary technological wisdom seized the hospital imagination two-plus years ago, but not with stellar results—at least not at first.

Given the size of the hospital—one hundred beds and a staff of one thousand—the administration elected to go with a dedicated word processor. "I'd rather not mention the name," Lefkowitz confides *soto voce*, "because I haven't anything nice to say about it."

When it worked, it worked, but that was more at its pleasure than that of the pharmacy director.

"The downtime always occurred when we wanted to meet a deadline or when we were in the middle of writing a paper and the printer was off. Besides, they shut the thing off every day at 4:30."

Lefkowitz and company—four other pharmacists, two assistants, and a secretary—were gradually sinking in the flotsam and jetsam of the information explosion. Something clearly had to be done; so Lefkowitz, who had been a member of the hospital committee that had looked into dedicated word processors, began to investigate the possibilities of a microcomputer for his department.

In April of 1981, the only microcomputer powerful enough to meet his needs for data processing, budget preparation, and dosage modeling was the problem-plagued Apple III, which had been released late the previous year to mixed reviews.

"Quite frankly, I bought the machine more on a lick and a promise," Lefkowitz now concedes. "They had a nice brochure."

The nice brochure offered purchasers a version of the top-selling *VisiCalc*, the existing library of Apple II programs compatible with the III, and the prospect of a word processor, called *Word Painter*. The latter eventually emerged as *Apple Writer III*, but eventually did Lefkowitz no good at the time. Without a word cruncher, Lefkowitz was little more than the disgruntled owner of a glorified Apple II.

"I was very pleased with *VisiCalc*, and I never had any of the hardware problems that other people seemed to have with the III. My problem was that they didn't come through with all the software they promised."

Rescue by Remote Resource. As luck would have it, relief was just around the corner. Leftkowitz had invested in a modem to link the department with the Source and other databases, and that investment paid off handsomely when he spotted a listing on the Source for *Word Juggler*, an Apple III word processor. According to the listing, the program was manufactured and distributed by Quark Engineering, right there in Denver, a scant mile from the hospital.

Word Juggler wasn't just the only word processor available for his Apple. Says Lefkowitz, borrowing a phrase, it polished it.

"Quark is one software company that's said, 'We're going to automate the office,' " Lefkowitz crows. As he sees it, Quark believes in one-stop data processing and report generation—in a word processor that can juggle data and reports in and out of various programs all at one work station.

"I'd like to have one system and have it do everything. It's sort of a supermarket philosophy. When you go into a supermarket or department store nowadays, you can get a lawyer, a dentist, or oil for your car. You can even get your prescriptions filled."

Lefkowitz's basic prescription for word processing was simple enough. He wanted a system that was so easy to use that novices could be typing documents an hour after being introduced to the program, whether they cracked the manual or not.

Special templates or overlays that label frequently used editing, formatting, and print keys make this possible, according to Lefkowitz. A single keystroke previews the document print format, while a horizontal scrolling feature permits the viewing of files up to 254 columns wide.

If further text changes are required, a single keystroke returns the user to the edit mode in the vicinity of the desired change. A single keystroke also initiates printing, with secondary options available for doing specific pages and multiple copies.

The department also has a hard disk system. Lefkowitz likens it to a giant filing cabinet with a seemingly endless capacity for mixing and matching subsections and file folders. "You can create subdirectories on any storage device



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in the SOS operating system," he maintains. "Whether it's a text file or a data file, *Word Juggler* can pull it out and incorporate it in a document you're working on.

"You have no idea how useful that is when you have the data already. It gives you the option of pulling something out of *VisiCalc* and either printing it, inserting it into another document, or turning it into an addendum. You don't have to retype what you've already done, and when you're saddled with science papers and reviews, having a word processor is golden."

This is particularly true when the satisfied customer continues to find other office chores for his electronic amanuensis. When Lefkowitz summons, his faithful machine mate uncomplainingly churns out the drudge work: the management, government, and pharmacological reports; the reviews and scientific abstracts; the form letters and bibliographies; and the lifeblood of his department—hospital drug lists, which it thoughtfully sorts by category.

Using his thirty thousand-word Quark *Lexicheck* speller program, Lefkowitz has also been able to root out the egregious typos and create an eight thousand-word pharmacy lexicon that's crammed with medical terms, drug company monikers, and the titled names of very important persons.

"*Lexicheck* is one of the fastest spellers I've seen," marvels Lefkowitz. "It can scan documents for misspellings at the rate of ten thousand words per minute—fourteen thousand if the dictionary is stored on a hard disk."

Interrupted Print and Intermixed Programs. And now, as they say on the midway, Quark has two new auxiliary programs that Lefkowitz is eager to exploit—a spooler called *Discourse* and a master hard disk program called *Catalyst*. With the spooler, Lefkowitz can print a series of files (as many as fourteen at one time) and still use his Apple for other tasks. This is possible because the printer output can be rapidly written to the spooler disk rather than being printed. Its only drawback for Lefkowitz is that it doesn't work with his Silentype.

Catalyst, on the other hand, promises to take the floppiness out of disks. In a sense, it lets Apple III users put all their programs in one hard disk basket.

"It's the finest piece of software I've seen around," declares Lefkowitz. Programs can be formatted onto a hard disk via *Catalyst* and easily loaded from a main menu by executing a simple key sequence.

With so much going for it, can *Word Juggler* be that software oddity—the faultless program? Not quite. The sophisticated program, though contained on a single disk, occupies a large chunk of memory. And even booster Lefkowitz is bothered by the limit of 1,750 lines of text per file. He has 256K; the limit is virtually half that on a 128K system.

The line restriction is a program shortcoming but it isn't fatal, according to the pharmacist. It can be easily overcome, he says, by linking files. Then, too, there's that quirk in the printer program, which has complicated the use of his Silentype.

Like any user, Lefkowitz sees room for program enhancements, many of which are said to be in the mill. Automatic column formatting and a math mode are particularly appealing.

"The easiest way to do internal arithmetic now," he explains, "is to do your calculations in *VisiCalc* and then bring them back into *Word Juggler*."

Lefkowitz the in-house publisher would also be mighty pleased if Quark would develop a double-column, side-by-side option that would permit design of a tabloid-style newsletter featuring columns of varying widths. And while we're on his wish list, mention should be made of his desire for a footnote-dragging feature that would automatically renumber said reference notes whenever he moves a block of text.

"But what is really needed," he finally adds, "is for somebody to figure out a way to network the IIIs to emulate a mainframe. That way you could have a number of terminals, all being able to use the same program."

Pharmacist's Future. This final wish has been fed by a curious phenomenon—to wit, the Parkinson's law of word processing. "The use of our machine seems to expand with the hours the department is open," Lefkowitz observes. "Somebody always has something to do and we could definitely use more terminals."

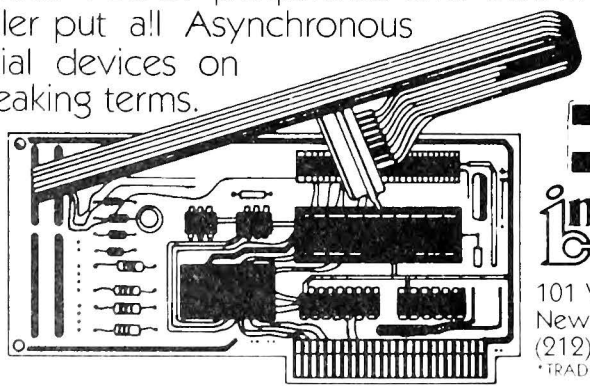
But if that is a reservation, it's a small one. Lefkowitz is firmly committed to the automated office, to the avowed national goal of paperwork reduction. If you're a believer, says he, you have to have faith in disks and not in paper. You can always generate a hard copy of what you really need.

But just to let you know he's securely planted in Rocky Mountain soil, this keeper of two thousand specialized drugs shows he's lost neither his perspective nor his sense of humor.

"We're waiting for the day when we have only two drugs on our shelves," he says. "One will cure everything, and the other will cure the side effects." ■

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Olivieri's Outline of Word Processors

by Peter Olivieri

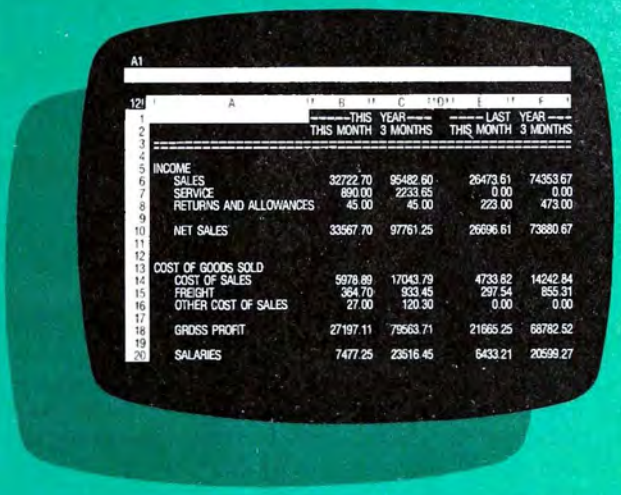
Welcome to our continuing saga about word processors. Did you make the suggested "wish list" of features you'd like to see in a word processor? If so, you'll probably want to have it in hand now as we examine two more packages: *Super-Text 40/80* from Muse and *Letter Perfect* (Version 5) from LJK.

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As usual, we'll discuss what equipment you need in order to run these packages and comment on some of their special features (or lack thereof). And, as usual, it's strongly recommended that you get acquainted with the command structure of any programs you're considering. What commands are available and how they are set up can make a real difference in how easy a program is to use and how appropriate it is for your particular needs.

Super-Text 40/80. Muse Software, 347 North Charles Street, Baltimore, MD 21201; (301) 659-7212. $175.

Equipment required: 48K, lower-case adapter or Videx eighty-column board, one or two disk drives, monitor, printer.

This program is very easy to use, and that's one of its major strengths. As its name implies, *Super-Text 40/80* allows you to work in either forty or eighty column mode. There's an excellent earlier version of the program (*Super-Text II*), as well as a version called *Super-Text 40/56/80,* which allows you to work in forty, fifty-six, or eighty columns.

In this review, we'll focus on *Super-Text 40/80.* This package offers lots of nice features. For example, there's a helpful count option that allows you to count how many characters, words, or paragraphs your document contains. If you're a person who does a lot of writing for publication, this should be a big plus.

Some of *Super-Text 40/80*'s features are normally found only in so-called standalone word processors. You can, for instance, define what a given key might represent. Thus, if you have a phrase that you're using over and over again in a document, you can reenter that phrase in your document as many times as necessary by simply pressing a single key. This can, of course, be useful when you're creating and editing a document, but it can also be used in many list processing applications. If, for example, you were entering the names and addresses of customers from a particular area into your system, a single keystroke could be used to enter Boston, Massachusetts (or any city/state combination you'd specified), wherever needed.

A math mode allows you to include fairly complex calculations within the documents you create. The built-in nine-digit floating point calculator performs on-screen calculations, does column totals, and can verify mathematical data that's placed within a document. Since many word processing applications in the business arena include tables of numbers, this is a very welcome feature.

This system also includes the ability to transpose two letters that might accidentally have been typed in the wrong order (a very common problem for the average typist).

Super-Text 40/80 also has a preview mode that allows you to see what your document will look like before you print it. Many word processing packages don't offer this capability, and it can be bothersome, at best, not to know in advance what your letter or document is going to look like on the printed page. For documents that are spread out over several disk files, *Super-Text 40/80* has an "autolink" feature that enables you to link all of your separate files together. This can be very helpful when you're preparing a long document or linking together different parts of a document for various applications (alternate versions of a legal document, for example).

Word wrap is standard here, as it is in most word processing programs. Other characteristics of this program include a type-ahead buffer; the ability to copy, save, or delete blocks of text; and an easy-to-use "find and replace" option that even includes "wild card" selections.

The *Super-Text 40/80* manual is quite well organized and really helps the user get acquainted with all of the program's features. It is clear, easy to read, and appropriately illustrated. The manual also contains instructions for modifying the keyboard (you can even get a modification chip from Muse).

