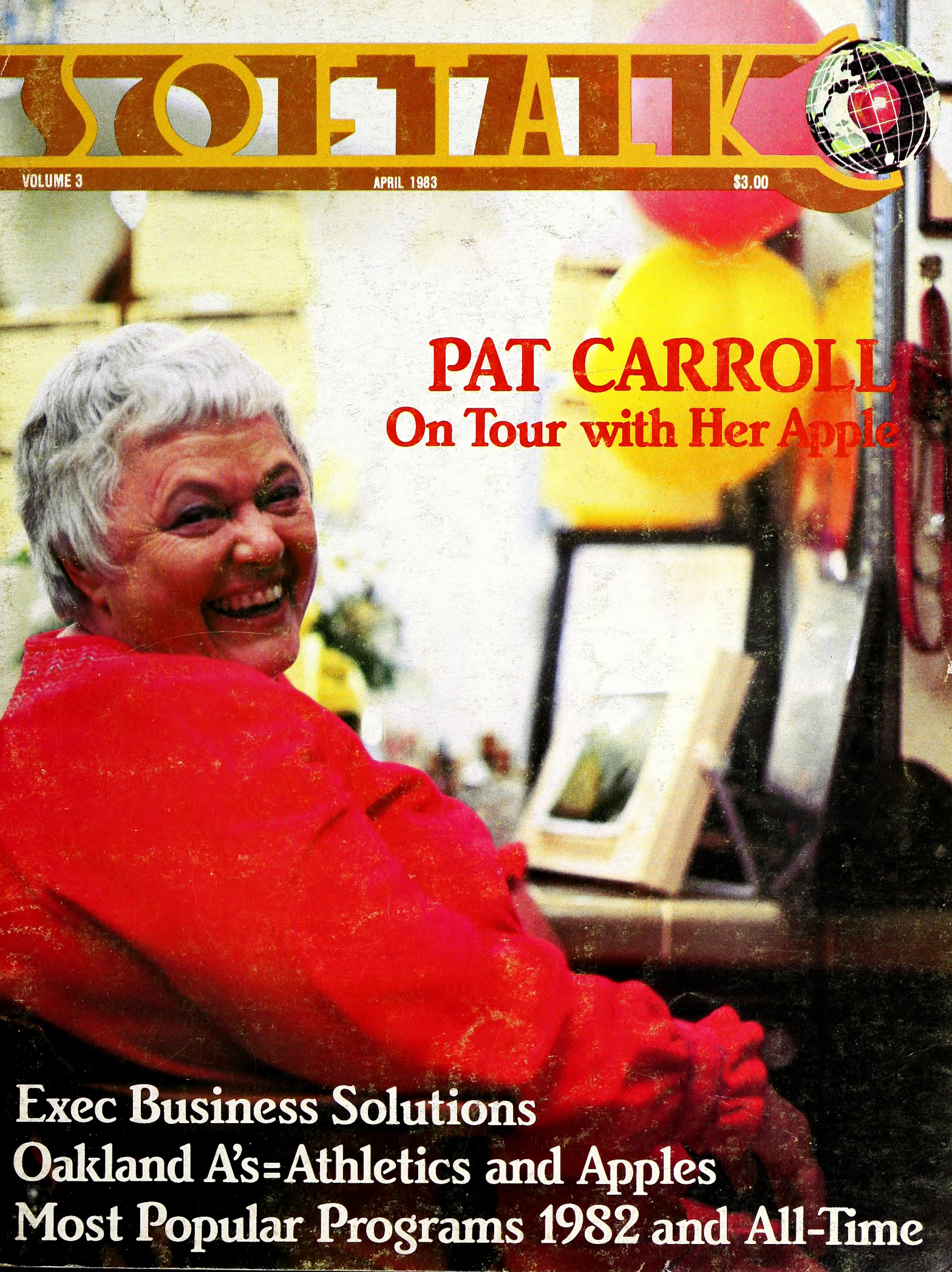
SOFTALK

VOLUME 3 APRIL 1983 $3.00



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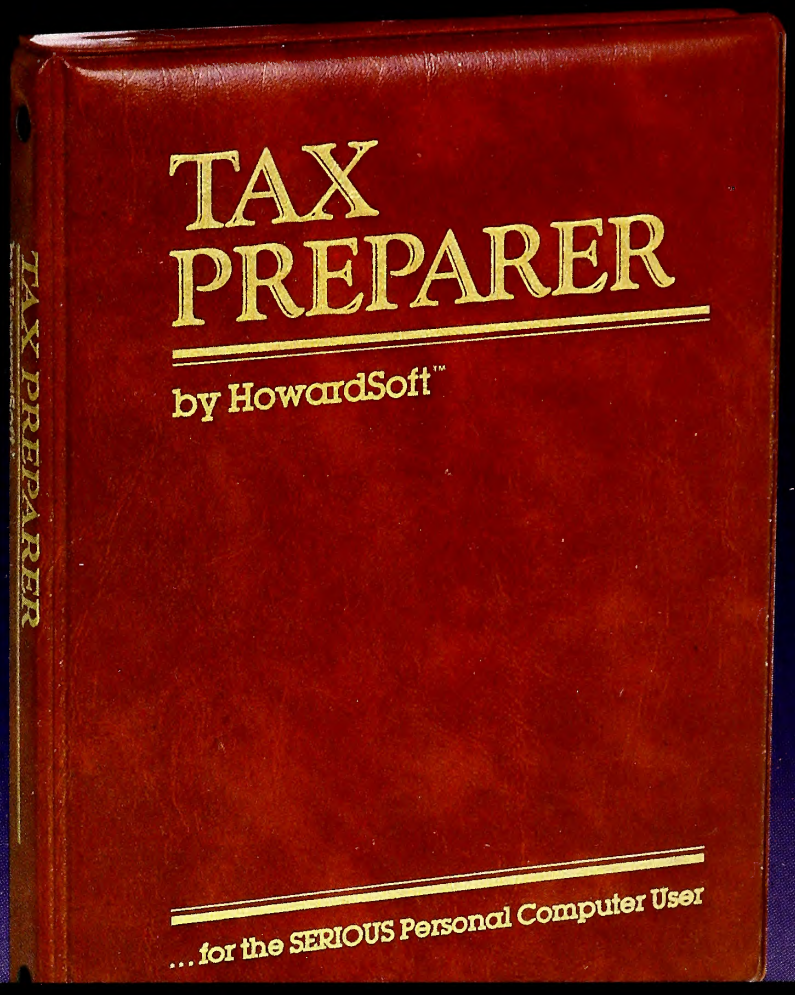

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S O F T A L K

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Jumping with Jack

Apple bought its Senior Analyst, but it's on the IIe that they've hit an incredible jackpot.

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Whirlybirds in Llyl win Softalk's Most Popular Program of 1982 and of All-Time awards—as a result of your votes. 76

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Rich Hofmann teaches university, but his heart is with the primary school kids he programs for—and who created a computerized Easter story for him.

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F E A T U R E S . D E P A R T M E N T S

I N N E X T M O N T H ' S S O F T A L K

The Music of May . . . Herbie Hancock . . . Music systems and keyboards for the Apple . . . Exec Syntauri . . . Organizing your disks . . . John Jeppson takes us inside the Apple III . . . and more . . .

I N D E X O F A D V E R T I S E R S

Cover: Pat Carroll backstage during the Los Angeles run of *Gertrude Stein Gertrude Stein Gertrude Stein*. Photo by Kurt Wahlner.

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

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CONTEST: Forty Thousand Words

Line up, troops! All you whiners who complained that our last few contests were just too hard, get down here in front and listen up. Limericks too tough for you, eh? Puns and anagrams too tricky? Well, this month we're getting away from all the stuff that's supposed to be good for the mind and stimulate the intellect.

April's contest is pure fun for fun's sake. If you haven't already taken a peek at the pictures on this page and on page 4, do so now and report back when you're finished. What you see there is a whole mess of cute little drawings created and compiled by a bleary-eyed art department. They're all a combination of rebuses (riddles in pictures), puns (the worse they are, the better they are), and charades (sounds like . . .).

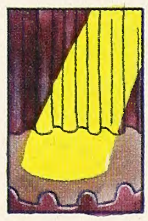
Your job, faithful ones, is to take a good square look at the pictures and figure out what the heck they're trying to say. And whoever is in the back moaning, "It's too hard; I can't do rebuses; give us an easier one; my brain hurts," sit down, clam up, and read on.

The big clue to all this party-time action is that each picture represents an Apple-related company or product. For example, if we had a picture of some unlucky sap being chased by a squad of attacking sandwiches, potato chips, and popcorn, you'd know without a doubt that it's *Snack Attack*.

Or if we had a picture of a pen walking through a door marked "Entrance," you'd immediately scream out, "Penguin Software!" After everyone told you to shut up and quit acting like a fool, you'd explain, "Pen go in; Penguin!"

All you have to do is write down what the picture says and what it refers to. For those still confused, all you'd have to write for the first example would be, "It's a person being attacked by snacks; *Snack Attack*." Just writing

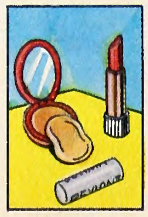








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				36.	37.	38.	39.	40.

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down the company or product won't do.

Now, in English: there are *two* things you have to write down for each picture.

Simple? You bet. There's one hitch, however. What would an April contest be without the usual fool? *Softalk*'s contest staff refused to be the fools again, so the dirty bunch of sneaks decided to turn the tables on you this time. The trick: how can you be sure all the pictures refer to a company or product? You can't. We won't tell you if they all do or not. And if they don't, we're not saying which ones or how many might be fake. (One? Ten? None of them? All of them?) That's your job.

All of the pictures say something, that's for sure. But when you find one that's not a company or product, write down its translation followed by, "Nyah, nyah, you can't make a fool out of me!"

When you have your list filled out, send it in with a facsimile of the coupon on this page (any fools caught cutting up the magazine will find their entries at the bottom of the pile).

Oh yeah, prizes. The person who submits the entry with the most correct answers will win $101 in prizes made by our advertisers. The extra dollar is for having the guts to enter a contest like this.

In case of a tie, the mighty *Softalk* RFD (random fool designator) will designate one lucky soul as the *Softalk* Fool of the Month, who will foolishly walk off with all the loot, laughing all the way to the computer store.

Name _____

Address _____

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What I'd like as prizes _____

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Send in your entry to Softalk Fools, Box 60, North Hollywood, CA 91603, postmarked by May 15, 1983. ■

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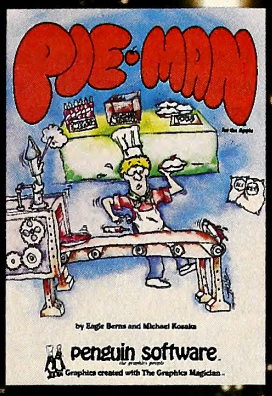
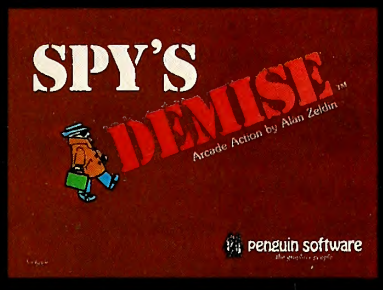
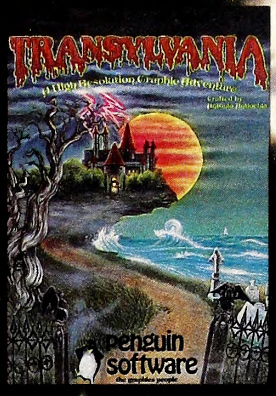


Chaos in the bakery as you contend with a cantankerous conveyor belt in an effort to make pies.



See if you can sneak past the security guards in this best-seller.



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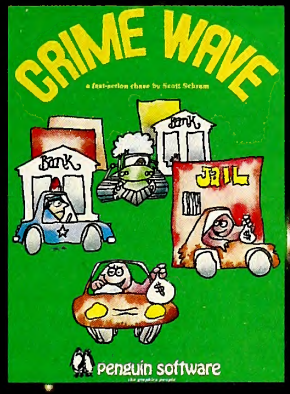

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Contest Winners

The Subheads Are Saved. Okay, we'll admit it. Writing short stories may not be as easy as solving droodles, writing limericks, or even counting turkeys. But look at it this way: the Save the Subheads contest in January's issue sure did weed out those who were looking for a fast and easy $100 prize. The contest was not one to be fooled with by the amateur entrant.

It was an interesting sight. The same thousands of turkey counters who took a chance with the November contest and the countless die-hards who entered the Oracle '83 contest took one look at the January contest, shrugged their shoulders, scratched their heads, and walked away.

Most of them.

The ones who stuck around were the same ones who, after sitting through eighteen hours of *Laverne and Shirley* reruns, would take just a short popcorn break before settling back down for the uninterrupted version of *The Winds of War*.

It wasn't an easy contest, nor was it an easy one to judge. Entries came in all sorts of forms: manuscript, screenplay, diary, and even one with artwork on its cover.

Choosing one winner was difficult and not a coveted task. Truth is, we liked a lot of them, and finding the best one didn't seem possible.

But it was possible to select Lisa Oerman (Muscatine, IA) as the *Softalk* Subhead Short Story Writer for 1983. Oerman's story, *The Sound of One Voice Talking*, was the one that shined brighter than all the rest.

Sharing her secret to winning the contest, Oerman told us that "first, I brought out all our *Softalk*s and wrote down all the subheads. I noticed that there seemed to be a lot on the subject of flying and winning and losing." (Gee, guess which section of the magazine she's been reading.)

"Then, I grouped the subheads that seemed to belong together on separate sheets of paper," Oerman continues. "I worked on the story itself for about an hour and a half every day for two weeks while I was at school waiting for my brother to finish his last class." She should have been using that time for studying, but who are we to judge?

All that patience and hard work paid off for Oerman; she'll be heading down to the Memory Bank in nearby Bettendorf to pick up her prize. "Probably a word processor," she says with uncertainty. "We don't have a printer yet."

Charles Shanes of Computer Concepts (Richmond, VA) has been taken hostage by Charles and Elizabeth Lewis, winners of the Oracle '82 (overall) and Oracle '82 Part 5 contests respectively. Shanes eventually kept the loot, but gave Charles a Disk II drive and Elizabeth her demands in software.

Entries were judged on how many subheads were used in relation to nonsubheads, how well subheads were connected to each other, the quality of the overall story, and how well subheads blended in with the rest of the sentence. *Softalk* judges read carefully to make sure story writers weren't just throwing in subheads at random and then forming sentences around them. Some of you had the nerve to do that and thought it would pass for a story. No way.

Others plopped down just one or a handful of subs and wrote epic novels around them, hoping that it would reel in $100 in prizes. Good try, but no dice. That would be like buying a box of chocolate chip cookies, a cheesecake, fifteen TV dinners, a gallon of fudge ripple ice cream, and some fresh fruit and vegetables and saying you went on a health food shopping spree. You're not fooling anyone.

And Now, the Standouts. Ben Moore (Carpinteria, CA) wins the Modesty Blaise Pascal award for his three entries generated by a Pascal program. Monsieur Pascal would have been pleased with Moore's use of the tools of the craft, but only moderately so. The resulting short story turned out to be nothing more than a bunch of concatenated strings, MaxSubheadNums, and WriteLns.

Lightning rarely strikes twice, but that didn't stop Susan "What's an F-stop?" West (Coolville, OH) from trying to win the contest by relating to us in her story how pleased she was to have won the Apples in History contest. "*Winning* [4/81] is better *the second time around* [11/80]," West had the gall to write. We agreed. But if we had let her win again, she'd probably have sent in the same underexposed pictures of her receiving her prize as she did last time.

We're awarding two prizes this month. The $100 prize goes to Lisa Oerman, and a photocopy of a $100 check will go to Brian Warner (Rochester, IL), who sent us the carbon copy of his entry, keeping the original for himself. The nerve of some people.

For video fanatics, a look at satellite video offerings ten years in the future was offered by George "Mind in the Gutter" Bass (Williamsburg, VA). On the Playboy channel, *Playboy Video Magazine* featured a pictorial, "The Girls of Sierra On-Line" (let's let old ads die gracefully, huh?) and Playmate of the Month Bambi Mae Hopper, vice president of sales at VisiCorp.

The highly coveted *Softalk* Greenpeace award goes to Laura Hunt (Parkersburg, VA) for her dedication to the conservation of natural subhead resources. Wrote Hunt: "While writing my story, I found several subheads leading long and healthy lives. Others I met along the way seemed to be hermits; I knew of their existence only by their brief appearance over a long period of time.

"For example, *the error of our ways* must have lived for at least a year, since it appeared in August 1981 (page 10) and again in July 1982 (page 82). Still others lived their lives to the fullest, seeing all they could, if only for a limited time. *The real thing* (April, May, and August 1982) and *Lord British* (March and May 1981) appeared several times during their short life spans.

"Some reappeared in slightly disguised form, perhaps the result of some crippling disease or merely an escape from the pressures of subhead life. Some are old subheads in costume; others may, in fact, be new ones with a family resemblance to their ancestors."

Kids' Korner. The following is an open letter to the aspiring subhead saver supremes of the Farrell Area School District:

To everybody: thanks for the Valentine cards and stories.

To Rhonda Zaborowski: the reason your dad wouldn't let you have any of the lost and deserted animals you saw at the California farm is because those abused beasts were retired *Softalk* writers gone crazy.

To Ray Hajduk: where the heck did you get your boot knives, switchblade, .357 Magnum, and sawed-off shotgun? Is that what they're teaching you at school? Oh, well, at least you

GOTO 184

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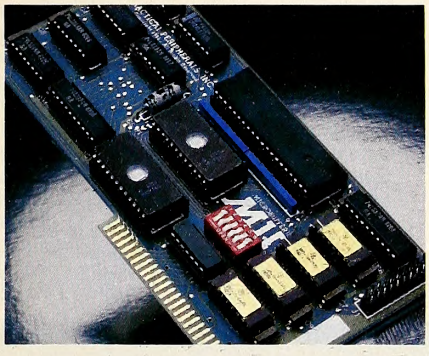
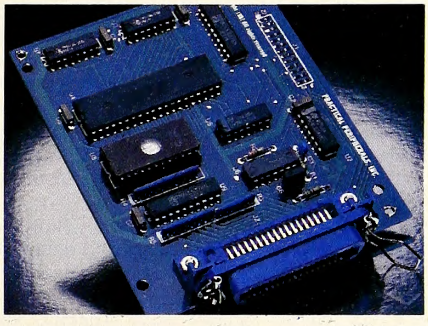


FOR APPLE II COMPUTERS, Mircobuffer II features on-board firmware for text formatting and advanced graphics dump routines. Both serial and parllel versions have a power-efficient low-consumption design. Special functions include Basic listing formatter, self-test, buffer zap, and transparent and maintain modes. The 16K model is priced at $259 and the 32K, at $299.



FOR EPSON PRINTERS, Microbuffer/E comes in two serial versions — 8K or 16K (upgradable to 32K) — and two parallel versions — 16K or 32K (upgradable to 64K). The serial buffer supports both hardware handshaking and XON-XOFF software handshaking at baud rates up to 19,200. Both interfaces are compatible with standard Epson commands, including GRAFTRAX-80 and GRAFTRAX-80+. Prices range from $159 to $279.

ALL OTHER COMPUTER/PRINTER COMBINATIONS are served by the stand-alone Microbuffer In-line.

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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, 20525 Mariani Ave., Cupertino, CA 95014. $35. Frontier Computing, Box 402, 666 N. Main, Logan, UT 84321. $10.

Critical Mass. Blauschild. Rungistanian author's next adventure; more colorful graphics, sophisticated and challenging puzzles. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95.

● **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.*

The Dark Crystal. Williams. Hi-res adaptation of popular fantasy movie. Puzzles to challenge even those who've seen the movie. Includes player option to let the Skeksis win. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $39.95.

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. Text. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *8/82.*

Escape from Rungistan. Blauschild. Graphics adventure with some animated real-time puzzles. Espionage theme. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *8/82.*

Genesis. Pritchett. Adventure program generator. Develops standard format, two-word-parser adventures with rooms, objects, flags; up to 99 apiece. No program knowledge necessary whatsoever. Fun. Hexcraft, Box 39, Cambridge, MA 02238. $49.

● **Hi-Res Adventure #1: Mystery House.** Williams. Whodunit in a Victorian mansion. First adventure with pictures. 2-word parser with logical comprehension. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $24.95.

Hi-Res Adventure #2: The Wizard and the Princess. Williams, Williams. Attempt to rescue princess from vengeful wizard. First graphic adventure in full color. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $32.95. *11/80.*

Labyrinth of Crete. Johnson, Pinero. Player is Jason and Hercules, simultaneously or independently, searching for golden fleece in a three-level labyrinth. Text with occasional graphics. Maps included. Adventure International, Box 3435, Longwood, FL 32750. $29.95. *3/83.*

Mask of the Sun. A unique animated graphic quest with full though sometimes frustrating parsing. Moving from room to room involves seeing scenery along the way go by—a graphics breakthrough with nice puzzles. Ultrasoft, 24001 S.E. 103rd St., Issaquah, WA 98027. $39.95. *11/82.*

● **Prisoner 2.** Mullich. Totally relandscaped but loyal version of original game: full-color hi-res graphics added, puzzles reworded, obstacles expanded. Sophisticated and difficult exercise in intimidation with elements of satire. Escape from an island requires player to solve logical puzzles, overcome obstacles, and answer riddles. Excellent computer fare; nothing else like it. Edu-Ware, Box 22222, Agoura, CA 91301. $32.95. *The Prisoner, 3/81; Prisoner 2, 10/82.*

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

●**S.A.G.A. Series.** Adams. Scott Adams's prototypical adventures—12 in all—spruced up with 100-color graphics and Votrax vocals. Fun, not always logical, very story-oriented series. Each adventure has its own theme and often exotic locale. They map small but score big on imagination. Adventure Intl., Box 3435, Longwood, FL 32750. $29.95 each.

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

Starcross. Science fiction prose adventure that comes wrapped in a flying saucer. Set in the year 2186, main puzzle is to discover raison d'etre of miniworld asteroid. Likable, engaging. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *11/82.*

Suspended. Berlyn. Well-plotted prose adventure demands control of six independent robots who can act simultaneously. Intelligent, challenging exercise in logic. A milestone. Infocom, 55 Wheeler St., Cambridge. MA 02138. $49.95.

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

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

● **Zork II.** Lebling, Blank. *Zork* comes into its own. 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. Benevolence conquers. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *9/82.*

Business

Accounting Plus II. Integrated package: general ledger, accounts receivable and payable, and inventory-purchasing modules. Basic and machine language. Menu-driven; prompting. Software Dimensions, 6371 Auburn Blvd., Citrus Heights, CA 95610. $1,250.

Accounting Plus IIe. Stripped and rebuilt to take advantage of all IIe functions. General ledger, $450; accounts receivable and payable, $350 each; package, $995. Software Dimensions, 6371 Auburn Blvd., Citrus Heights, CA 95610.

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.

Cdex Training for VisiCalc. Brandt. Self-contained Apple-assisted training program and reference guide for the #1 electronic spreadsheet. User-selectable information. Cdex, 5050 El Camino Rd., Los Altos, CA 94022. $49.95. *3/83.*

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

dBase II. Speedy relational database management system. Requires SoftCard. Ashton-Tate, 9929 W.

Jefferson Blvd., Culver City, CA 90230. $700.

DB Master. Comprehensive database management system with password protection, extensive report creation options. 1,000 characters per record. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $229. *10/81.*

FCM (1st Class Mail). Schoenburg, Pollack. Fantastically user-friendly program for specialized database applications. 12 fields, sort and filter on any field or combination. Continental, 11223 S. Hindry Ave., Los Angeles, CA 90045. $74.95. *6/82.*

General Manager. User-definable database management system; can use one to four disk drives or hard disk. Change screen and field formats without reentering data. Current version supports IIe and 80-column card at no extra cost. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $229.95. Hard disk version, $374.95.

The Incredible Jack. Word processor, database, and spreadsheet in one, plus mailing label print and sort. Gives 80-column dual case display on the IIe. 64K, 80-column card for II Plus. Business Solutions, 60 E. Main St., Kings Park, NY 11754. $79.

List Handler. List-lover's delight. Prints lists, labels, and letters. Handles 3,000 records per disk and eight disk drives. Takes requests. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $89.95. *2/83.*

Multiplan. Easy-to-learn electronic work sheet using plain English commands. Powerful modeling and presentation capabilities. For use in analysis, forecasting, technical engineering, and the home. Versions 1.04 and up use 80 columns and extended memory of the IIe. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $275.

PFS:File (formerly *Personal Filing System*). Page, Roberts. User controls data in totally unstructured database. Up to thirty-two pages (screens) of information in each record. IIe version has 80 columns, u&lc. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *10/80.*

PFS:Graph. Chin, Hill. Works alone or interfaces with files created with *PFS:File* and *VisiCalc*. Produces bar, line, and pie charts merging data from several sources. 80 columns and increased graphics support in IIe version. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *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. $125. *6/81.*

Quick File IIe. Easy-to-use personal database filing system. Fifteen fields; files as long as disk allows. IIe, 2 disk drives. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $100.

Quick-Vis. A quick revision subroutine that adds Kraft joystick cursor control to *VisiCalc*, eliminating separate procedures required for cursor movement using keyboard. Kraft, 450 W. California Ave., Box 1268, Vista, CA 92083. $22.95.

State of the Art General Ledger and **Budget and Forecasting Module.** The ledger does 12-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. State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626. $495; budget module, $395.

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

Videx Preboot VisiCalc. Prepares *VisiCalc* to run in 80 columns, u&lc. Advanced version uses mixture of existing memory cards. Videx, 897 N.W. Grant St., Corvallis, OR 97330. $49; advanced: $89.

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

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.

Communications

Apple Link. Jaffe, Pierce. Creates intelligent terminal at receiving end with no additional software. Only modem software known to man that can transmit *ScreenWriter* text files. Also transmits random access text files. Computer Applications, 13300 S.W. 108 Street Circle, Miami, FL 33186. $59.95.

ASCII Express: The Professional. Robbins, Blue. Greatly improved version of original modem software package features automatic redial, individual macro files, and conversion of Integer, Applesoft, or binary programs into text files. Works with a plethora of hardware. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95. *12/82.*

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

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

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

Micro/Courier. Electronic mail program. Provides file transfer of any DOS 3.3. file (correspondence, *VisiCalc*, charts) automatically and unattended, connected to another *Micro/Courier*. 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. Allows keyboard mapping, u&lc, 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 2400. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95.

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

Transend 1, 2, 3. Intelligent terminal software with multiple hardware compatibility. Advanced, easy to use. 1 sends text only; menu driven, limited editor. 2 sends text and files like *VisiCalc*; verifies transmission. 3 does both and handles electronic mail with auto-redial, clock calendar, and password protection. Upgrade, $20. SSM, 2190 Paragon Dr., San Jose, CA 95131. $89, $149, $275. *9/82.*

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

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.

Fantasy

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

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

● **Beneath Apple Manor.** Worth. The original dungeon game for the Apple, created in 1978. Newly released version has hi-res, sound effects, a few more magic items, but still the classic game. Quality, 6660 Reseda Blvd., #105, Reseda, CA 91335. $29.95. *2/83.*

Dungeon. Nesmith, Enge. Adaptation of the board game of the same name. Six levels of dungeon—all on one level like board; three levels of difficulty. Limited animation. TSR Hobbies, Box 756, Lake Geneva, WI 53147. $25.

Galactic Adventures. Reamy. Role-playing science fiction adventure revision of *Galactic Gladiators* strategy game. 26 scenarios. Allows creation and saving of your own adventures. Strategic Simulations, 465 Fairchild Dr., #108, Mountain View, CA 94043. $49.95.

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

Microbe. Clardy, Zalta. An internal course in medicine, disguised as a fantasy/adventure/arcade/simulation. "Enjoy your next viral infection!" Good game, great educational tool. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $44.95.

● **Odyssey: The Compleat Apventure.** Clardy. Fantasy adventure far beyond one place and one setting. Castles, catacombs, an ocean voyage, and the orb of power. Synergistic, 830 N. Riverside Dr., #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, Sierra On-Line Building, 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., #201, Renton, WA 98055. $17.50.

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

Graphics

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

The Artist. Schwader. Graphics toolkit for creating shapes, shape tables, character sets. Character animation and byte-move utility routines allow printing text on hi-res screen. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $79.95.

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

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

The Graphics Magician. Jochumson, Lubar, Pelczarski. Outstanding animation package consisting of picture editor and shape table extender. 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.*

The Graphic Solution. Graphics editor and bit-mapping animation system using film-editing techniques. Saves hi-res screen as standard DOS file. No programming knowledge necessary. Accent, 3750 Wright Pl., Palo Alto, CA 94306. $149.95.

Imaginator. Entry and professional level 3-D graphics programs for creating, editing, and manipulation of 3-D images. Townsend Microware, 921 Water St., Box 1200, Port Townsend, WA 98368. *Imaginator I,* $79; *Imaginator II,* $119.

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.*

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

The Accountant. Forman. Simple-to-use double-entry finance system features seven integrated files and a set of automatic transactions. A sleeper just beginning to get wider distribution. Decision Support, 1438 Ironwood Dr., McLean, VA 22101. $129.95. *1/82.*

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

Chequemate. Home finance package that handles checks, charge cards, cash control, automatic tellers, and more. Reports to screen or printer. A bargain. Masterworks, 25834 Narbonne Ave., Lomita, CA 90717. $39.95. *4/82.*

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

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

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

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

Know Your Apple. Visually oriented computer tutorial with manual. Covers disks, drives, and peripherals. A model of clarity. Muse, 347 N. Charles St., Baltimore, MD 21201. $34.95. *3/83.*

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

Market Analyst. Investment analysis package with portfolio management, technical analysis, and telecommunications capability. 64K. Anidata, 613 Jaeger Ct., Sicklerville, NJ 08081. $395. *2/83.*

Nutritionist. Release 4.0 of interactive graphics diet analysis program. Computes nutritive values of meals, menus, or complete diets; creates special requirement diets. N-Squared Computing, 5318 Forest Ridge Rd., Silverton, OR 97381. $145.

Permanent Portfolio Analyzer. Investment tool based on long-term financial strategies of Harry Brown. C.R. Hunter & Associates, 1527 Northwood Dr., Cincinnati, OH 45237. $295.

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

Stock Market Advance Decline Timing Program. Altman. Tells when to buy stocks. Buy/sell recommendations on both short and intermediate term. Defines change in direction of advance/decline line. Dr. R. Altman, Box 1197, Hightstown, NJ 08520. $149.

Tax Break Planner. Lennard. Multiyear tax-return-analysis program allows tax optimization beyond

THE HEAD OF THE CLASS

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

For The Fun Of It

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

Partners In Learning

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

A Success In Schools

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

Head Start

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

Computer Advanced Ideas

CAI

Bringing Ideas Home

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

For the Apple II/IIe

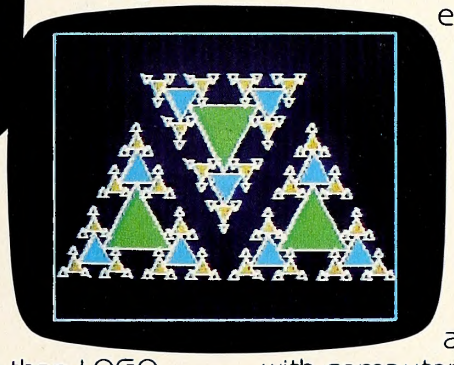
Spinnaker presents Delta Drawing.™

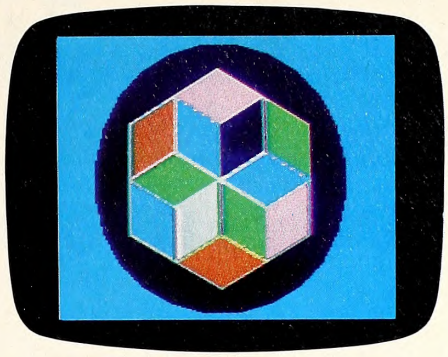
An introduction to the modern art of programming using the ancient art of drawing.

Kids love to draw.

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

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





Easier to use than LOGO.

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

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

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

How your children will learn programming.

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

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

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

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

Get Delta Drawing today.

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

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

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

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

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

SPINNAKER™

We make learning fun.