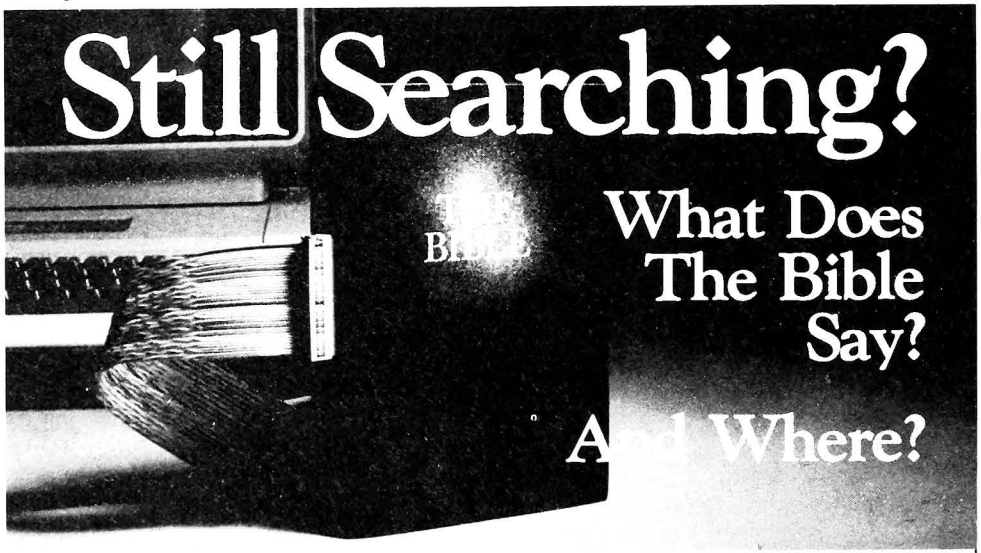
Muse also has a list processing package available that allows for merging a list of names and addresses with a document that's been prepared using *Super-Text 40/80.* Several of the more popular printers can be used to take advantage of this option, and specific parameters are given in the manual for using Epson, Diablo, Centronics, NEC, and IDS for this purpose.

Among *Super-Text 40/80*'s other features are the ability to control automatic tabbing, to position page numbers wherever you wish on the page, to center lines with ease, and to include page headings and footers. A "split-screen" feature allows you to view two different portions of a document at the same time. If you're an author, you may also especially appreciate the program's superscripting and subscripting features, as well as the ability to organize the document into chapters (with chapter relative page numbers).

Be sure to look at all of the *Super-Text* series of word processing packages before you make your final decision. The number of characters that will display on the screen is not the only difference in the three packages. For example, *Super-Text 40/56/80* doesn't include the math mode or the split-screen feature. And it's slower than *Super-Text II.* Like *Super-Text 40/80,* it includes a type-ahead feature, where the *Super-Text II* does not.

Super-Text 40/56/80 also has a "character designer" option that lets you create characters of whatever variety you wish, including cursive characters, characters from a foreign language, or special symbols. And the fifty-six characters per line option was introduced as an "in-between" size to address the complaint that eighty-character lines were too hard to read. It's definitely easier on the eyes.

When it comes to the *Super-Text* packages, your choice is really between *Super-Text 40/80* and *Super-Text 40/56/80.* Is the size of the on-screen character important to you? Do you need the math mode? Is the split screen essential? Once again, you must do your homework concerning your particular application needs. Only then will you be able to ask the right questions and make the best decision.



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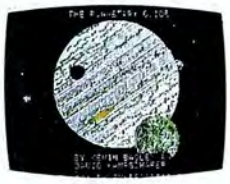
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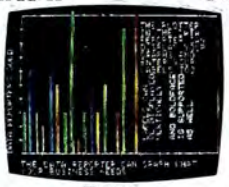
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There are some drawbacks to *Super-Text 40/80.* Some users report that it reacts more slowly than earlier versions did, although not to the extent that it's a problem. And in eighty-column mode, the program is somewhat slower and a bit awkward to use.

The maximum file size you can work with is just under fifteen thousand characters. This isn't all that large a file, but then we must remember that we're working with microcomputers. And, once you delete text, it's gone for good. Some other systems are more forgiving and keep track of your recent deletions, in case you change your mind.

The files you create using *Super-Text 40/80* cannot be accessed by any of your other programs. They can, however, be accessed by other Muse programs, including *Form Letter Module, Address Module, Address Book,* and the *Sensible Speller.*

All in all, this is a fine package that merits the serious consideration of users who want to get serious about word processing. It has excellent documentation, readable manuals, a good tutorial, and many of the features that we've come to associate with a standalone word processor. And the forty-column/eighty-column option can be the best of both worlds. The forty-column gives clearer letters and is easier on your eyes, while the eighty-column lets you see just what a page will look like.

Letter Perfect (Version 5), LJK Enterprises, Box 10827, Saint Louis, MO 63129; (314) 846-6124. $149.95.

Equipment required: 32K minimum, one or two disk drives, monitor, printer.

When you start up *Letter Perfect* for the first time, you're asked to describe the characteristics of your system. How will video display be handled? Your choices are Apple forty-column format, the ASL Smarterm, the Bit 3 Full View 80, the Videx Videoterm, the M & R Sup'R Term, and the Vista Vision 80. Next you must select the printer interface, choosing from serial, parallel, micromodem, and even the old Apple serial interface.

Now you're asked a series of questions about the kind of printer you have. The options on the program menu are NEC, Qume/Diablo, Epson, Centronics 737/739, Paper Tiger, and others. The system also asks for information about how you intend to interface with the package.

The next series of questions concerns the formatting of your pages of output. You can select the sizes of the top and bottom margins, the width of the page, whether text is right justified or not, the number of spaces between lines, the size of the left-hand margin, and how footers and headers will be spaced. It's nice to be able to choose these options from a menu rather than having to place printer control characters in the document itself.

Certain choices of printer provide you with an additional menu that allows you to take advantage of your printer's special features, such as underlining, boldface type, or enlarged print. With the Epson printer, for example, you can select different fonts, choosing from among four options: ten characters per inch (standard), a condensed font, a double-strike font, or an enhanced font.

Cursor movement around and through a *Letter Perfect* document is unusually flexible. You can move to the beginning of a document, the end of a document, to the beginning of the line, to the next page, or even back a page. In fact, you can scroll continuously through a document at a speed you select.

Cursor movement is achieved by using various combinations of keys. For example, control-Y moves the cursor up one line and control-Z moves the cursor to the end of a line. It would have been nice if control keys hinted by letter at the operation they performed, but it's understandable that this would be very difficult to do when there are a large number of commands to be considered. In any event, once you get accustomed to using a particular word processor, its keying sequence soon becomes second nature to you.

The escape key is used in two different ways in *Letter Perfect.* It's used in place of the shift key to indicate a capital letter (keyboard modification instructions to use the shift key for capitalization are provided). The escape key is also used to get some special print characters. Pressing escape and a particular number key allows you to print such things as a left or right bracket, a power symbol, a back slash, open and closed braces, the at sign, and an underline. Subscripts and superscripts are also available.

A merge option from the main menu allows you to add a file you already have on disk to the end of the file that's currently in memory. In addition, you can use *Letter Perfect* in creating a database. This makes it possible to produce a form letter and to merge a list of names and addresses into that letter.

One of *Letter Perfect*'s attractive features is the fact that it has a companion product. *Data Perfect* is LJK's database management package. As you would hope, the packages "talk to one another," which can be particularly useful when you wish to include data in a report. This is an advantage that should not be overlooked when you're considering a word processor.

For the most part, the *Letter Perfect* user guide is well written. The progression of topics is logical and the manual is thorough, providing you with all the documentation you need to use the system successfully. The package also includes a helpful and attractive reference card.

Some disadvantages to the manual are the fact that the explanations it contains, while clear, are often too long. No screen images are included to clarify the material being discussed, which means that it's sometimes hard to follow everything that's being said.

In sum, the *Letter Perfect* word processing system is a well designed package that's easy to learn to use and well documented. It has all the features most people would expect of a professional word processing package. Once you've defined your word processing needs, you're encouraged to look at *Letter Perfect* and its companion, *Data Perfect.* ■



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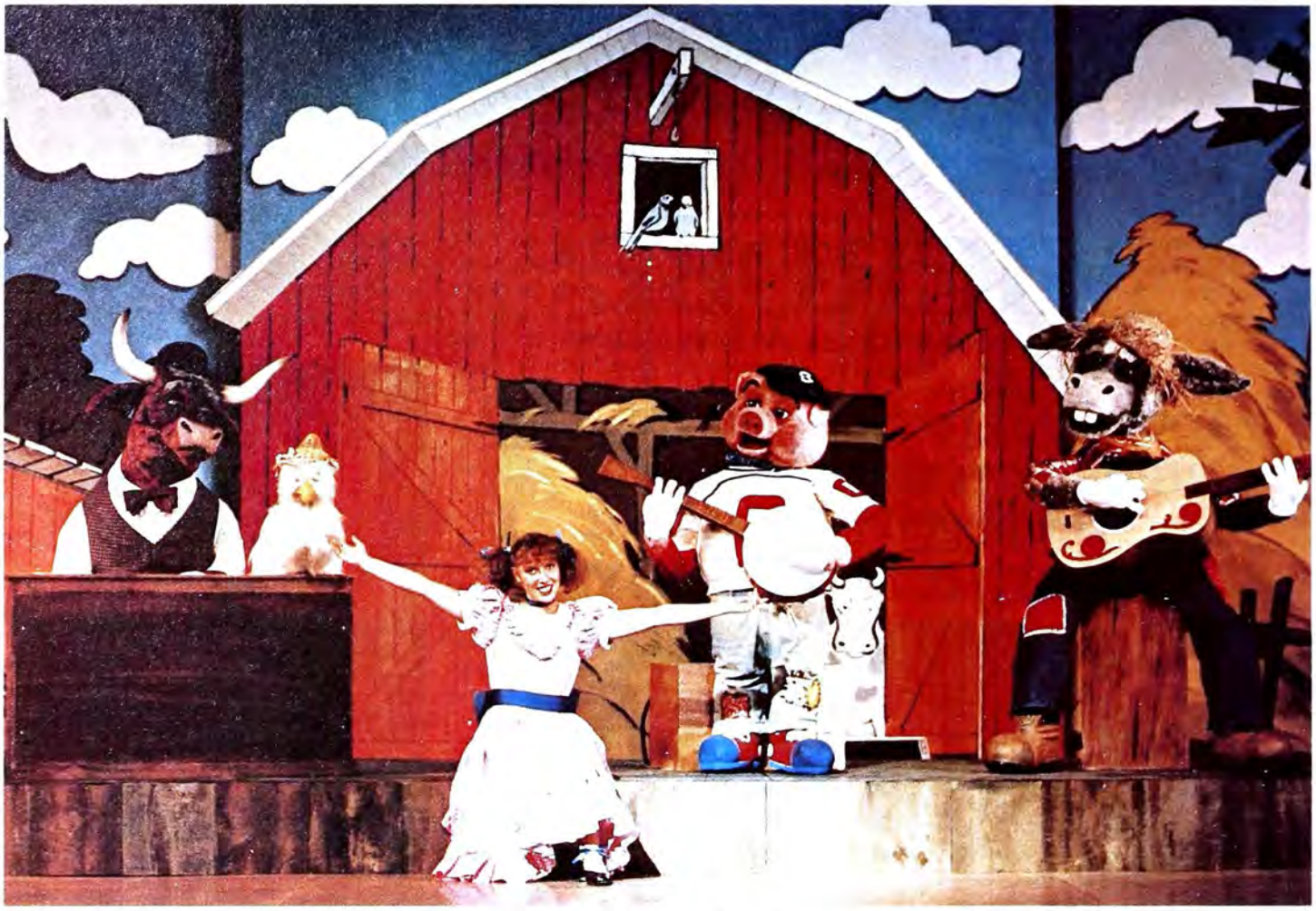
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The Americans, They Are a Funny Race. The first and most fascinating aspect of existence that tends to come to human beings' attention is the phenomenon of movement. Later on, we derive a subtle delight and sense of satisfaction from seeing this most immediate evidence of life imparted to things that our reason tells us could not possibly be alive—wind-up toys, Betty Boop, a Ferrari, department store windows at this time of year, or Abraham Lincoln 120 years after his death.

The ultimate, or at least current, manifestation of this phenomenon was developed in the laboratories of WED, the engineering arm of Walt Disney Productions, in 1963. A plexiglass mold filled with wires, brass tubes, bushings, bearings, valves, and ball and socket joints, covered with a latex skin molded over the body, resulted in the first "audio-animatronic figure"—a singing robin that serenaded Mary Poppins outside a window, joined later by an entire flock as a permanent Disneyland attraction.

The computer programming requirements necessary to choreograph the voices and movements of these characters (in 1963!) can be imagined.

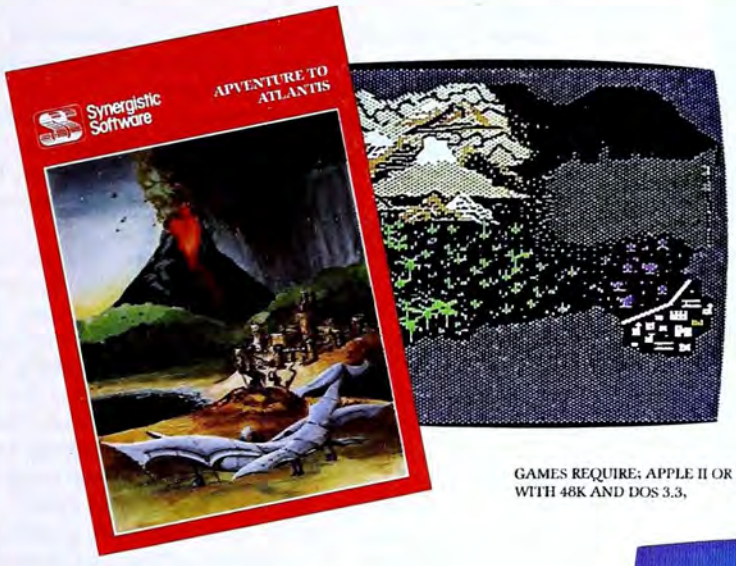
The little songbirds, however, were only the first step on the evolutionary scale of computer figure animation. The following year, Disney turned up at the New York World's Fair with a historic creation, and a few prehistoric ones as well. Disney's dinosaur exhibit was life-sized, and had special transportation requirements. Few New Yorkers who saw it have forgotten the sight of a tyrannosaur and stegosaur being floated down the East River on barges.

Robotic Rage. While the dinosaurs were impressive as an example of heavy figure animation, they were not technically far removed from the singing birds. Far more advanced, and one of the most popular attractions at the Fair, was the audio-animatronic figure of Abraham Lincoln, which rose from a chair and delivered a speech, complete with gestures and shifting expressions. Lincoln had some bugs in him, and threw several mechanical fits in rehearsal, once smashing his chair. He calmed down for his debut, however, and is now a seasoned performer at both the Disney parks.

The success of Disney's computer character animation did not escape the notice of technologically savvy businesses and entrepreneurs.

Former Disney "imagineer" Alvaro Villa founded AVG Productions in 1978, designing the "Battlestar Galactica" attraction for the Universal Studios tour and the Monster Plantation at Six Flags Over Geor-

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Bob Wire and Dusty Destry harmonize in the Country Critter Review.

gia. His crowning achievement is reputed to be a robot duplicate of Andy Warhol that will be part of a national touring attraction in late 1983. It is said to have "the most sophisticated head ever built," capturing certain characteristic facial tics of the impassive pop artist.

Behind Every Great Man, There's a Little Computer. Creative Presentations was involved in industrial theater and corporate communications before creating a robot Mark Twain for a trade show in 1976. Since then, they have gone full time into the design, manufacture, and staging of animated productions.

Frank Gaughan, creative director of Creative Presentations, is the mastermind behind the robotic attractions at Marriott's Great America, Hershey Park, and the Six Flags amusement parks.

Before Creative enlisted the aid of an Apple, the usual eighteen-minute production required the assistance of a lighting coordinator to run the lighting and actually turn on the equipment and begin the show. The initial equipment configuration was a reel-to-reel tape deck, a pneumatic controller, and the lighting control panel.

A typical show required a lighting coordinator, one live performer, and one usher for operation. The lighting coordinator had to pay close attention to the show and make discreet lighting changes on cue. The synchronization of character movement and sound were also critical.

Now, an Apple usually hovers attentively stage-left, overseeing the show via control lines connecting it to the pneumatic solenoids in the animated characters on stage, and running about sixty lighting cues, music, and character dialog. It also functions as house manager, keeping track of show times, controlling the house lights, and rewinding and cuing the reel-to-reel tape deck containing all the show routines and music.

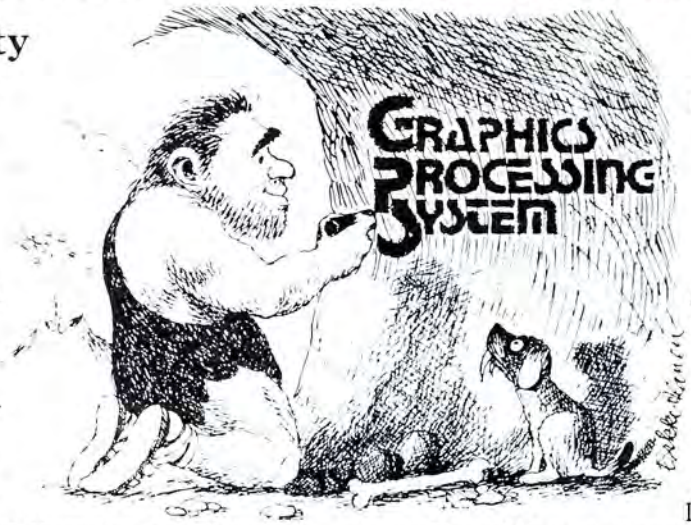
Before they got the Apple, Creative used their own system. "It worked okay," recalls Gaughan, "it just seemed to have a lot of trouble picking up the data. The Apple is very reliable."

Teamwork. Slot 0 of the basic Creative Presentations Apple contains a ROM card programmed to fire the valves inside the pneumatic solenoids, releasing the compressed air that causes the character onstage to execute a programmed movement. When the computer signal ceases, the air flows back through another valve.

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Arcade Challenges . . .





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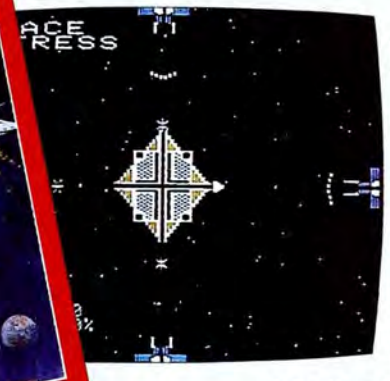




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Mark Twain under construction; Creative Presentations's first entry into the world of computer-animated figures.

Slot 2 contains a data decoder card that takes input from the reel-to-reel deck—two to four channels, music on the right track and data-on-tape on the left—translating for the ROMs so they'll know which character is to move and what the move will be.

Slot 3 holds a clock for time keeping; and slot 4 contains a character interface card that communicates with the stage characters and the lighting control panel. This card takes the instructions from the ROM card in slot 0 and relays the electrical impulse to a corresponding card inside the stage character, triggering the appropriate solenoid. Each character interface card can control up to eight characters and can be expanded to control up to sixteen stage characters with more than two hundred individual movements . . . with one Apple.

Food for Fun. Gaughan estimates that "there are probably five or six computer animation companies out there that you could call solvent." It is a specialized profession with a limited clientele. The prevailing winds of the current economic situation are not great help, either. Bob Wire, Lester the Mule, and Trail Dust, the gang from the Six Flags Over Texas "Country Critter Revue," all got pink-slipped in November. Yet now that they've trudged back to their home base at Creative, they may soon find work again as an attraction at Celebration Station in Rockford, Illinois . . . or as restaurateurs. The pizza business is now heavy into computer animated revues, with Pizza Time carving out their Chuck E. Cheese empire on the West Coast, and Show Biz Pizza taking over the Southwest. Some restaurants do their programming in-house; others go to such computer animation houses as Creative Engineering of Orlando, Florida, the giant of the field, or to Creative Presentations.

It all started, of course, with Disney. The parks in Anaheim and Orlando use what is called (sorry, Walt) a "dirty system," with hydraulic lines pumping oil rather than air through the characters' synthetic arteries, causing greater pressure and allowing for the slight lift of an eyebrow, the curling of a lip, and the movement of large, heavy dinosaur limbs—feats that could not be duplicated by the pneumatic solenoids that can raise a felt-covered hoof or airy feathered wing. Nor can they duplicate the faint, strangely exciting aroma of hot machine oil that lends extra power to Mr. Lincoln's words and giddiness to pirates' plundering.

Air, however, is cheaper than oil. Thus, a hungry America must sacrifice a little realism while chowing down to the musical accompaniment of electronic vermin, quadripeds, and various reptile and avian species.

Besides, if a line ruptures, you won't get oil all over your pepperoni. ■



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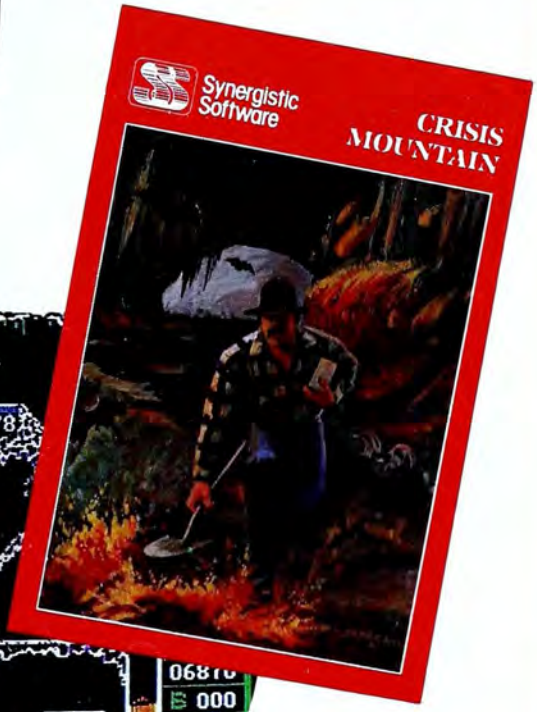
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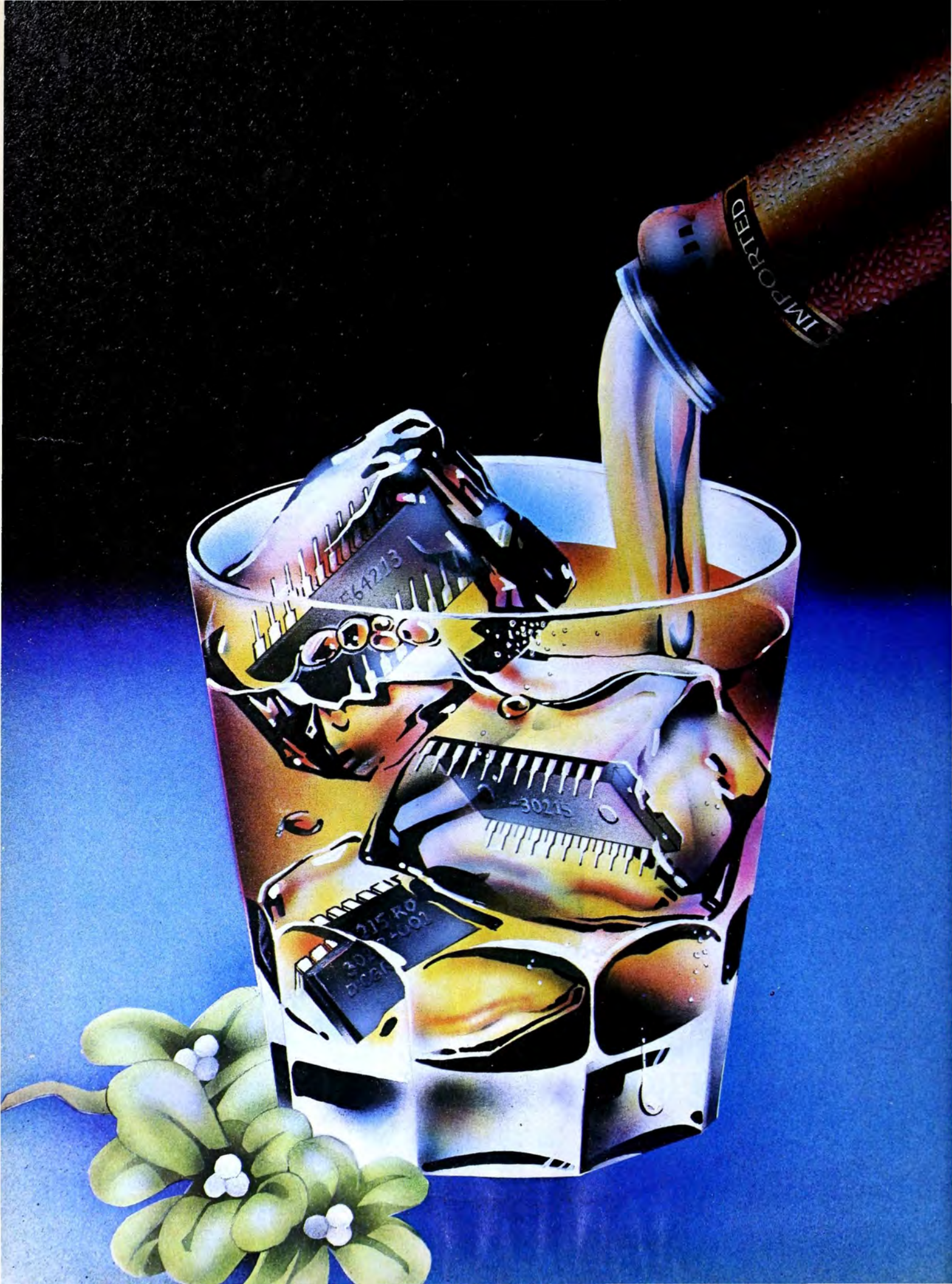
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The Loneliest Time

by David Hunter

This couldn't be happening. Not to Gil Bonds. No sir. Not now.