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

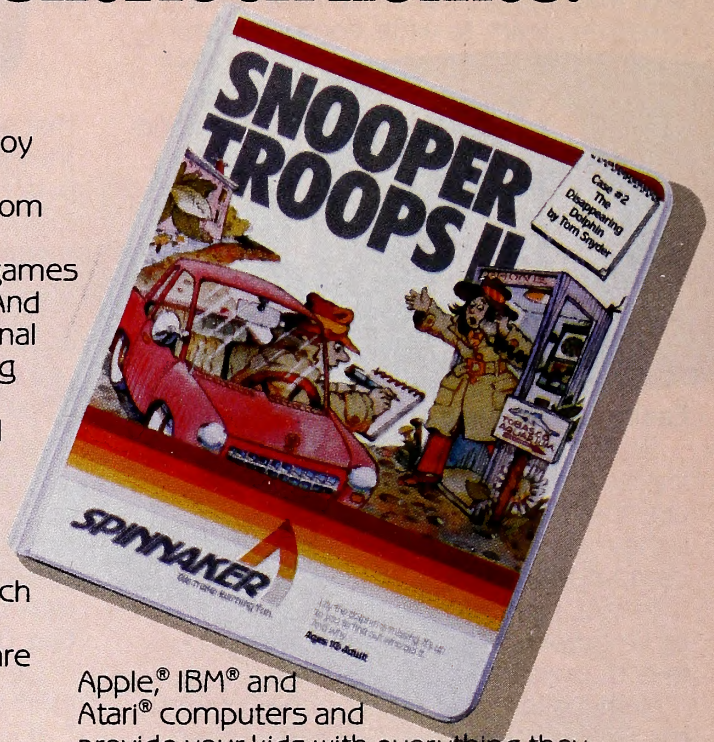
Where can you find educational games that your kids will really enjoy playing?

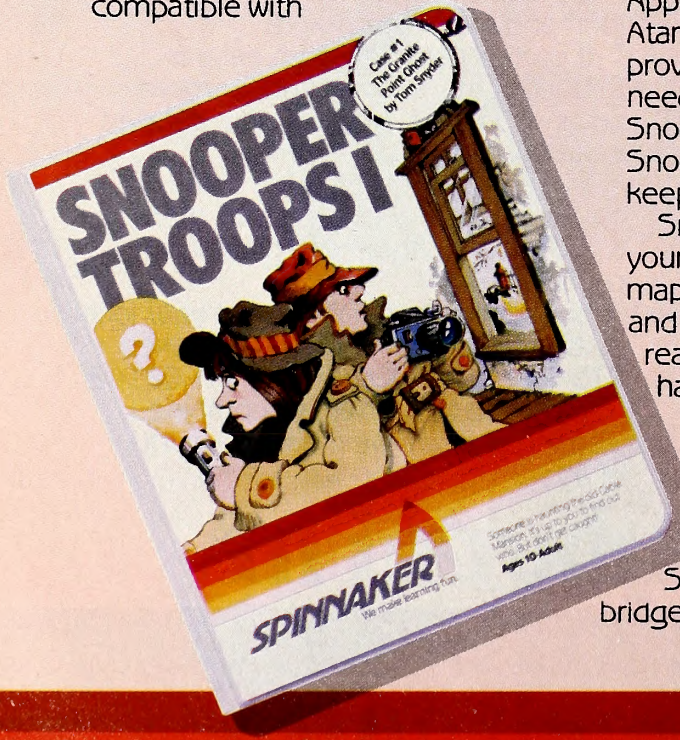
Elementary, my dear Watson. From Spinnaker.

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

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

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





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

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

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

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

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

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

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

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

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

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

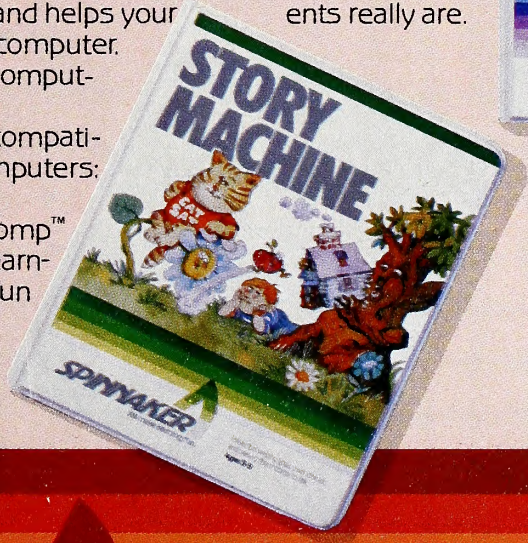
Rhymes and Riddles™ (Ages 4-9) is a letter guessing game featuring kids' favorite riddles, famous sayings and nursery rhymes.

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

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

And we're introducing new games all the time.

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



SPINNAKER™

We make learning fun.

1985 by indexing. Indicates form line numbers and amounts; doesn't generate forms or schedules. Includes all current tax laws. Proforma, 2706 Harbor Blvd., #200, Costa Mesa, CA 92626. $179.95.

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

Tax Mini-Miser. Sunrise. Tax-planning package computes six tax strategies over one year or one strategy up to six years. Starsoft, 4984 El Camino Real, #125, Los Altos, CA 94022. $295.

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

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.

Home-Arcade

A.E. Wada, Horai. Blasting away like mad in 3-D. Time the release and detonation of missiles and repel the next wave. Innovative graphics, new firing technique, and fugues to boot. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *2/83.*

● **Alien Rain (Apple Galaxian).** Suzuki. Monsters in this classic seem to take it personally when you gun down one of their kind. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *9/81.*

● **Apple Panic.** Serki. Rid a five-story building of crawling apples and butterflies by running up and down connecting ladders, digging traps, then covering critters before they devour you. Extremely addictive, excellent hi-res play. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *9/91.*

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.*

Aztec. Stephenson. Graphic fantasy arcade with animation throughout. DataMost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95. *1/83.*

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

Boa. Smith, Daniels. Snake-in-a-maze game replaces enemy snakes with rodents. Transmission omits reverse. Micro Magic, #C, 908 Memorial Parkway N.W., Huntsville, AL 35801. $29.95.

Bolo. Micro version of sci-fi fantasy. Huge maze where you don't eat anything. Drive around in tank and destroy enemy bases as you're dogged by intelligent assassin tanks. Much depth, many months' fun. Top class. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $34.95. *2/83.*

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

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

● **Choplifter.** Gorlin. Fly your chopper to rescue 64 hostages, avoiding interceptor jets, homing mines, and tanks. Challenging, realistic, and playful. Stunning graphics. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *7/82.*

Crime Wave. Your beat: the city. Bank robbers strike; can you catch them? Metropolitan chase-'em-up on city streets or at the scene of the crime. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95.

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

● **Crossfire.** Sullivan. Aliens come at you from four directions on a grid laid out like city blocks. Strategy and intense concentration required. Superb, smooth animation of a dozen pieces simultaneously. One of the great ones. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95. *1/82.*

● **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.*

Evolution. Mattrick, Sember. Player is la prey in six stages from amoeba to human. Surprise ending ain't fun. Sydney, 600-1385 W. 8th Ave., Vancouver, BC, Canada V6H 3V9. $39.95.

Frogger. Lubeck. Not even close. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34.95. *12/82.*

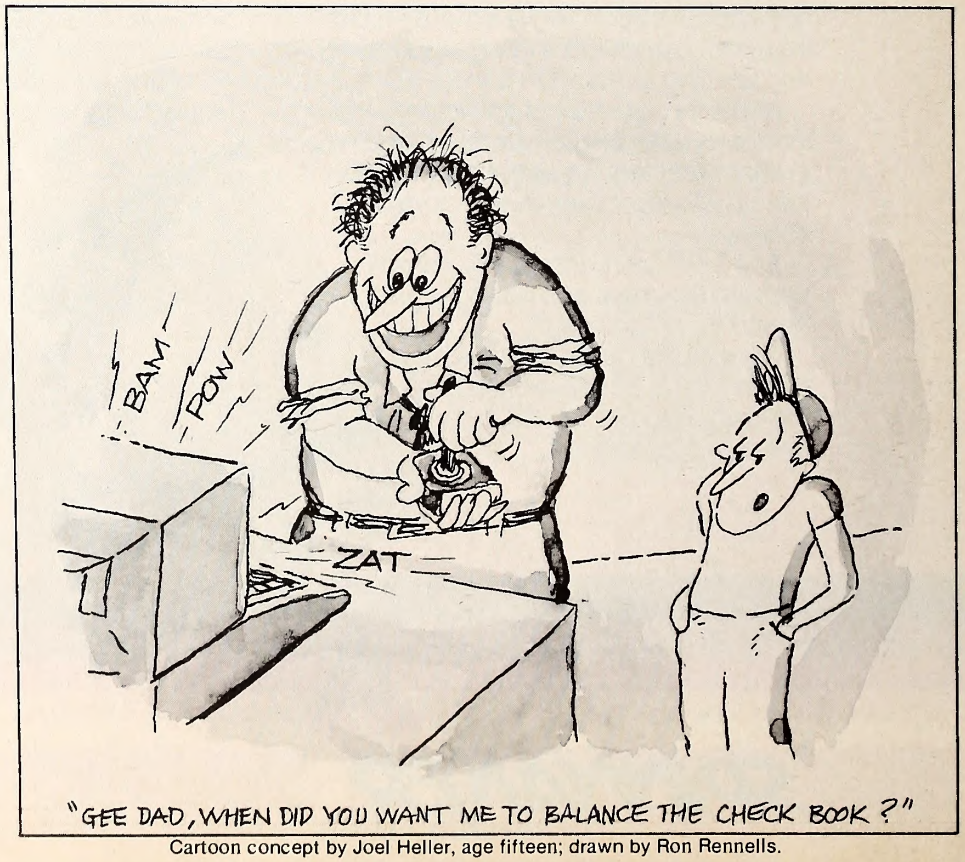
● **Gorgon.** Nasir. Fly over planet shooting and dodging invaders and saving kidnapped inhabitants. Outstanding hi-res graphics, challenging refueling sequence. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95 *8/81.*

Jawbreaker 2. Beuche. No relation or resemblance to *Jawbreaker 1* or Beuche's first. Very playable and addictive. New, fun, and fresh. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34.95. *1/83.*

Load Runner. Smith. Design your own puzzles, scenes, and setups in quest to steal Bungeling Empire's gold. Use tightropes, trap doors, and ladders to your advantage. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95.

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

Marauder. Weigandt, Hammond. Blast through a force field with your marauding rocket, then switch to a berserker in a maze. Nine mazes; fifteen difficulty levels. Sierra On-Line, Sierra On-Line Build-



Cartoon concept by Joel Heller, age fifteen; drawn by Ron Rennells.

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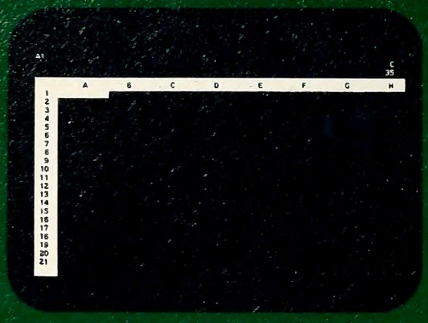

INTERACTIVE ELECTRONIC WORKSHEET **YES**

ON-LINE REFERENCE GUIDE **NO**

"NAMING" OF CELLS OR AREAS **NO**

PLAIN ENGLISH PROMPTS **NO**

INDIVIDUAL COLUMN WIDTHS **NO**

EXTENSIVE FORMATTING CAPABILITIES **NO**

PROTECTED CELLS **NO**

MULTIPLE, LINKED WORKSHEETS **NO**

SORTING CAPABILITY **NO**

VisiCalc® was a swell idea for then.

The next generation. First generation electronic worksheets were a good idea. They were early software management tools that could eliminate a lot of hours with a spreadsheet, calculator, pencil and eraser. Enter Multiplan, the next generation electronic worksheet that's as easy to use as it is useful.

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Compare ease of use. All Multiplan prompts are full length words or phrases. And Multiplan provides "naming," the ability to assign a plain English name to any cell or area. "Gross Profit = Sales—Cost" rather than "AA44=AZ23—BK154." Which means you can work more intuitively. And faster.

Compare utility. Multiplan lets you link related worksheets so that information is transferred between them automatically. For instance, you can keep regional sales forecasts on separate sheets but link them with your overall company forecast. Then, just change the forecast for any region, and the company forecast sheet is updated automatically. Something you can't do with first generation worksheets.

Compare reports. Not just the work you can do, but the way you can present it. Multiplan's flexible formatting options allow you to produce presentation-quality reports. And its sorting capability lets you sort by either alphabetic or numeric order. So a sales manager who normally lists sales regions alphabetically could sort by amount sold and conveniently rank by sales performance. The

*Based on features in releases VC-202B0-AP2 and VC-156Y0-IBM of VisiCalc on the Apple II and IBM-PC respectively.

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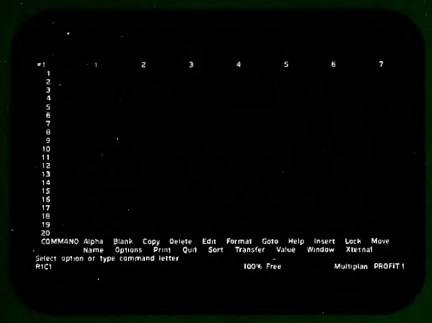
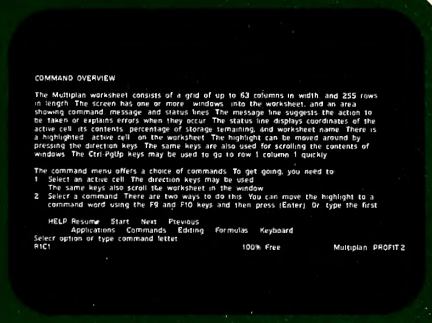
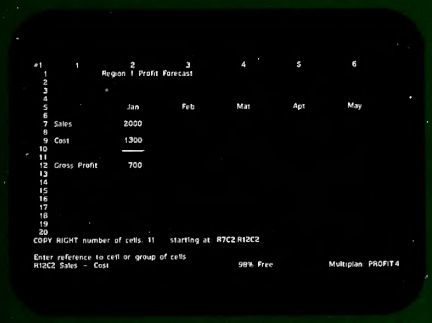


INTERACTIVE ELECTRONIC WORKSHEET **YES**

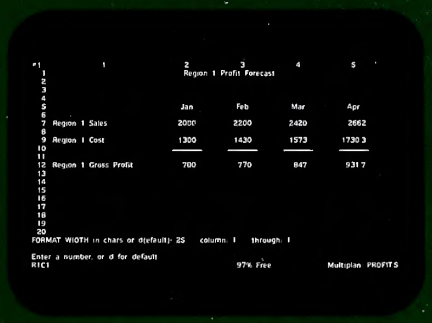


ON-LINE REFERENCE GUIDE **YES**

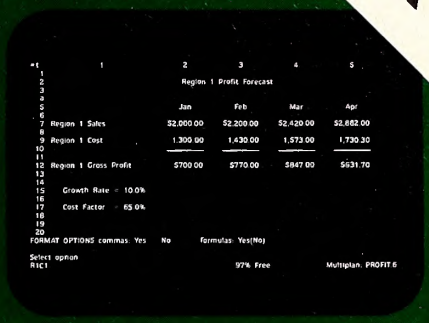
"NAMING" OF CELLS OR AREAS



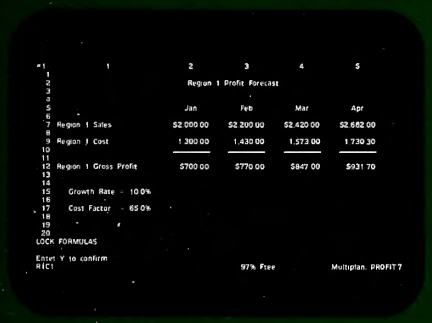
PLAIN ENGLISH PROMPTS **YES**



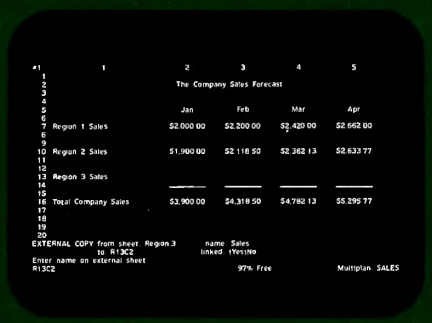
INDIVIDUAL COLUMN WIDTHS **YES**



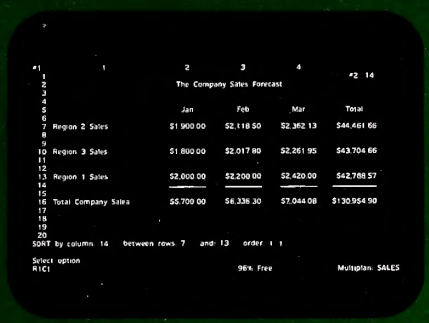
EXTENSIVE FORMATTING CAPABILITIES **YES**



PROTECTED CELLS **YES**



MULTIPLE, LINKED WORKSHEETS **YES**



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BETTER TOOLS FOR MICROCOMPUTERS

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ing, Coarsegold, CA 93614. $34.95. *9/82.*

- **Meteoroids (Asteroids) in Space.** Wallace. Make little asteroids out of big ones, plus occasional hostile alien ships. Hyperspace, autobrake, autofire. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $19.95.
- **Microsoft Decathlon** (formerly *Olympic Decathlon*). Smith. Ten standard decathlon events. Hi-res animated athletes, muscle-stirring music; you provide the sweat. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $29.95. *6/81.*

Miner 2049er. Livesay, Hogue. Run, jump, climb, and slide through the mines, reinforcing the groundwork along the way. Elevators, cannons, chutes, and ladders help; mutants don't. Hot stuff, best of the genre. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $39.95. *1/83.*

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

Pinball Construction Set. Budge. Design and play your own computer pinball games, on-screen, with zero programming. A miracle of rare device. Superior. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $39.95. *2/83.*

- **Pool 1.5.** Hoffman, St. Germain, Morock. Makes most shots you could on a real table, with the advantages of instant replay and slow motion. Four different games. IDSI, Box 1658, Las Cruces, NM 88004. $34.95. *6/81.*
- **Raster Blaster.** Budge. First realistic pinball game. *Softalk* readers' Most Popular Program of 1981. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $29.95. *5/81.*

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

Seafox. A good sub-versus-convoy home-arcader. Variety of vessels, bouncing torpedoes, refueling dolphins, and intelligent depth charges. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *11/82.*

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

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

- **Sneakers.** Turmell. Many-layered shoot-'em-up; one of the best. Stomping sneakers and other creatures require varying techniques. Fun. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *9/81.*

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

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

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

Super Taxman 2. Fitzgerald. Pac up your troubles! Bigger, more complex version of the most perfect extant rendition of a certain arcade game. H.A.L. Labs, 4074 Midland Rd., #23, Riverside, CA 92505. $25. *1/83.*

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

Thunderbombs. Becklund. You'll need two sets of eyes, hands, and reflexes to survive this one. Your cloudship is under bilateral attack, and it's just you and your bilateral lightning torpedoes. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95.

Tubeway. Van Brink. Tempestuous galaxy-saving action with 32 levels. DataMost, 8943 Fullbright Ave., Chatsworth, CA 91311. $34.95.

Wargle. Bernstein. Maneuver through square-grid layout zapping a "wolf pack." Looks innocuous but soon induces *Crossfire*-style hypnosis. Hayden, 50 Essex St., Rochelle Park, NJ 07662. $34.95.

Wavy Navy. McAuley. Galaxy shooting game brought down to sea level in bright, cartoon-style hires. No aliens raining on player's patrol boat; just kamikaze pilots, bombers, and missiles. Shoot them, or it's "P.T. blown home." Good, fun game. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *2/83.*

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

Home Education

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

Apple Logo. Papert. Custom version (by its inventor) of turtle graphics language. First-rate educational tool. Great kid-friendly documentation. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Bop-A-Bet. Alphabetic eat-'em-up, teaching letter recognition and eye-hand coordination. Lets little ones emulate older sibs. Sunnyside Soft, 5815 E. Parkside, Fresno, CA 93727. $29.95. *2/83.*

CyberLogo. Woodhead. Logo learning package introduces computers, uses imaginary school and playground settings to teach kids language with fun. Includes off-computer activities for reinforcement. By *Wizardry* author. Only Logo for 48K Apples. Cybertronics Intl., 999 Mount Kemble Ave., Morristown, NJ 07960. $99.95.

Dragon's Keep. Graphics adventure in which youngsters find and free imprisoned animals. Written for second-grade-level readers; requires the touch of a key, no typing, to execute actions. Encouraging and rewarding. All upbeat. Sunnyside Soft, 5815 E. Parkside, Fresno, CA 93727. $34.95. *2/83.*

Earl's Word Power. Knudson. Educational software providing homonym training in a Shakespearean mode. Late elementary to early junior high level. Neat. George Earl, 1302 S. General McMullen, San Antonio, TX 78237. $29.95.

Early Games for Young Children. Paulson. Basic training in numbers, letters, Apple keyboard for children ages two to seven with no adult supervision. Has a neat little drawing program. Counterpoint Software, #140, Shelard Plaza North, Minneapolis, MN 55426. $29.95. *11/82.*

Ernie's Quiz. CTW. Four games, four subjects, one disk. Image recognition, counting skills, creativity, and Muppet expertise are introduced with lots of positive feedback. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83.*

Facemaker. DesignWare. Exercises kids' creativity and introduces programlike command sequencing as kids create faces and link them together in animated pattern. Spinnaker Software, 215 First St., Cambridge, MA 02142. $34.95.

First Words. Wilson, Fox. Vocabulary comprehension training program using color-graphics anima-

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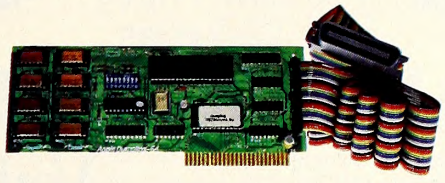

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TECHNOLOGY UPDATE

tion and sound to teach fifty basic nouns to children ages nine months to two years. Requires Echo II speech synthesizer. Laureate Learning Systems, 1 Mill St., Burlington, VT 05401. $185.

Fractions. Hi-res addition, subtraction, multiplication, and division of fractions. With learning manager system. Edu-Ware, Box 22222, Agoura, CA 91301. $49.

Gertrude's Secrets. Gertrude the Goose teaches four-to-nine-year-olds shape and color relationships. Solve logic puzzles, create shapes. The Learning Co., 4370 Alpine Rd., Portola Valley, CA 94025. $75. *2/83.*

Instant Zoo. CTW. Identify animals, test perception and reaction, match and decode words. Word editor lets you create your own word lists. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50.

Knowledge Bowl. Home version of that TV college quiz show. Test knowledge of humanities, social sciences, and hard sciences in more than thirty programs. Play alone or compete with companion. Well done. Academic Hallmarks, Box 998, Durango, CO 81301. $27 each.

Krell Logo. Concentrates on underlying principles of Logo; sections on assembly language interfaces and music creation, plus *Alice in Logoland* tutorial. Krell, 1320 Stony Brook Rd., Stony Brook, NY 11790. $149.95. *7/82.*

Letter Man. Teaches typing, *Pac-Man* style. Behavioral Engineering, 230 Mt. Hermon Rd., #207, Scotts Valley, CA 95066. $29.95.

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

Micro Mother Groose. Rhyme-related games with progressive levels, music, animation. Simple enough for tots to operate it. Free poster and stickers, too. Software Productions, 2357 Southway Dr., Box 21341, Columbus, OH 43221. $39.95. *2/83.*

Micro Typing. Lessons aim toward familiarity with the typewriter, but work with the Apple, too. Hayden, 600 Suffolk St., Lowell, MA 01853. $29.95.

Mix and Match. CTW. Create mixed-up Muppets and teach the Apple about animals. Logic and word-guessing games. Add your own word lists. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83.*

- **The New Step by Step.** Software and audio tape team up to teach Basic programming painlessly. Graphics, animation, sound effects, and workbook. Superior. Program Design, 11 Idar Ct., Greenwich, CT 06830. $79.95. *7/82.*

Punctuation Skills: Commas. Covers all uses of the comma. **Punctuation Skills: Endmarks.** Covers semicolons, colons, exclamation points, and periods. Milton Bradley, 111 Maple St., Springfield, MA 01105. Each, $49.95.

Rocky's Boots. Rascally raccoon helps children build logical thinking and computer understanding. Construct machines of logical gates in convolutions of thickening complexity. Music and sound effects add to fun. The Learning Co., 4370 Alpine Rd., Portola Valley, CA 94025. $75. *2/83.*

SAT English I. Designed to help high school students prepare for college entrance exam. Covers verbal half of test; learn by mistakes. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $30. *11/81.*

Snooper Troops. Snyder. Ongoing hi-res mystery series in form of educational games. Highly structured; excellent fourth through eighth-grade educational tool. Fun for adults, too. Spinnaker Software, 215 1st St., Cambridge, MA 02142. $44.95 each. *9/82.*

Spelling Bee Games. Hi-res games strengthen hand-eye coordination, memory, motor skills. Word lists include shapes, animals, more. Edu-Ware, Box 22222, Agoura, CA 91301. $29.95.

Spotlight. CTW. Simple geometry for preteens. Games involve number estimation and angles of reflection. Good and fun. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50.

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

Story Machine. Helps develop positive attitude toward writing and ability to write correctly. Words come to life when sentence typed is acted out on-screen. Kids five to nine love to type "The tree ran down the street" and see it do so. Spinnaker Software, 215 1st St., Cambridge, MA 02142. $34.95.

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

Type Attack. Hauser. Learn to type while defending the planet of Lexicon from invaders. IIe version teaches IIe keyboard. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95.

Typing Strategy. Uses animated keyboard image and two typing games to teach a typing strategy. Behavioral Engineering, 230 Mt. Hermon Rd., #207, Scotts Valley, CA 95066. $29.95.

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

The Visible Computer: 6502. Hi-res simulation teaches machine language programming by illustrating inside of working 6502 microprocessor. Software Masters, 3330 Hillcroft, #BB, Houston, TX 77057. $49.95.

Vocabulary Skills: Subtext Clues. Develops vocabulary through context, contrast, educated guesses, and examples. **Vocabulary Skills: Prefixes, Suffixes, Roots.** Includes concepts, prefix and suffix tutors, and word building. Milton Bradley, 111 Maple St., Springfield, MA 01105. Each, $49.95.

Whole Brain Spelling. Manton, Campanini. Concentrates on internal visualization skills; 2,000 words on 200-word lists with graded levels of difficulty. Ages nine to adult. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $34.95.

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

Strategy

Battle for Normandy. Tactical Design Group. Create your own strategies as Allied D-Day invasion force or German defenders. Strategic Simulations, 465 Fairchild Dr., #108, Mountain View, CA 94043. $39.95. *1/83.*

Black Jack Strategy. Wazaney. Strategy tables, simulator, and tutor, plus free fast DOS loader program. Play-mode dealer's tough to beat. Soft Images, 200 Rt. 17, Mahwah, NJ 07430. $69.95.

Bomb Alley. Grigsby, Billings. Detailed re-creation of 1942 Mediterranean naval and air war, including critical supply problems. Full scenario and two short scenarios. Strategic Simulations, 465 Fairchild Dr., #108, Mountain View, CA 94043. $59.95. *3/83.*

Casino. Five hi-res games, Vegas-style: blackjack, baccarat, keno, poker, and roulette. DataMost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95. *10/82.*

- **Castle Wolfenstein.** Warner. First game to fuse successfully strategy, home-arcade fantasy. Escape from Nazi stronghold with secret plans. Room lay-

out changes with each new game. Enemy speaks, in German. Muse, 347 N. Charles St., Baltimore, MD 21201. $29.95. *10/81.*

Chess 7.0. Atkin. A loving piece of programming; neither too slow nor too easy. Plays a mean end game. Tops yet. Odesta, 930 Pitner, Evanston, IL 60202. $49.95. *1/83.*

- **Computer Baseball.** Merro, Avery. Simulates individual player abilities from the teams of thirteen famous World Series. Enter and play teams of your own creation. Strategic Simulations, 465 Fairchild Dr., #108, Mountain View, CA 94043. $39.95. *9/81.*

Epidemic! Faber. Fight epidemic caused by virus-bearing meteorites striking Earth in different geographic areas; weapons are interferon, vaccines, radiation treatment, and possibly a nuclear alternative. Different. Strategic Simulations, 465 Fairchild Dr., #108, Mountain View, CA 94043. $34.95. *3/83.*

- **Flight Simulator.** Artwick. Uses aerodynamic equations, airfoil characteristics for realistic take-off, flight, and landing. Two years on Top Thirty. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $33.50.

Flip Out. Huskey. Drop marbles through top of maze, activating traps to free your marbles and trap your opponent's. Sirius, 10364 Rockingham Dr., Sacramento. CA 95827. $29.95.

Frontline. Eagan. New wave strategy/arcade hybrid requiring simultaneous offensive and defensive play. Tests mind, reflexes. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $29.95.

Germany 1985. First game in SSI's World War III quartet. NATO forces tangle with Soviet troops in West Germany. Operational-level; two scenarios with solitaire option. Strategic Simulations, 465 Fairchild Dr., #108, Mountain View, CA 94043. $59.95.

Gin Rummy. Carpet. Play against computer. Hi-res hand can be arranged. Knocking allowed. Computer plays pretty well. DataMost, 8943 Fullbright

"Another day, another dollar!"

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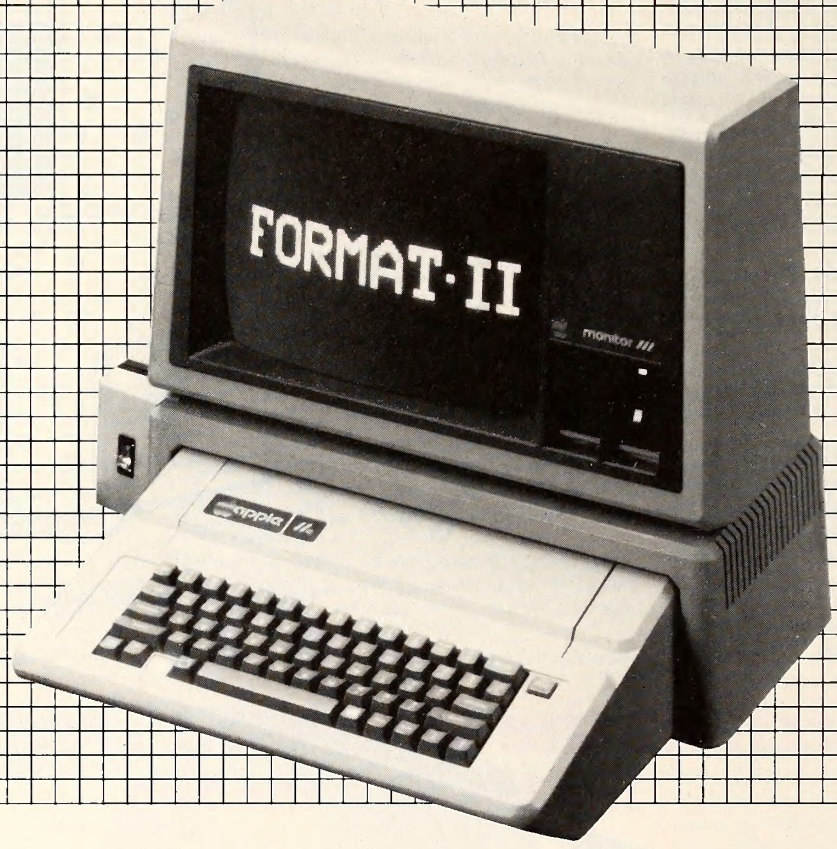
WORD PROCESSING BREAKTHROUGH!



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What you see is what you get. Text is displayed on the screen exactly as it will print out—paragraphs, underlining, justification, page breaks.

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(212) 486-7707 telex 236200 KEN UR.

Note: Format II—Enhanced Version supports Apple //e, Apple II + , and Franklin Computers. All popular 80 column cards are supported including Apple Computer's 2 new 80 column text display cards, Videx, Smarterm, Vision 80 and Sup'R'Term, Full View 80, Magnum 80.