Yellow light bulbs shone through grimy glass holders shaped like giant sunflowers in the long, dim hallway. Thrusting thin fingers into the pocket of his sweat-stained dress shirt, Gil located a cigarette and transferred it to his bare, slightly trembling lips. In the inside pocket of his black coat, Gil grasped a butane lighter. Eyes fixed on the closed door across the hall, he automatically lit the cigarette.

Where is that lousy crook? She said ten minutes and it's been thirty. Three cigarettes. This stinking marble seat is getting colder by the minute.

Gil nervously brushed back his short, curly mop of charcoal black hair. He was one of those people who hate to wait for anything. At age thirty-seven, he shouldn't be expected ever to wait for anything, least of all to see his lawyer.

Without a sound the door marked "private" opened in front of him. A person carrying a briefcase, dressed in a long yellow raincoat and wearing a motorcycle helmet, stepped out. Gil looked down and crushed his half-finished cigarette on the tiled floor as the silent person in the raincoat walked off down the hall. In the open doorway stood Rhonda Realty.

"Hello, Gil. Sorry for the delay. For God's sake, come on in." Rhonda smiled and held the door for him.

The conference room was small and plain. There were no windows and only the barest necessities, one small table and two chairs. Gil and Rhonda sat facing each other.

"How do you feel?" Rhonda asked as she lit a cigarette. "Only a fool wouldn't be nervous. Don't let it get the better of you."

"I feel like I'm walking the plank and the sword sticking in my back is very sharp," Gil said, staring intently at Rhonda and her salmon-red locks. He looked away embarrassed.

"Now just calm down, Gil. If you tell the judge and that moron-filled jury the truth, like you told me, nothing will happen. They only throw the guilty in prison."

"Am I guilty?" Gil asked, staring intently again. He swallowed and licked his lips.

"The only thing you're guilty of, Gil, is being a drunkard."

Thin fingers grasped another cigarette. *Last one before the frying pan.*

Lost in thought, ignoring Rhonda, Gil took a bigger than usual puff on his cigarette and started hacking violently, dropping the cigarette on the floor.

"Honestly Gil. You're so smashed all the time. If you hadn't been imperially bombed that night, this whole thing would be fiction."

Gil closed his eyes and let out a smoky whimper.

"Which reminds me. They may try to get you with some other charge. You won't get away easily. Be careful what you say." Rhonda put her hand on Gil's arm. "I think you don't have a thing to worry about."

Gil wanted to believe this beautiful lawyer, but his sad face betrayed his real emotions.

"Look," she took his arm again and kept it this time, her face glowing with a determination that was very becoming. "We both know that you're not a technological spy. You're not involved with industrial espionage. Right?"

Illustration by Kevin McKeon

"No way," Gil said grimly.

"Okay then. You've got nothing to worry about. Tell the truth."

Gil entered the courtroom and sat in the seat designated for the defendant. Except for Rhonda, he knew no one else in the large, well-lit, chilly room.

This can't be happening. It's just impossible. It was an accident. Honestly. I didn't mean to do it.

Gil fought to keep his thoughts from overflowing and ruining his shaky composure. *Concentrate. Stay alert. Listen to every word. Watch the judge. Ignore the jury.*

He tried to remain calm on the outside while the TVM camera crews set up. Two hulky cameramen and two wispy newsgirls represented the two most popular and raunchy networks. Gil shivered at the sight of them.

It's not the 150 million watching around the world that bother me. It's the twelve in this godforsaken state. Those closeups can kill. God, I hope the bloated wineskins under my eyes aren't too bad.

Knees shaking, Gil stood with head bowed as the robot clerk announced the judge: "All rise. The court of greater Guthrie, Oklahoma, is now in session. Honorable Judge Phyllis Birch presiding." There was silence in the courtroom. Even the high-speed video cameras were noiseless.

White, shoulder-length hair fell haphazardly on the judge's black robe. Gil judged her age at close to sixty. The Honorable Phyllis Birch settled majestically on her seat like a Boeing 784 touching down at the Oklahoma City airport. Straightening her small, round-rimmed glasses, she spoke a few words Gil couldn't make out to the robot clerk, who then disappeared behind a door.

The cameras rolled on and the day in court began. Gil's was the only case. His heart jumped every time he heard his name mentioned. There was little else amidst the legal mumbo jumbo passing between the judge and the attorneys that Gil could understand. He motioned to the robot coffee vendor moving down the aisle. Gil awaited his fate calmly, with a steaming cup of Brazilian black.

Just try and screw me. I dare you. I'll sue. Try and defame me on TVM.

The prosecuting attorney made his opening statement, addressing the court from next to his desk. He made it out to be an open-and-shut case. Rhonda listened attentively. Gil began to feel like his was a lost cause.

The newsgirls wrote frantically on tiny handywriters.

At least they have TVM up the river at State Pen.

I must be going mad. That can't happen.

Gil looked apprehensively at the wall of jurors. The faces and upper bodies of twelve honest, working, voting folks, beamed from outlying towns, showed impassively.

You really can't tell which way their eyes are looking.

The twenty-inch monitors were in two rows of six. A black man with very long hair sat smoking a fat cigar on the screen in the lower, far-right corner. Suddenly it seemed like he was staring straight at Gil, who almost spilled his coffee. Gil looked away and then back quickly. The man with cigar was watching the DA again.

Listen to every word. Watch the judge. Ignore the jury.

Gil snapped out of his blue funk in time to see Rhonda trying to catch his attention.

What does she want? Move over there? You're joking. You're not—dammit. Gil looked frantically at the judge and blinked twice. *She's gone. Must be a recess.*

Gil walked over to an ancient-looking wood rail and leaned over to hear Rhonda.

"I'm making my opening statement in five minutes, so sit tight. You won't be called on the stand until tomorrow. Gives you a chance to come in all fresh and bright tomorrow morning."

Gil coughed and grabbed Rhonda's arm.

"Jesus, Gil. Go have a cigarette in the lobby. Be back in five minutes. We're not through this day yet." Rhonda returned to her seat.

Gil puffed hungrily and looked at the bleak, wintry outdoors. The forty-story Mid-American CompBank building glistened a quarter-mile straight ahead. Gil had been in that building only once, ten years ago. That was for a successful job interview. Long before and ever since, Gil had wanted to work in that gorgeous, metallic building.

But no. Make me live somewhere between Hennessey and Lovell and work at that damn telecommuting center.

Gil returned to the courtroom. Almost immediately the judge entered and Rhonda began her opening statement.

And does the company take care of its own kind? I have to unload mucho dollars for this hotshot lawyer, my whole Christmas bonus. They'll probably fire me no matter what happens.

Back to TVM in the stripy hole.

"I repeat, members of the jury, we will prove that this sad man is the victim of a strange coincidence. Does he look like the kind of man who would consciously vandalize the peaceful and well-respected Rodan Corporation of Oklahoma? No one says computers aren't foolproof. Mistakes can still be made."

On that note, Rhonda sat down and Judge Birch sat up high in her chair. Gil felt sick. *The coffee can't be that awful.*

After another short recess the prosecution presented its case.

There was only one witness, the computer. Gil's crime was there in black and white, from the instant the computer nabbed him in the act. The computer's record of the event was the single most damaging piece of evidence against him. It showed that a break-in had occurred and that the signal originated from Gil's home. Written statements from the arresting officers and incriminating fingerprints from Gil's keyboard were handed over to the judge.

The prosecution made some curious points, inconsistencies found in Gil's behavior and actions. In the end, said the prosecution, Gil was an inexperienced criminal, but a criminal nonetheless. Maximum penalty was demanded, for breaking and entering a closed corporate computer system: ten years in the state penitentiary.

"A very interesting case, which will resume tomorrow at 10:30 a.m. sharp," said Birch. The robot clerk appeared again. The judge exited and the court broke up.

Rhonda found Gil.

"You look terrible. Get some sleep. Come on."

He got up slowly and headed for the exit behind her.

"It wasn't so bad now, was it? Gil, you honestly are something. Get you in the sun and you almost look human."

Want to go out for a drink baby? No, forget it. Not a good idea.

"Can you drop me by the rails, Ms. Realty?"

"Rhonda, you dope! Rhonda. You're paying me enough to call me Rhonda. None of this Ms. Realty crap. I hate that name. Somebody's idea of a joke." Her face was as red as her hair.

"Did you say you need a ride? No trouble. Hop in."

Gil enjoyed sitting in the big back seat with Rhonda while a chauffeur drove the battery-run Behemoth 310 to the commuter station. *Not bad. Let someone else do the driving. Sit here in privacy and enjoy the scenery. Rhonda drives around like this all the time. Wish it were mine.*

"Get lots of sleep. Don't stay up late," Rhonda said at the station.

"See you tomorrow," Gil said meekly. Rhonda drove off.

Gonna ride that rail. All the way home. Thirty miles to my darling. All the way home.

"Seven rooms is all it is. Seven rooms of gloom."

Thirty minutes later, Gil sat alone in his living room listening to a GM oldies station, eating a leftover broccoli spear.

This house's so alone. Since you went away. Miss your sweet smile oh darling. Since you went away.

Gil took a glass down from the cupboard and made himself a drink. *The only way I'll go to sleep early enough to wake up tomorrow is start drinking now.* Gil forgot to eat dinner and got to sleep very early.

I rode that rail. Thirty miles to my doom. Hurry save me oh my darling. Thirty miles to my doom.

The next morning, before the trial, Gil and Rhonda met by accident in a coffee shop.

"I'm glad I found you. I feel a lot better," Gil said as he sipped steaming java.

"You look better."

"I got plenty of sleep." Gil put down his cup. "What's wrong? Now you look down in the mouth."

"Gil, I'm worried. They're really after your head. They may try something . . . something degrading."

"To me or them?" He lit a cigarette.

"Both."

"I don't understand."

Rhonda stared into her coffee cup like she was peering into the center of the world. Deep furrows on her brow, like rivers on a road map, appeared and then vanished. Her right forefinger traced a small portion of the white cup's rim.

"What's there to explain, Gil? Things haven't been good for the World of Commerce the last two years. Money's in short supply. Systems are failing. There must be someone to blame. You're it. You're being blamed for all the ills of the world."

"Don't say that. You're supposed to encourage me, not make me more paranoid." Gil puffed madly on his cigarette.

"I know that, Gil. You're such an innocent child. A child in a big world."

I deserve that. A child facing imprisonment for a crime I didn't mean to commit. I wasn't trying to bust into that compwork. I didn't know what I was doing. I was drunk.

"Come on, Gil. You'll do all right. We'll keep you out of State Pen and settle this matter today. I promise. Just watch out for the prosecution; they'll ask some loaded questions." Rhonda smiled prettily. Gil had the feeling she had just resolved some nagging problem and was now freer. "Cheer up. I think the judge is looking out for you," she said.

Gil chewed on that last morsel of information as he walked in and sat down in the courtroom.