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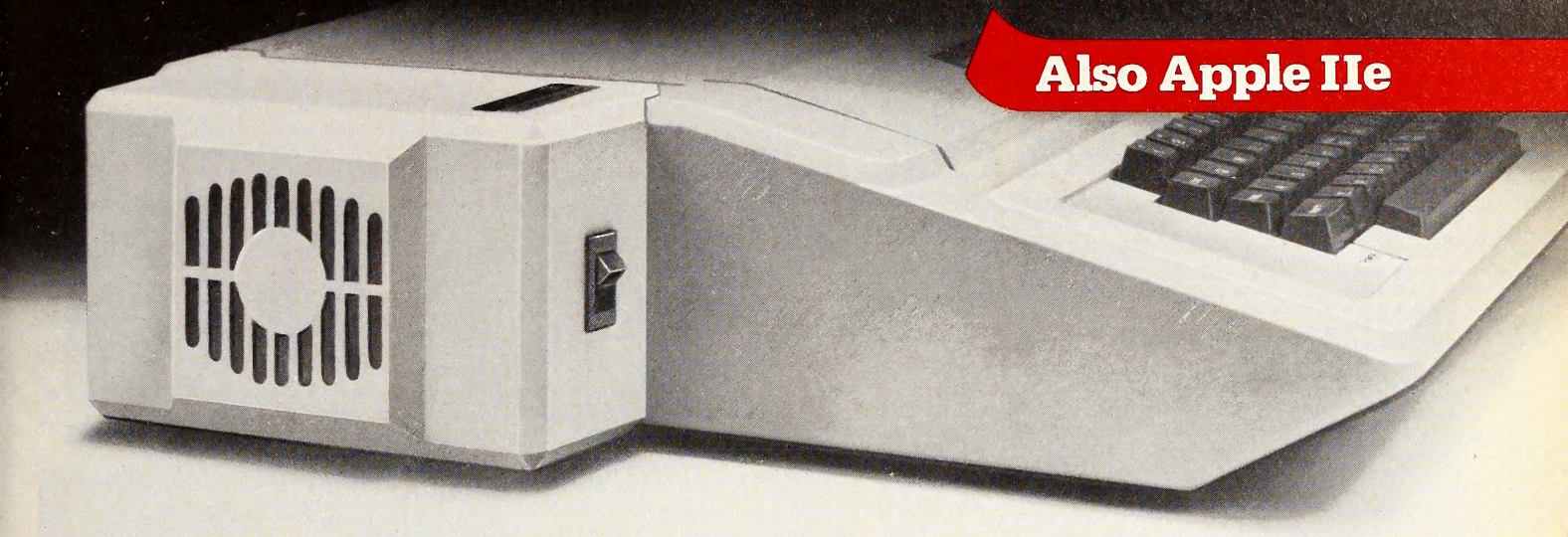
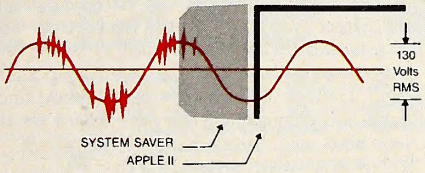
The most important peripheral for your Apple® II.



Also Apple IIe

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.

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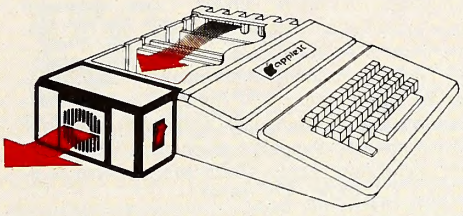
As soon as you move to 64K RAM or 80 columns on your Apple II you need SYSTEM SAVER.

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.

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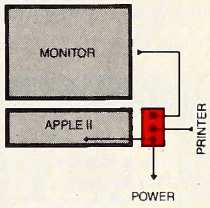
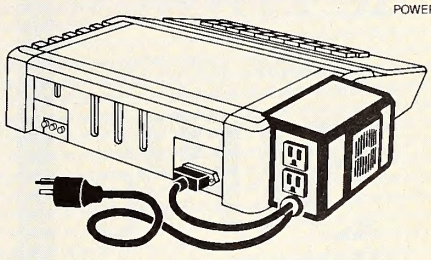
SYSTEM SAVER contains two switched power outlets. As shown in the diagram, the SYSTEM SAVER efficiently organizes your system so that one convenient, front mounted power switch controls SYSTEM SAVER, Apple II, monitor and printer.

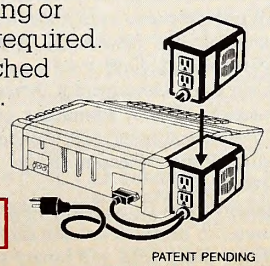




The heavy duty switch has a pilot light to alert when system is on.You'll never use the Apple power switch again!

Easy Installation

Just clips on.
No mounting or hardware required.
Color matched to Apple II.



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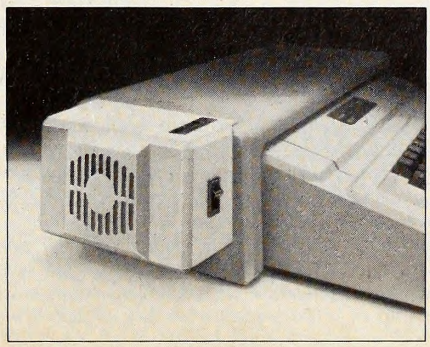

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Ave., Chatsworth, CA 91311. $29.95. *6/82.*

Go. Erwin. Classic Oriental territory game in hi-res. Surround your opponents before they surround you. Play in solitaire or bihuman mode. Hayden, 600 Suffolk St., Lowell, MA 01853. $34.95.

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

• **Microgammon II.** Program for play, practice, improvement of backgammon skills. Pretty good competition. 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, 19537 Wells Dr., Tarzana, CA 91356. $79.95.

Pandemonium. Wazaney. Solitaire-poker word game with 6,000-word dictionary, scoring display, and player-selectable clock. Soft Images, 200 Rt. 17, Mahwah, NJ 07430. $39.95.

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.

Space Vikings. Robbins. 3-D simulation of space combat. Raid the planets of twenty star systems, gathering loot and establishing bases. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $49.95.

Zendar. Eagan. Manage struggling economies of an 8-nation island. Very long game. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $29.95.

Utility

ALD System II. Assembly language development system; allows object files to 16K, source files to 37K; upper and lower case text entry. Insoft, 10175 S.W. Barbur Blvd., #202B, Portland, OR 97219. $75.

Amper Magic. Nacon. Attaches machine-language routines to Applesoft programs. No knowledge of machine language necessary. Anthro-Digital, 103 Bartlett Ave., Pittsfield, MA 01201. $75.

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

Apple Mechanic. Kersey. Multiple utility disk with shape editor, custom typefonts, byte rewriter, and tricks to facilitate music, text, and hi-res generation. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50. *9/82.*

Apple Pascal. Structured operating system featuring enhancements of color graphics, sound generation, and Apple's I/O features. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $495.

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

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

Bug Byter. Screen-oriented mnemonic debugging tool with resident assembler and disassembler. Displays contents of accumulator, X and Y registers. Computer-Advanced Ideas, 1442A Walnut St., #431, Berkeley, CA 94709. $47.50.

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

DOS Tool Kit. Excellent utility package; Apple II assembler-editor system and Applesoft toolkit. Edit, assemble machine language programs; write, edit Basic programs. Simplifies graphics, includes character generator. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $75. *10/81.*

Flex Text. Simonsen. Adds graphics to text and vice versa; prints variable-width text with no hardware. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

GPLE. Enhanced version of *Program Line Editor* with programmable cursor and listing control. Edit line by line, or by range of lines, and search for strings. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $60.

Hands-On Basic Programming. Kamins, Bennett. Workbook and disk teach Basic programming, other basic knowledge of the Apple. User frustration deliberately omitted from this tutorial. Edu-Ware, Box 22222, Agoura, CA 91301. $79.

Merlin. Does assembly language programming with dozen editing commands and 28 pseudo-ops. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $64.95.

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

ProntoDOS. Weishaar. High-speed disk utility cuts about two-thirds of the time off bload and save functions. Compatible with all DOS commands; frees up to 15 extra sectors per disk. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

Pseudo-Disk. Turns RAM card into additional temporary disk drive. Thermal Scan, 1779 Bradburn Dr., St. Louis, MO 63131. $34.95.

Simple DOS. Text file utility creates files, adds or changes records, without a DBM package. SoftStalker, Box 689, Steamboat Springs, CO 80477. $49.95.

• **Super Disk Copy III.** Hartley. Easy-to-use menu-driven software utility; correct file sizes, undelete, free DOS tracks, more. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $30. *10/81.*

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

Type Faces. Printing enhancement tool for dot-matrix printers; fifteen hi-res character fonts available. Alpha, 12 New England Executive Park, Burlington, MA 01803. $125.

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

Word Processing

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

Apple Writer IIe. Shift, shift-lock, and tab with those keys, four-arrow cursor control, delete key. Data files compatible with II Plus. IIe only. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $195.

Bank Street Writer. Kusmiak, Bank Street College of Education. Designed for use by whole family. Universal search and replace, word wrap are standard. U&lc without hardware. On-disk tutorial. Takes advantage of memory, keyboard on IIe, if you have one. Broderbund, 1938 4th St., San Rafael, CA 94901. $69.95. *2/83.*

Dictionary. Expandable 25,000-word spell-checking program for *Superscribe*, *Screen Writer*, *Apple Pie*, and *Apple Writer*. Instant look-ups and corrections. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $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., #3L, New York, NY 10022. $250. *2/83.*

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. *12/82.*

Magic Window II. 40, 70 (in hi-res), or 80 columns in this expanded version. Compatible with Pascal 80-column. With user-tailored, fast menu; underlining; global search and replace. IIe version uses all 64K, more if you have it. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95.

Pie Writer. Business processor allows 9,999 pages. Word deletion, auto indent, spooling, and type-ahead 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. No extra hardware for u&lc, 70-column display, printer spooling. Edits Basic, text, and binary files; complete search

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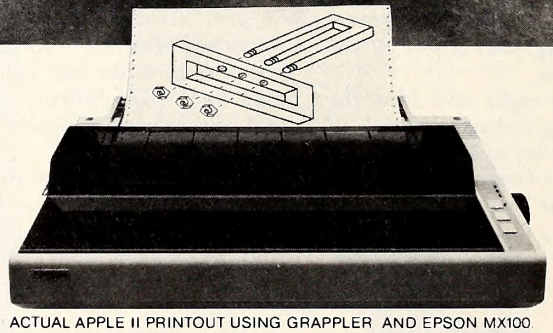
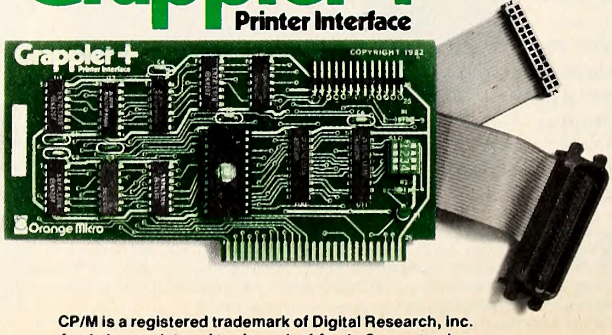


ACTUAL APPLE II PRINTOUT USING GRAPPLER AND EPSON MX100

With The Grappler™ + Printer Interface



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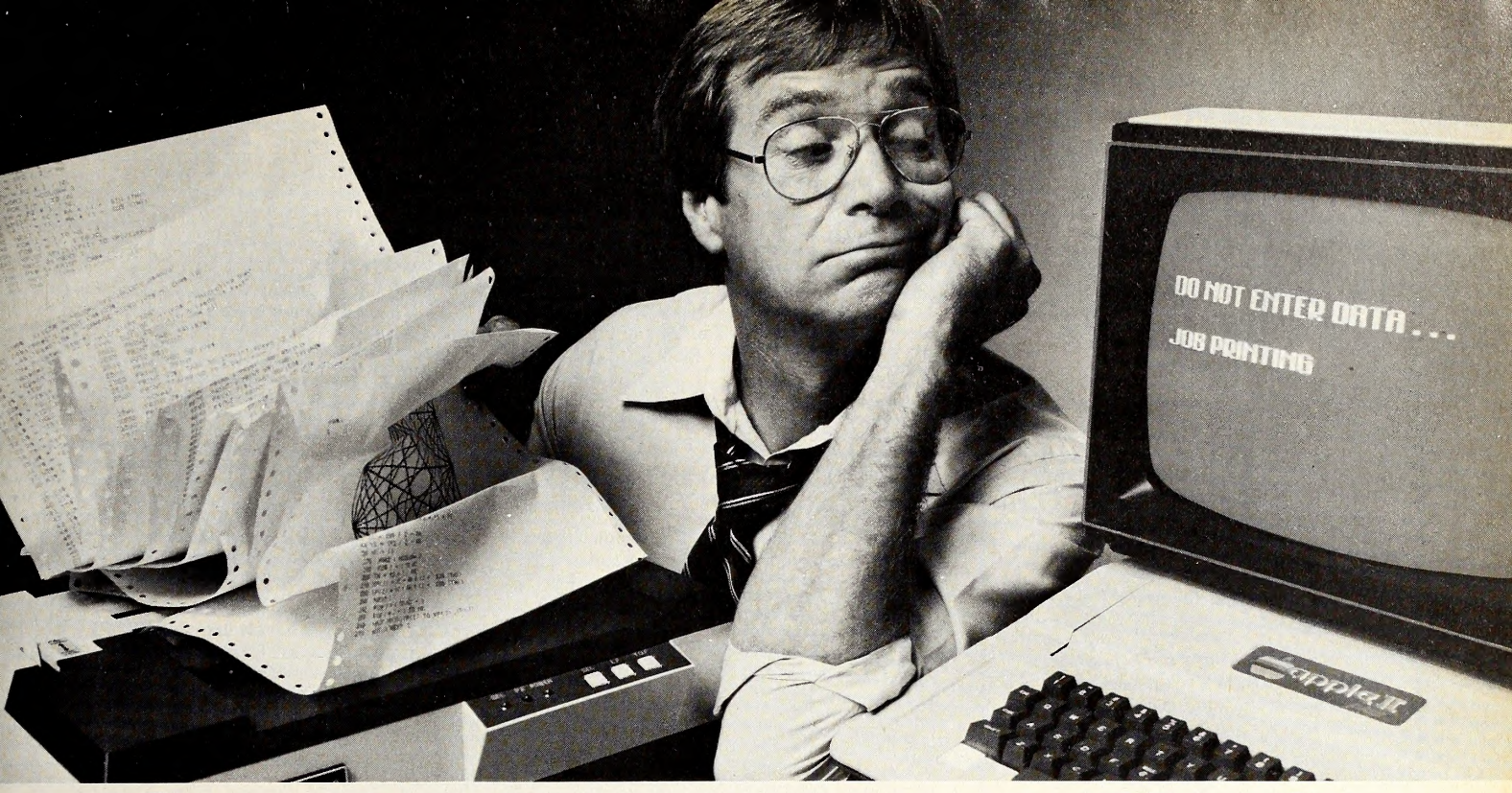
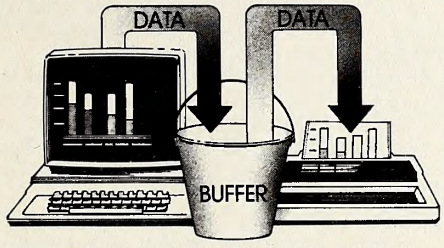


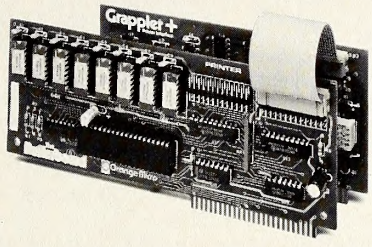
If your printer uses your Apple® more than you do, you need The Bufferboard™.

If your Apple is locked into the "PRINT" mode so much that you've taken up solitaire to kill the boredom, you need a buffer. And if your computer is the Apple II or III, the only buffer for you is The Bufferboard. Expandable to 64K of storage, The Bufferboard stores an instantaneous **bucketful** of print data from your computer. Then it feeds the data to your printer at its own printing rate. Your Apple is set free from driving your printer and is ready for more data from you.



Take your existing interface—and buffer it!

Only The Bufferboard has a simple Interface-Docking System. No bulky boxes or expensive power supplies are needed because The Bufferboard fits right into your Apple—and **docks** onto your existing printer interface. The result is convenient



and economical buffering of most popular printer interfaces, including the Grappler + ™ interface, Epson interface, and Apple printer interface. Thirty seconds and a single hook-up are all you need to end the printer waiting game forever.

Up to 20 letter-size pages stored at a time.

The Bufferboard comes standard with 16K, and is expandable to 32K or 64K of buffering capacity with the addition of memory chips. This "bucket" will hold up to 20 pages of a print job, allowing you freedom to use your Apple.

The Bufferboard—designed exclusively for the Apple Computer.

Specifications:

• Versions for Grappler + interface, Epson interface, Apple interface, and other popular printer interfaces • 16K buffer standard • Upgradeable to 32K or 64K • Automatic memory configuration • Automatic self test • Includes interface docking cable.

The Bufferboard is made by Orange Micro, Inc.; the same people who brought you the popular Grappler + printer interface. Both the Grappler + and The Bufferboard are now available at your local Apple dealer.

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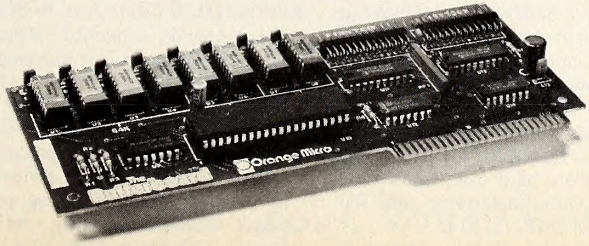

The Bufferboard™
For Apples and Printers

and replace. IIe version uses 80 columns, u&lc, shift key, and all available memory. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $129.95. *1/83.*

Sensible Speller. Spell-checking program sports listable 85,000 words, extensible up to 110,000 words. Recognizes contractions, gives word counts, word incidence, number of unique words. Clear documentation and simplicity of operation. Works with many word processors' files. Best of breed. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $125. *1/82.*

Super-Text Home/Office (40/56/70). Zaron. Get 40, 56, or 70 columns without hardware. Design 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. $99.

Super-Text Professional (40/80). Automatic 80-column, u&lc on equipped IIe; with appropriate equipment on II Plus. On-screen formatting and help reference guides. Muse, 347 N. Charles St., Baltimore, MD 21201. $99.

Videx Preboot Apple Writer. 80-column display for *AppleWriter II* with u&lc input from keyboard. Enhancer II and Videoterm compatibility. Videx, 897 N.W. Grant St., Corvallis, OR 97330. $19.

Word Handler II. Elekman. Simple program with straightforward documentation. Allows folded paper printout for two-sided printing. 80-column with the IIe. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $199. *11/82.*

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

Zardax. Philips. Highly recommended. Single program includes supersimple use of powerful word processing features. Considerable extras including communication by modem. Good 80-column facility with board, automatic in IIe version. Computer Solutions, Box 397, Mount Gravatt, Queensland, Australia. In the U.S.: Action-Research Northwest, 11442 Marine View Dr. S.W., Seattle, WA 98146. $295. *Zip-Comm* modem program. $80. *11/82.*

Apple III

Access III. Communications program for time sharing and standalone tasks; gives access to remote information services, minis, and mainframes. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

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

Apple III Business Graphics. BPS. General-purpose graphics program draws line graphs, bar graphs in three formats, overlays, and pie charts in 16 colors. Continuous or discrete data; curve-fitting capabilities. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

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

Apple Writer III. Lutus. Uses WPL (word processing language) to automate text manipulation and document creation. Adjusts print format during printing; translates from typewriter shorthand to English or other language and back again. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $225.

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

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

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Lexicheck. Spelling checker that runs from inside *Word Juggler.* 30,000-word dictionary; add your own words. 8,000-word legal dictionary disk also available. Quark Engineering, 1433 Williams, #1102, Denver, CO 80218. $145.

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

Micro/Terminal. Gives access to 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.

PFS:File (formerly *Personal Filing System*). Page. Form-oriented information management system stores and retrieves up to 32,000 entries. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175.

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VersaForm. Landau. State-of-the-art business forms processor. Does invoicing, purchasing orders, mailing lists, client billing. Powerful, complex, worth getting to know. Hard-disk-compatible. Applied Software Technology, 14128 Capri Dr., Los Gatos, CA 95030. $495. *8/82.*

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

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

Word Juggler. Gill. Word processor uses expanded memory. Printout can be reviewed on-screen prior to printing; multiple copies printed of selected pages. Quark Engineering, 1433 Williams, #1102. Denver, CO 80218. $295. *12/82.* ❑■

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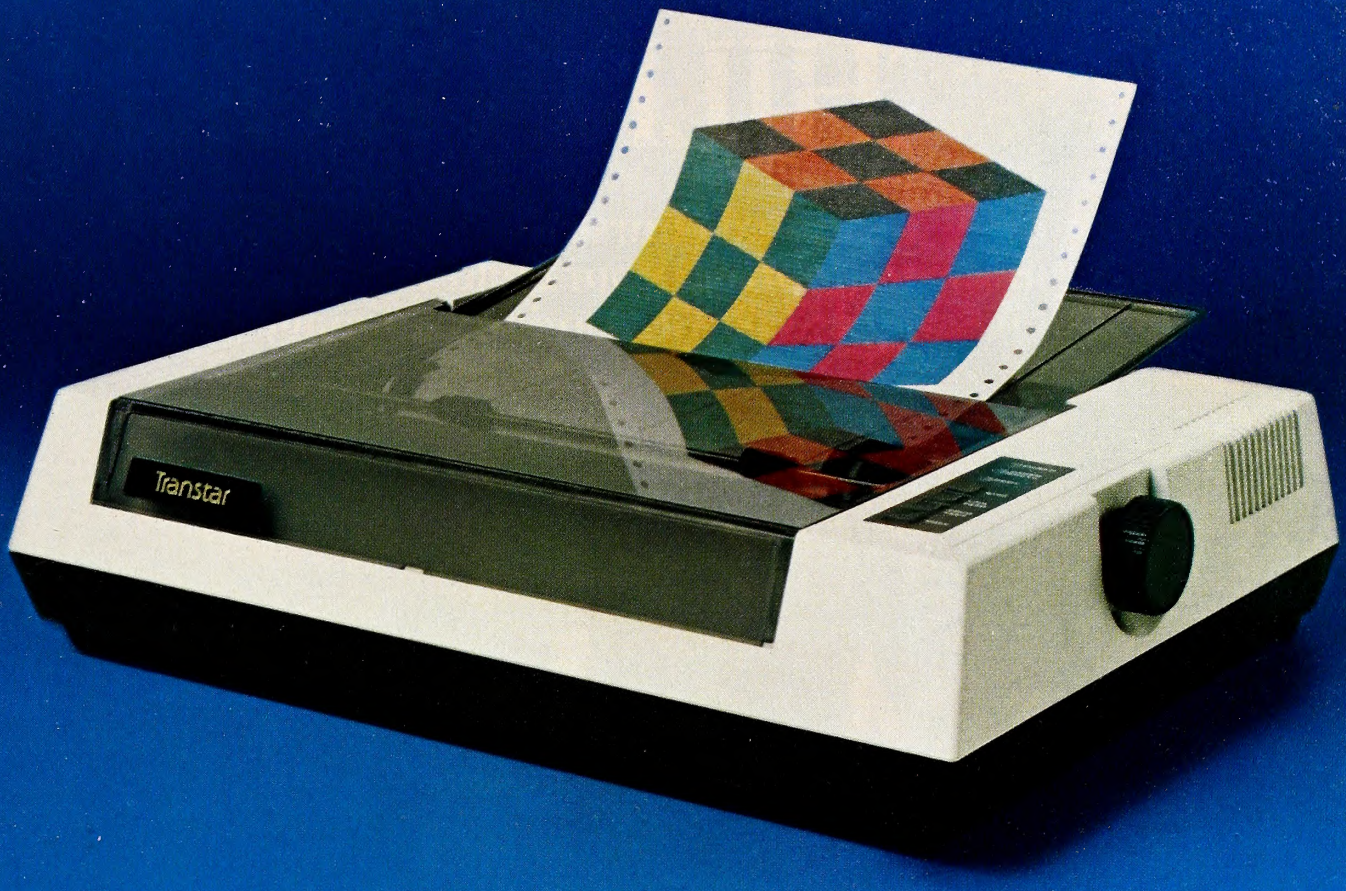

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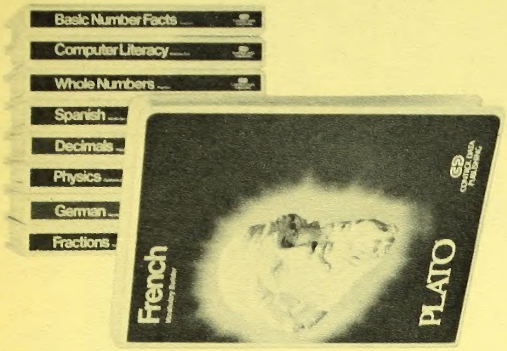

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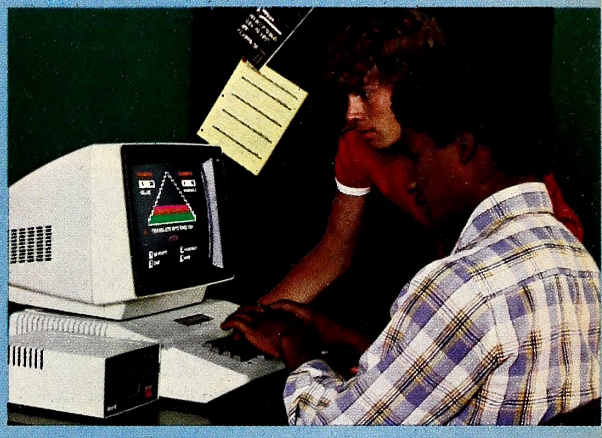

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No Excuses Accepted

Softalk is certainly the most informative and readable of all the microcomputer magazines I have seen. I especially enjoy Open Discussion and believe that it is the best place to present the Apple community with my opinions relating to the computer marketplace.

In your December '82 issue, *Softalk* printed a highly critical but accurate review of Sierra On-Line's official *Frogger* game. The president of that firm, John Williams, wrote a rebuttal that was printed in the January '83 issue.

First of all, I would like to point out that there is no excuse for a second-rate program, particularly from a leading company such as his. Second, it is clear that Mr. Williams's excuses are invalid. He writes: ". . . the origin of the 'lackluster graphics' you complain of stems from . . . the Apple II," and that the problem in the visuals is a result of "lack of color scrolling . . . making mud of any white object on a colored field . . . [and a] multitude of other problems that Apple graphics present." Well, Mr. Williams, how did Nasir Gebelli manage color scrolling in *Phantoms Five* way back in December 1980? How did Broderbund manage making objects move over colored backgrounds in *A.E.*? How have thousands of enterprising programmers worldwide managed to work around the "multitude of problems that Apple graphics present" to produce the most stunning array of games and other graphic software available for any microcomputer? It's called ingenuity, and it's something you could have used a lot more of in preparing your *Frogger.*

On another note, I found the article on the Apple IIe quite interesting, and I'm looking forward to reading more on the subject. However, *Softalk*'s coverage of the Lisa was disappointing. Although I cannot afford this machine, I would be interested in reading about it, as I imagine most of your readers would. Perhaps the lack of coverage was due to an early publication deadline. In any case, I'm hoping that you will print something additional about it in the next few months. Other things that I would like to see are a review of the huge variety of add-in microprocessor boards now available and a monthly top-ten chart for peripherals and accessories.

David Temkin, Highland Park, NJ

There's no doubt that ingenuity and Apples go together; the Apple's accessibility has enabled programmers and hardware designers to do things on the Apple that "should" have been impossible.

But some problems have not been solved, and it's not fair knocking creators because they don't create everything. Ben Franklin discovered electricity, but he neglected to invent the light bulb; is he less admirable because of it? On the other hand, he didn't try to market key-adorned kites.

Vertical scrolling, like that in Phantoms Five, *has been implemented on the Apple for some time. Horizontal scrolling is a different matter entirely. No one has discovered how to extend the Apple's limitations in this area.*

A.E. *uses color in an unusual way; none of it is solid color. In fact, the background is black—that is, no color. Color on color is a problem as yet unsolved.*

There are people who swear that Atari graphics have it all over Apple graphics for just such abilities as these. But we agree with you—in general, our old Apple's graphics look a heck of a lot better anyway.

Sierra On-Line has broken many barriers. It's no wonder that when it licensed Frogger from Sega, Sierra expected to be able to break barriers here too. It couldn't. Whether this means the company should have dropped the project for the Apple is a moot point. But John Williams, who is, incidentally, not president but director of marketing for Sierra On-Line, was not talking through his hat.

On that other note, more coverage on the Lisa will be forthcoming—when we have a Lisa to tell you about firsthand.

Militating against Half-Tracking

I would like to see all games designed so that players are able to save the top ten scores to disk, with initials on request. They should also be able to erase these scores if requested. This would make all games a little more challenging and fun. Also, software writers: please don't make my disk drive do funny things. It really doesn't like to go half-tracking, which doesn't prolong its life very well.

Contrary to some beliefs, arcade games should also be "backupable." Most people say that since games are of low price, people can afford to have them replaced. This is just an excuse of the businessman who can afford to do so. When you're in the military, getting only a 4 percent raise (as we did this year), twenty-five to thirty-five dollars is a lot of money.

One company that does not get any recognition is Cross Educational. It makes some excellent programs for many high school or college courses.

Dennis Heaton, Seattle, WA

Lucky Legaliteen

Softalk could do its readers a valuable service by running an article discussing and clarifying the laws regarding software copyrights. I've noticed that there seems to be some confusion about what's legal and what's not. Most people are aware that copying software to sell is illegal, but how about trading copies, or photocopying software documentation? I have not seen such an article in any major computer magazine.

On my recent sixteenth birthday, my mother baked her traditional cake—this time, it was an Apple (16K, of course). Here it is, for fellow readers to enjoy seeing. (I was lucky enough to enjoy eating it too!)

Wes Wasson, Kingman, AZ

Hopping Support
I wanted to take this opportunity to let your readers know that some software manufacturers do care about us. I purchased the game *Frogger* by Sierra On-Line a couple of months ago. From the moment I first attempted to boot the disk to play the game, I got nothing but a whirring drive and a rebooting message on my screen. Needless to say, I tired of *Frogger* rapidly. I decided to fire off a rather testy letter to Sierra On-Line and tell them what I thought of a game that took me six tries to boot. Within a few days of my letter, I got a personal phone call from the publisher. They were very sorry I was having such a rough time. They asked me to send them my disk, and told me they'd send another. Sure enough, they did.

Well, I had the new disk about one week, and then it went bonkers when I tried to boot it (flashing inverse characters all over the screen—that kind of thing). Again, I shipped my disk off with another letter, and again they sent me another disk. And this one works great! I think Sierra On-Line's support of their software is fantastic; they deserve a lot of our business for that very reason. My hat is off to them—thanks for being there when it counted!
Margie Zembal, Vancouver, WA

Properly Handled
I sent a letter to Silicon Valley Systems outlining an interface problem I was having between my printer and *Word Handler II*. Within seven working days I received a phone call from them concerning my problem. Not only did the lady help me to my great satisfaction, but she was also very pleasant and even filled me in on the latest updates that they're working on for *Word Handler*. Even though I had offered to call them in my letter, they went out of their way and called me. Their timely and positive manner convinced me that they really are there to help. That's the support a user is looking for.
Leo C. Dodge, Ellicott City, MD

Exemplary Exec
Softalk has been of great assistance to me in my first year as an Apple owner. I have been pleased that, despite your financial dependence on the software industry for advertisements, you have been able to maintain your journalistic independence in the reviewing of software. I am particularly referring to your critical review of *Frogger* by Sierra On-Line, your largest advertiser and the sponsor of my first year as a *Softalk* subscriber.