They're here again. I can remember when TVM newsers weren't allowed in courtrooms. How interesting can this case be? I guess when you don't have anything else to do. . . . And the jury fades in. They all look like schoolteachers. I did my bit of duty. What a bore. You have to sit in this stupid room looking at TV monitors, while a dumb robot lets you in and out, lights your cigarettes, operates the video camera, and serves coffee and doughnuts. It's like going to the autodentist. Judgment is extracted. And one is alone with one's numbness.

Rhonda called Gil to the witness stand. Once he was settled she smiled and gently asked him the big question.

"Mr. Bonds, please tell us exactly what happened the night of December 19, 1997. You may go back as far in time as you wish in order to tell all the facts and factors leading up to the events of that night. Be thorough and keep nothing from this court."

Gil fidgeted in the hard wooden seat and looked at Rhonda. Getting up here was easy. Now he had to talk coherently. Rhonda's face showed no emotion, but Gil thought he detected a slight jerk of her head for encouragement.

"There's not much to tell. Most of it's pretty personal, what led up to that night. But I'm not ashamed to talk about it."

I am. She was too good to lose. I drove her away.

The cameras whirred silently and everyone looked at Gil.

"That afternoon, we had the traditional Christmas party at work. My only real friends are the people I work with. We drank a lot and danced a lot. Everybody had a good time. The company, Mid-American CompBank, was paying for it, so everybody felt good. There hadn't been a party like it since last Christmas.

"I danced with five or six of the girls in the office, including my boss. I was having a great time until I started thinking about my wife. You see, she left me three months ago and I'm still in love with her. Suddenly the party was empty and lifeless for me. I had drunk quite a bit and began to feel uncomfortable. And I couldn't stop thinking about Nellie, my wife."

The prosecuting attorney coughed loudly and Judge Birch noisily shifted positions in her chair.

"I took the rails home late that afternoon. B Red line to West Lovell, Stop O. I felt down and lonely. I arrived home around 6:45 p.m. At 7:30 p.m. I decided to contact Nellie through the CPWN."

Gil swallowed and paused. He looked at the jury, and they seemed to be falling asleep. A spectator in the back of the room stifled a loud yawn. Judge Birch smiled slightly and looked at Gil. He could have sworn it was a look of encouragement.

"You see, I was desperate. I felt like James Stewart in an old movie I saw years ago on TVM. What if I had never existed? Would the world even notice? Would the people I've known be better off? The only good thing I've done in my life is marry Nellie, and then I ruined that. I wanted to patch things up. I really wanted her back. My life was falling apart.

"So I tried calling her on my terminal. I figured I'd find her somehow, even though I had no idea where she was." Gil paused and cleared his throat.

"I'm not even a preprogrammer, but I have a professional 899 A supermicrocomputer, the model many engineers use, I'm told. The machine was given to me by my boss after a particularly good year. Half the keys are foreign to me. I've only used it for sending and receiving cwiks and reading the news services."

With drink in hand, I sat at the monitor. The room was starting to swirl around and the radio blasted country-reggae. Where are you? Hit those keys. Smash 'em. I'll find you.

"I must have hit a wrong sequence of characters early on, because nothing went the way it was supposed to. I tried linkage with the county files and accessed my next-door neighbor's mailbox instead."

Ha ha, up yours, Ben and Barbara. No messages today. Hope that tree falls on your house.

"Apparently I erased half the programs in my neighbor's databank, but I didn't know it at the time. I must have somehow switched the keyboard into a different mode. I thought I was typing words. Anyway, the computer seemed to be sending something else altogether.

"I tried again to link with county and found myself disrupting the Guthrie Municipal Hospital." Gil stopped guiltily and scratched his nose. "I didn't mean to do any of it. But once I started there was no way to stop. I had to find her."

That was the scariest part. Somehow I blocked all incoming and outgoing data from the hospital's emergency communications compwork for thirty seconds. Any longer and I might have caused real trouble. It was the middle of the evening, the busiest time for the hospital. God, the tragedy I might have caused.

"I tried one more time to find Nellie. I keyed her folks' number in Meridian. Suddenly, I was staring at a bright red screen with a cryptic symbol on it. I tried typing something, but nothing happened. I typed some more out of frustration. Nonsense it was. I tried to say 'Nellie come back.' "

Nelhi,, com bacck. Doon't go nnow. Damn lights, can't see a thing. Why's it all red? What the hell is going on here? Now it wants prompting. Okay, sucker. Here you go.

"That didn't work. The screen just got redder and displayed a blank line, as if it wanted me to sign my name. So I typed, 'Go to hell.' Well, that's just what happened. My screen went black, except for a line of blazing white characters. It said 'Intruder, Break One, Area 23.' "

Oh man. What did I do? Damn drink, where'd it go. Hell, where's the bottle. Now the screen's flashing. And that noise, like a chimpanzee playing a synthesizer. What have I done? Dammit, now the computer's shut itself off. What's going on?

"Before I could tell what happened I fainted. When I awoke, the police were standing over me. They had entered the house and were preparing to arrest me. They said I had broken into the compwork of the Rodan Corporation of Oklahoma. I didn't know what they were talking about."

Rhonda looked at Gil. Her strong, Irish face was rigid. Her stance forward, like an athlete. She stared at Gil with her big brown eyes for perhaps fifteen seconds.

"A few more questions, Mr. Bonds," she said quietly.

"Is it a fact that you don't know anyone who is currently working at the Rodan Corporation?"

"Yes. It's on the other side of the county. I've never been there."

Rhonda looked at a small piece of paper.

"Is it true that before December 19, you had never heard of Vanteric coding?"

"Yes." *She's good. She's great.*

"But you had heard of SpectreNet, which you can access on your 899 A supermicrocomputer?"

"Yes. I never used that feature. To tell the truth, I don't care much for computers and all that. I work with them, doing the same thing year after year. So when I get home, I ignore my smc most of the time."

Rhonda looked down at her piece of paper again.

"Have you tried many times to contact your wife since she left you?"

Gil gulped, looked at the video cameras and then at the jurors.

"Yes. I've tried a dozen times to find her, but I haven't reached her once." *I call her friends but they never seem to pass on the messages. Maybe she doesn't want to see me.*

How the truth can sting. She probably never really loved me. Loved my salary is more like it. She's gone for good.

Gil's face reflected the stone-cold facts running through his mind.

"That will be all, Mr. Bonds. Thank you. No more questions, Your Honor." As Rhonda turned to go to her seat, Gil thought he caught a fleeting smile of encouragement. He tried to feel optimistic. It wasn't easy.

Here we go. The big moment has arrived. Man turns to jello on TVM.

The prosecution had plenty of questions it wanted to ask Gil. A delicate, educated-looking man of about forty stood up. Hands clutching several sheets of paper, the prosecuting attorney stood by his desk and addressed Gil on the witness stand.

"Mr. Bonds, you say that you arrived at home on December 19 at 6:45 p.m. and then tried to contact you wife at 7:30 p.m. What were you doing during the forty-five minutes between these two events?"

Gil rubbed his hands together and coughed a smoker's cough.

"Mister, I drank a couple of drinks, smoked two cigarettes, and spent about fifteen minutes looking for an old numberbook."

The prosecuting attorney got steely-eyed.

"Mr. Bonds, do you know a Mr. Shaver Sullivan?"

"I've never heard the name before." *Is this a trick?*

"He's a well-known smasher of spy rings. Did you know that Mr. Sullivan visited your office only two months ago?"

"A lot of people visit our office. No." *Who is this Sullivan?*

"Did you know that your wife has been seen with Sullivan several times?"

"Objection!" Rhonda jumped to her feet. "Question does not tend to lead to relevant material."

That was pretty lousy. Up yours, Mr. Prosecution. Of course she's seeing someone. Who the hell cares?

Rhonda sat down flustered but triumphant.

"Did you know your wife is currently working for the Rodan Corporation, Mr. Bonds?" The crafty little man twisted off the last two words like they were disgusting, crawling insects.

"No." *I already said I haven't talked to her, schmuck.*

"She's a junior accountant there."

Judge Birch displayed impatience. "The prosecution will please get to the point." Rhonda held her breath.

"Mr. Bonds, do you hate the Rodan Corporation?"

The judge frowned.

"No, mister."

"Is it true your wife called you the morning of December 19?"

If she had called? If she had called. "No, sir."

"No further questions." The sly little man sat down.

Gil walked back to his seat. He swam through a liquid sensation of conflicting thought and impressions. *Has he proven anything? What was all that leading up to? How come he stopped. They sure pulled one on me. Rhonda said "degrading." Do I really look like a spy? They've taken the computer's word for it that I am, but that isn't enough and they know it. So why drag Nellie into all this?*

Gil sat down. Rhonda called to the witness stand Filmore Stanton, code specialist with Starkweather Consultants. She questioned him about Gil's keying Vanteric Code on SpectreNet. Stanton showed that Gil keyed "Nelhie,, com bacck. Doon't go nnow," and SpectreNet translated it into the precise Vanteric lock-breaker for Rodan's computer system.

Stanton also showed that the phrase "go to hell" in Vanteric was the door-opener for Rodan's compwork. When Gil typed that line too fast it set off the alarm, which tracked the signal and froze his keyboard. Anyone who had knowledge of the codes would surely know about the sequenced timing for entering them.

Rhonda sat down. The prosecution did not cross-examine Stanton. The robot clerk glided in and announced a twenty-minute break. Rhonda motioned Gil over to the rail.

"Let's go outside. I've got something to tell you."

Gil had been feeling good up to this point. He had sat on the hot seat and survived. He could have sworn it was all over.

They stood near a large plexiglass window and smoked nervously.

"Gil, get ready for a shock. The next witness is your wife."

"What!" *She's here. Witness? For whom?*

"Gil, she's a witness for the prosecution. She's going to testify against you. I'm still now sure about what. Chances are you've nothing to worry about."

Gil suddenly felt cold.

"It sounds like you've known for a while," he said. He felt betrayed.

Since yesterday. Remember the person in my office when you came by."

Of course. Couldn't tell whether it was a man or woman in that raincoat and motorcycle helmet.

"I was worried sick while I was talking to her. I knew you would be sitting on that bench," Rhonda said. "I convinced her to put on the helmet so that other people wouldn't see her coming out of the conference room. It's just luck that she didn't see you. It would have been a horrible scene."

"What did she say?" Gil dropped his cigarette into the airotray.

Rhonda stared at the smoke swirling around their feet. Then she raised her head resolutely and looked directly at Gil.

"She was looking for the best deal. She'd agree to keep certain information out of court, if we gave her money. A lot of money. I told her we wouldn't give her a nickel. Boy, did she take off in a hurry, straight to the prosecution."

Gil was numb. *Don't cry. Not now. Later.*

"I'm still not sure what she's going to say." Rhonda lit another cigarette. "Probably lies. A final attempt to win over the jury. They must have just closed the deal a few hours ago. Her idea of money is peanuts to these guys. But they're desperate now. They're not past trying something this cheap."

Gil looked down with a blank, miserable expression.

"I think I'll have no problem. Their evidence is real lousy. They tried to crack you. That was their plan. Get you on the stand and nail you to the wall. Now it's my turn to grill their prize witness."

Rhonda looked at Gil compassionately.

"I know this is rough for you, Gil. She doesn't think much of you and will try to hurt you on the stand. Why they changed the laws I'll never know. It's bad enough letting the newsers in. Please don't let it get to you. She only wants money. I think that's all she ever wanted in life. Money and the spotlight."

The prosecuting attorney looked like a proud father when he called Nellie Thomas Bonds to the stand. The tension in the courtroom was thick as the surprise witness came forward. The jurors all stared.

Wearing some outfit I've never seen. Took off the wedding ring. Damn. At least she didn't change her hair.

Nellie seemed calm and collected, though she looked anything but innocent. Long blonde hair, curled and bleached, made a striking contrast to her pitch-black, navylike outfit and bright red lipstick. She was young, pretty, and dangerous.

"Ms. Bonds, you are aware of the charges being brought against your husband?" Once again the attorney brushed off the last two loathesome words.

"Yes." Long blonde synthetic lashes flickered.

"You have observed behavior that would prove your husband is part of a spy ring?"

"Yes."

What is she thinking? Does she really hate me? She said she did, before. I had a bottle in my hand and her stupid OuijaCalc in the other. I'm glad I broke it.

"Did your husband ever say anything bad about the Rodan Corporation?"