I would particularly like to thank you for "Exec TG Products" that appeared in the December '82 issue. I had become extremely frustrated with three TG joysticks, two of which I had to return to the store during the warranty period. At the time of the article, I had a nine-month-old TG joystick that had failed about two weeks after the ninety-day warranty had expired. After reading the article, I took a chance and mailed the product to TG with an explanatory letter and an offer to pay a reasonable amount for repair. Two weeks later, I received my joystick back, repaired with TG's improved strain-relief round cable rather than the ribbon cable that had been the source of my problems. There was no charge for the repair. TG was under no obligation to provide this service. I would like to thank them and to thank *Softalk* for informing me of the quality of this company.
Allan S. Lieberthal, Granada Hills, CA

A Few Inches More
It has been difficult for me to obtain an extension cable that will connect my Apple II to an Epson printer. The cord and connector leading from the interface card were too short. I needed the convenience of an extension cord. The Data Set Cable Company of Las Vegas, Nevada, was my solution. This company specializes in constructing extension cables. The manager of the division, Gordon Paulson, constructed a high-quality cable for me, and I've found it works well.
Roger M. Levin, Palo Alto, CA

The Right Answer
The out-of-the-ordinary assistance received from Jack Oakuright of Answer Corporation and their *Disk Utility 1.1* saved the day for this Florida accounting firm. Somehow we managed to destroy the directory on the data file of our largest client. Without the help of their disk utility, we would have lost one hundred fifty hours of input, not that we didn't keep a backup. With the disk and backup from their engineering staff, the directory was restored in twenty minutes. By the way, we were using a *VisiCalc* storage function when the disk became inoperable. It was the second time this had occurred, and we have since tossed the *VisiCalc* master program aside and use the backup copy. We would be interested in hearing if anyone else has experienced this problem.
Gregory E. Matthews, Saint Petersburg, FL

An Examination of Premises
As an expatriate Californian living in London and working in the computer field, I would like to comment on a disturbing aspect of some computer games recently emanating from my former homeland. Specifically, I have in mind those games pretending to be simulations of a possible nuclear war between the United States and the Soviet Union. What is disturbing is that these games convey (or perpetuate) misunderstandings of the present East/West stand-off that are not only false but also highly dangerous.

Two of these games are worthy of discussion: *Norad* (Southwestern Data Systems) and *Germany 1985* (Strategic Simulations), since each, in its own way, illustrates this pernicious effect of computer games. I should point out that the quality of this software, as software, is not in question (and is of little importance anyway). What I am concerned about is the dangerous misunderstandings and misconceptions that these games propagate.

According to *Softalk*'s mention (January '83, page 93), "*Germany 1985* is. . .SSI's catastrophic vision of World War III. Soviet battalions have invaded. . .West Germany. The game provides several variables to challenge the player in this confrontation between East and West." *Softalk*'s writer, incidentally, goes on for several lines in this lighthearted manner, as if nuclear conflict between East and West (and don't think it wouldn't be nuclear) were simply a variation on *Dungeons and Dragons*.

My essential criticism of SSI's game (and similar ones) is that it perpetuates a vital misunderstanding of the nature and degree of the Soviet threat to the West. The public understanding, fostered by recent administrations and by Pentagon spokesmen, is that the Soviet Union is the embodiment of everything evil, and thus of everything un-American. This scenario concludes that the Soviet Union would certainly invade (and probably destroy) Western Europe were it not for the fear of Western nuclear retaliation. This view is false. But it is widely believed, and this belief (among others) has consequences that are extremely dangerous for the West—indeed, for the world.

The fact is that a peaceful trade with a flourishing, capitalist Western Europe is much more advantageous to the Soviet Union than an attempted military invasion. The distinguished American scholar George Kennan makes the point succinctly when he writes that "the fears voiced in [the U.S.] and in Western Europe about the present danger of a surprise Soviet attack against the NATO countries of Western Europe are almost too bizarre to be credible" (*The Nuclear Delusion*, page 94).

Southwestern Data Systems is normally

known for its sober, high-quality utilities. But in describing *Norad*, SDS's product guide becomes breathless with excitement. "Alert! Enemy missiles bearing nuclear warheads are hurtling towards the United States! Automatic ABM guidance systems have failed! You have been designated as the failsafe system, and must manually target . . . " ad nauseam.

How many players of *Norad* (how many nonplayers, too) know that the United States has no antiballistic missile (ABM) system, and that there are no plans to install any? The United States is practically defenseless against incoming warheads. The missiles themselves fall back to earth as soon as their warheads have been released. The Soviet Union is similarly almost defenseless, despite the existence of a rudimentary ABM system around Moscow. The reason America lacks an ABM system is not for want of money. The Pentagon generals apparently have only to ask to receive, even though what they get is the funny money that is wrecking the American economy. No, the reason is that there is simply no effective defense against hundreds of ballistic warheads raining down at ten thousand miles per hour, mostly through tornadoes of superheated gas produced by previous explosions.

Do the buyers of *Norad* believe that America has any defense against Soviet retaliation to an American first strike? Don't forget that while the Soviet Union has repeatedly and publicly renounced the first use of atomic weapons, first use remains the cornerstone of NATO's European defense strategy. Games such as *Norad* encourage the illusion that a war between the United States and the Soviet Union would basically be like any other war—except that this time we would have the very latest in technological weaponry, and the best (the very best) that our tax dollars could buy. This is an illusion that may turn out to be fatal for us all.

How, then, is it possible for software publishers like SSI and SDS to be so flippant in their portrayal of what would be a scarcely imaginable disaster, a catastrophe so horrendous that even the extermination of six million people would pale in comparison. From publishers of software who are otherwise apparently intelligent, can we not hope also for some moral responsibility? Or is it too late, even for that?

Robert Marlowe, London, England

Of Peripherals, Piracy, and Protection Policy

First of all, let me say that I am not trying to add to the producer/pirate debate, since most discussion directed to that front has not produced a solution—even if it has made us all painfully aware that we have a problem on our hands. My two cents' worth is aimed at a blight on the tree of modern microcomputing called copy-protection schemes.

On the outside, it seems to be a very reasonable idea. If some people are making copies for illegitimate purposes, make it impossible for people to copy the software. Of course, this raises the price of the software—to pay for not only the added cost of developing protection schemes but also registration costs, the extra costs of backups or for a little hardware board, and so forth. One thing that really steams me is that we (you and I, the consumers) are paying for a feature that doesn't work!

Early protection schemes begat nibble copiers, and as the protection improved so did the nibble copiers. Recently, some software houses developed disks that they claim cannot be copied using a nibble copier. Along come folks with some new hardware boards that take a picture of your entire memory so that no total load program is safe. So now manufacturers are producing software to look at all the ROMs in your peripheral slots to find these cards. Can you imagine what will happen if your printer card ROM has the same bit of code in the locations they check? "Sorry, but because of our copy-protection scheme, you can't get a hard copy of your database."

In any case, I think the following statement is valid: for any copy-protection scheme devised, some bright person somewhere will invent a way to bypass or break the protection. Thus, we are paying for a feature that we neither want nor need. Just for the record, the only copy-protected software I buy are games, where there doesn't seem to be much difference in the price of protected and unprotected software.

Actually, the increased price isn't the only reason I won't buy protected software. After all, there are some very nice packages that do wonderful things that are copy-protected. In some cases, it's the warranties that scare me away. Several of the very high-priced packages work on the "break-it, buy-it" principle. You can look over the manual all you want for free, but break the seal on the disk package and it's yours. I've seen several pieces of software that looked good on paper but just didn't perform as I expected in use. Manuals never cover everything, and perhaps the software will perform the undocumented function you desire, but you'll never know until you try it. If you don't believe that this is a common problem, read the letters pages of other popular computer magazines more carefully. Software manufacturers often submit letters saying, "In your review you stated that our program didn't do such and such, but if you perform the following steps (this will be clarified in the new manual) you *can* do such and such."

Of course, warranties are basically a cost problem as well. If you are loaded with money, maybe you can afford to blow $500 on software that you later find to be worthless to you. My next point hits everyone—the rich and the poor. What was the last piece of perfect software you wrote? Let's face it: most complicated software can run into problems. What if you bought one of those new, improved, 100-percent-compatible disk drives? Sure, they handle 3.2, 3.3, CP/M, and Pascal, but what if a given program's whiz-bang operating system plays games that the specs don't mention? Then—pow! It worked fine at the dealer's place, but it won't boot for you. Go back to your dealer on hands and knees and pray that he'll take it back.

How about those little errors, like a misspelling in an error message, or the trace option that won't work when printing using the buffer option? These things probably won't show up in testing, but what if some user discovers them and reports them? You can't just send an errata sheet to your customers, since they don't have the tools to correct the problem. Is the manufacturer going to send a new disk to all of its customers and recall all of the old packages from stores to get new disks? For a little error? We knew the answer to that question before we asked it.

There's something I've always suspected about copy protectors. I've always thought that they were hiding something. Remember, I buy only games, so this applies only to certain game manufacturers. What kind of stuff other folks are getting away with I don't know. I bought an Enhancer II, a Videx product, because I needed upper and lower case; the auto-repeat and type-ahead buffer sounded nice; macro keys sounded great; it wouldn't take a slot; and the price was reasonable. Of course, even though the Enhancer fit in the space where the encoder board used to fit, I didn't believe it would work just like the encoder board. So I took a whole load of software to my dealer to test it—my terminal program, my assemblers, my compilers, Pascal, CP/M, my full-screen editors, the works. All of the funny, unkeyables worked in Basic, in Pascal, in CP/M, and so forth. I couldn't find one thing wrong with the Enhancer. So I brought it home, installed it, and was delighted.

Unfortunately, I did not test any of my games. I mean, why should I? None of them use special keys. What were they hiding? Some game manufacturers do not strobe the keyboard after reading a character! The old Apple keyboards didn't care, and the encoder board Apples don't care, but the Enhancer doesn't like it. So suddenly three of my favorite games respond to my keyboard once, and do not respond again until I press the reset key. Do you know why this is unpardonable? Because Apple states in the reference manual that the keyboard should be strobed after you read a character! Because all of these games could be fixed to work on all Apples (old, encoder, Enhancer) by adding, at most, eight bytes of code! Because for months I thought that I had found a problem with the Enhancer until a friend of mine showed me what was causing the problem, using a game he wrote as an example.

So what can we do about copy-protected software? I don't know about you, but I have just changed my personal policy. Now I won't even buy copy-protected games.
Richard Ekblaw, Champaign, IL

The manufacturer responds:

Some programs, games especially, may have trouble with a type-ahead buffer. While it is easy to flush the buffer at any time from the keyboard, Videx has a solution to offer those who can identify with this reader's inconvenience. It is possible to disable any feature of the Enhancer II by using the *Macro Editor* program on the Enhancer Utilities Disk. The Enhancer II has always offered this.

During the past year, Videx has been producing Enhancer IIs with Firmware 1.1, which will automatically disable the Enhancer II's advanced features simply by holding down the space bar while turning on the power. This feature was designed to provide our users with convenience and ease of operation with any program.

Videx will provide updates of the new version of Enhancer firmware at no charge, on an exchange-due basis. A call to our customer service department is all that is necessary to arrange a firmware exchange.

(Videx has recently made available a Quick Reference card for the Enhancer II. For those interested in receiving one, please call or send a stamped, self-addressed envelope to our customer service department.)
Angela Rush, Videx customer service,
Corvallis, OR

Dumb Protection

I've read in other computer publications of software companies rescinding their copy-protection schemes due to pressure from CP/M users. This, I believe, is indicative of the attitude held by CP/M users toward copy protection of the programs they use.

I cannot believe that CP/M users are more honest or intelligent than Apple users. However, they do insist that they be able to back up their programs, or modify them to suit their

needs, as necessary.

It soon becomes obvious to anyone using an Apple for business, as I do, that the 5¼-inch disks do not do the job. Even a pair of 8-inch drives in single density is doing it the hard way. Copy-protected programs do not allow the user to download to the 8-inch drives. It is for this reason that all my business software runs on my Apple under CP/M.

Possibly, if enough users of Apple DOS (Dumb Operating System) would let software producers know their feelings, like CP/M users have, it might do some good to improve the situation.
W. R. Eade, San Marcos, CA

A Complex Issue—Simplified Version
It is more than just software pirates, Mark Pelczarski. Have you ever made a photocopy of a page out of a book in the library? How about making a copy of a record onto tape? When you decide you are going to crack down on pirates, are you going all out, or just where it does you the most good? Do you play a musical instrument? Have you ever made a copy of a piece of music so that you could play your sax along with the rest of the band? Or how about videotaping that wildlife program you were waiting all week to see but couldn't, because you had to go to a meeting? Are you against this conduct too? It looks the same to me.

I agree with J. Barry Smith; I too will copy something if I can get it. Everybody I know copies. What about the little old lady in the library that I saw make a copy of a recipe from a cookbook. Was that book not copyrighted? Would you arrest someone for copying a recipe out of a cookbook? Not I.

I would not have to pirate if the prices were not so high. How much are certain games really worth to you? I believe, nonetheless, that there are some games that are certainly worth their price. Let's face it—some games are fun and some stink.
Norman Jonston, Santa Cruz, CA

No Flair for Fiction
I really enjoy *Softalk*; it's wonderful. However, there are some things I would like to see changed and new things added.

First of all, I absolutely love the new column on telecommunications for the Apple. It is my favorite column, and I think that it should be in every magazine.

I agree with Edward Isenberg (January Open Discussion). *Softalk* should use advertisement cards and limit each user to choose only three information numbers. That way people wouldn't circle fifty numbers just to get some mail. I also think that each month there should be a favorite program. In some magazines, there is a questionnaire to fill out asking about your favorite programs. This would help many people decide what programs to buy by seeing what other people like.

What has happened to Marketalk Reviews? I have noticed the number of reviews declining, as well as the length of the reviews. Please try and cram in a few more.

Now here is my major complaint about the magazine. In recent issues, there have been fictional stories that deal with computers. I hate them! Your magazine is about computers, not computer stories. They make your magazine look like *Playboy*! Whether that's bad or not remains to be seen. Please remove them at once. I find them dull and boring.
Peter T. Clark, Sacramento, CA

Stepwise Projections
I have been reading *Softalk* for the past year and a half, and I really look forward to each issue. My only complaint, which isn't much of one, is that I have a hard time getting through an entire issue before the next one comes out!

I found the article, "The Cat That's the Apple's Meow," in the February issue most interesting. I feel there is a real place in the magazine for such articles that take readers through projects step by step. I would like to make my Apple do things, but I'm never quite sure how to go about it. I am sure, though, that many readers would take a great interest in this type of article. What we're talking about is exploring ways to interface the Apple to the real world—from controlling simple external switches and beyond. Most books that attempt this seem too technical. *Softalk* articles that approach these ideas simply, much like a Heathkit manual, would be valuable. Here is an area that holds great potential, but it seems neglected by most magazines.
David A. Sommers, Midland, MI

Printer Hints in Print
In Peter Olivieri's December '82 Mind Your Business, he referred to an excellent book on the Epson for the Apple. So far I've drawn blanks in trying to find such a book. Could you identify this book for me?
Mathias J. Leupold, Wayland, MA

The book referred to was the Epson MX Printer Manual. *Although it is published by Compusoft Publishing, it is available only with the purchase of the Graftrax Plus Retrofit Kit; you can't get it separately.*

In the February Open Discussion I made reference to and recommended *The Other Epson Manual*. I'm writing now to let readers know the address of the publisher, Cut the Bull Software, Box 82761, San Diego, CA 92138.

This manual is a thirty-eight-page soft-cover book, printed using the Epson printer by Bill Parker, one of the staff writers for *Call —A.P.P.L.E.* To quote the author, the manual is "a summary of tips, tricks, debugged sample programs, and improved documentation for the MX-80 printer with Graftrax."
Jerome White, Pittsburg, CA

Needling for the Opined
I'd like to see more about the play and programming in *Softalk*'s product reviews, and maybe the reviewers' opinions as well.
Carl Mueller, Murfreesboro, TN

Beyond the Outlines
I am a regular reader of *Softalk* and enjoy the magazine very much. I have been reading Olivieri's Outline of Word Processors, and I am tired of reading reviews of word processing programs written by someone who is not familiar with, and who hasn't used, the programs he reviews. Today's sophisticated and powerful word processing programs for the Apple II require intensive and extensive use in order to be properly evaluated.

In January *Softalk*, Peter Olivieri reviews *ScreenWriter II* by Sierra On-Line; and he makes it clear that he has barely looked at the program and has written his review based on a quick reading of the manual and some conversations with users. For example, *control-P* advances the cursor one page, not *shift-control-P*. He says that ". . .certain maneuvers are sometimes cumbersome. . ." and "until. . .an attachment to the game port is developed, this will always be the case to some degree with word processing programs on microcomputers." If he had used the program he would know that a joystick can be used for cursor movements with *ScreenWriter II*. In a very brief review he singles out indexes and hyphenation for consideration, functions little used by the average writer. Yet he refers to "something called runoff," which is the entire second half of the program, the printing half. And this contains one of the most useful and powerful features of the program: a test feature that allows the user to see the text as it will appear on the page. Actually, it gives a very good approximation, as no word

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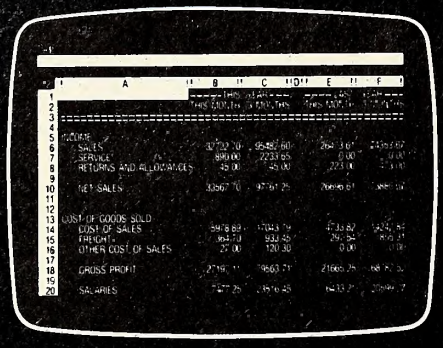

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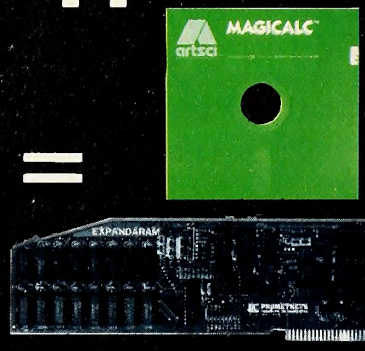

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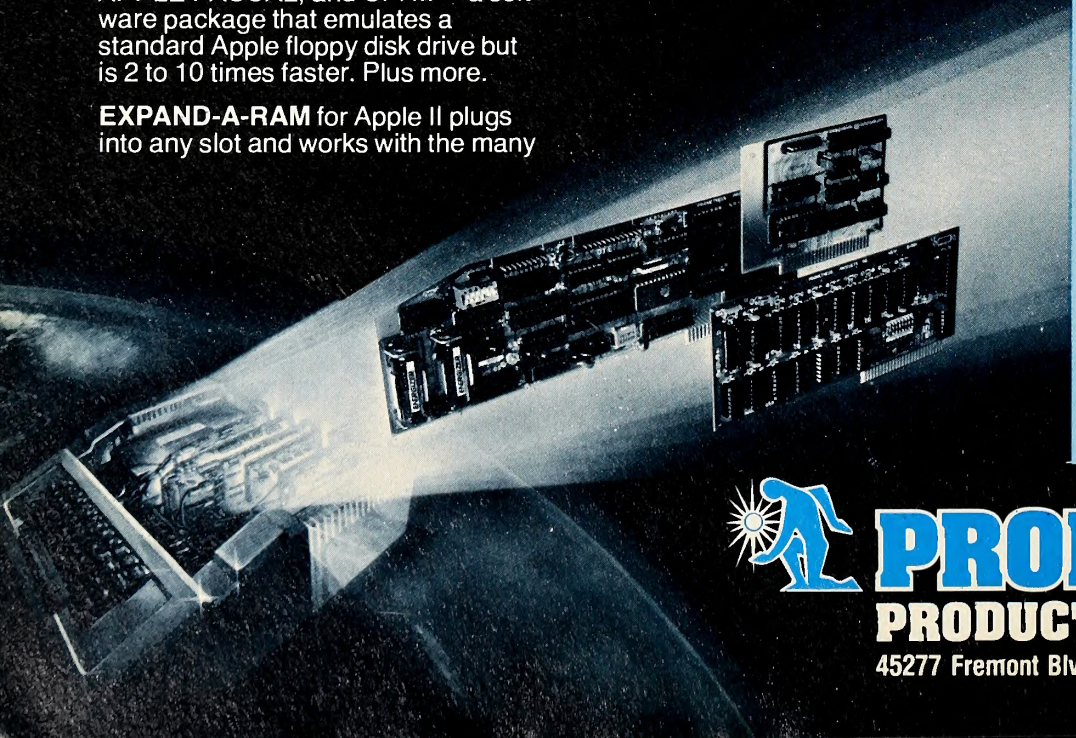

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processing program designed for microcomputers can allow the user to display on-screen exactly what will be printed on paper. Anyone who is at all familiar with word processing should know this. Also, I cannot reconcile the fact that Olivieri discusses a high-level function such as automatic index creation and asks, "Where, oh where, are those sticky labels?" Sticky labels indeed!

A colleague and I, both college English instructors and both currently writing our Ph.D. dissertations, have reviewed word processing programs for the Apple II during the last year. We both do a lot of writing besides our dissertations. We both chose *ScreenWriter II* over all the other programs, including *WordStar*.

Only by working with a word processing program intensively and for a considerable length of time can one truly become familiar with its strengths and weaknesses. Several times we felt that we had found the perfect program, only to find, days or weeks later, that the program was limited or flawed in some serious way. We contacted Sierra On-Line about some problems with the program they were not aware of. It is apparent (given the history of the program) that they have not had the program evaluated by someone who needs, understands, and uses word processing. They have relied on user response—not a good marketing technique. The continued popularity of the program indicates that users recognize the many strengths of the program and value it in spite of its flaws. Given its checkered past, Olivieri should have said something about file integrity maintenance; I assume he didn't because he doesn't know the program.

ScreenWriter II is the most versatile and powerful word processing program on the market for the Apple II. By the way, Olivieri is wrong when he says that the original *Magic Window* program has only a forty-column display. I've worked with that one too. To be sure, *ScreenWriter II* has a number of faults, none of which Olivieri pointed out. There is not space enough here to enumerate the many strengths of *ScreenWriter II*, nor to enumerate its several weaknesses. I have long waited for an accurate and thorough review of the program, which received some bad press in its earlier versions. I guess I will have to wait until I write the review myself.

George Tylutki, La Plume, PA

Peter Olivieri responds:

It is very easy to get defensive about George Tylutki's comments, but I think it unnecessary in this case. I would, however, like to comment on one or two points he raises.

First and foremost, I do use the programs that are reviewed. I have a set of applications that are entered into each of the word processing programs. They are evaluated based on these particular applications. These packages do not get as thorough an evaluation as our reader has been able to give, but it should be remembered that the articles are outlines, not critical reviews. In earlier installments we cautioned

readers to do their homework, try out the packages that interest them, and use the outlines as guides only.

As to whether I understand word processing, I suppose that may always be open to question. However, I (like George Tylutki) wrote my dissertation using a word processor. I have used IBM, Digital, and Apple word processors, including *ScreenWriter*. In fact, for the last three years, everything I've typed has been done on a word processor.

Mr. Tylutki's letter, however, serves a much more important purpose. It portrays a user who is both thoroughly familiar with, and quite happy using, a particular word processing package. In many ways, his letter serves to highlight the strengths of *ScreenWriter II* much better than many a review. It is a very powerful program and one of my favorites. It is, of course, important to use a package thoroughly to finally get to know its strengths and weaknesses, just as it is important to know a good deal about the requirements of one's own particular application. I hope that my word processing outlines provide readers with some help in narrowing their choices. Feedback from readers like Mr. Tylutki certainly helps.
Peter Olivieri, Winchester, MA

Light Reprieve
Tell Christopher Light that machine language is confusing enough for beginners without their having to decipher his mistakes. I refer to his column from the January '83 *Softalk*.

When himem is set to location 38144 ($9500), the string formations are, as he says, started at 38143, working their way down. Examining locations 38368 to 38400 ($95E0 to $9600) will reveal your machine language program at 38384 ($95F0), but your new strings will not be dangling from 38383 ($95EF) downward, as he also says. Rather, they will be found dangling from 38143 ($94FF) downward. If Chris is not more careful he may be found dangling from the gallows—the victim of all the beginners who get hung up on his mistakes.
Martin J. Wilson, Danvers, MA

Christopher Light responds:

Thanks for pointing out the error. The second sentence of paragraph one on page 59 in the January '83 issue should have read: Reboot DOS, which will automatically reset himem at 38400 ($9600).
Christopher U. Light, Chicago, IL

Powerful Suggestion
To Greg Tibbetts: Can you suggest any sources of public-domain software for CP/M users?
Daniel J. Krause, West Bloomfield, MI

Greg Tibbetts responds:

Try contacting the larger CP/M user groups for their group library. At last count, for example, CPMUG, the primary one, had seventy-five-plus eight-inch disks of public-domain programs, most including the source code. Much of this collection is of limited value, and some of the rest must be modified slightly for use with SoftCard. A full catalogue is available of all seventy-five disks by contacting the group. They can be reached at CP/M User's Group, 1651 Third Avenue, New York, NY 10028. You might also contact Digital Research at their Pacific Grove headquarters for the names of other groups.
Greg Tibbetts, Santa Barbara, CA

Cursors! Foiled Again!
Calling all Apple III users! Something very strange happened to me after typing in Taylor Pohlman's superb character font and shape table editor in the February '83 *Softalk*. I ran the program with no problems. I tried experimenting with a new block-style character font. After changing a few characters I saved the font and loaded it into memory. Everything worked fine except for one problem—the entire character font was backward!

When I find the bug, it will have a slow and painful death. Nothing escapes the blazing cursor!

Also, many of you who don't have Pascal may have problems trying to load in new character fonts created by the font editor. One way to load these newly created fonts is by using a simple program called *Newdownload* on page 138 of the April '82 issue of *Softalk*. Both this program and the accompanying character font

editor are written by John Jeppson. Of course, owners of Apple III Pascal only have to use the alter function of the Pascal Filer to change the font's current file type to a font-file type.
Dan Kunesh, Downers Grove, IL

Serendipity
Someone asked in Open Discussion how to access the escape code necessary to change printing modes for the Epson MX-80 F/T printer when using *Apple Writer II*. Needless to say, I have been anxiously waiting for the answer. This morning I accidentally found out how, and want to share with *Softalk* readers.

I stumbled—and I mean stumbled—on it while writing a program in word processing language to handle mailing labels. It got me to the back of the manual, Appendix B, to be more specific. There, on page 104, is a discussion of the special characters glossary file that you load from the Additional Functions Menu (#5 and the file name Special). With some experimenting I discovered that the following works.

After loading the Special file, you have access to the escape code, a flashing "[" with a "D" or "U" (the escape shift-D and the escape shift-U for the Qume Sprint printer). Just call either of the special commands in and simply change the D or U to the character you need for your printer command. The flashing "[" apparently is the escape code command. Whichever letter you change it to, however, must be in upper case. I assume one can use this same technique for other printers using the escape command. It seems to work well.
Charles Miller, Cambridge, MN

Logo a Go-Go
I was surprised to see the high sales for Apple Logo, and not see Terrapin Logo in Fastalk. Apple certainly has done a remarkable job in marketing the second-best Logo available for the Apple computer. Whereas Apple Logo has many bells and whistles, it is second to Terrapin Logo in three essential features: It is less efficient in memory use. (Very important, considering that the interpreter leaves only about ten thousand bytes for the user.) It has no convenient trace function. (Important not only for debugging but also for understanding programs, in particular the interplay of various program modules and understanding recursion.) Its syntax is, overall, less user-friendly.

Perhaps your entries in Fastalk contribute to the misconception that apparently exists among the public. The October *Softalk* mentions Apple Logo but ignores Terrapin Logo completely. The January '83 issue mentions Terrapin Logo, but the two are treated quite differently. The two Logos are so similar that giving Papert as the author for one but not for the other is misleading (not to mention that many other people, not the least of which is Harold Abelson, were involved in developing the language). If Apple Logo is a "first-rate educational tool," so is Terrapin Logo. Both entries completely miss the potential of Logo in string and list manipulation, and therefore in language processing and, at least of Terrapin Logo, in music, feeding the widespread misconception that Logo is merely a graphics language. Terrapin's documentation is, if anything, better than Apple's and so are its utilities.
Dagobert Soergel, College Park, MD

A major criterion for inclusion in Fastalk is sales. All programs that sell as many packages as the least-selling entry to make any of Softalk*'s bestseller lists are meant to be included. Apple's Logo was the only one to meet this criterion. Another criterion is service. You will find Terrapin's and Krell's Logos reinstated in this issue, along with a new entry,* Cyberlogo. *In the event of space limitations, programs included by this criterion will have to be deleted first.*

A Miser Now Wiser
In some ads I see reference to a 6 percent California state sales tax which is to be added to orders. It appears to me that businesses located in places such as Los Angeles where there is an added ½ percent sales tax (earmarked for public transit or some other local use) are trying to get this added tax from us nonresidents. I am not going to donate to the Los Angeles public transit system, which I'll probably never use, even if I am willing to accept the 6 percent state sales tax. I can order from out of state and pay less for transportation and handling than this 6½ percent tax. I balk at being assessed any added local tax that neither I nor my representative have voted upon. If Los Angeles wants to help business, they'd better omit that added tax on mail orders and be content with their cut of the regular tax.
Charles P. Haber, Huntington Beach, CA

The California State Board of Equalization requires that businesses in California assess a 6 percent sales tax from residents who purchase items mail order. Certain counties, Los Angeles and San Francisco among them, assess an additional ½ percent transit tax. If you are purchasing mail order from businesses within these counties, and you intend to use what you purchase in these counties, you pay a total of 6½ percent sales tax. If you reside and will be using your mail-order purchase outside the areas with the transit tax, you are not required to pay the extra ½ percent. This is the case even if the businesses you're buying from are located in one of the areas that has a transit tax. If you don't live in California at all, none of these taxes will apply to your mail-order purchases. Got it?

Tales of the Unexplained
I am fourteen years old and have an Apple II Plus with a disk installed in slot 6. For experimental purposes I tried the following program:

```
10  FOR A=0 TO 6
20  PR#A
30  NEXT A
```

If the program had worked as written, it would have executed *PR#0* and then hung on *PR#1*. Instead, it immediately booted my disk in slot 6.

I had some other strange results, with some variations. When I changed line 20 to *IN#A* in place of *PR#A*, the disk also booted. Here is the strange part. With 20 changed, I inserted line 15 as *print A*. When the program was run, numbers 1 through 6 were printed in a column and the disk booted when it hit 6. The strangest part was when line 20 was changed back to *PR#A*—the computer printed 0 and 1, and finally hung. If anyone reading this has an explanation, please write to Open Discussion.
Alan Gallatin, Oceanside, NY

Hot Stuff
Does anyone know of an Apple II program to monitor preventive-maintenance steps in a heating system? I am looking for a standalone model, equivalent to the computerized reminder-and-recorder systems offered by certain climate control services.

On another subject, Michael Demyan's advice in December '82 Open Discussion is incomplete. He suggested determining *VisiCalc*'s degree of precision with the formula:

```
@INT ((cell) * x .5) / x
```

where *x* governs the number of decimal places of precision desired.

This formula works only when the value in cell is positive or zero. If there is any chance that cell contains a negative number, use (or regret not using):

```
@INT ((cell) * x + @IF (cell > 0, .5,
  −.5)) / x
```

Sally Tobey, Marshall, MN

Negative Reaction, Positive Results
The letter "No Small Change" from Stanley Wilcox in Open Discussion (December '82) was interesting, but I found that it required a few big changes in order to work properly with negative numbers. I've rewritten the program to handle negatives, and it also inserts a convenient dollar sign.

```
4   TEXT : HOME
6   VTAB 8
10  INPUT "ENTER NUMBER ";T
15  GOSUB 3000
18  L = LEN (PU$)
20  PRINT TAB( 20 − L);PU$: GOTO 10
3000  ZT$ = ""
3002  IF T < 0 THEN ZT$ = "−"
3003  IF T = 0 THEN PU$ = "$0.00":
      RETURN
3005  T = ABS (T)
3006  IF T < .1 AND T = > .01 THEN PU$ =
      ZT$ + "$0" + STR$ (T): RETURN
3007  IF T < .01 THEN PU$ = "$0.00":
      RETURN
3008  T = INT ((T * 100) + .5)
3010  IF T < 10 THEN PU$ = ZT$ +"$" +
      "0.0" + STR$ (T): RETURN
3020  IF T <'100 THEN PU$ = ZT$ + "$" +
      "0." + STR$ (T): RETURN
3030  PU$ = ZT$ + "$" + LEFT$
      ( STR$ (T), LEN ( STR$ (T))− 2) +
      " " + RIGHT$(STR$(T),2): RETURN
```

Raymond E. Green, president, Technocom, Fort Lauderdale, FL

We've found this program can handle numbers as large as 9,999,999.99 (positive or negative) accurately. With numbers larger than that you will find yourself dealing with modified scientific notation, whereupon there should be no confusion when it gives you a wrong answer because a wrong answer never looks like a right answer. One idiosyncrasy: The number 1.009 will be rounded to 1.01, but .009 alone comes out as 0.00.

Caught in a Bind
Someone please help me if you can! For over five years a Hewlett-Packard desktop calculator, with eight-inch floppy disks and custom software, has been a workhorse in my small business. Increasing maintenance-contract fees have forced me to invest in new microcomputer technology. I have three Apple II Pluses, and over eight thousand dollars invested in Corvus 20M storage, a Mirror with video-cassette back-up, and a Constellation network. I have bought numerous programs, including *dBase II*, *VisiCalc*, *Datadex*, *Pie Writer*, *AppleWriter II*, *Super File*, *Route Master*, and a half dozen others. Altogether I have over $20,000 invested, counting the Qume printer and Epson MX-100 printer, six disk drives, three monitors, a Saturn 128K card, Microsoft cards, an Apple language card, and eighty-column cards. I want to store my programs on the Corvus with quick access from a menu.

My office people are experienced and well qualified to handle just about any office ma-

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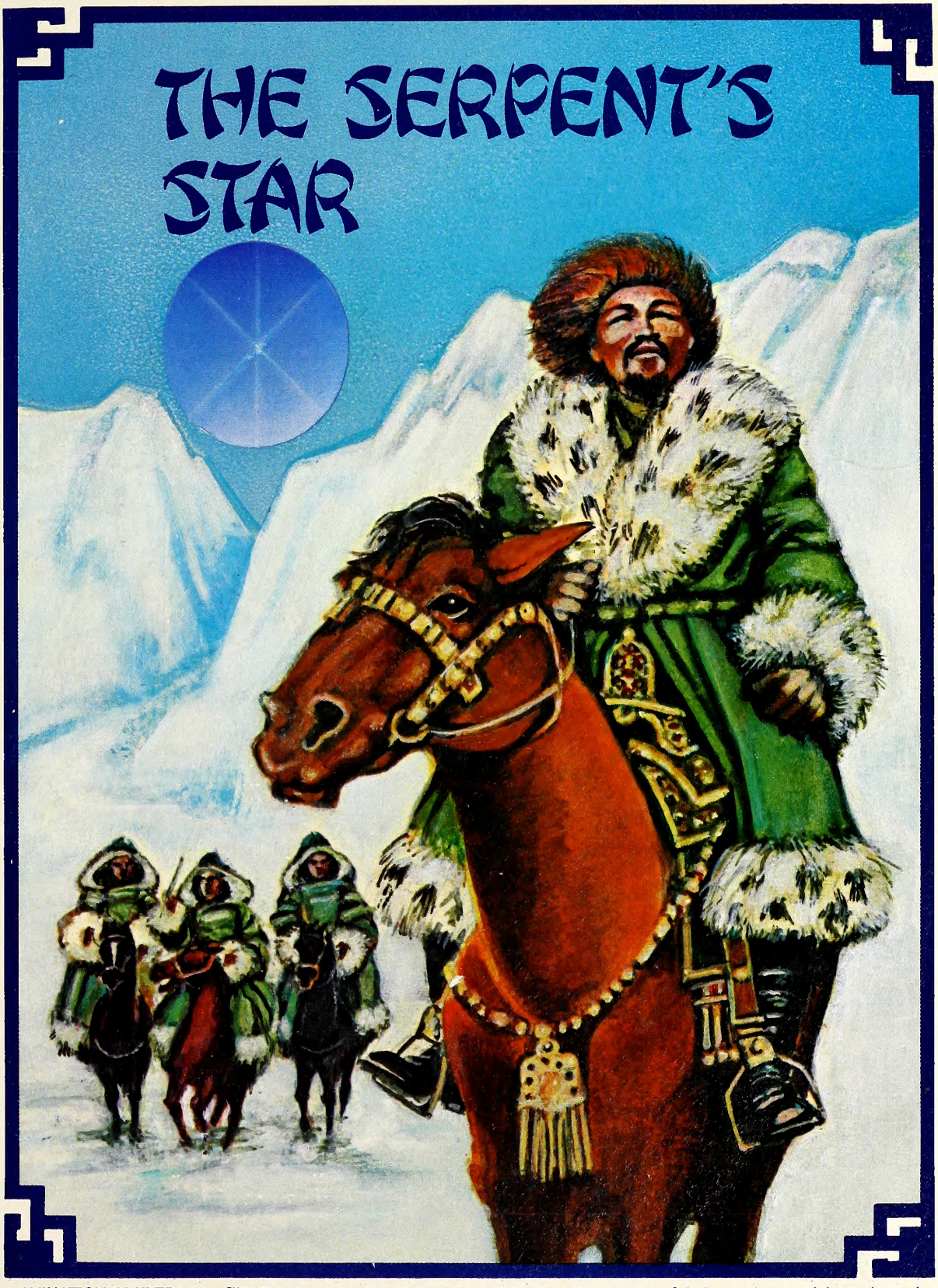

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chine, be it printing calculators, typewriters, copiers, mimeos, collators, telephone-answering machines, or postage machines. But they cannot and will not go through the rituals of proper handling of floppy disks. I need to convert all my work to the Corvus hard disk. I am strapped because the software companies are afraid of piracy. Have I acquired a micro museum? Or do some *Softalk* readers with the smarts have some answers for me other than Lisa?
Frank H. Smith, Berkeley, CA

Courting the Mannered Memo
Can anyone refer me to a complete accounting program that's formatted in the manner required by the California superior courts in accordance with various counties' "Probate Policy Memorandum"?
Wayne E. Thompson, Whittier, CA

Beyond Basics
I am a math and computer teacher at Monroe High School. Monroe is a small private school in Fairbanks, Alaska. About two years ago we received our first microcomputer. We now have five Apple II Pluses, and over forty students have completed a one-semester course in beginning Basic. Our emphasis in the course is on problem-solving through structured programming, with a little history and hardware technology, as well as an examination of the uses of computers in society. From the comments of our graduates who have taken computer courses on the university level, and the independent projects of some of our other students, we feel the course is successful.

We are now thinking of offering a second course in computers. And here we are having a problem. In most of the computer magazines we subscribe to, very little is said about what to do after a student completes a basic Basic course. Perhaps someone could recommend a good textbook for our use.

I know what I would like to do: teach Pascal. But using Pascal on the Apple really requires two disk drives and a language card for each computer. That is a little out of our budget. Next, I would like to teach data management, specifically, creating and amending sequential and random-access files, arrays, sorting, and more complicated uses of string manipulation. Currently, I have several students doing independent study, learning just these techniques. One is even learning machine language and shape tables, which I can't help much with. I would really like to design a more formal approach. A usable textbook would probably have to be Apple-specific, but I'm having trouble finding *any* suitable text.

Perhaps I'm having trouble because these topics are not best dealt with using Basic, so no one writes about them in Basic. I find that difficult to accept. Can fellow readers be of any assistance?
Rodney D. Hixon, Fairbanks, AK

Subsidizing the Future
I have taken one computer class during my senior year of high school, and I plan on continuing my study of computer science when I go to Central Michigan University. My sources of financial aid are limited; I was wondering if any readers of *Softalk* know of any organizations or companies that offer financial assistance to people like me, who wish to work toward a degree in computer science. I'd appreciate hearing about it in Open Discussion.
Mark Deja, Gladstone, MI

Planning Ahead for Summer
I'm interested in going to computer camp this summer. I am eleven years old and my family has an Apple II Plus. Can anyone give me some leads on computer camps in general, or one near me that I could contact? Please let me know through Open Discussion—I really want to find one I can go to.
Sheri Bowman, Harlingen, TX

Pascal Publications, Please
As a novice to the microcomputer field, I have asked many people which language I should try to learn first. As you might expect, Pascal was often given as *the* language to learn. I purchased Apple's Pascal package for my Apple II Plus and have been trying to teach myself Pascal. I have had some problems and cannot readily find solutions. Yet, I often read about Basic solutions to similar problems. Still, I want to go directly to Pascal, not Basic. Could anyone suggest any good, clear books that would help me?
Jim Rebeck, Sun Prairie, WI

A Disarming Plea
I have a problem, and I'd like to find the best way to use my Apple II Plus with two disk drives, Epson printer, and *File Cabinet* to solve it.

I am working with the Freeze Strategic Nuclear Campaign, and one of my jobs is to collect and organize hundreds of newspaper clippings on various phases of the project. The cross references, many of them financial, for example, can be very broad indeed. I don't have a manual to use with *File Cabinet,* and I understand that no single manual exists for this program. Very little of my data is numerical—it consists mainly of news clippings. The program says that I can sort my material either alphabetically or numerically. I'm not sure which method I should use. I'm also not sure how much material from each clip I can store in my files. Since I have two disk drives, I would like to use the second one for data files, while dedicating the other drive to my operating program. I don't really know how to accomplish this correctly.

I keep the news clippings in file folders and I have begun to number them. I got the idea that I could key my files into the computer as lists, then the computer could direct me in locating the original clipping by referencing its file folder number. I need to devise a way to locate clippings faster and with greater ease.

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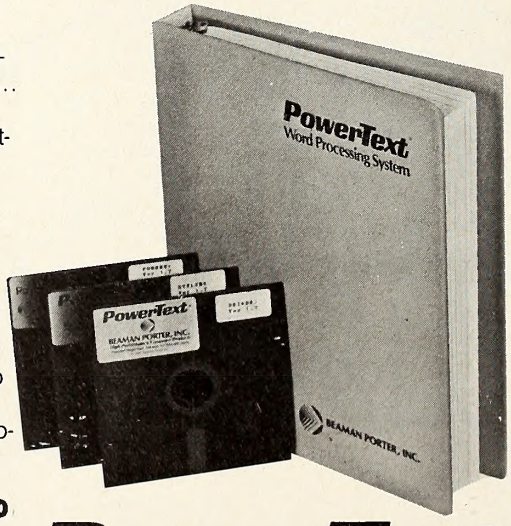

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Regarding my Epson printer, I am unable to get it to print a report of my records. It may be that I did not correctly outline the format of a report. Any help or advice from fellow readers on this matter would be appreciated.
Tom Parker, Armonk, NY

Search for a Remedy

I am associated with a group of seven physicians. We work out of several different places and all have specialties. I am in charge of the time-consuming and frustrating task of scheduling. It is often mandatory that certain people be in the hospital for special procedures. Along with this, I must schedule vacation and time off for these physicians.

I own an Apple II Plus and feel that if I could get an appropriate program commercially it would be ideal for this problem. I have checked with my local computer dealer and they are not aware of any such program. I would appreciate any information from readers that might help.
Guillermo C. Geisse, Saint Louis, MO

Brain-Wave Imbroglio

Some friends and I are currently involved in a stress-management program of sorts. One of us has an Apple, and we'd like any information about hardware or software that can be utilized for biofeedback purposes. None of us is into program development, and we are in dire need of such feedback information. We'd appreciate reading any suggestions or recommendations in Open Discussion.
R. L. Cook, Los Angeles, CA

Hard Put To Justify

In August of 1982 I purchased an Apple II Plus with the Apple III monitor and disk drive. Along with the assorted software I received a free trial subscription to your magazine. I had certain expectations of what your magazine would offer but I was not prepared for the dismal failure of it to meet even some of them.

From a magazine devoted exclusively to the Apple computer, I would have expected more concerning the operation of the computer. Someone must have realized that in a number of places the manuals that come with the Apple leave a lot to be desired. It is an ideal situation for you to take advantage of by publishing articles on the nuts-and-bolts operations of the computer, clarifying vague points in the reference manuals, and discussing basic programming at all levels.

If one has any common sense, one must realize that computers are having a growing impact on our lives and will continue to do so. There is an incredible demand for beginning programming courses. *Softalk* has apparently chosen to use itself as a forum allowing advertisers to market their products to those who can ill afford to spend money on related equipment after the considerable initial investment. It is rather reminiscent of the marketing of the American car. You can get the basic car but you must expend *x* amount of dollars more to make it work right.
David B. Grott, Poughkeepsie, NY

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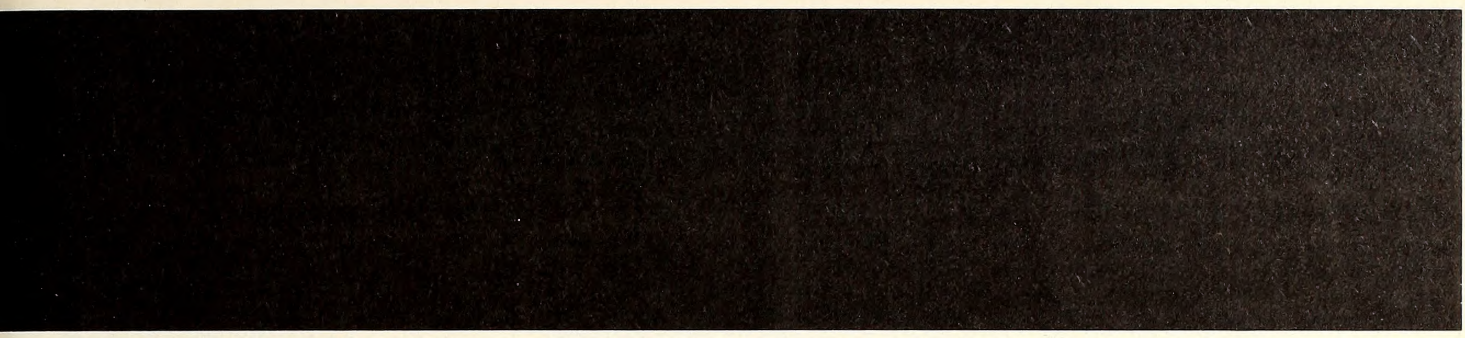

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Exec Business

BY ROE R. ADAMS III

The spring of 1982 brought many changes to Business Solutions. First, the company was able to move out of Alan Dziejma's basement and into the entire second floor of a professional building, leasing an enormous twelve hundred square feet of space. Large windows and extensive skylights provided natural light to the environment, a definite improvement from the basement.

Secondly, Dziejma (pronounced Jayma) chose a new product direction for the company. Continuing its development of multiapplication programs, Business Solutions decided to produce a package that combined an electronic spreadsheet with a database management system while also offering word processing. This jack-of-all-trades program turned out to be even more than Dziejma had envisioned. Thus, Business Solutions's most popular product was named *The Incredible Jack.*

The evolution of a company from a creeping, crawling caterpillar to a beautiful soaring butterfly is a fascinating process. Very few companies actually achieve the metamorphosis; the corporate jungle swallows most of them first.

Evolutionary Process. The spring of 1983 finds Business Solutions undergoing a similar corporate evolution on the eastern end of Long Island. It is difficult to peer inside the cocoon and observe the process in detail, as the shield of corporate secrecy protects the evolving pupa. However, from a study of the early stages of the company's life span an

Solutions: Jumping with JACK

Opposite page (clockwise): Marc Shargel, Bob Wimpfheimer, Marie Aurigemma, Alan Dziejma. Above (left to right in ascending order): Marc Shargel, vice president, marketing; Marie Aurigemma, office manager, Alan Dziejma, president; Karen Saroka, administrative assistant; Marie Gaudet, writer; Bob Wimpfheimer, senior programmer, Fred Tryster, project leader, Apple; Susan Liers, manager, quality assurance; Bernice Dziejma, treasurer; Brian Macker, project manager, IBM pc, Suresh Jagannathan, programmer.

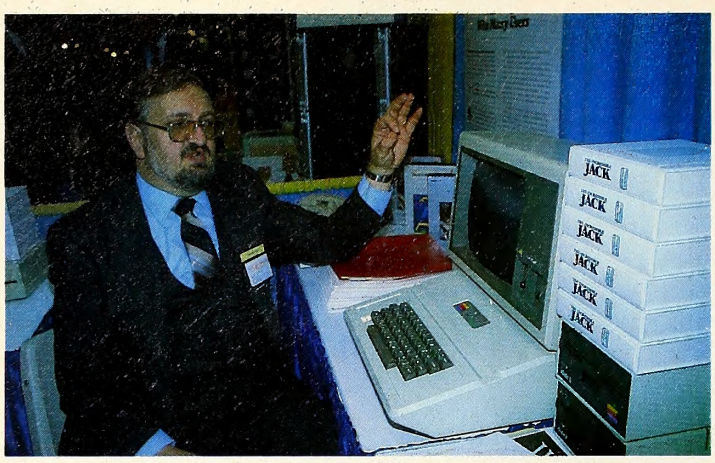
intriguing picture emerges.

Business Solutions hatched from the fertile mind of Alan Dziejma in 1980. Dziejma started his computer career while in college at Carnegie Mellon University in 1964.

"I entered the school thinking that I wanted to be either a professional violinist or a physicist," Dziejma recalls. "Obviously, I have not met either of my career goals!"

Early in his college career, Dziejma took an advanced-placement computer-science course. "I had absolutely no inkling what a computer was, but I was in the mood to take all the tricky-sounding courses." The first computer Dziejma worked on was a 32K Bendix G-20, which had a drum memory and ALGOL for the programming language. The first project he worked on entailed using ALGOL to create and rotate three-dimensional shapes.

Graduating in 1967 with a degree in mathematics, Dziejma went to work for White Weld and Company, an investment banking firm on Wall Street. White Weld had the idea of providing Standard and Poors data to financial analysts on a timesharing basis. Dziejma was initially responsible for developing a compiler for the appropriately titled "First Financial Language" program.



Alan Dziejma exhibits Business Solutions's most popular product, *The Incredible Jack*, at the 1982 Comdex in Las Vegas.

After a whirlwind six months, Dziejma found himself, at the ripe age of twenty, in charge of the entire development effort of the company, with seven people reporting to him. Due to his age, Dziejma had to take older people with him on business trips; he was too young to rent a car.

In the late sixties, timesharing created quite a stir in the financial community. The first First Financial Language was also well received, and Dziejma was called on to give lectures on the system concept. He spoke at the Sloane School, New York University, and the Massachusetts Institute of Technology.

Making of a VisiFriend. One of Dziejma's employees at White Weld was Bob Frankston, who was then a high-school student working part-time. A close, long-term friendship developed between the two that would span the evolving microcomputer industry. Frankston was best man at Dziejma's wedding long before teaming up with Dan Bricklin to write *VisiCalc*.

In 1969, the timesharing industry fell on hard times, and Dziejma looked around for something new. While working for White Weld and its subsidiary, Interactive Data, he had done some consulting work for General Motors, at the still amazing amount of four hundred dollars per day. Dziejma worked on General Motors's financial reporting system, called Oracle, and so impressed the company that in late 1969 they hired him full-time.

Dziejma was responsible for the design of a massive branch information system. GM had more than three hundred offices nationwide and wanted to link them all electronically. GM's original concept was for five regional data centers to share the timesharing chores. Dziejma introduced the idea of doing some of the local processing at the individual branch offices on smaller computers. This speeded up the network considerably by freeing the large-scale timesharing computers from trivial tasks. It also boosted the reliability of the network, decreasing the amount of expensive downtime. Dziejma chose the small Datapoint computers as the best for use in the branch offices and had twenty systems installed throughout the company.

Dziejma next tackled the development of a general ledger system for GM's U.S. division. Even though some of the figures ran into ten digits, the entire multibillion-dollar operation was accounted for by Dziejma on a 16K Datapoint 2200 with cassettes. Previously the accounting work had been done manually on large cards, so the company was very pleased with the marvelous upgrade.

Datapoint underwent a massive reorganization in 1970, and in the following year was looking for a director of marketing. Dziejma was chosen for the position and the opportunity proved a real change of pace. He hadn't had any real marketing experience, but what he did have was a good, solid grassroots feel for how the Datapoint equipment could be used, based on his work at GM. Dziejma proceeded to build a marketing staff for Datapoint's computers.

Datapoint's 2200 was a 16K desktop computer with an unusual wide and short CRT. The computer had a tremendous one-millisecond response time, and sold for the very affordable price of $16,000. Dziejma was at the forefront of what became known as distributor processing. The idea was to take small computers and distribute them everywhere. Dziejma brought to the project an understanding of applications coupled with an in-depth knowledge of networking.

The Arc of Computing. Datapoint's innovative ARC networking system was Dziejma's brainchild. The concept was to have remote databases to which resource processors could be attached. Massive computer capability was split up among little modules.

Dziejma's success at GM attracted a great amount of industry attention. In particular, the giant Digital Equipment Corporation appreciated his talents. In 1973, he joined Digital as product manager, where his most significant accomplishment was a hard-won fight to bring the VT-100 to light.

Dziejma felt that Digital needed an intelligent terminal to replace the mainstay VT-52, which was large, bulky, and nonintelligent. Due to shifts in corporate emphasis, the project was canceled seven times. Each time he resurrected the VT-100 and started pounding on doors to gather support and funding.

Dziejma was completely responsible for the functional specifications of the terminal. The VT-100 had several innovative features—132 columns, smooth scrolling, double-high/double-wide characters, and printer spooling. While working at the MIT Artificial Intelligence Lab, Dziejma had developed the technique for an expanded character generator. The terminal was a phenomenal success, shattering all previous Digital sales records.

Digital promoted Dziejma to group manager over all small systems, such as the LSI-11 series, as well as all the terminals. He had twenty-five product managers under his supervision, accounting for $350 million a year in sales.

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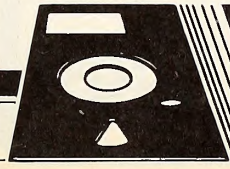

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Dziejma was also on the steering committee for the development of DECNET, Digital's networking system. DECNET's big success was that, for the first time, relatively incompatible systems and terminals could be linked together. DECNET now spans the globe, linking major computers in different countries.

Digital VP. In 1977 Dziejma received an offer from Applied Digital Data Systems to become the company's vice president of marketing. The firm was the country's largest OEM supplier of display terminals, but it was rapidly losing ground to National Cash Register. Applied Digital was trying to break into the computer field; they had marketed the 64K System 70 with an 8080-based processor. It was the size of a desk and so wide that it had to be dismantled to fit through a door. Quite innovative at its introduction, the machine was woefully outdated by the time Dziejma joined the company.

Applied Digital Data Systems had only one hardware engineer and three technicians available to work on the development of a new computer. Dziejma quickly realized that unless the company formed a group whose only job was to develop a new computer, it would never get anywhere in the market. So he created the computer division and in 1980 introduced a family of three computers under the name of MultiVision. The entry-level machine was equipped with 64K and two double-density, double-sided disk drives.

At the same time, Frankston and Bricklin were beginning their meteoric rise with *VisiCalc*. Dziejma suddenly realized that a growing market existed for software. He had gotten out of software and into systems because the software business was not really a business back in the sixties. Sixteen years ago, software was considered an ethereal thing that was routinely included with the hardware. "The software business grew up when I was not looking," Dziejma says.

Dziejma bought an Apple in 1980 and the potential of this new wonder really excited him.

The Ultimate Solution. Dziejma approached John Brown, a former colleague at Digital Equipment, for some seed money in September of 1980. On an initial investment of $120,000, Dziejma founded Business Solutions. The initial premise of the company was to form a product line aimed at the Fortune 500. Dziejma felt that *VisiCalc* was not addressing the needs of the large corporations—the networking environment. What was needed, he thought, were turnkey systems that would fulfill the specific needs of different corporate areas.

Business Solutions's first products were tailored for sales managers, because Dziejma understood the need for such modules in his previous work. The first module, "Sales Performance," was followed by "Setting Quotas" and "Calculating Commissions." Dziejma chose an innovative packaging for the company's product line, a compact white plastic disk. He did not want the usual notebook-style packaging, but something unique.

Late in 1980, Business Solutions hired its second employee, Marie Aurigemma, as office manager. Aurigemma had been Dziejma's executive secretary at Applied Digital Data Systems. "Alan said he wanted to build a small company where everyone could enjoy their work," she recalls. Her new offices at Business Solutions comprised Dziejma's comfortably furnished basement. She was told on being hired that the only condition for her employment was that she had to go out and buy her own desk! To this day, through all the company's relocating, Aurigemma still has that desk.

Unfortunately, in December 1980 the marketplace was not ready for vertical applications. The needed channels of distribution did not yet exist. Although some orders were received, it wasn't profitable to sell a package for $125 when only fifty a month were sold. By January 1981, John Brown, who was now with Business Solutions, and Dziejma came to the realization that the real marketable product was the module designer itself. It was time to sell the goose instead of the golden eggs. This internal development tool evolved into *Senior Analyst*, which included database management and electronic spreadsheet capability.

In a Nutshell. Dziejma began actively seeking a distributor for the company's new product. A humorous situation arose because he had chosen the code name "Project Acorn" for disguising the software project. Unbeknownst to him, IBM had chosen that same phrase for its top-secret personal computer. When Dziejma was making the rounds to different high-level people in the computer industry, he raised quite a few eyebrows by relating that his company was working on "Project Acorn"!

With Bob Frankston's help, Dziejma entered into rapid contract negotiations with Personal Software, the original name of VisiCorp. Just before an agreement was reached, Apple Computer heard about Dziejma's product. Apple was very interested in the product because it was written in Pascal and therefore translated easily to the then-new Apple III.

At the time, Apple was hungry for any product that would operate on the III and immediately outbid Personal Software. Apple agreed initially to buy fourteen thousand copies. This represented quite a windfall for Dziejma's small company, but help was needed to pull it off.

Fortunately a big university in nearby Stony Brook, Long Island, had a large number of Pascal-adept students. Dziejma devised an unusual employment test. First, he ran a want ad, especially seeking Pascal programmers. He was amazed when ninety students answered the ad. To weed out the nonserious applicants, Dziejma sent each a section of *Senior Analyst*'s code with one part wrong. The task of the applicants was to figure out what was wrong with the code, and only the most persistent students came back to Dziejma with the solution. Still, there were thirty persistent people to choose among. Only four students were hired. Three of them, Brian Macker, Susan Liers, and Robert Wimpfheimer, are still with the company.

Working long hours in Dziejma's basement, the group developed the final form of *Senior Analyst* for the Apple II Plus and Apple III. What started as a part-time summer job for the students rapidly became a full-time position. The team often worked far into the night, and occasionally Marie Aurigemma would stumble over people in sleeping bags when she arrived the next morning.

Robert Wimpfheimer handled the computation portion of the program. He later did consulting for Apple Computer on a variety of programs while still working for Business Solutions.

Star Programmer. Brian Macker was responsible for the report gen-

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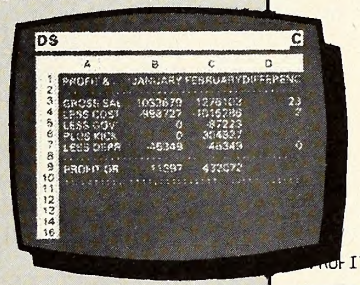

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LESS GOV'T PAYOFFS	0	-87223		-87223
PLUS KICKBACKS	0	304827		304827
LESS DEPRECIATION EXPENSE	-46349	-46349	0%	-92698
PROFIT OR (LOSS)	-11397	432072		420675

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LESS COST OF GOODS SOLD	(998,727)	(1,015,286)	(2,014,013)
LESS GOV'T PAYOFFS	-0-	(87,223)	(87,223)
PLUS KICKBACKS	-0-	304,827	304,827
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DATA SECURITY CONCEPTS

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eration and data management development of *Senior Analyst*. He also converted the Apple II Plus version to the Apple III. Dziejma thinks Macker is one of the finest programmers he has ever worked with: "Brian has an unusual style of writing programs. He works the entire program up on paper first, doing all the debugging in his head. He then inputs the program into the computer and it runs the very first time."

Susan Liers managed the quality assurance of the product and did the technical writing. Liers is a world-class athlete in the grueling sport of race walking and holds a half dozen world records. She has represented the United States in overseas track meets and participated in the Helsinki Olympics in 1952.

The first copies of the Apple II Plus version of *Senior Analyst* were delivered to Apple in November 1981; the Apple III version was delivered in the spring of 1982.

Because of the company's close ties to Apple, Business Solutions's next major product, *The Incredible Jack*, was developed initially for the debut of the Apple IIe originally set for October 1982. The program was one of the very first written exclusively for the IIe.

Dziejma provided the architecture for the program. Brian Macker was responsible for the word processing and file management portions. Susan Liers handled the same duties as before with equal aplomb. A few new team members were added. Frederick Tryster, another graduate from Stony Brook University, did programming for the compiler and spreadsheet portions of *The Incredible Jack*. Marie Gaudet wrote the documentation. Karen Saroka joined as an administrative assistant, while Suresh Jagannathan handled additional programming functions.

Business Solutions is basically a ground-floor development company. It specializes in doing fundamental research into new frontiers. *The Incredible Jack* was actually a case of reversed engineering. When the creators started mapping out the functions the program should have, they looked at several current programs on the Apple to see what features were then most marketable. Some of the features were difficult to match, but with perseverance they managed not only to do so but also to expand upon them. Afterward, it dawned on Dziejma that they had used Apple III programs as prototypes. This meant that they had reverse-engineered the Apple III's SOS operating system, enabling those same sophisticated features now to be run on the Apple II Plus with much less memory. Quite a feat!

What the Buzz? *The Incredible Jack* is a technological breakthrough. It is the only truly integrated form of applications software on the Apple market today. The phrase *integrated application* has become the hottest buzzword of 1983. Several other programs appear to be integrated but in fact are not. Those programs offer multifunctional programs, but each function is still separate from the others. Not so with *The Incredible Jack*. Business Solutions has actually managed to meld word processing, database management, and spreadsheet capabilities into one program. That means that if there is a table of figures within a report, and if some of the figures, or the total, are referred to in the text, the changing of any of those numbers will cause the text to be updated automatically. That is real integration.

With *The Incredible Jack*, Business Solutions planned on doing its own marketing. The company's biggest problem is its obscurity in the marketplace. Hardly anyone realizes that this is the company that wrote *Senior Analyst*—the price one pays when a product is marketed by another company.

The Incredible Jack was launched in the fall of 1982 on a $30,000 advertising budget. The response has been phenomenal. *The Incredible Jack* is priced at one-third the cost of its closest competitor. Every sales projection has been exceeded by many factors of magnitude. Now the major national distributors are asking Dziejma if they can distribute the product.

Under Instead of over the Hill. The price structuring of the product also reflects Dziejma's feeling about the historic value of programs. "One of the disadvantages of being in the computer industry for sixteen years is that all of the major accomplishments of my youth that really seemed like big deals at the time are now being sold for twenty-nine dollars!" Dziejma has decided to make *The Incredible Jack* a classic in its own time.

One of Dziejma's strengths is his ability to captivate people with his vision of the future. The latest person to be swept up to those Olympian heights is a very familiar name with Apple Computer, Marc Shargel. Shargel joined Business Solutions in February 1983 as vice president of marketing. To take this position he had to move from sunny California to the northeastern chill of February in Long Island, New York. Only the highest motivations could have prompted such a move.

Shargel had been with Apple for two and a half years, in charge of producing point-of-sale materials for dealers and developing the large library of Apple software training demos. He was the star of Apple's famous video sales training tape that introduced the Apple III "Professional Solution" promotion to the national sales force in the summer of 1982. His background in Pascal programming on the Apple III will stand him in good stead among the Business Solutions people, where the poster, "Pascal Spoken Here," really has some meaning.

The hiring of a high-powered executive like Shargel is part of the cocoon-spinning process the company is undergoing. Another visible sign is the recent expansion of the company, almost tripling its previous floor space. Accompanying this is a projected general increase in employees from twelve to twenty. To fund this metamorphosis, Dziejma recently arranged the private placing of $1 million for funding. This will allow the advertising budget to expand substantially to $400,000 this year. Dziejma's four-year plan is right on track and accelerating.

It's What's inside That Counts. It's quite perplexing to look at this particular corporate cocoon and determine with any certainty what the shape and color of the resultant butterfly will be. A light touch on the surface of the cocoon yields quite a surprise, which startles the casual lepidopterist. Usually, one can feel the smooth, quiet breathing of a confident pupa waiting for its appointed time to emerge and soar in the morning sun.

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THE BASIC Solution

By Wm. V. R. Smith

This second part of our database management program presents the sections that handle disk input and output, including a method for deleting data from the middle of a random-access text file.

Last month, part 1 of the three-part presentation introduced the routines for handling the menu and entering, editing, viewing, and deleting a record in memory. That may sound like most of the battle right there, but remember that this is a disk-based database, as we discussed last month. All of those actions could be performed on only one record. That makes for a pretty limited program, so this month's routines allow all those functions to act upon as many pieces of data as you can reasonably get on a disk. And yet, there is still only one record kept in memory at a time.