"Yes. He said he hated it."

I never said that. All I said was there was a time when there weren't all these damn foreign companies in America.

"Did your husband have any reason to hate the Rodan Corporation?"


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"He said, 'They've ruined America. Someone should make them pay.' "

What is she talking about? Why are you doing this to me? It's over. Do I have to go to prison for it?

"Ms. Bonds, tell us what happened four months ago on the night of October 1."

"Objection. What bearing does this have on the case?"

"I'm getting to that," said the prosecuting attorney acidly.

"Overruled," said Judge Birch.

"Go ahead, Ms. Bonds."

Nellie looked down at her lap and then right at the jurors, slightly parting her lush red lips.

"Gil came home smashed that night. I was distraught over his drinking. We got into an argument."

Thanks for bringing that one back. A real bad one. The beginning of the end. God I hated you that night.

"Something he said during the argument alerted me that maybe he was involved with a spy ring. I remember it clearly. 'We've got them now. Soon they will pay,' that's what he said. I asked him what he meant, but he refused to talk about it."

Boy oh boy. That's slim. I was talking about collecting on last year's World Series bet with the Oklahoma City office. Everyone in our office was still due considerable bucks, but that's part of the game. You trick the losers into paying up. I didn't clarify because I was too angry.

"Ms. Bonds, tell us what you found on September 12, 1982."

"I found a piece of paper with computer code on it. It was crumpled up lying under a newspaper in Gil's study. I couldn't understand it, but it looked important. I kept it and showed it to a friend."

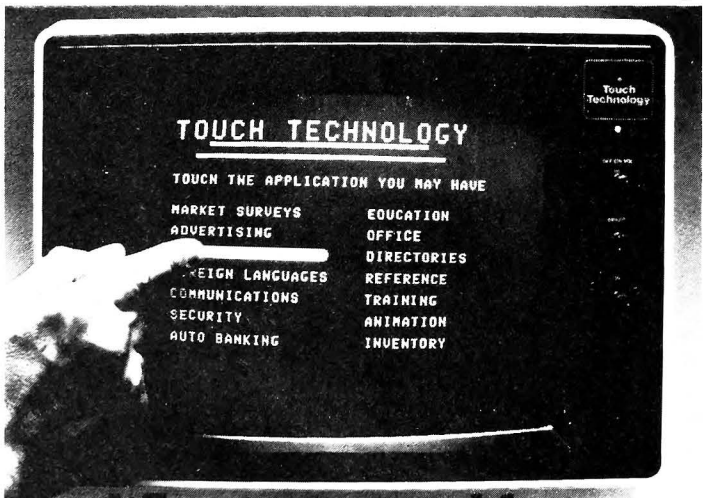
"Who was this friend?"

Mr. Sullivan no doubt. Probably been seeing him for years and never told me. Stab deeper, darling, it don't hurt no more.

"Steven Anderson, a computer operator at the Rodan Corporation's Hitchcock office."

"Did your friend identify it as Vanteric code?"

"Yes."



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"Mr. Anderson is willing to testify, Your Honor, except he's on vacation and can't be reached." The prosecuting attorney paused and then continued.

"What happened to the piece of paper, Ms. Bonds?"

"I threw out the piece of paper, wanting nothing to do with it. I didn't want to think my husband was a criminal."

"That is all, Ms. Bonds." The prosecuting attorney sat down confidently.

Rhonda stood up and looked at Nellie like she was about to breathe fire and burn up those tantalizing blonde curls.

"Mrs. Bonds," Rhonda said, emphasizing the name like it was the bubonic plague, "you say the piece of paper may have had Vanteric code on it. Then you destroyed it. How come?"

"Like I said, I didn't want any part of it."

"Then why go to the trouble of taking it to your friend in the first place?"

"I don't know." Nellie looked worried. Her thin, delicate face darkened with shadows of doubt.

"Why did your curiosity stop when you still didn't know for sure what was on the paper?"

"I was convinced it was Vanteric code because my friend Steven said so."

Rhonda wound up. "Suppose the writing was of a harmless nature; did that ever occur to you?"

"No, I suppose not." Nellie's golden lashes flickered nervously.

"Is this scrap of paper a figment of your spiteful imagination?"

"Objection!"

Rhonda stared fiercely at the prosecuting attorney.

"Sustained. You don't have to answer that question, Ms. Bonds." Judge Birch smiled wickedly.

Nellie uncrossed her legs.

I guess we have to take your word for it. And your friend's word that it was Vanteric code. And your word again that I hated the Rodan Corporation.

"Was your husband ever involved with criminals before?"

"Yes."

"Can you remember these names?"

Fictitious friends. Real crooks. Bingo.

"We're waiting, Mrs. Bonds." Rhonda shifted on her feet impatiently.

"I can't tell."

"Why not?"

Nellie's features suddenly wrinkled up into a mask of hate. Her blonde curls trembled.

"Because that bastard will kill me if I tell. That's why I left him. He was desperate, and he knew I knew his plans. He told me one night. He said he'd beat me if I ever told anyone. I was scared."

Rhonda closed her eyes and whispered, *oh God*, to herself.

"How come you didn't go to the authorities immediately?"

"I was scared of him and his friends. I knew they would find a way to get me."

"What you're saying is contrary to all the facts known about Mr. Bonds up to this time. Why did you come forward so late in this trial?"

"You may know more facts, but you don't know him. He's evil. He's a drunkard. He'd ruin any woman who marries him, like he ruined me. Luckily, I escaped. He's a loser. He'll never make it. He doesn't even have the guts to try a crime like this. It must have been one of his friends who started it. I hate them all as much as I hate him."

I'll remember this day for a long time. I'll try to forget, but it won't go away. Like the past three months. I'll remember. She'll probably forget.

"No further questions, Your Honor." Rhonda sat down and frowned. Nellie got up shakily and slowly took her seat in the courtroom.

Both attorneys made their closing statements. The prosecution stood by the computer's evidence, saying more conclusive evidence could be gotten, given time. Rhonda reiterated the points of the trial and proclaimed Gil innocent of the charges. The jurors' monitors flickered out. They teleconferred in private to reach a verdict.

Gil felt weak in the stomach and broke into a cold sweat. *It comes down to this. Twelve strangers, miles away. What will they do?* Gil motioned to the robot coffee vendor and then changed his mind. He had a

hell of a time making it go away.

The jurors returned and Gil stood up to receive his fate. The black man with long hair and a cigar spoke in a strong, educated voice.

"We find the defendant not guilty of breaking and entering a closed corporate computer system."

Tension lifted all around the courtroom and some talking broke out. Rhonda smiled and leaned back. The prosecuting attorney wrote frantically.

Judge Birch pounded her gavel electronically.

"I will hear any appeals tomorrow morning. For the moment you're a free man, Mr. Bonds. I have one piece of advice, should you ever deal with this court again. Stay away from the coffee, it's always awful."

Gil laughed and gave the judge a high sign. The court broke up.

Gil stood with drooping head, watching Nellie out of the corner of his eye. She took the arm of a tall, blond man in a long, gray coat. Gil fidgeted, as if he meant to go after her.

"Forget her, she's no good."

She was great the first two years of our marriage. Then something went wrong. She grew up in all the wrong ways.

Rhonda took Gil's arm. He glanced at her; she looked ravishing.

"I'm not sure why we won so easily. Some of the jurors must have been sympathetic. The jury as a whole discounted her testimony as being inconclusive. She helped you more than she hurt you."

On the outside. Inside. . . .

"Who cares? We won. Let's tear up the town. For starters, I'll buy you dinner at Monroe's," Rhonda said cheerfully.

Gil exhaled. And then he laughed. *It's good to win for a change. I beat them and her. I'm ready. Let's go baby.*

Two weeks later, Gil and Rhonda met in her office in downtown Guthrie.

"Sorry to mess up your afternoon, but I said you wouldn't get away easy. They've brought further charges against you that you'll have to face."

Gil puffed question marks with his cigarette smoke.

"The new charge is drunk computing. I don't think you can get out of it either. The evidence is strong against you, mostly from what you said yourself during the trial."

"Drunk computing? You're joking. I've never heard of such a thing."

"Gil, it's been around for years, though not many people are ever convicted for it. It's only when you really foul things up, like you almost did to the hospital; that kind of accident the authorities will notice."

Well I'll be a skunk's uncle.

"What are they going to do? Throw me in prison and take my license away?"

"Not for first-time offenders." She consulted an official-looking piece of paper. "They'll revoke your sending privileges. Your computer terminal will be capable of receiving information, but you'll have a fixed quota of cwiks."

"Doesn't sound too bad. I don't call very many people anyways."

"Maybe you can learn from it, Gil. Remember what happens when you lose control. You could have been tried for murder if you had seriously blocked communications at the hospital. And don't forget the trial we just went through. That was close. If the prosecution hadn't tried that cheap trick, we—it might have been even closer."

When he didn't respond, she looked up. He was looking at her, his eyes steady.

"I don't know how to thank you," he said after a moment. "Let's start with dinner tonight."

"Sure, I'd love it." She began to gather her things, but Gil wasn't finished.

"And tomorrow night."

She stopped still.

"And the next night. And the one after that."

Rhonda's eyes searched Gil's. He imagined she was seeing the last few months in a moment. When she spoke, her voice was low but definite.

"Yes."

Gonna ride in a car. All the way home. Thirty miles with my darling. All the way home.

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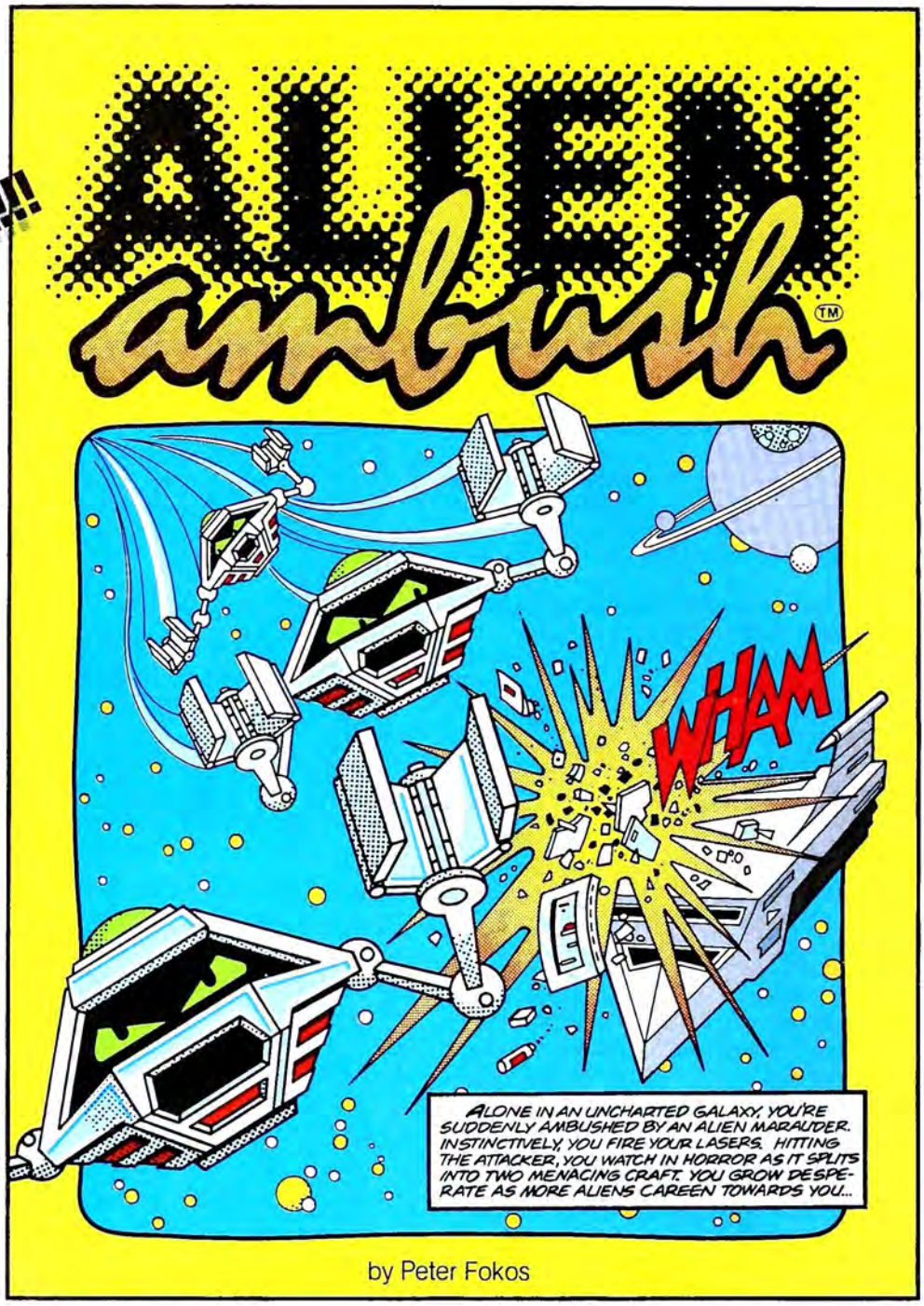
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Softalk Presents The Bestsellers

Where are all the smart guys now?