Some of the new routines necessitated some changes in the old routines, so preceding the listing of new routines is a short list of lines to type in. Some of the lines are additions and some are changes to last month's sections, but they can all be easily incorporated by loading the program from last month and just typing them in. In addition, there is one line to delete, which is mentioned after the additions. When you've done all that, you're ready to type in the new routines.

The first new section includes a lot of rem statements. You don't have to type these in if you don't want to, but keep them handy. They will be invaluable to you if you ever want to modify the program in any way. Three new variables are identified in lines 120 through 122 and all of the major routines are listed in lines 200 through 290.

The disk I/O routines are in lines 4000 through 4490. The database uses random-access records with a maximum field length of forty characters. As currently configured, the program will include five separate fields in each record. You can change this number of fields by changing the data in lines 1200 through 1230 *before* you start a data file.

Be sure to save the program to disk before you run it, as a syntax or typing error could damage the program in memory. In fact, it's usually a good idea to save to disk every five minutes or so while you're entering a program as a guard against power fluctuations.

When you first run the program it will search the disk for a file called Data File. Since it won't be there the first time, the program will ask you if it is all right to clear the file. Enter a Y and the program will ask for a database name; then it will open a file with a few fields to record that name and the number of records, which starts at zero.

If, by the way, you already have a file called Data File on the database program disk, but it wasn't created by this program, transfer the file to another disk and delete it from the disk containing the program or this program will damage the information in it.

Each time you run the program thereafter, the disk will spin and the program will open your data file. Because of the way the file is saved and automatically opened, you can only keep one data file on each disk. Enter a few records and then try out the other options in the menu.

The view-record option lets you look at all the fields in a single record, selecting the first record automatically and incrementing from there unless you ask for a specific one. The view-a-page option looks at one selected field in all the records. This option is useful if you want to find a particular record but you don't know where it is.

The edit-record and delete-record options each operate on the last record viewed. If no record has been viewed, you will be kicked back to the menu.

Delete-a-record will remove any record in the file. It does this by removing the last record in the database, writing it over the record to be deleted, and decrementing the next-available-record counter (NAR) by one. This method is faster than moving all the subsequent records back to fill in the space, although it does change the order of the records.

The print-data section won't be available until next month. If you choose it, you should get a "not functional" message.

Nothing we're going to present in next month's section will change the file structure, so you can begin entering records now if you want. If you make any modifications between now and then, keep the version as it appears here under another file name so you can be sure to have a version that is compatible with the new sections.

These are the changes to make to the sections from last month.

```
120 REM NAR = NEXT AVAIL REC
121 REM LVR = LAST VIEWED REC
122 REM RR = REC TO READ/WRITE
1012 HTAB 5: PRINT "RECORD # ";RR;" OF
     ";NAR - 1
1035 CALL - 958
1040 PRINT H$(X);: HTAB 15: PRINT A$(X)
1285 D$ = CHR$ (4)
1286 LVR = 1
1375 HTAB 15: PRINT LEFT$ (A$(E),19)
1480 PRINT H$(E);: HTAB 15: CALL - 868
1525 IF LEFT$ (A$,1) = "E" THEN RUN
2032 VTAB 3: PRINT "DATA NAME : ";DT$
2034 VTAB 5: PRINT "CONTAINS ";NAR -
     1;" RECORDS"
2050 VTAB 7 + X: HTAB 5
2070 VTAB MS + 7: HTAB 5: INVERSE
2160 VTAB MS + 7:HTAB 5
```

Also delete line 2630. Here are the new sections of the program.

Good luck!

```
200 REM  ******************************
201 REM  * SUBROUTINES
202 REM  ******************************
210 REM 1000 - VIEW A RECORD
215 REM 1100 - CLEAR RECORD DATA
220 REM 1200 - SET UP HEADERS AND
    DATA
225 REM 1300 - EDIT RECORD
230 REM 1600 - INPUT NEW DATA
235 REM 2000 - MAIN MENU
240 REM 2400 - PAGE THRU
245 REM 2500 - EDIT REC
250 REM 2600 - ADD THE RECORD
255 REM 2700 - CLEAR REC
260 REM 2800 - PRINT SYS
265 REM 2900 - EXIT TO BASIC
270 REM 4000 - READ A REC
275 REM 4100 - WRITE TO DISK
280 REM 4200 - SAVE FILE INFO
285 REM 4300 - INIT DISK FILE
290 REM 4400 - READ FILE STATUS
800 REM  ******************************
801 REM  * START OF PROGRAM
802 REM  ******************************
900 GOSUB 1200
905 POKE 216,0
```

```
910 ONERR GOTO 950
920 PRINT D$;"UNLOCK DATA FILE"
930 GOTO 980
950 POKE 216,0
952 HOME : VTAB 10
953 INPUT "O.K. TO CLEAR DATA FILE
    ";A$
955 IF A$ <> "Y" THEN STOP
956 HOME : VTAB 10
957 PRINT "PLEASE ENTER A NAME FOR
    THIS DATABASE"
958 INPUT " ";DT$
959 HOME : VTAB 10: PRINT DT$
960 VTAB 20: INPUT "CORRECT ";A$
961 IF A$ <> "Y" THEN 956
965 GOSUB 4300
980 GOSUB 4400
985 POKE 216,0
990 GOTO 2000
2300 REM  ******************************
2301 REM  * VIEW A RECORD
2302 REM  ******************************
2307 IF NAR <> 1 THEN 2310
2308 HOME : VTAB 10: PRINT "NO
    RECORDS IN FILE ";: GET A$
2309 RETURN
2310 RR = LVR: GOSUB 4000
2315 GOSUB 1000
2316 NRV = LVR + 1: IF NRV = NAR THEN
    NRV = 1
2320 VTAB 20: HTAB 1: PRINT "NEXT
    RECORD TO VIEW ";: HTAB 22: PRINT
    NRV
2322 PRINT "ENTER 0 TO EXIT"
2325 VTAB 20: HTAB 21: INPUT " ";A$
2330 IF A$ = "" THEN LVR = NRV: GOTO
    2300
2335 X = VAL (A$): IF X < 1 OR X = > NAR
    THEN 2399
2340 LVR = X
2350 GOTO 2300
2399 RETURN
2400 REM  ******************************
2401 REM  * VIEW PAGE OF RECS
2402 REM  ******************************
2405 HOME
2407 IF NAR > 1 THEN 2410
2408 HOME : VTAB 10: PRINT "NO
    RECORDS IN FILE ";: GET A$
2409 RETURN
2410 FOR X = 1 TO NH: PRINT X;" - ";
    H$(X): NEXT
2415 VTAB 20: INPUT "WHICH HEADER
    SHALL WE USE ";A$
2420 H = VAL (A$): IF H < 1 OR H > NH
    THEN 2499
2425 HOME : PRINT "REC # " ;H$(H)
2430 INVERSE : PRINT "                    ":
    NORMAL : REM 38 SPACES
    BETWEEN QUOTES
2435 FOR RR = 1 TO NAR - 1
2440 GOSUB 4000
2445 PRINT RR;: HTAB 8: PRINT A$(H);
2446 LP = LP + 1
2447 IF LP < 20 THEN 2450
2448 LP = 0: GET A$
2449 VTAB 3: HTAB 1: CALL - 958
2450 NEXT RR
2451 LP = 0
2455 GET A$
2499 RETURN
2500 REM  ******************
2501 REM  * EDIT RECORD
2502 REM  ******************
2505 IF RR = 0 THEN 2590
2510 GOSUB 1300
2520 GOSUB 4100
2590 RETURN
2600 REM  ******************
2601 REM  * ENTER NEW REC
2602 REM  ******************
2605 RR = NAR:NAR = NAR + 1:LVR = RR
2610 GOSUB 1600
2615 GOSUB 4100
2620 GOSUB 4200
2690 RETURN
2700 REM  ******************
2701 REM  * CLEAR RECORD
2702 REM  ******************
2710 IF RR = 0 THEN RETURN
2720 GOSUB 1000
2725 VTAB 22: PRINT "REMOVE THIS
    RECORD ? ";: GET A$
2727 PRINT
2730 IF A$<>"Y" THEN RETURN
2735 IF NAR - 1  = RR THEN LVR = 1:
    GOTO 2750
2740 H = RR:RR = NAR - 1: GOSUB 4000
2745 RR = H: GOSUB 4100
2750 NAR = NAR - 1
2760 RR = 0: GOSUB 4200
2790 RETURN
2800 REM  ******************
2801 REM  * PRINT DATA
2802 REM  ******************
2900 REM  ******************
2901 REM  * EXIT TO BASIC
2902 REM  ******************
2905 IF MS = 7 THEN END
2910 HOME : VTAB 10: PRINT "NOT
    FUNCTIONAL"
2920 FOR X = 1 TO 2000: NEXT
2930 RETURN
4000 REM  ******************
4001 REM  * READ A RECORD
4002 REM  ***************
4005 REM
4007 PRINT
4010 PRINT D$;"OPEN DATA FILE,L40"
4020 FOR X = 1 TO NH
4030 PRINT D$;"READ DATA FILE,R"; (RR *
    NH) + X
4040 INPUT A$(X)
4050 NEXT
4060 PRINT D$;"CLOSE"
4070 RETURN
4100 REM  ******************
4101 REM  * WRITE A RECORD
4102 REM  ******************
4105 REM
4110 PRINT D$;"OPEN DATA FILE,L40"
4120 FOR X = 1 TO NH
4130 PRINT D$;"WRITE DATA FILE,R"; (RR
    * NH) + X
4135 PRINT A$(X)
4140 NEXT
4150 PRINT D$;"CLOSE"
4160 RETURN
4200 REM  ******************
4201 REM  * SAVE FILE INFO
4202 REM  ******************
4205 REM
4210 A$(1) = STR$ (NAR)
4215 A$(2) = DT$
4220 FOR X = 3 TO NH:A$(X) = " ": NEXT
4230 RR = 0: GOSUB 4100
4240 RETURN
4300 REM  ******************
4301 REM  * INIT DATA FILE
4302 REM  ******************
4310 NAR = 1: GOSUB 4200
4315 LVR = 0
4320 RETURN
4400 REM  ******************
4401 REM  * READ DATA STATUS
4402 REM  ******************
4410 RR = 0: GOSUB 4000
4420 NAR = VAL (A$(1))
4430 DT$ = A$(2)
4490 RETURN
```

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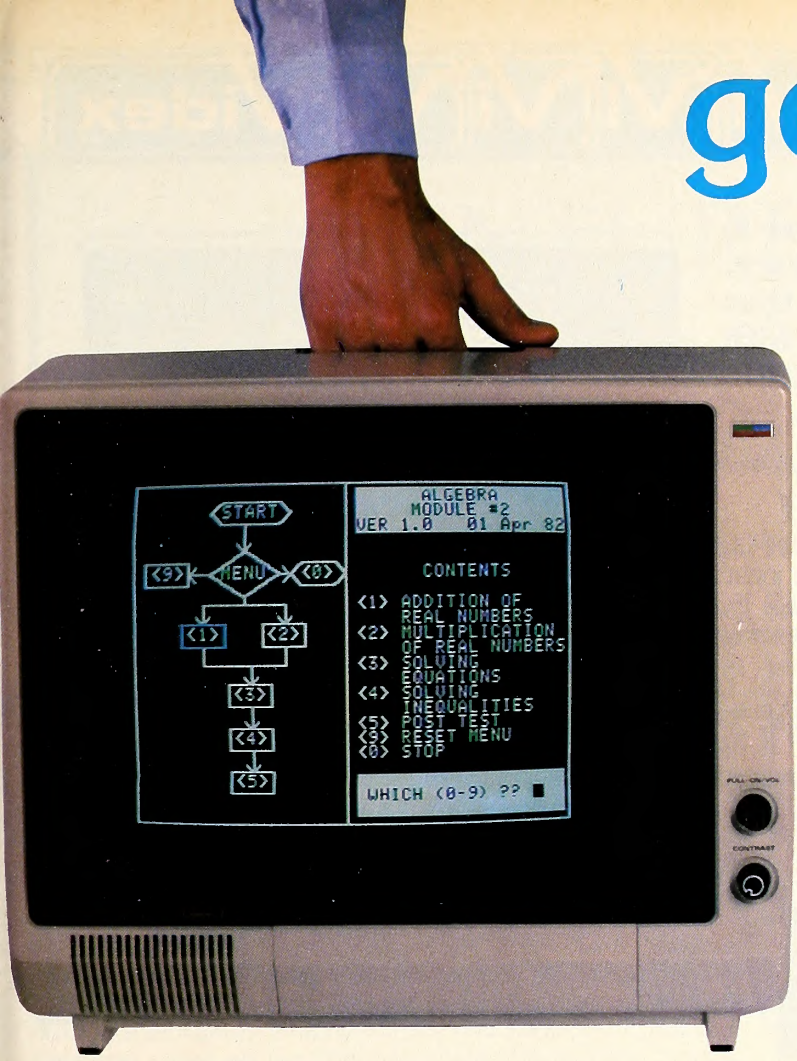

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VENTURES WITH VISICALC

BY JOE SHELTON

When you purchased *VisiCalc*, you received one of the best sources of information on how to learn and use it—the *VisiCalc* manual. But like any form of instruction, the manual is more useful to some people than it is to others. This month, we'll discuss a couple of books that show how to use *VisiCalc*. We'll look also at a couple of special training packages and at some products that might help you get more out of the program.

Then, for you *VisiCalc* junkies, we'll examine and experiment with one of the most powerful features of *VisiCalc—replicate*. Most everyone knows how to use it, but few people understand all its nuances or know the kinds of tricks you can do to make it more valuable and easier to use. We'll use replicate to create a checkbook balance template that will help you make sure your checkbook matches your bank statement.

VisiCalc Primers. A number of authors who recognize that there's a need for simpler, more concise information than the manual provides have written books that explain *VisiCalc* in different ways. There are many such publications available; a trip to your dealer or to a bookstore that carries a good selection of computer books will prove that. The two volumes mentioned here are good examples of the kinds of books available, but they are not by any means the only good ones out there.

The first, *The VisiCalc Book Apple Edition* by Donald Beil (Reston Publishing Company, Reston, VA), is an example of a book that could supplement, or even replace, your manual. Beil's book is a thorough explanation of what *VisiCalc* is, what it does, and how to use it. It does what a good book should do—begins at the beginning, explaining *VisiCalc* in simple terms. It then proceeds to explain what the program can be used for and, through a number of examples in tutorial form, introduces a new purchaser to the power of *VisiCalc*.

But don't let that fool you experienced users. Obviously, you're still interested in learning or you wouldn't be reading this article. *The VisiCalc Book* offers experienced users a lot too. Have you had trouble understanding how to use a particular function, even though it is explained in the manual? *The VisiCalc Book* explains every function and command in depth. It also contains many charts and drawings that can really help you understand the program more completely. Don't throw away your manual, but if you want an exceptional addition to your library, one that will probably end up beside your computer, do look at *The VisiCalc Book*.

Real Estate. If you happen to overhear someone trying to describe *VisiCalc* to a friend, one phrase that's likely to come up is "the power of *VisiCalc*." Patricia J. Hughes and Kaz Ochi have used that expression in the title of their new book, *The Power of VisiCalc: Real Estate* (Management Information Source, Portland, OR).

The authors assume that you have a basic understanding of *VisiCalc* and proceed to show you how you can use *VisiCalc* in real estate. Each command and entry is shown, so you can make some use of the book even if you don't understand *VisiCalc* very well. You'll have an easier time of it if you have an understanding of real estate also, but once you've completed a template, you can easily use it to do such things as projected operating cash-flow analysis. This book isn't for everybody, but if you're involved in real estate the book might be a very important addition to your library.

Beginner Training. Program manuals have a big job to do. They must explain what a product is and how you use it, and they must attempt to provide a constant source of reference as users become more experienced. Sadly, many manuals that try to do all of these things end up doing none of them very well. In addition, many people who buy a program just don't have time to read the entire manual.

Apple Computer produces a number of Product Training Paks (available from your dealer) for many of their more important products. These PTPs are designed to provide users with just the basics of how to use a program. The assumption is that a PTP will teach that 10 percent of a product you use 80 percent of the time.

Apple's PTP for *VisiCalc* is a simple and friendly forty-five-page introduction that begins by explaining how to boot the system. The *VisiCalc* PTP is an especially useful product in the business environment, since business users often need to pick up, in a minimum amount of time, the minimum information necessary to operate the program. Even though this package is designed for the Apple III, most of the commands are equally useful for *VisiCalc* on the Apple II. To maximize learning, users should have a computer and the *VisiCalc* program disk available.

Interactive. For a different kind of training, Cdex Corporation has created *Cdex Training for VisiCalc*. This three-ring binder contains three training disks that provide interactive instruction on how to use *VisiCalc*. The training begins by explaining such simple things as how to move the cursor and progresses to matters as complex as the individual functions. Good graphic examples work together with the program's interactive nature to assist you in learning. This package is a very useful one for someone who is just getting started with *VisiCalc* and wants to learn it quickly. Of course, you can pick and choose your topics, but the package can't really be used as a quick reference aid.

To Replicate or Not To Replicate. Once you understand the replicate command, you'll rarely be questioning whether to use it or not. You'll use it often and save lots of time by doing so. It may not add to your analytical ability, but it certainly will speed up and simplify the process of developing templates.

On the off chance that you don't know about replicate (a surprising number of *VisiCalc* users don't), let's talk about it for a minute. At its simplest, replicating is nothing more than copying a value contained in one cell into another cell. At its most complex, it involves copying the values, text, formulas, and functions in a range of cells into multiple ranges of cells. The range to be replicated can be either columns or rows. *VisiCalc Advanced Version* goes one step further, allowing you to replicate blocks (groups of columns and rows) once or even several times.

Try to imagine a situation in which you have twenty-five columns of numbers and you have to total each column at the bottom. To accomplish this, you could enter an @SUM statement for each of the twenty-five columns. Or you could sum a single column and replicate the formula into the other twenty-four columns.

Let's consider another example. Say you are completing a thirty-six-month cash-flow analysis that contains individual income and expense entries, separate income and expense totals, and a final cash-flow analysis. With replicate, you'd simply enter the formulas for one month's analysis and replicate them into the remaining thirty-five months. Using

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replicate is a real timesaver.

In summary, replicate allows you to copy a cell entry into another cell, copy a cell entry into a number of cells, copy a row or a column into another row or column, copy a row into a series of rows, and copy a column into a series of columns. In *Advanced Version*, replicate can also be used to copy a block into another block and to copy a block into a series of blocks.

The replicate operation can be thought of as having two parts. The first of these is the definition of the *source range* (the cell or cells you want to copy) and the *target range* (where you want the copies to go). The second part of the operation comes into play only if you're replicating cells that contain references to other cells. In our example of summing columns, we would have to tell *VisiCalc* whether we wanted the cell references in each formula to refer to the original column or to the relative column (the column above each @SUM statement). Obviously, in our example we want relative column summations.

Advanced Version offers you two other options. In addition to cell formats, *Advanced Version* has something called *attributes*; these are similar to formats. You have the option of replicating attributes or formats only (ignoring the remaining contents of the cells), replicating the cell contents (ignoring the attributes or formats), or replicating the complete cell (that is, contents, formats, and attributes).

With that introduction, let's take a simple example and see what we can discover about using replicate. Whenever you are learning *VisiCalc*, just remember that if you save your file just before you attempt something that you aren't sure how to do, you can't hurt anything. No matter how bad you mess things up, all you have to do is clear the spreadsheet, reload your file, and start again. So don't be afraid to experiment—it's the best way to learn.

The template we'll build is designed to help you balance your checking account. You'll be able to enter every check you write each month and then have *VisiCalc* automatically calculate the balance remaining in your account after each check has been dealt with. Compare this figure against the one recorded in your checkbook register and any difference will be obvious.

If you've been reading this column regularly, you know what's next. Boot *VisiCalc* and let's play.

We'll use column A for the check numbers. Go to A10 and enter the check number of the first check you want to record. This will probably be the check number following the last balance you verified as correct. For our example we'll start with check number 100. If you want to be consistent with our example, enter 100 for now and change it when you start on your own checkbook.

You could enter 101 in A11, 102 in A12, and so on, but entering 1 through 200 would be a long process. Replicating makes it quick and painless.

In A11, enter +A10+1. In A11, press /R. The prompt line (figure 1) requests the source range or return. The source range is what you want to replicate. It can be a single cell or a range of contiguous cells in either a column or a row. As we noted before, it can even be a block of cells if you are using *Advanced Version*. The requirement for the definition of the range is that it begin with a cell reference, followed by an ellipsis (three periods), followed by the ending cell reference. Since we're going to replicate only a single cell, the range will be A11...A11. Press return and *VisiCalc* will automatically enter the ellipsis and the final cell coordinate. You can enter the final cell coordinate automatically, as we just did, or you can enter it manually.

VisiCalc now requests the target range. You can enter the target range manually, or you can point with the cursor keys to select the beginning and ending range cells. Try both methods. Use the arrow keys to move into A12 and type a period. Notice that *VisiCalc* has again saved you time and effort by automatically entering the remaining two periods in the ellipsis. If we wished, we could now use the cursor keys to point at the final delimiter of the range. Instead, enter A209 and press return. Doing this saves time, since you've simply entered the coordinate rather than having to scroll to find it. Remember, you can save time and effort by selecting cells with the cursor, manually entering them, or doing a combination of the two.

If yours is an Apple II with 48K or less, choose a target range delimiter of 109. Otherwise you might not have enough memory to complete the template.

Figure 2 shows that *VisiCalc* has now prompted the cell coordinate in the formula we're replicating and is asking whether each replicated formula should contain the same cell reference (A10) or a relative reference. In other words, will each successive cell in column A contain A10 (no change) or will each refer to the cell above it (A12 to A11, A13 to A12, and so on)? Since we want each cell to contain the next sequential check number, enter R for relative reference. If we press N for no change, each cell in the column will contain 101, and that's not what we want.

Now press R for relative and see the result! If the formula in A11 had had multiple cell references (for example, +A10*BK3+1), we would have been prompted for relative or no change for each of the formula's cell references.

Stop and think about the difference in how long it took replicate to accomplish what you've just done and how long it would have taken you to enter individual check numbers from 100 to 299. Believe in replicate yet? Stick around, it gets better.

Now save your template on your data disk so we can try an experiment. Enter 300 in B10. We're going to make a second column, numbered 300 to 499. But first, we will replicate to obtain check numbers 300 through 310. Go to A11 and press /R.A20 return B11. Remember, you could have selected either A20 or B11 using the cursor arrows. Notice that in this example we've selected a source range rather than an individual cell, and a single target cell rather than a range of cells.

Press return and once again you're prompted for no change or relative. Which should we do? We're starting a new column; if we press N, the formula in B11 will be +A10+1, and that's not what we want, is it? The thing to do is to press R, because we want the formulas in column B to be relative to B10. But now we have something new. We're being prompted for no change or relative for the coordinate A11. Why? Because *VisiCalc* is replicating each formula in the source range A11...A20 into the corresponding cell in column B. You can imagine that it will take a while to select N or R for each cell, especially if you're replicating

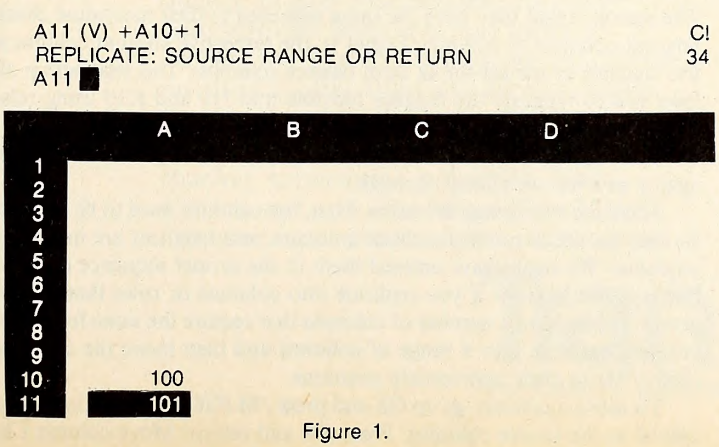

Figure 1.

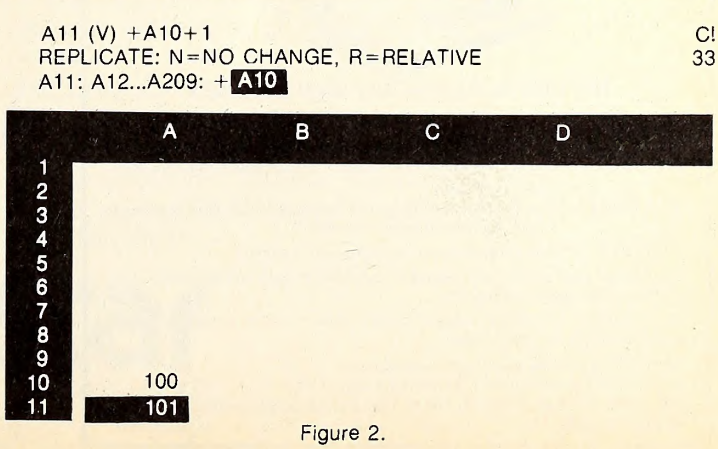

Figure 2.

a column containing a hundred or more formulas. Continue to press R until the replication is complete. If you enter too many Rs, pressing escape returns things to normal.

Is there an easier way? Of course there is, but there's a qualification. If you're replicating a single formula into the target column, you can do it by an easier method than the one you just tried (we'll get to that shortly). But, if you're trying to replicate a column (or a row, for that matter) that contains different formulas, you'll have to select N or R for each cell reference in the column. Our cash-flow analysis is an example of that type of replication.

When you're trying to remember whether to select a single cell or a range to replicate, think about what you are trying to replicate. If you have to enter a range to include all individual formulas, you need to select a range for the source and just the beginning cell for the target. If all the formulas are the same (with only relative reference differences), you need only a single cell for the source and a range that defines the target.

Before completing column B let's remove the values in B11 through B20. We could blank each cell, or we could even ignore them and replicate over them. But since we're learning about replicate, let's use it. Go to A9 and press /R return B11.B20 return. Magically, the cells have been blanked! You have replicated a blank cell. This is another way replicate can save time and effort.

One more experiment and we'll return to the project at hand. Go to A11 and press /R.A20 return B11. Looks familiar so far. Enter .C11 as the end of the target range, press return, and begin pressing R as each reference requires an N or R selection. If you press too many Rs, just press escape until things return to normal. Notice that you have just replicated one column into two others. Didn't take very long, did it?

Column C starts with a 1 in C11, while B contains 301. Why the difference? The formula in C11 is +C10+1. Since C10 is blank, 1 is the correct value. Enter 500 in C10 and see the results.

Save your file again and then see if you can complete columns B and C. You have learned a couple of methods that will accomplish this. In fact, you might try it one way, clear the spreadsheet, load your file again, and try completing it using the other method. When you finish, your template should look like figure 3.

	A	B	C	D
10	100	300	500	
11	101	301	501	
12	102	302	502	
13	103	303	503	
14	104	304	504	
15	105	305	505	
16	106	306	506	
17	107	307	507	
18	108	308	508	
19	109	309	509	
20	110	310	510	

Figure 3.

We now have 600 check numbers to make use of. Go to D9 and enter the balance in your account for the check prior to the check number in A10. In our example, the check register balance for check 99 is $1,000, so we'll enter 1000 in D9.

If you don't like waiting while *VisiCalc* recalculates after each entry, turn off automatic recalculation by pressing /GRM. Just remember that the only ways to ensure the accuracy of any displayed values are to return to automatic recalculation (/GRA) or press the exclamation mark.

Move to B10 and insert a blank column (/IC). Insert another column between columns C and D and another between columns E and F. These are the columns in which the individual check amounts will be entered. To help clarify each column's use, enter CHECK # in cells A8, C8, and E8. Enter AMOUNT in B8, D8, and F8. Enter BALANCE in G8, I8, and K8. Remember, you can use replicate.

Next, we'll calculate a running account balance in column G. G9 already has our beginning balance of $1,000. In G10 we want to calculate the balance for a check amount entered in B10. The formula should be beginning balance less check amount. Enter +G9−B10 in G10. Enter 10 in B10 and the result in G10 should be 990 (don't forget to recalculate). Save your file to the data disk.

Next, replicate the formula in G10 into the remaining part of column G (through cell G210). Should both of the references be no change or relative? Or should one be no change and one relative? Since each total is based on the check amount of the current check and the check total of the prior check, enter R for both references.

After completing the replication, move slowly down column G for five to ten cells to ensure that both cell references increment (indicating relative reference) in each cell. You should do this any time you replicate formulas to ensure that you have accomplished it successfully. If the cells increment correctly, you can be assured that the formulas in the remainder of the column are also correct. As a backup, you might enter different check amounts in column B and check the result in column G. If you don't get what you expect, clear the file, load it, and try again.

Next we should complete the balances for checks 300 through 700. Replicate the formula in G10 into I10 and K10. Relative or no change? You might wonder why we selected columns I and K for the balances. The reason is that they have the same reference to their individual check amount columns as column G (that is, the respective amount column is five columns to the left for all three balance columns). This relationship allows you to replicate the balance formula into I10 and K10 using relative reference.

Now replicate both formulas down each column (relative reference again) and we are almost through.

There are two things left to do. First, the columns need to be ordered so that the check numbers, check amounts, and balances are in proper sequence. We could have entered them in the proper sequence initially, but replicate is faster if you replicate into columns or rows that are together. If you have a number of columns that require the same formulas, you can replicate into a range of columns and then move the columns (with /M) to their appropriate positions.

To move a column, go to G8 and press /M (G8 is automatically displayed as the source column). Press .C8 and return. Move column I to

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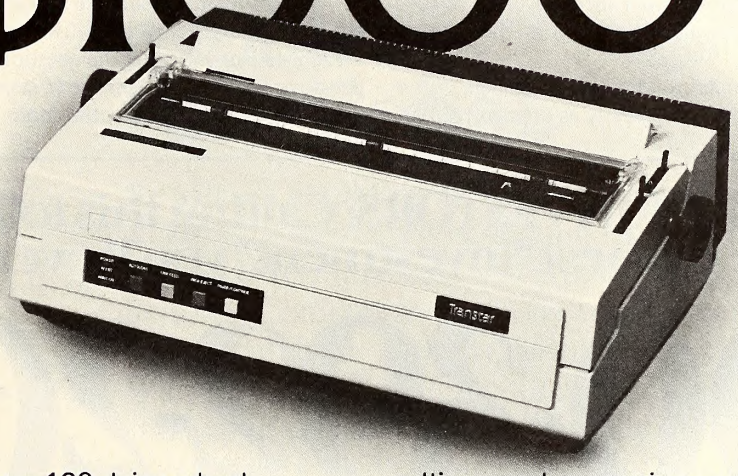

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the right of column E (using the cursor to point if you wish) and delete columns I and J (/DC). Remember to save the file first if you are trying something you aren't sure of.

Last, if the template is to work correctly, it must have correct balances in F9 and I9. Since the balance for check number 300 will be calculated in C210, enter +C210 in cell F9. Enter +F210 in I9.

Now all you have to do is enter your check amounts in the appropriate cells and your check register balance will be calculated automatically. If this balance differs from the one in your check register, you know where to look for the mistake.

	A	B	C	D
8	CHECK #	AMOUNT	BALANCE	CHECK #
9			1000	
10	100	10	990	300
11	101		990	301
12	102		990	302
13	103		990	303
14	104		990	304
15	105		990	305
16	106		990	306
17	107		990	307
18	108		990	308
19	109		990	309
20	110		990	310

Figure 4.

Don't worry about all the 990s in column C. Every time you enter a check amount, the balance will change to reflect the different total. If you'd like to have it display 0 until a check amount is entered in the appropriate amount cell, there's an easy way to make that happen. A prior column explains @IF, but the formula in C11 would be @IF(B11>0,(C10−B11),0). If you replicate that formula using relative reference, 0 will be displayed until a value is entered in the amount column for that check.

No Change? You're probably wondering what this no change stuff is about and where it might be used. It isn't used nearly as often as relative, but there are times it is necessary. A sales/income statement forecast would be a perfect example. You might want your forecast sales and/or expenses to grow at specific rates. To complete our discussion of the first period's formulas, sales and expense formulas will reference two cells that contain as variables the sales and the expenses growth rates. When you replicate these formulas for each subsequent period, these cell references will require no change. Thus, changing the sales growth rate in either variable cell affects the respective growth value in every period.