There's never a surfeit of intelligence in any market, but there's clearly a shortage of it among pundits in the microcomputer industry. Even if there weren't, it might take more than the wisdom of Solomon to sort out the data accumulated by *Softalk* during the October poll.

Consider that everybody except possibly Mike Markkula held last rites for the Apple II and the Apple III when the IBM Personal Computer hit the market about a year ago. Today, these two models are selling like never before.

Even those who hedged their bets said the Apple II would be forced to solicit the home user while IBM captured the desktop personal computer market as well as the small business market. Business software sales have never been better in the Apple market, while arcade games are wading in a morass of undifferentiated indifference.

If arcade games, those perennial sales leaders, are dying, then the home-based game player must be buying Ataris, right? Then how did Infocom place four programs in the Top Thirty?

Well, we can still all agree that all those folks who said they were buying Apples for their children's education but walked out with *Choplifter* in tow aren't going to fuel a home education boom, right? Then how is it that both the Learning Company and Spinnaker could practically declare dividends off their October sales, with Spinnaker competing with the big guys for buyer attention?

Anyway, last month proved that you've got to protect your software. After all, Penguin's packages nearly disappeared from sight on the Hobby 10, right? Yeah, this month only two of them made the Top Thirty.

Okay, but software technology is developing so fast that, when you get a hot product, you sell the hell out of it before the competition catches up, right? Not if you're Apple Computer. Then you give *Apple Writer III* and *VisiCalc* away with new Apple III sales, surely the best value in giveaways around.

But won't those products stop selling in stores? Yeah, they'll drop from first and second to second and third.

What gets first place? *VisiCalc: Advanced Version.*

Yes, dear hearts. The rest of the software industry should picket VisiCorp's San Jose offices while hoisting "Don't Tread on Me" flags. Of course, *VisiCalc* leads the Apple II market in sales. But with Apple's grand giveaway in progress, it looked like a chance for somebody else to grab the gonfalon in the Apple III market. That somebody else turned out to be *VisiCalc,* with its advanced version.

There are a lot of somebody elses out there though. October brought one other revelation. After a period of relative stagnancy in the number

Apple III

This Month	Last Month	
1.	9.	**VisiCalc: Advanced Version,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	2.	**Apple Writer III,** Paul Lutus, Apple Computer
4.	4.	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
5.	5.	**Access III,** Apple Computer
6.	8.	**Apple III Business Basic,** Apple Computer
	—	**Apple III Pascal,** Apple Computer
8.	3.	**Apple III Business Graphics,** Apple Computer
9.	—	**General Ledger,** George Shackelford, State of the Art Inc.
10.	—	**QuickFile,** Apple Computer

Word Processors 10

This Month	Last Month	
1.	2.	**Screen Writer II,** David Kidwell, Sierra On-Line
2.	1.	**Apple Writer II,** Paul Lutus, Apple Computer
3.	3.	**Word Handler,** Leonard Elekman, Silicon Valley Systems
4.	6.	**WordStar,** MicroPro
5.	—	**Apple Writer II Pre-Boot Disk,** Kevin Armstrong and Mark Borgerson, Videx
6.	9.	**Dictionary,** Tom Cain, Sierra On-Line
7.	4.	**Super-Text 40-56-70,** Ed Zaron, Muse
8.	—	**Easy Writer Professional,** John Draper, Information Unlimited Software
9.	7.	**PIE Writer,** Softwest, Hayden
10.	5.	**Magic Window II,** Bill Depew and Gary Shannon, Artsci

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of titles being carried in the marketplace, this month saw a full 25 percent jump. What was even more remarkable was that the increase was across the board. Significant jumps in available software in the past have usually centered on a currently popular genre. This month, software publishers were zeroing in on all areas.

For instance, the *General Ledger* from State of the Art and *QuickFile* from Apple made the Apple III list for the first time. But threatening to overthrow the establishment is Micro Lab's *Data Manager.* And the advent of the SoftCard III saw *dBase II* and *WordStar* sold for the Apple III for the first time.

The number of new business packages for the Apple II defy listing in this short space. State of the Art was the only absolute newcomer to the Business 10 list, but publishers of accounting software are taking dead aim at the Apple market. BPI, Systems Plus, State of the Art, Goci, Continental, Peachtree, and TCS are all active. Accountants can now fall asleep with the names of available modules dancing through their dreams.

Screen Writer II regained the word processing lead from *Apple Writer II,* although the inclusion of the latter package in a special Apple promotion continued to make it the largest mover of any software package

Strategy 5

This Month	Last Month	
1.	1.	**Castle Wolfenstein,** Silas Warner, Muse
2.	—	**S.E.U.I.S.,** John Lyon, Strategic Simulations
3.	3.	**Flight Simulator,** Bruce Artwick, SubLogic
4.	—	**Cosmic Balance,** Paul Murray, Strategic Simulations
5.	—	**RobotWar,** Silas Warner, Muse

Adventure 5

This Month	Last Month	
1.	—	**Starcross,** Infocom
2.	2.	**Zork I,** Infocom
3.	5.	**Deadline,** Infocom
4.	5.	**Zork II,** Infocom
5.	1.	**Escape from Rungistan,** Bob Blauschild, Sirius Software

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.	—	**Snooper Troops I,** Tom Snyder, Spinnaker Software
4.	3.	**Ultima,** Lord British, California Pacific
5.	—	**Prisoner II,** David Mullich, Edu-Ware Services

in the world. Riding on the coattails of *Apple Writer II*, much as *Graphtrix* and *Apple Writer Extended Features* once did with *Apple Writer* 1.0, is *Apple Writer II Pre-Boot Disk*, an offering from Videx that gives you eighty-column display with a Videx card.

There were significant shakeups in the Hobby 10. Not only did Penguin rebound in October by capturing first and second in the category, two new entries were noted. *Apple-Cillin,* the diagnostics software from XPS, nabbed a tie for seventh on the list while *Apple Spice,* a nifty package of programmer utilities, took tenth. *Lisa 2.5* and *TASC* rejoined the list.

We think our new mailing list program is the best in the world. And we're not alone.

1st CLASS MAIL. By Bob Schoenburg and Steve Pollack. Here's a pair of authors who may be software's answer to Irving Wallace. Wallace is the bestselling author who hears the murmuring of general populace and caters to their desires. Bob Schoenburg and Steve Pollack seem to have the same trait.

Consider.

The pair brought out *Home Money Minder*, a perfectly respectable home finance package. Then they listened to the user feedback. The result was *Home Accountant*, one of the phenomenal success stories of the first half of 1982.

Around the same time *Home Money Minder* hit, the team also tested the market with *The Mailroom*. Mailroom never was the success of *HMM*, but the authors used the same technique – listen to the users and incorporate all the good ideas. The result is **1st CLASS MAIL** – a program that, incredibly enough, manages to live up to its double-entendre name.

All of the above is not to accuse Schoenburg and Pollack of putting out the programming equivalent of stalking-horses to do their market research for them. Their original efforts do stand on their own merit. They just pale next to the sequels.

1st CLASS MAIL is so well thought out and so easy to use that other publishers who call their programs "user friendly" should bow their heads in shame.

SOFTALK got an early release of the program sans documentation. Yet a rank computer illiterate was able to apply the program to two separate uses with relatively little trouble. This is high praise indeed: that a novice operator could use a powerful program with no more than the screen menus.

The program allows for twelve fields, clearly more than the traditional name and address of a mailing label. The implication is that the software can be put to other innovative uses as well. The built-in ability to sort and filter on any field or combination thereof enhances the chances that users will find multiple applications for the program.

Continental Software will actually be publishing four versions of the program.* The one already in release is for the Apple II using floppy disks. A hard-disk version will follow. Both versions are pending for Apple III as well, awaiting the development of a rapid binary sort subroutine.

1st CLASS MAIL is a first-rate program for specialized data base applications.

Reviewed by Al Tommervik, Publisher, Softalk.

***Available for: Apple II,™ Apple III™/III with Profile,™ IBM-PC™/IBM-PC with Tecmar™ hard disk/IBM-PC with Davong™ hard disk.**

Continental Software

Continental Software, 11223 South Hindry Avenue
Los Angeles, CA 90045 Telephone (213) 417-8031

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COMPUTER GRAPHICS



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by Mark Pelczarski

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for the Programmer

The Graphics Magician

by Mark Pelczarski, David Lubar, and Chris Jochumson

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

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

All Penguin applications products are now on unprotected disks for your convenience. Apple II is a trademark of Apple Computer, Inc.

The Home 10 saw some significant changes also. *FaceMaker* from Spinnaker and *Type Attack* from Sirius tied for eighth. *FaceMaker* joins *Apple Logo* as the only educationally oriented software ever to score on the Home 10. *Apple Logo*, by the way, became the first of its kind ever to make the Top Thirty.

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.	6.	**Apple Logo,** Apple Computer
4.	3.	**Transend,** Tim Dygert and Bob Kniskern, SSM
	8.	**Personal Finance Manager,** Jeffrey Gold, Apple Computer
6.	—	**ASCII Express: The Professional,** Bill Blue, Southwestern Data Systems
7.	4.	**Typing Tutor,** Image Producers, Microsoft
8.	—	**Type Attack,** Jim Hauser and Ernie Brock, Sirius Software
	—	**FaceMaker,** DesignWare/Clark Quinn and Margaret Weinstein, Spinnaker Software
10.	5.	**Data Capture 4.0,** David Hughes and George McClelland, Southeastern Software

Hobby 10

This Month	Last Month	
1.	8.	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
2.	—	**The Complete Graphics System,** Mark Pelczarski, Penguin Software
3.	6.	**Apple Mechanic,** Bert Kersey, Beagle Bros
4.	5.	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
5.	—	**Lisa 2.5,** Randy Hyde, Sierra On-Line
6.	—	**TASC,** James M. Peak and Michael T. Howard, Microsoft
7.	2.	**Zoom Grafix,** Dav Holle, Phoenix Software
	—	**Apple-Cillin II,** Thomas Jones and William Peters, XPS
9.	1.	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
10.	—	**Apple Spice,** David Fox and Corey Kosak, Adventure International

Business 10

This Month	Last Month	
1.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
3.	3.	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
4.	4.	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp
	6.	**PFS: Report,** John Page, Software Publishing Corporation
6.	4.	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
7.	7.	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
8.	—	**Accounting Plus,** Software Dimensions, Systems Plus
9.	8.	**PFS: Graph,** Bessie Chin and Stephen Hill, Software Publishing Corporation
10.	—	**General Ledger,** George Shackelford, State of the Art Inc.

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Improve your keyboard skills with MasterType.

A typing program for the Apple II that dares to be fun. But it's not just child's play. No matter who you are, your computer will become a more efficient tool, as you become a more proficient typist. And MasterType can help. Dramatically.

But don't just take our word for it.

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.

Bring your Apple hours of fun.

Learning to type has never been so enjoyable. And since MasterType has 18 different learning levels, you can play for hours while your typing gets increasingly better. And all for only $39.95.

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Softalk Presents The Bestsellers

Type Attack ventured into the niche dominated by *MasterType* and, in its first full month of distribution, nearly unseated Microsoft's grizzled *Typing Tutor* for second in the class. All the pundits who predicted hot sales of typing programs share a set with all living unicorns.

Arcade games as a genre actually continue to sell well. It's just that there are now so many of them that few—six this month, to be exact—rise above mass. *Frogger* was the only truly successful new entry. New entries with promise were *Canyon Climber, Crisis Mountain, Super Taxman II,* and *Ming's Challenge.*

Infocom almost retired the trophy in the Adventure category. The top four programs are theirs, and a fifth, *Zork III,* missed the final place by only one sale. Ultrasoft's *Mask of the Sun,* bringing faster disk access to hi-res adventures, is a promising newcomer.