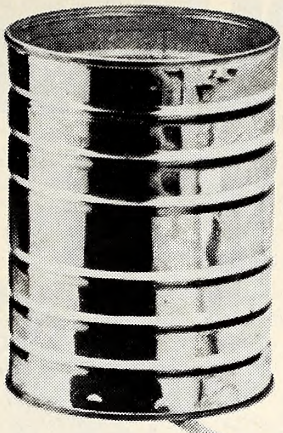
Replication Tips. Before we close, here are a few tips for using replication that are worth remembering.

Older versions of *VisiCalc* don't have an edit command. That means that sometimes the complete formula isn't visible in the entry contents line. If you want to see what's in a cell, replicating it allows you to see the complete formula displayed as you are prompted for relative and no change. Be sure to write the formula down as it's displayed. Afterward, simply blank the cell to return to the original template.

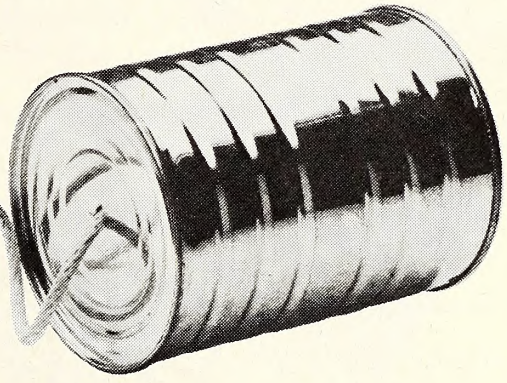
If you're going to use a formula similar to one you've used already and you don't want to reenter it, simply replicate it and then edit the changes. This can be especially useful when you're working with complex formulas because most of the entry is already complete and you may have to make only minor changes.

Advanced Version users can use replicate to simulate a block move. All you have to do is replicate the block to the destination range, ensuring that all references to cells outside the block are no change and that all references to cells inside the block are relative. *Important*—you must ensure that any cell references referencing *into* the block from elsewhere on the spreadsheet be changed to reflect the new cell references! Then blank the original block (using replicate, if you wish) and you have a block move.

To Replicate or Not? No Question! Now that we've completed this template, imagine how long it would have taken without using replicate. To replicate or not is *not* the question! The question is, how many different ways can you use replicate to save yourself time and trouble? The answer: the more you look, the more ways you'll find. ◨



A communications package that's slightly easier to use than MICRO/Terminal.



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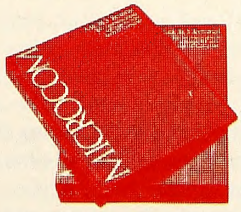

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It's CHOPLIFTER in '82

and WIZARDRY for All-Time Pops

Apple II owners were of one mind in *Softalk*'s annual Most Popular Software poll. The problem was that the one mind contradicted itself. Adding to the confusion was a *Softalk* foul-up on the eligibility requirements.

Choplifter and/or *Wizardry* won, depending on whom you talk to and what gauge you use. Actually, they both won, which was almost an impossibility given the structure of the balloting.

Apple owners were asked to select their ten favorite programs released in late 1981 or during 1982. Then they were asked to nominate just one program as their all-time favorite from all the software ever released for the Apple.

Votes for the most popular program of 1982 were weighted according to their rank on the ballot, with first-place votes being awarded ten points and tenth-place votes being awarded one point.

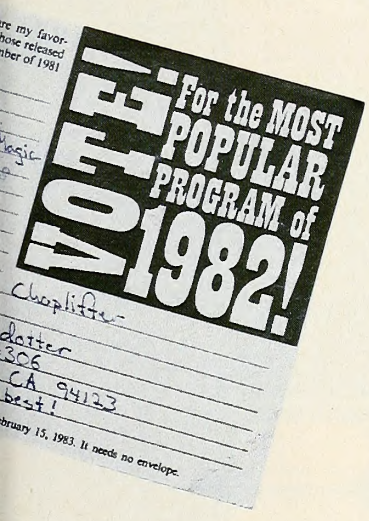
Using that tabulating system, *VisiCalc: Advanced Version* was the most popular Apple III program, and Broderbund's *Choplifter* was the

overwhelming winner as the best Apple II program released in 1982. Dan Gorlin's debut effort scored on more than 50 percent of the ballots, showing its wide acceptance by Apple users with varying tastes. It was mentioned on 374 more ballots than the runner-up.

In short, *Choplifter*'s victory was a landslide.

In second place was none other than *Wizardry*, Sir-tech's bellwether program from Andrew Greenberg and Robert Woodhead. It scored an additional 227-vote margin over the third-place program. So it was clearly *Choplifter* and *Wizardry* in that order for 1982.

Then came the tabulation of votes for the all-time favorite. The vote was even more decisive. *Wizardry* won. It was a rout. *Wizardry* got more than double the votes of second-place *VisiCalc*. *Wizardry* got quadruple the votes of *Choplifter*, which finished fourth.



So how could the voters reconcile placing *Choplifter* ahead of *Wizardry* in one vote and behind in another? Common threads of reasoning ran through the comments: "*Choplifter* has the best graphics ever. It's too bad you can't continue the game after saving all the hostages." "*Wizardry* gets my vote because of the depth of play. And it's the master for the following scenarios."

In other words, *Choplifter* was stunning, but when you're done, you're done. With *Wizardry*, when you're done, you're just waiting for another scenario to be released. *Choplifter* was king in '82; *Wizardry* is the program for all seasons.

Softalk added a confusion factor of its own, by listing as eligible contenders several programs that weren't. These included *Locksmith 4.1*, *Screen Writer II*, *PFS:File*, *Apple Writer II*, *Global Program Line Editor*, and *Flight Simulator*. All except *Flight Simulator* had undergone revision during the eligibility period and were included by virtue of the announcements of their transfiguration. Nobody knows how *Flight Simulator* made the list of eligibles.

Disqualifying those programs is consistent with the rules applied in previous years. Last year, *VisiCalc* underwent an extensive revision and enhancement but was excluded from the balloting. *VisiCalc: Advanced Version* was eligible in the Apple III voting this year because it is a separate program from *VisiCalc III*.

The reasoning behind the rule is that programs with longer marketing windows will probably do better in a poll than those just recently brought to market. Because the poll is intended to reflect the owners' opinions of the best new software, prior releases are excluded. To do differently this year would do an injustice to programs deserving a spot on the Top Thirty.

But disqualifying those programs, all of which ended up on the Top Thirty, invalidates a few thousand votes.

Lacking a Solomon to propose cutting the baby in two, *Softalk* hit upon a solution certain to be unsatisfactory to everyone. The votes were all counted and the programs ranked regardless of eligibility. Then only the eligible programs were numbered.

That means you'll see *Locksmith 4.1* listed third in the Top Thirty, but *Cannonball Blitz* gets the number-three rating. *Locksmith 4.1* and the other ineligible programs get an asterisk instead of a rating. But they are placed in the correct order so you can see how the voters evaluated them.

A word of caution about the results printed here. They reflect only programs released during the last three months of 1981 or during 1982, with the exceptions already noted. The omission of such programs as *VisiCalc*, *DB Master*, and *Castle Wolfenstein* is not a reflection of their popularity, but merely reflects their ineligibility due to longevity in the marketplace.

Voters named 848 separate titles on their ballots. Some weren't eligible, such as the three just cited. But that number's an indication of the strength of the Apple market. No other computer or operating system had anywhere near as many new entries in the past year. Even more to the point, a majority of the programs listed got more than two votes, which means somebody besides the author and his mother voted for it.

From the standpoint of bulk, arcade games represented the largest segment of new efforts, although the total was considerably less than 30 percent. Utilities, business applications, and educational programs also had a significant number of different entries. Following were strategy games, home applications, adventure games, word processors, fantasy games, and Apple III software.

Games dominated the most popular program of 1982 votes. Only five nonentertainment programs made the Top Thirty. There was considerably more balance in the all-time list: seventeen entertainment programs to thirteen applications programs.

Arcade games led the all-time list with ten entries. Four packages came from each of the fantasy games, business applications, word processing, and utility categories. Two adventures, one strategy game, and one home applications package concluded the list.

Apparently, good fantasy authors are worth their weight in gold. On the all-time list, only fantasy authors were able to replicate their success. Greenberg and Woodhead had *Wizardry* and *Knight of Diamonds*. Lord British had *Ultima* and *Ultima II*.

Several authors were hot in 1982, putting two programs on the charts. Greenberg and Woodhead had their *Wizardry* double feature, Olaf Lubeck had *Cannonball Blitz* and *Frogger*, Paul Stephenson wrote *Swashbuckler* and *Aztec*, David Snider created *Serpentine* and *David's Midnight Magic*, and Jim Nitchals had *Bug Attack* and a shared credit on *Microwave*. Chris Jochumson shared credit for both *Graphics Magician* and *The Arcade Machine*. Ken Williams shared credit for *Threshold* and *Time Zone*.

In addition to his authoring efforts, it was a very good year for Ken Williams the publisher. Sierra On-Line had six programs among 1982's tops and four programs among the all-time favorites. Both were high marks for publishers.

Broderbund scored second on the publishing front. They had five programs among last year's favorites and two packages on the all-time

APPLE III

1. **VisiCalc: Advanced Version,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2. **Word Juggler,** Tim Gill, Quark Engineering
3. **Quick File III,** Rupert Lissner, Apple Computer
4. **PFS:File,** John Page and D. D. Roberts, Software Publishing Corporation
5. **Catalyst,** Tim Gill, Quark Engineering
6. **PFS:Report,** John Page, Software Publishing Corporation
7. **Lexicheck,** Tim Gill, Quark Engineering
8. **Great Plains Hardisk Accounting System,** Great Plains Software
9. **Senior Analyst III,** Apple Computer
10. **VersaForm,** Joseph Landau, Applied Software Technology

MORE ARCADE TEN

19. **Pinball Construction Set,** Bill Budge, BudgeCo
20. **Beer Run,** Mark Turmell, Sirius Software
21. **Super Taxman 2,** Brian Fitzgerald, H.A.L. Labs
22. **Thief,** Bob Flanagan, DataMost
23. **Seafox,** Ed Hobbs, Broderbund
24. **Crisis Mountain,** David H. Schroeder, Synergistic Software
25. **Marauder,** Rorke Weigandt and Eric Hammond, Sierra On-Line
26. **Jawbreaker,** Olaf Lubeck, Sierra On-Line
27. **Ceiling Zero,** Stephen Warady, Turnkey Software
28. **Star Maze,** Gordon Eastman, Sir-tech

Makers of Raster Blaster winner of the Softalk Award for most popular program of 1981.

The First Software Toy

BudgeCo announces The Pinball Construction Set, the first entertainment software that has the simplicity and freedom of interaction of a toy. You don't use this program—you play with it.

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list. DataMost had three hit packages last year, two of which also made the all-time list. Obviously, Sir-tech placed two entries on each list.

There were no other publishers with dual entries on the all-time list. On the 1982 list, Sirius Software, Infocom, and Cavalier Software each had two entries.

The all-time list had some surprises other than the *Wizardry-Choplifter* reversal. *VisiCalc* was no surprise in second, but *Castle Wolfenstein*'s third-place showing is unprecedented. Last year it placed second to *Raster Blaster* for program of 1981. That's a stunning showing over two years for any entertainment program. In contrast, *Raster Blaster* dropped from first in 1981 to eleventh of all time. *Wizardry* was seventh in the 1981 program contest, after being in distribution for just less than three months.

Ultima II was the second strongest fantasy program of all time, although it ran third to *Knight of Diamonds* for 1982. *Ultima,* not eligible for 1982 balloting, also topped *Knight of Diamonds* for all-time honors.

Neil Konzen's *Global Program Line Editor* would have been tied for twenty-first for 1982 had it not been disqualified. But it jumped to eighth on the all-time list, reflecting one comment that "you can't be a programmer if you don't have *GPLE.*" The eighth-place all-time vote is the highest ever for a utility package.

Zork I, not eligible in 1982, was the runaway adventure leader of all time. *DB Master,* also not a 1982 candidate, was tenth, a higher showing than its fourteenth place in the 1981 poll. *Aztec* showed strength, going from a 1982 rating of twenty-sixth to an all-time rating of eighteenth. The currently red-hot educational market is too new to have captured owners' hearts in the all-time balloting.

Softalk Publishing made the awards last month at the West Coast Computer Faire. *VisiCalc* was a double winner. It also took top honors among IBM Personal Computer programs. *Star Raiders* won as best program ever on the Atari.

The specialized lists reflect *Softalk*'s monthly Bestseller format with a few exceptions: The disqualified programs are shown with an asterisk instead of a position rating. The strategy and adventure lists are fleshed out to ten to reflect the strong voting for programs of this type. The fantasy list is extended to eight for the same reason. The arcade list actually continues the list of arcade games in the Top Thirty. Eighteen arcade games made the Top Thirty, making a list of the top ten rather redundant. Instead, the nineteenth through twenty-eighth programs in that genre are listed.

There were other dynamite new programs for the Apple III as well as *VisiCalc: Advanced Version.* Quark Engineering put three titles on the list: *Word Juggler, Catalyst,* and *Lexicheck.* Software Publishing Corporation added *PFS:File* and *PFS:Report.* Apple came up with *Quick File III* and *Senior Analyst III. VersaForm* and *Great Plains Hardisk Accounting Series* were the other owner choices.

Two new database programs paced the business list—*dBase II* and *General Manager. Multiplan* gained fifth with very little 1982 exposure; it will be eligible for the 1983 vote as well. Although it was not listed and was not eligible, dozens of voters could not refrain from casting ballots for *VisiCalc.* It scored second to *PFS:File* among all business programs. *DB Master* got enough votes for sixth, even though it wasn't eligible either.

Sensible Speller led all eligible word processing programs. *Word Handler* was second and *PIE Writer* third.

Locksmith 4.1 drew the highest vote among utilities. *Graphics Ma-*

HOME EDUCATION TEN

1. **Apple Logo,** Logo Computer Systems, Apple Computer
2. **Terrapin Logo,** Terrapin
3. **Snooper Troops I,** Tom Snyder, Spinnaker Software
4. **Facemaker,** DesignWare, Spinnaker Software
5. **Early Games for Young Children,** John Paulson, Learning Tools
6. **Elementary My Dear Apple,** Apple Computer
7. **Snooper Troops II,** Tom Snyder, Spinnaker Software
8. **New Step by Step,** John Victor, Program Design Inc.
9. **Rocky's Boots,** Warren Robinett and Leslie Grimm, Learning Company
10. **Type Attack,** Jim Hauser and Ernie Brock, Sirius Software

WORD PROCESSORS TEN

* **Screen Writer II,** David Kidwell, Sierra On-Line
* **Apple Writer II,** Paul Lutus, Apple Computer
1. **Sensible Speller,** Charles Hartley, Sensible Software
2. **Word Handler,** Leonard Elekman, Silcon Valley Systems
3. **PIE Writer,** Softwest, Hayden
4. **Magic Window II,** Bill Depew, Artsci
5 **Executive Secretary,** John Risken, Sof/Sys
6. **The Dictionary,** Tom Cain, Sierra On-Line
7. **Easy Writer Professional,** John Draper, Information Unlimited Software
8. **Zardax,** Ian Phillips, Action-Research Northwest
9. **Gutenburg,** Micromation
10. **Bank Street Writer,** Gene Kusmiak and the Bank Street College of Education, Broderbund Software

ADVENTURE TEN

1. **Time Zone,** Ken and Roberta Williams, Sierra On-Line
2. **Deadline,** Infocom
3. **Zork II,** Infocom
4. **The Mask of the Sun,** Chris Anson, Alan Clark, Larry Franks, and Margaret Anson, Ultrasoft
5. **Starcross,** Infocom
6. **Hi-Res Adventure #4: Ulysses and the Golden Fleece,** Bob Davis and Ken Williams, Sierra On-Line
7. **Zork III,** Infocom
8. **Transylvania,** Antonio Antiochia, Penguin Software
9. **Kabul Spy,** Tim Wilson, Sirius Software
10. **Escape from Rungistan,** Bob Blauschild, Sirius Software

FANTASY EIGHT

1. **Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
2. **Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
3. **Ultima II,** Lord British, Sierra On-Line
4. **Prisoner 2,** David Mullich, Edu-Ware Services
5. **Crush, Crumble, and Chomp,** Epyx/Automated Simulations
6. **Apventure to Atlantis,** Bob Clardy, Synergistic Software
7. **Ali Baba and the Forty Thieves,** Stuart Smith, Quality Software
8. **Empire I: World Builders,** David Mullich, Edu-Ware Services

STRATEGY TEN

* **Flight Simulator,** Bruce Artwick, SubLogic
1. **Hi-Res Computer Golf,** Stuart Aronoff, Avant-Garde
2. **Rendezvous,** Wes Huntress, Edu-Ware Services
3. **Guadalcanal Campaign,** Gary Grigsby, Strategic Simulations
4. **Spitfire Simulator,** Ted Kurtz, Mind Systems
5. **Galactic Gladiators,** Tom Reamy, Strategic Simulations
6. **Air-Sim 1,** Ted Kurtz, Mind Systems
7. **Cosmic Balance,** Paul Murray, Strategic Simulations
8. **Cytron Masters,** Dan Bunten, Strategic Simulations
9. **Space Vikings,** Mitchell Robbins, SubLogic
10. **Southern Command,** Roger Keating, Strategic Simulations

gician paced the 1982 programs. Beagle Bros put three programs on the utility list. Their ineligible *DOS Boss* would have placed eleventh.

Among home applications, *Home Accountant* remained dominant. The surprise of the list was the seventh-place showing of Brook Boering's revolutionary *Ceemac*. It's not been known as a commercial success, but it's sure popular among those owning it. *The Accountant* was ineligible for 1982 balloting, but showed its strength by garnering more votes than ninth-place *DataFax*.

Tax Preparer from Howardsoft would have been tenth on the Home list had it been eligible. But the showing of tax packages in general was mystifying. Thousands were sold last year. Only a handful were voted for this year.

Logo was the hot item in educational circles—Apple's version led the pack, with Terrapin's version a distant second but well ahead of all other educational programs. Most of the entries have been making commercial waves lately. *MasterType*, a monthly sales leader among educational programs, was a 1981 product that would have been third.

There were few surprises, but some portents among the arcade products. The thirty-first program was Bill Budge's *Pinball Construction Set* that was sold for only a few weeks before this survey was conducted. Making considerable waves was *Miner 2049er*, which had even fewer sales days in 1982. Both are eligible for the 1983 poll and figure to place strongly.

After months of taking a back seat to the text adventures, hi-res adventures got new recognition. *Time Zone* led the 1982 voting, *The Mask of the Sun* was fourth, and four other graphic adventures scored highly. Infocom didn't suffer much with its text adventures, however; it placed second, third, fifth, and seventh.

The fantasy ranks were the thinnest. Only eight programs received significant support. David Mullich appears determined to give the Greenberg-Woodhead combo and Lord British a run for their money. His *Prisoner 2* was fourth and his *Empire I: World Builders* was eighth.

Castle Wolfenstein and *Flight Simulator* continue to sit atop the strategy list, but neither were 1982 programs. Avant-Garde's *Hi-Res Computer Golf* took top honors. But the category actually belonged to

BUSINESS TEN

* **PFS:File,** John Page and D. D. Roberts, Software Publishing Corporation
1. **dBase II,** Wayne Ratcliff, Ashton-Tate
2. **General Manager,** Brillig Systems/Paul Malachowski and Kevin Cooper, Sierra On-Line
3. **PFS:Report,** John Page, Software Publishing Corporation
4. **PFS:Graph,** Bessie Chin and Stephen Hill, Software Publishing Corporation
5. **Multiplan,** Microsoft
6. **VersaForm,** Joseph Landau, Applied Software Technology
7. **First Class Mail,** Bob Schoenburg and Steve Pollack, Continental Software
8. **List Handler,** Silicon Valley Systems
9. **VisiCalc Formatting Aids,** Data Security Concepts
10. **Data Reporter,** Robert Clardy, Christopher Anson, and Michael Branham, Synergistic Software

HOBBY TEN

* **Locksmith 4.1,** Omega Microware
* **Global Program Line Editor,** Neil Konzen, Synergistic Software
1. **Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
2. **Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
3. **Apple Mechanic,** Bert Kersey, Beagle Bros
4. **Utility City,** Bert Kersey, Beagle Bros
5. **Zoom Grafix,** Dav Holle, Phoenix Software
6. **Merlin,** Glen Bredon, Southwestern Data Systems
7. **GraForth,** Paul Lutus, Insoft
8. **Alpha Plot,** Bert Kersey and Jack Cassidy, Beagle Bros
9. **Special Effects,** Mark Pelczarski, Penguin Software
10. **Apple-Cillin II,** Thomas Jones and William Peters, XPS

HOME TEN

1. **Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2. **Personal Finance Manager,** Jeffrey Gold, Apple Computer
3. **ASCII Express: The Professional,** Bill Blue and Mark Robbins, Southwestern Data Systems
4. **Electric Duet,** Paul Lutus, Insoft
5. **Dow Jones Market Analyzer,** B. C. Burch, RTR Software
6. **Transend,** Tim Dygert and Bob Kniskern, SSM
7. **Ceemac,** Brook Boering, Vagabondo Enterprises
8. **Tax Manager,** TASO, Micro Lab
9. **DataFax,** Curt A. Bianchi and Rudy Diezmann, Link Systems
10. **Real Estate Analyzer,** James Howard, Howardsoft

ALL-TIME TOP THIRTY

	Index	
1.	308.36	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
2.	143.21	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	96.42	**Castle Wolfenstein,** Silas Warner, Muse
4.	78.26	**Choplifter,** Dan Gorlin, Broderbund Software
5.	54.62	**Screen Writer II,** David Kidwell, Sierra On-Line
6.	39.80	**Ultima II,** Lord British, Sierra On-Line
7.	29.81	**PFS:File,** John Page and D. D. Roberts, Software Publishing Corporation
8.	25.81	**Global Program Line Editor,** Neil Konzen, Synergistic Software
9.	20.48	**Zork I,** Infocom
10.	20.15	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
11.	19.32	**Raster Blaster,** Bill Budge, BudgeCo
12.	18.32	**Locksmith 4.1,** Omega Microware
13.	17.15	**Snack Attack,** Dan Illowsky, DataMost
14.	16.32	**Ultima,** Lord British, California Pacific
15.	14.99	**Microsoft Decathlon,** Tim Smith, Microsoft
16.	14.15	**Star Blazer,** Tony Suzuki, Broderbund Software
	14.15	**Word Handler,** Leonard Elekman, Silicon Valley Systems
18.	13.49	**Aztec,** Paul Stephenson, DataMost
19.	13.32	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
20.	12.99	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
21.	12.49	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
22.	12.16	**Cannonball Blitz,** Olaf Lubeck, Sierra On-Line
	12.16	**Sneakers,** Mark Turmell, Sirius Software
	12.16	**Time Zone,** Ken and Roberta Williams, Sierra On-Line
25.	11.66	**Apple Writer II,** Paul Lutus, Apple Computer
26.	11.16	**WordStar,** MicroPro
	11.16	**Taxman,** Brian Fitzgerald, H.A.L. Labs
28.	10.82	**Super Disk Copy III,** Charles Hartley, Sensible Software
29.	10.49	**Night Mission Pinball,** Bruce Artwick, SubLogic
30.	10.32	**dBase II,** Wayne Ratcliff, Ashton-Tate

Strategic Simulations and Mind Systems in 1982. SSI published five of the strategy winners; Mind Systems had two leaders.

The single outstanding feature of the survey was the vitality of the Apple software market in all its applications. For every rumor that a particular publisher was switching to the Atari or IBM Personal Computer, two new programs appeared.

One of the industry pros returned a partially completed ballot with the comment that "in retrospect, 1982 wasn't a very good year." Dozens of consumers contradicted that viewpoint with comments on how good 1982 was. Both views are probably accurate. There wasn't much breakthrough software in 1982. But there was a diversity of high-quality applications and entertainment software to address even the tiniest market niche.

The Apple market looks alive and well.

THE TOP THIRTY-1982

	Index	
1.	247.70	**Choplifter,** Dan Gorlin, Broderbund Software
2.	198.47	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
*	98.78	**Locksmith 4.1,** Omega Microware
3.	89.06	**Cannonball Blitz,** Olaf Lubeck, Sierra On-Line
4.	81.84	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
*	73.67	**Screen Writer II,** David Kidwell, Sierra On-Line
5.	66.67	**Night Mission Pinball,** Bruce Artwick, SubLogic
6.	66.20	**Star Blazer,** Tony Suzuki, Broderbund Software
7.	56.55	**Snack Attack,** Dan Illowsky, DataMost
8.	55.03	**Taxman,** Brian Fitzgerald, H.A.L. Labs
*	54.62	**Apple Writer II,** Paul Lutus, Apple Computer
*	53.02	**PFS:File,** John Page and D. D. Roberts, Software Publishing Corporation
9.	52.04	**Ultima II,** Lord British, Sierra On-Line
10.	47.46	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
11.	41.95	**Swashbuckler,** Paul Stephenson, DataMost
12.	40.49	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
13.	38.79	**Serpentine,** David Snider, Broderbund Software
14.	38.73	**The Arcade Machine,** Chris Jochumson and Doug Carlston, Broderbund Software
15.	37.40	**Bandits,** Benny Ngo and Tony Ngo, Sirius Software
16.	37.09	**Frogger,** Olaf Lubeck, Sierra On-Line
17.	36.99	**Crossfire,** Jay Sullivan, Sierra On-Line
18.	33.05	**Threshold,** Warren Schwader and Ken Williams, Sierra On-Line
19.	32.67	**Microwave,** Jay Zimmermann and Jim Nitchals, Cavalier Computer
20.	32.39	**Time Zone,** Ken and Roberta Williams, Sierra On-Line
21.	31.92	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
*	31.92	**Global Program Line Editor,** Neil Konzen, Synergistic Software
22.	31.76	**Deadline,** Infocom
23.	30.15	**Zork II,** Infocom
24.	28.51	**David's Midnight Magic,** David Snider, Broderbund Software
*	27.41	**Flight Simulator,** Bruce Artwick, SubLogic
25.	26.30	**Bug Attack,** Jim Nitchals, Cavalier Computer
26.	24.35	**Aztec,** Paul Stephenson, DataMost
27.	24.28	**Snake Byte,** Chuck Summerville, Sirius Software
28.	22.90	**Apple Mechanic,** Bert Kersey, Beagle Bros
29.	22.17	**Sensible Speller,** Sensible Software
30.	20.53	**The Mask of the Sun,** Chris Anson, Alan Clark, Larry Franks, and Margaret Anson, Ultrasoft

PROGRAMS THAT RECEIVED A FIRST-PLACE VOTE

The following list includes all programs that received a first-place vote in the balloting, irrespective of their eligibility. Unmarked entries received first-place votes for 1982 Program of the Year only. Entries with single asterisks received first-place votes for Best Program 1978–1982 only. Entries with two asterisks received first-place votes in both categories.

Apple III

Apple Writer III
Catalyst
Great Plains Hardisk Accounting System
Lexicheck
PFS:File
**PFS:Report*
***Quick File III*
***VisiCalc: Advanced Version*
***VisiCalc III*
***Word Juggler*

Apple II

**ABM*
***The Accountant*
**Accountant Finance Data Base System*
**Adventure*
Agenda Files
***Agri-Ledger*
**Aircraft Commander*
***Air-Sim 1*
**Air Traffic Controller*
**Algebra 2*
***Ali Baba and the Forty Thieves*
**Alien Rain*
**Alien Typhoon*
***Alpha Plot*
Ampersoft
***Apple Adventure*
***Apple Archive*
***Apple-Cillin II*
***Apple Flasher*
***Apple Logo*
***Apple Mechanic*
***Apple Panic*
**Apple Pascal*
**Applesoft*
Apple Spice
***Apple II Business Graphics*
**Apple World*
***Apple Writer*
***Apple Writer II*
***Apventure to Atlantis*
***The Arcade Machine*
The Artist
***ASCII Express: The Professional*
**Assembler*
**A-Stat*
**Asteroid Field*
**Asteroids*
***Aztec*
**Back It Up II+*
***Bag of Tricks*
***Bandits*
Bank Street Writer
***Battle of Shiloh*
***Beagle Bag*
***Beer Run*
**Beneath Apple Manor*
*** ?@?X?@*
***Big MAC*
**Bilestoad*
**Bill Budge's 3-D Graphics System*
Bolo
***Borg*
BPI Accounts Receivable
***BPI General Ledger*
Bridge Master
Bug Attack
***Cannonball Blitz*
**Casino*
Castles of Darkness
***Castle Wolfenstein*
Ceemac
Ceiling Zero
***Chess 7.0*
***Choplifter*
**Classic Adventure*
**Colossal Cave*
***Communicator/Text Editor*
**Complete Graphics System*
**Composer's Assistant*
**Computer Baseball*
**Computer Bismarck*
***Computer Courier*
**Computer Football*
**Computerized Management System II*
**Computer Quarterback*
Com-Ware II
Congo
**Consolidator*
***Copy II+*
***The Cosmic Balance*
**CRAE 2.0*
***Crazy Mazey*
***Crisis Mountain*
**Cropduster*
***Crossfire*
Cyborg
Cytron Masters
Dark Crystal
Dark Forest
***Data Capture 4.0*
**Data Factory*
***DataFax*
Data Perfect
***Data Reporter*
Datatree
***David's Midnight Magic*
***dBase II*
***DB Master*
***Deadline*
***Deadly Secrets*
**Delta Drawing*
Desecration
Dictionary
**Disk Fixer*
**Disk Organizer*
Diversi-DOS
**DOS Boss*
**DOS System Master*
**DOS 3.3*
**DOS Tool Kit*
***Dow Jones Market Analyzer*
**Dow Jones Portfolio Evaluator*
**Dungeons and Dragons Character Generator*
**Eamon Adventures*
***Early Elementary I*
Early Games for Young Children
**Easy Writer*
***Easy Writer Professional*
**Echo II Speech Synthesizer Software*
**Edit 6502*
Edit-Soft
***Electric Duet*
***Elementary My Dear Apple*
Eliminator
**Epoch*
Es-cape
***Escape from Rungistan*
Executive Briefing System
***Executive Secretary*
Facemaker
***Falcons*
***Family Roots*
**Fantasyland 2041 A.D.*
Federation
**FID*
**File Cabinet*
**File Helper*
Filer
***File Whiz*
First Class Mail
***Flight Simulator*
***Format II*
Free Fall
***Frogger*
Galactic Convoy
***Galactic Gladiators*
**GALE*
**Gamma Goblins*
***General Manager*
Genetic Drift
***Germany 1985*
***Gin Rummy*
***Global Program Line Editor*
**Gobbler*
***Goblins*
Gold Rush
**Gorgon*
**Grade Book*
***GraForth*
**Grammatik*
***Graphics Magician*
Graphics Package A2-3D1
The Graphic Solution
***Graphics Processing System*
Graphic Writer
**Grid-Search*
***Guadalcanal Campaign*
Gutenberg Word Processor
***Hadron*
**Hellfire Warrior*
***Hextacy*
***Hi-Res Computer Golf*
**Hi-Res Cribbage*
***Home Accountant*
Horizon V
***Horse Racing Classic*
**Information Master*
***Inspector*
IPA Educational Module 1
IPA Educational Module 4
Island II
Jawbreaker
***Knight of Diamonds*
***Labyrinth*
***Laf Pak*
Landlord
***Last One*
**Letter Perfect*
**Lisa 2.5*
***Locksmith 4.1*
Lunar Leeper
**Mad Venture*
***Magic Window*
***Magic Window II*
***Marauder*
Market Analyst
***Market Analyzer*
**Market Maverick*
***The Mask of the Sun*
***Master Diagnostics Plus*
**MasterType*
**Math Invaders*
***Math I*
***Merlin*
Metatrak
***Microbe*
***Micro Golf*
**Micro Lab's Applesoft Tutorial Disk*
**Micro Memo*
**Micro DSS/F*
***Micro Rim*
***Microsoft Decathlon*
***Microwave*
***Miner 2049er*
**Missing Ring*
**Modifiable Data Base*
**Monty Plays Scrabble*
Moptown
**MPE 2.0*
Ms. Speller
**Multi-Disk Catalog III*
***Multiplan*
Music Maker
**Music Theory*
**Mystery House*
Napoleon's Campaigns: 1813 & 1815
Neptune
***Nibbles Away II*
Night Mission Pinball
Norad
**Odyssey*
Oil Rig
***Operation Apocalypse*
**Orbitron*
**Oregon Trail*
**Original Adventure*
Pegasus
***Penpainter*
***Personal Finance Manager*
Pest Patrol
***PFS:File*
***PFS:Graph*
**PFS:Report*
***Photar*
***PIE Writer*
Pig DOS
***Pinball Construction Set*
**Pool 1.5*
***Portfolio Master 3.1*
***Prisoner*
***Prisoner 2*
***Quest for the Holy Grail*
**Raster Blaster*
**Rear Guard*
***Rendezvous*
***Repton*
**Reversal*
***Ribbit*
***RobotWar*
**Rocket Command*
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***VisiSchedule*
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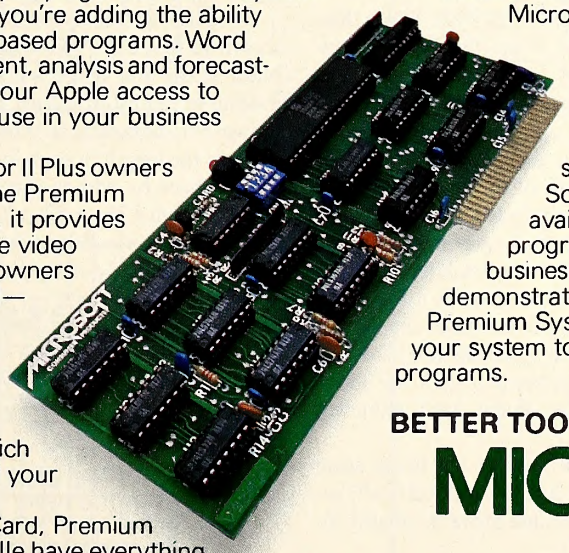

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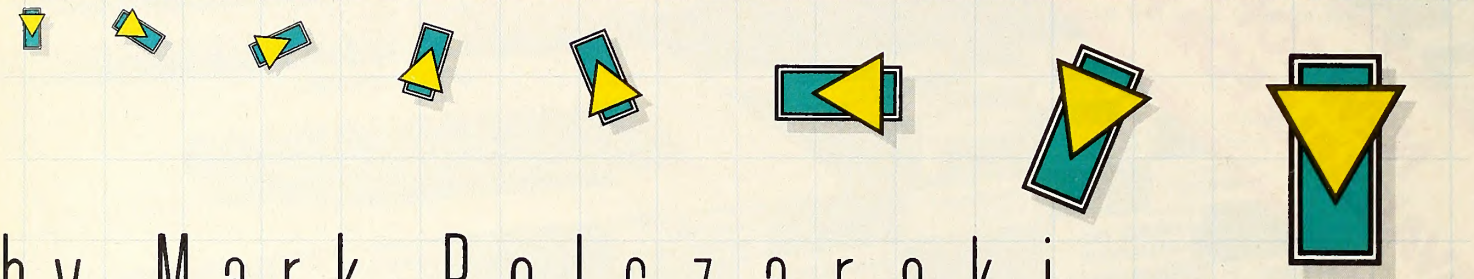


by Mark Pelczarski

Plotting preshifted shapes from Basic, as we did last month, sort of defeats their purpose. Preshifted shapes are designed for speed. Basic isn't; at least not when it comes to graphics. So this month we'll look at building larger preshifted shapes (larger than last month's hi-res dot), and voyage back into the world of machine language for some of the coding.