The Fantasy 5 list saw an overhaul, with *Snooper Troops I* and *Prisoner II* debuting. *Snooper Troops I* will probably get relegated to a new educational list soon, but its teaching is done within the framework of a children's fantasy role-playing game.

Strategic Simulations, as befits its name, made an impact on the Strategy 5 list with *Cosmic Balance* and *S.E.U.I.S.* The latter program nearly unseated *Castle Wolfenstein* for first place.

So all this should lead us to believe that Apple's still the promised land for software, right? Not if you're an arcade programmer. ◨■

Apple-franchised retail stores representing approximately 7.9 percent of all sales of Apple and Apple-related products volunteered to participate in the poll.

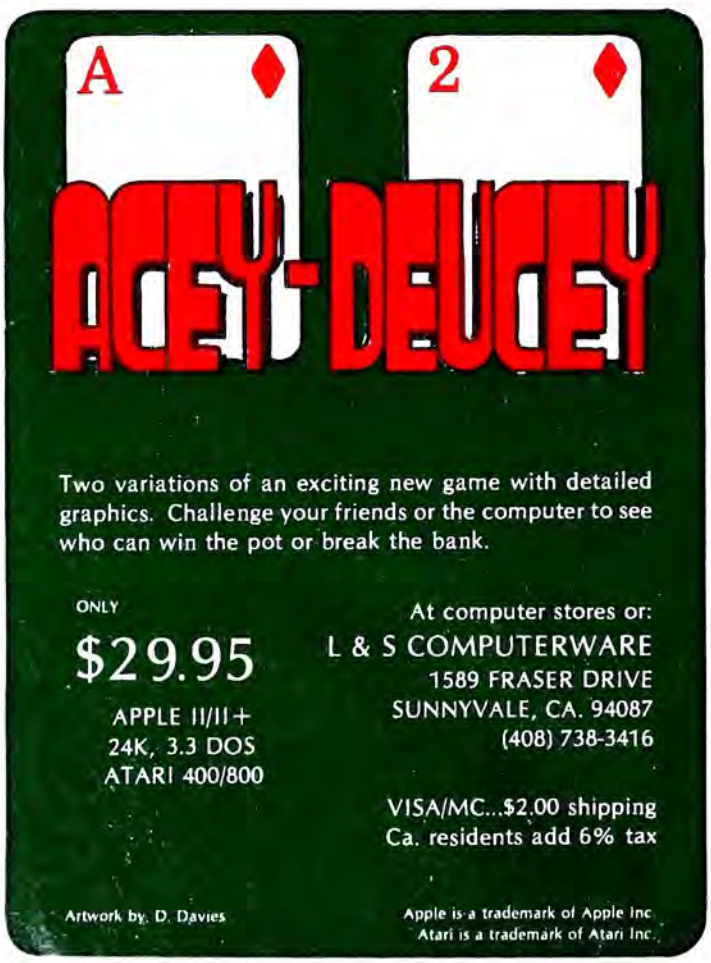
Respondents were contacted early in November to ascertain their sales for the month of October.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preference of the individual respondents were not considered.

Respondents in November represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only for the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 3.77 percent, which translates roughly into the theoretical possibility of a change of 4.21 points, plus or minus, in any index number.



The Top Thirty

This Month	Last Month	Index	
1.	1.	152.92	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	2.	139.94	**Choplifter,** Dan Gorlin, Broderbund Software
3.	3.	97.62	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
4.	7.	87.04	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
5.	6.	84.15	**Screen Writer II,** David Kidwell, Sierra On-Line
6.	4.	74.06	**Apple Writer II,** Paul Lutus, Apple Computer
7.	5.	58.19	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
8.	8.	56.74	**The Arcade Machine,** Chris Jochumson and Doug Carlston, Broderbund Software
9.	12.	47.13	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
10.	—	30.30	**Starcross,** Infocom
11.	14.	26.93	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp
	17.	26.93	**PFS: Report,** John Page, Software Publishing Corporation
13.	14.	26.45	**VisiTrend/VisiPlot,** Micro Finance Systems/Mitch Kapor, VisiCorp
14.	16.	24.52	**Cannonball Blitz,** Olaf Lubeck, Sierra On-Line
15.	9.	22.12	**Word Handler,** Leonard Elekman, Silicon Valley Systems
16.	11.	21.64	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
	—	21.64	**Frogger,** Olaf Lubeck, Sierra On-Line
18.	—	20.68	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
	19.	20.68	**Star Blazer,** Tony Suzuki, Broderbund Software
20.	—	19.24	**Zork I,** Infocom
21.	—	17.79	**The Complete Graphics System,** Mark Pelczarski, Penguin Software
22.	19.	17.31	**Master Type,** Bruce Zweig, Lightning Software
23.	—	16.35	**Apple Logo,** Apple Computer
	18.	16.35	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
25.	—	14.43	**Deadline,** Infocom
	—	14.43	**Accounting Plus,** Software Dimensions, Systems Plus
27.	—	13.95	**Zork II,** Infocom
	—	13.95	**WordStar,** MicroPro
29.	23.	13.46	**Transend,** Tim Dygert and Bob Kniskern, SSM
	—	13.46	**Personal Finance Manager,** Jeffrey Gold, Apple Computer
	10.	13.46	**Snack Attack,** Dan Illowsky, DataMost

Sirius™
presents



KILLER GAME.

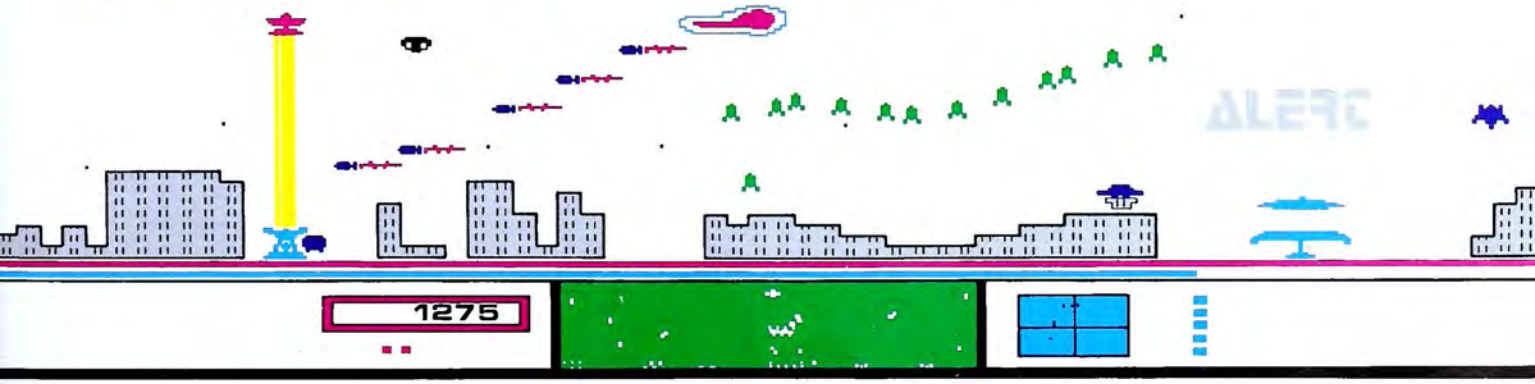
More Than Awesome!

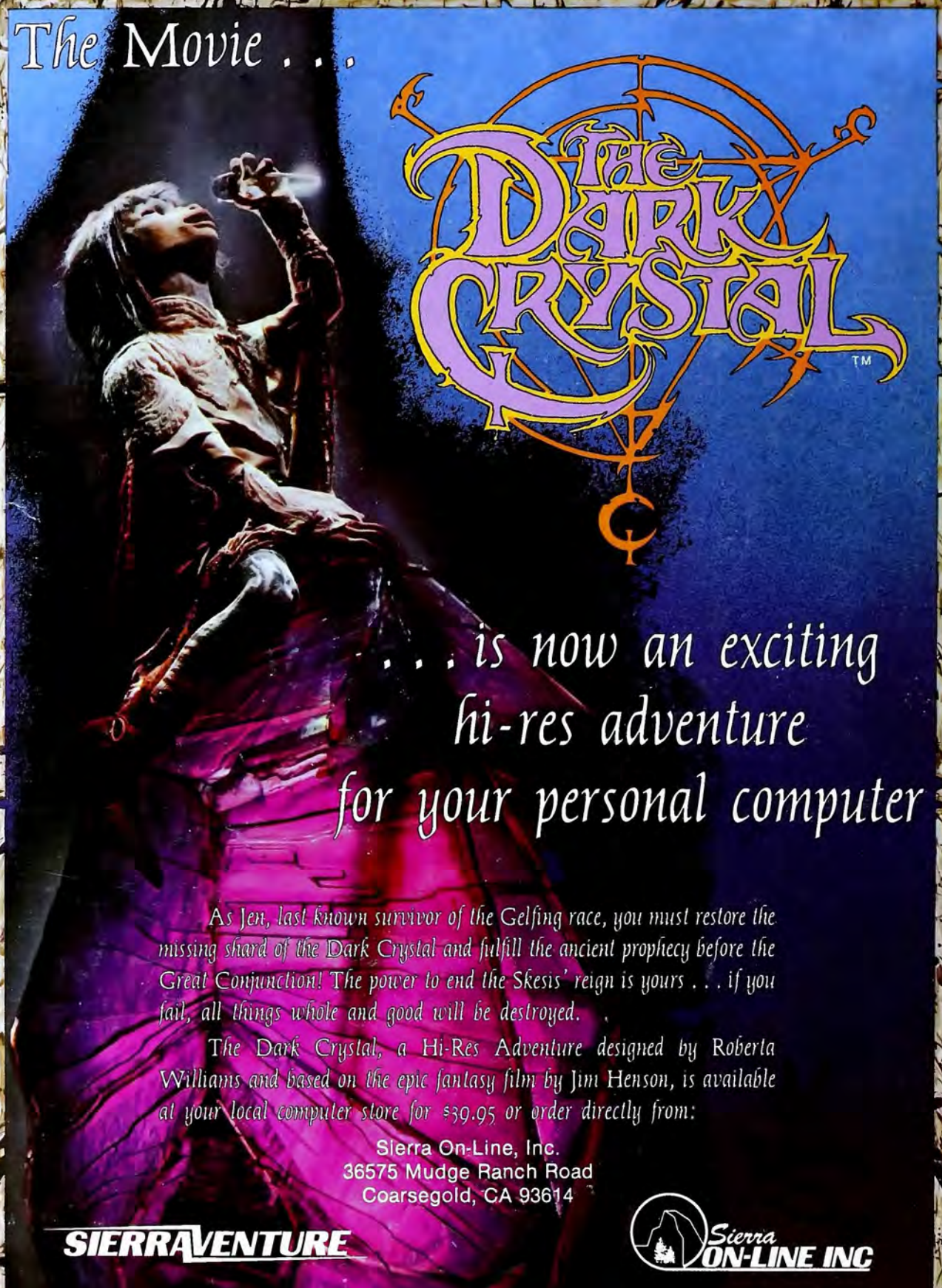
"Code Crimson, do you read me Star Fighter Armageddon?"
"Affirmative, Commander."
"This is urgent! The Quarriors have attacked Repton! They're building a base station and draining our power supply. They're guarding Repton with everything they've got. You and your squadron are our last hope!"
"I'm on my way, Commander!"
"Full speed, Star Fighter. Remember, you... (Click! Pop! Buzz!...)"
"Commander?! Come in! Commander?"
Will the Armageddon arrive in time to save Repton? Or will the evil Quarriors take over the colony? There's only one way to find out!

Take over the controls of the Star Fighter Armageddon. Besides a laser gun, you are armed with devastating nuke bombs, a radar screen and an energy shield. You'll need them all to stop the Quarriors! You'll be under constant attack from Nova Cruisers and Single Saucers. You've got to avoid the Spye Surveillance Satellites and the deadly Dyne-Beam Shooters. And watch out for the Draynes that are after the Reptonian power supply. Repton is a battle so realistic, you'll be relieved to find out that you're still on Earth when it's over!

Requires an Apple Computer with 48K and one Apple disk drive. Playable by one person with keyboard or joystick.

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