First, a Shape. We'll do a fairly easy shape so that the amount of data we generate doesn't wreak havoc on the proofreaders and the less proficient typists. This is your chance to shine with creativity, however. Almost all the shapes in all the arcade games you play are created in this form, so make up the shape you want, plot it out, and watch it animate at the end of this article.

Last month's column hinted that there is a technique for creating and animating a shape that allows you to omit the erase cycle of the usual draw-update-erase animation. There is, and it speeds up your animation considerably. Since we're just putting bytes onto the screen, we can cause a shape to erase its old image at the same time as the new image is being plotted if we know the maximum single movement of the shape. That is, if we know, for example, that in any single move a shape will go no more than two dots in any direction, we can create a two-dot border that is the color of the background around the shape. Technically, the two-dot border is part of the shape. Visibly, it isn't.

Figure 1 shows a box shape preshifted across three bytes. Note that, although the box is less than two bytes wide, when the border is included and the shape is shifted through its seven possible positions relative to the byte boundaries, we need the extra byte as part of the definition.

You'll notice that, in defining the boxes, we also played some games with a horizontal line cutting through the middle of the box. Remember that when using preshifted shapes, the shape selected from the table will depend on the desired horizontal position of the image on the screen. We can take advantage of the need for seven preshifts by modifying each preshift slightly to cause the object to animate as it moves. A man walking can have his legs moving as he moves across the screen, helicopter blades can swirl, lights and radars on a spaceship can blink and turn, and on and on. In a way, it's double animation, with the shape moving smoothly around the screen and the shape itself animated as well.

Okay. But that doesn't explain why those lines in the boxes seem oddly out of sequence. The intention is for the line to scroll vertically inside the box while the box moves. Shouldn't the line move in smaller increments between frames? Well, it does.

Two Dot or Not Two Dot? We're going to animate the box in two-dot moves. Besides making the box move faster around the screen, there's a very good reason for moves in multiples of two. Odd-numbered horizontal movements mess up any colors you might have. Bits that were in even columns (blue or violet) get put in odd columns (orange or green), and vice versa. Your shape definition can contain every Apple color at once, including blended colors such as those used in the fill routines. So to keep colors consistent as the shape is moved around, it's usually advisable to move in twos. The result is that, instead of the shapes animating in a 1,2,3,4,5,6,7 sequence, they animate in a 1,3,5,7,2,4,6 sequence. If you look at the shapes in figure 1 again, you'll see that this order moves that little line inside the box in much shorter steps.

The hexadecimal numbers defined by the shape are shown alongside the shape itself. For our plotting routine, we need the width and height of the shape in bytes (3 by 12). To speed up access to the individual shapes, we'll also store offsets in the table that point to the start of each of the seven shapes in the table.

Here's the format of the table:

The first fourteen bytes (starting address + 0 through starting address + 13) hold the two-byte offsets for each of the seven shapes, telling the routine what to add to the starting address of the table in order to find the address of the individual shape needed.

Bytes 14 and 15 hold the height and width of the shape, in bytes.

Getting Into Shape. Starting at byte 16 (starting address + 15), the byte values define each of the seven shapes, row by row, as illustrated in figure 1.

The first sixteen bytes of the table that describes our 3 by 12 shape are shown in figure 2. Note that, no matter what the size of the shape, the offset to the first shape is always 16 since the first shape always starts at the end of the list of offsets, at the starting address + 16. Sixteen is 00 10 in two-byte hexadecimal. Since the width and height are 3 and 12, 3 times 12 gives the length of each individual shape, in bytes, and we can find the other offsets by adding this length to each previous offset. The second offset is 16 plus 36, or 52, or 00 34 in hexadecimal. The third is 52 plus 36, or 88, and so on. If hexadecimal makes you queasy use the short program in listing 1 to compute and poke in the first sixteen values for any shape you make.

After you enter the first sixteen bytes, you have to enter the shape

```
10  HOME : INPUT "WIDTH : ";W
20  INPUT "HEIGHT : ";H
30  L = W * H
40  F = 16
50  FOR I = 0 TO 12 STEP 2
59  REM QUOTIENT OF DIV. BY 256
60  POKE 32768 + I, INT (F / 256)
69  REM REMAINDER OF DIV. BY 256
70  POKE 32769 + I,F - INT (F / 256) * 256
80  F = F + L
90  NEXT I
100  POKE 32782,W: POKE 32783,H
```

Listing 1. Index poker.

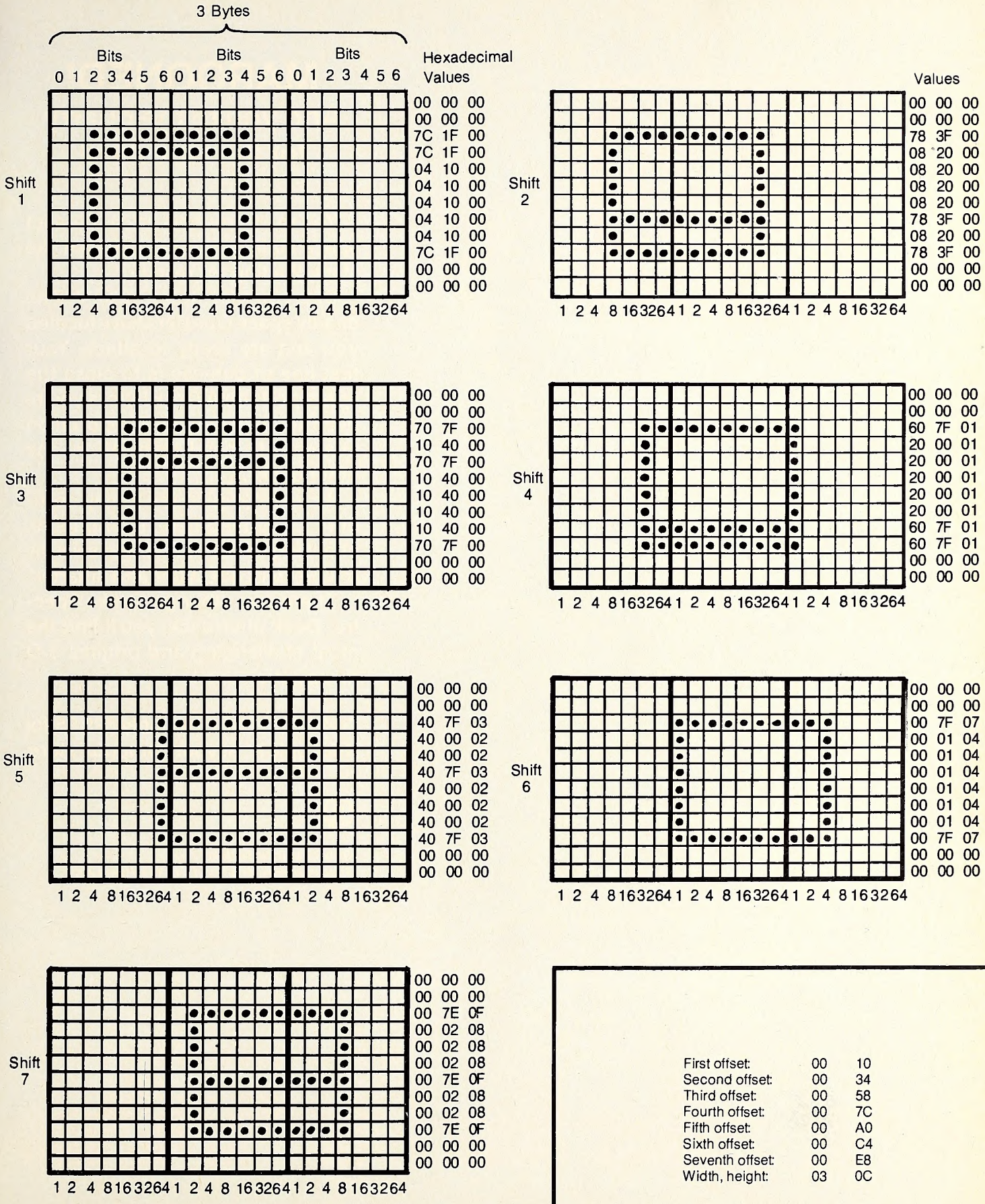
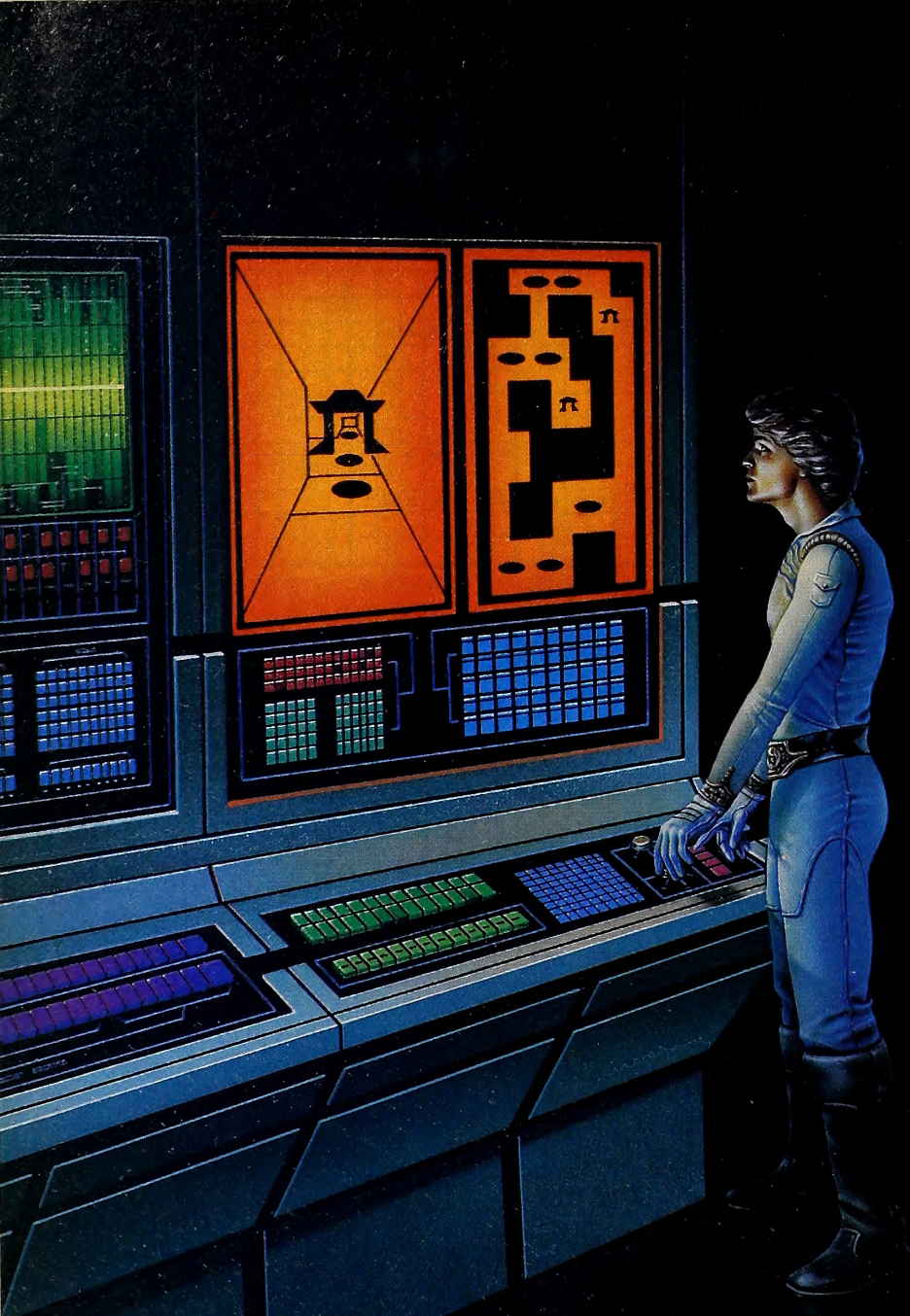


Figure 1. A preshifted box shape.

First offset:	00	10
Second offset:	00	34
Third offset:	00	58
Fourth offset:	00	7C
Fifth offset:	00	A0
Sixth offset:	00	C4
Seventh offset:	00	E8
Width, height:	03	0C

Figure 2. The table index.



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```
CALL -151
8000: 00 10 00 34 00 58 00 7C
8008: 00 A0 00 C4 00 E8 03 0C
8010: 00 00 00 00 00 00 7C 1F
8018: 00 7C 1F 00 04 10 00 04
8020: 10 00 04 10 00 04 10 00
8028: 04 10 00 7C 1F 00 00 00
8030: 00 00 00 00 00 00 00 00
8038: 00 00 78 3F 00 08 20 00
8040: 08 20 00 08 20 00 08 20
8048: 00 78 3F 00 08 20 00 78
8050: 3F 00 00 00 00 00 00 00
8058: 00 00 00 00 00 00 70 7F
8060: 00 10 40 00 70 7F 00 10
8068: 40 00 10 40 00 10 40 00
8070: 10 40 00 70 7F 00 00 00
8078: 00 00 00 00 00 00 00 00
8080: 00 00 60 7F 01 20 00 01
8088: 20 00 01 20 00 01 20 00
8090: 01 20 00 01 60 7F 01 60
8098: 7F 01 00 00 00 00 00 00
80A0: 00 00 00 00 00 00 40 7F
80A8: 03 40 00 02 40 00 02 40
80B0: 7F 03 40 00 02 40 00 02
80B8: 40 00 02 40 7F 03 00 00
80C0: 00 00 00 00 00 00 00 00
80C8: 00 00 00 7F 07 00 01 04
80D0: 00 01 04 00 01 04 00 01
80D8: 04 00 01 04 00 01 04 00
80E0: 7F 07 00 00 00 00 00 00
80E8: 00 00 00 00 00 00 00 7E
80F0: 0F 00 02 08 00 02 08 00
80F8: 02 08 00 7E 0F 00 02 08
8100: 00 02 08 00 7E 0F 00 00
8108: 00 00 00 00
3D0G
BSAVE BOX,A$8000,L268
```

Figure 3. Entering the shape table.

data itself. By following the steps in figure 3, you can enter all the data directly into memory. Note by the addresses that we started the table at address $8000 hex, or 32768 base 10. The last step is to bsave your shape with the command:

```
BSAVE BOX,A$8000,L268
```

The length of the table is computed by taking the length of each shape, times 7, and then adding 16 (for the first sixteen bytes). Or, just given the width and height of the shape (in bytes):

```
Width × Height × 7 + 16
```

All of this, by the way, is much more easily done through graphics editors that do all the calculations and setup of shapes. Die-hards may still enter a lot of the values directly in hexadecimal, but there are utilities to do much of this work for you.

The machine language shape-plotting routine is given in listing 2. It is similar in function to the plotting program we did in Basic last month, except it allows shapes that are more than one byte long. It is set up so that you relate the X and Y coordinates at which you want to plot the shape by poking those values into zero-page locations 4 and 2 respectively.

The first thing the routine does (lines 14 through 25) is a quick divi-

```
1          ORG  $6000
2  XBYTE   EQU  0
3  XBIT    EQU  1
4  YLOC    EQU  2
5  XCOUNT  EQU  3
6  SCX     EQU  $4     ;SCREEN X
7  SLO     EQU  $06    ;SCREEN LINE
                          ADDRESS
8  SHI     EQU  $07
9  WIDTH   EQU  $08
10 HEIGHT  EQU  $09
11 THI     EQU  $7000  ;Y LOOKUP TABLE
12 TLO     EQU  $70C0
13 SHAPE   EQU  $8000  ;SHAPE LOCATION
6000: A0 00      14 START  LDY  #0
6002: A5 04      15        LDA  SCX
6004: 18         16        CLC
6005: C9 07      17 DLOOP  CMP  #7       ;THIS IS A CHEAP
                                           DIVISION
6007: 90 08      18        BCC  DDONE    ;THAT CAN BE
                                           AVOIDED
6009: 38         19        SEC
600A: E9 07      20        SBC  #7
600C: C8         21        INY
600D: 18         22        CLC
600E: 4C 05 60   23        JMP  DLOOP
6011: 85 01      24 DDONE  STA  XBIT     ;DIVISION DONE
6013: 84 00      25        STY  XBYTE
6015: A0 0E      26        LDY  #$0E     ;GET HEIGHT
                                           AND WIDTH
6017: B9 00 80   27        LDA  SHAPE,Y
601A: 85 08      28        STA  WIDTH
601C: C8         29        INY
601D: B9 00 80   30        LDA  SHAPE,Y
6020: 85 09      31        STA  HEIGHT
6022: A5 01      32        LDA  XBIT     ;GET INDIVIDUAL
                                           SHAPE
6024: 0A         33        ASL           ;OFFSET AND
                                           ADD TO START
6025: A8         34        TAY           ;OF SHAPE'S
                                           TABLE
6026: B9 00 80   35        LDA  SHAPE,Y
6029: AA         36        TAX
602A: C8         37        INY
602B: B9 00 80   38        LDA  SHAPE,Y
602E: 18         39        CLC
602F: 69 00      40        ADC  #<SHAPE
6031: 8D 5B 60   41        STA  BLOCK1+1 ;MODIFY CODE
                                           FOR SPEED
6034: 8A         42        TXA
6035: 69 80      43        ADC  #>SHAPE
6037: 8D 5C 60   44        STA  BLOCK1+2
603A: A2 00      45        LDX  #0       ;TO START
                                           SHAPE
603C: A5 08      46 LOOP1  LDA  WIDTH    ;# OF HOR. BYTES
603E: 85 03      47        STA  XCOUNT
6040: A4 02      48        LDY  YLOC
6042: C0 C0      49        CPY  #$C0     ;CHECK IF OFF
                                           SCREEN
6044: 90 04      50        BCC  YTABLE
6046: A0 29      51        LDY  #$29     ;OFF SCREEN,
                                           END LINE
6048: B0 0C      52        BCS  LOOP2
604A: B9 C0 70   53 YTABLE LDA  TLO,Y
604D: 85 06      54        STA  SLO
604F: B9 00 70   55        LDA  THI,Y
6052: 85 07      56        STA  SHI
6054: A4 00      57        LDY  XBYTE
6056: C0 28      58 LOOP2  CPY  #$28     ;CHECK IF OFF
                                           SCREEN
6058: B0 05      59        BCS  CONT
605A: BD 00 80   60 BLOCK1 LDA  SHAPE,X  ;THIS CODE
                                           GETS MODIFIED
605D: 91 06      61        STA  (SLO),Y  ;PUT IT ON
                                           SCREEN
605F: E8         62 CONT   INX           ;NEXT SHAPE
                                           BYTE
6060: C8         63        INY           ;NEXT SCREEN
                                           LOCATION
6061: C6 03      64        DEC  XCOUNT   ;KEEP TRACK OF
                                           WIDTH
6063: D0 F1      65        BNE  LOOP2
6065: E6 02      66        INC  YLOC     ;NEXT Y
6067: C6 09      67        DEC  HEIGHT   ;KEEP TRACK
                                           OF HEIGHT
6069: D0 D1      68        BNE  LOOP1
606B: 60         69        RTS
```

Listing 2. Shape plotting routine.

```
10  PRINT CHR$ (4);"BLOAD SHAPE PLOT"
20  PRINT CHR$ (4);"BLOAD LOOKUP,A$7000"
30  PRINT CHR$ (4);"BLOAD BOX"
40  X = 128: Y = 128: HGR : POKE - 16302,0
50  POKE 2,Y: POKE 4,X: CALL 24576
60  XP = PDL (0):YP = PDL (1)
70  X = X - 2 * (XP < 80) + 2 * (XP > 160)
80  Y = Y - 2 * (YP < 80) + 2 * (YP > 160)
90  GOTO 50
```

Listing 3. Animation demo.

sion by 7 to determine the X bit and X byte that the X location you used corresponds to. The division routine goes through a loop that subtracts 7 from the X value until the result is smaller than 7. The number of subtractions (counted in the Y register) is the quotient, giving the X byte, and the number left over (in the accumulator) is the remainder, or the X bit.

From there the routine pulls the height and width out of the table, then, using 2 times the X bit value, finds the location of the offset values for the desired shape. The offset is added to the starting address of the table, giving the starting location of the shape definition to be used. The address is then inserted into the machine code (at BLOCK1+1 and BLOCK1+2). This is called *self-modifying code*; the program actually rewrites part of itself, in this case an address. The advantage gained here is in speed. Sometimes the technique is also used to keep programming code short.

A Loopy Pair. The rest of the routine is a pair of loops that puts each row of bytes onto the screen while counting down the screen vertically. We use the Y lookup table for finding the starting address of each screen line once again.

This routine was originally written with David Lubar and is partially used in *Graphics Magician*. Much of what has been used this month and last is the result of things discovered with Lubar and with Chris Jochumson (who wrote the *Arcade Machine*), both of whom are to be commended for their very open attitudes about programming "secrets" that they've discovered. The people who've helped them deserve thanks too, for techniques tend to develop over several generations of use. Sharing techniques and information greatly benefits the quality of the marketplace.

The last listing this month puts all these techniques together. Listing 3 is a basic program that loads the Shape Plot routine, the Y lookup table (at $7000), and the box shape we created (or any other shape that you design). Line 50 pokes in the X and Y coordinates and calls the routine. Line 60 reads the paddles, and lines 70 and 80 compute the new X and Y values. Note that the weird expressions in the latter two lines use an interesting little fact: an expression such as (XP < 80) generates a value of 1 if true, or a value of 0 if false. You can use that 0 or 1 in a computation! In line 70, for example, the equation evaluates as follows:

If XP < 80, the joystick is to the left:
    X = X - (2 * 1) + (2 * 0), which is X - 2.
If XP is between 80 and 160, the joystick is in the middle:
    X = X - (2 * 0) + (2 * 0), which is X.
And if XP > 160, the joystick is to the right:
    X = X - (2 * 0) + (2 * 1), which is X + 2.
Neat, huh?

One last note: the Basic routine is written to accept values between 0 and 255 for X and Y. That means that if you let the shape go too far to the right, or up to the top of the screen, you'll get an error—the program just stops. Once again, Basic becomes cumbersome. The reason is that poke statements only accept values from 0 to 255 (the values that fit in a byte). To get an idea of how fast the animation can go from Basic, we've left out any if statements or value checks. Unfortunately, the more Basic statements you add, the more you slow down the animation. An alternative solution to the speed problem is to perform the movement calculations in machine language, or to have the movements pregenerated in a path table. Either way you can easily increase the speed enough for the routine to be driven from Basic, although you still have to be careful about how much code you put into an animation loop. ◨

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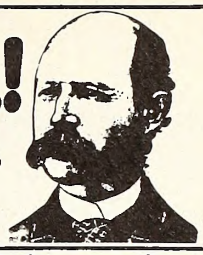

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by Mark Simonsen

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6008- 45 58 54 20 46 49 4C 45   EXT FILE
6010- 20 4C 49 53 54 45 44 20    LISTED
6018- 57 49 54 48 20 44 4F 55   WITH DOU
6020- 42 4C 45 2D 54 41 4B 45   BLE-TAKE
6028- 27 53 20 48 45 58 2F 41   'S HEX/A
6030- 53 43 49 49 20 44 55 4D   SCII DUM
6040- 50 20 46 45 41 54 55 52   P FEATUR
6050- 45 2E 2E 2E 2E 2E 2E 2E   E.......
```

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```
A$: 100 200 250 300
X:  10 20 3000 3010 3020
Y:  50 3000 4000 5200
```

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```
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X  = 255
Y  = 3.14159
```

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(Hi-Res Picture Mover)

```
 90 HOME : HGR2 : POKE 768,160: POKE
    769,0: POKE 770,76: POKE 771
    ,44: POKE 772,254
100 FOR PG = 2 TO 3: POKE 230,PG
    * 32: CALL 62454: HCOLOR= 3
    : FOR PG = 3: FOR X = 0 TO 15
    9 STEP 5: HPLOT 0,X TO X * 1
    .8,159: NEXT X,PG: HGR
110 ST = 163B4: GOSUB 2010:ST = 2
    4576: GOSUB 2010: GOTO 110
2000  POKE L,N -  INT (N / 256) *
    256: POKE L + 1, INT (N / 25
    6): RETURN
2010 N = ST:L = 60: GOSUB 2000:N =
    ST + B191:L = 62: GOSUB 2000
    :N = 8192:L = 66: GOSUB 2000
    : CALL 768
2030  POKE 50,63 + 192 * (ST = 16
    384): VTAB 21: PRINT  SPC( 1
    20): VTAB 22: PRINT " P=PICT
    URE #";: PRINT 1 + (ST = 163
    B4)";": GET A$: PRINT A$: IF
    A$ = "P" THEN  RETURN
```

Optional Improved Format:

2-WAY VIDEO SCROLLING

Each statement lists on a new line. Compare to the normal listing above.

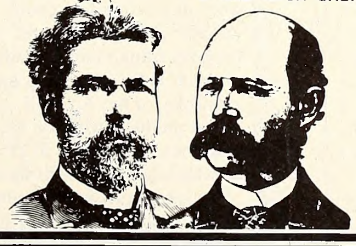
```
 90
    : HOME
    : HGR2
    : POKE 768,160
    : POKE 769,0
    : POKE 770,76
    : POKE 771,44
    : POKE 772,254
100
    : FOR PG = 2 TO 3
    : POKE 230,PG * 32
    : CALL 62454
    : HCOLOR= 3 + (PG = 3)
    : FOR X = 0 TO 159 STEP 5
    : HPLOT 0,X TO X * 1.8,159
    : NEXT X,PG
    : HGR
110
    : ST = 163B4
    : GOSUB 2010
    : ST = 24576
    : GOSUB 2010
    : GOTO 110
2000
    : POKE L,N - INT (N / 256) * 256
    : POKE L + 1,  INT (N / 256)
    : RETURN
2010
    : N = ST
    : L = 60
    : GOSUB 2000
    : N = ST + 8191
    : L = 62
    : GOSUB 2000
    : N = 8192
    : L = 66
    : GOSUB 2000
    : CALL 768
2030
    : POKE 50,63 + 192 * (ST = 163B4)
    : VTAB 21
    : PRINT  SPC( 120)
    : VTAB 22
    : PRINT " P=PICTURE #";
    : PRINT 1 + (ST = 163B4)";";
    : GET A$
    : PRINT A$
    : IF A$ = "P" THEN RETURN
```

Listings scroll Up AND Down at high speed, for easy location of program code.

LONG CATALOGS feature fast 2-Way-Scroll too, speeding up location of file names. Hit the Left-Arrow Key to SCROLL BACKWARD, any-key to continue forward, or ctrl-C for a clean break.

2-WAY VIDEO SCROLLING

```
JCATALOG
DISK VOLUME 123
*A 009 HELLO
 A 010 MULTI-CAT
 A 052 SORTFILE
*A 010 KEY-CAT
*A 052 BYTE ZAP
 A 024 HI-WRITER
 B 034 BBROS LOGO
 A 050 WOWZO
 T 002 XLISTER
 A 062 DOS BOSS
 T 010 LETTER
 T 020 STATEMENT
 T 003 NAIL FILE
*A 052 ALPHA PLOT
*A 008 TEXTTRAIN
*A 009 BEAGLE MENU
*A 021 HANG PERSON
 B 034 GOOD PIC
 B 034 UGLY PIC
 A 020 BUZZWORD
*B 020 FID
 A 020 TEXT DUMP
 I 010 CITY DUMP
 A 009 NIFFUM
 B 000 HAIR GROW
```



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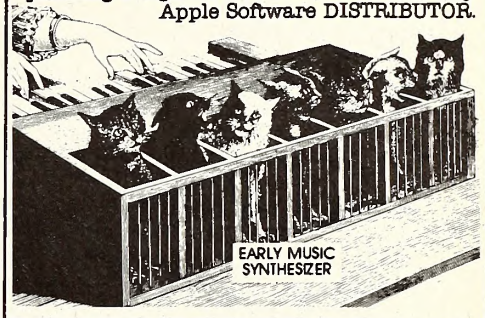

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12-Games-Plus. The best Apple game bargain around. See review: January 1983 Softalk, pg. 148.

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Read what the experts are saying...

BusinessWeek
December 13, 1982

And Business Solutions Inc., of Kings Park, N.Y., is selling its JACK program, one of the few programs written for an 8-bit machine, at $79 – far below cost. "Price will go to the heart of the matter," predicts Marian L. Murphy, vice-president for operations at ComputerLand Inc. The Hayward (Calif.)-based chain of 370 computer retail stores carries 2,500 separate software programs, and Murphy says that ComputerLand's experience has shown that "If a program is cheap enough, a lot of people will try it."

Electronic Engineering
TIMES October 25, 1982

JACK-OF-ALL-TRADES

Called Jack, this software package for the Apple II includes a word processor, mailing list, a personal-file system and calculator routines. All of the routines are integrated into one package, not as a collection of separate programs.

The word-processing capability includes the creation of formatted records with items that require calculation being automatically computed and included as the document is prepared. The record-keeping routines handle records that range in size from the data for a mailing label to one that stores text from up to 69 sheets of legal-size paper.

Up to 1000 records, depending on individual record size, can be handled on one diskette.

PERSONAL COMPUTING December, 1982

NEW SOFTWARE IS JACK-OF-ALL-TRADES

The Incredible Jack, a four-applications-in-one software package for the Apple II computer, has just been introduced by Business Solutions. Jack offers a personal filer, calc package, and word processing and mailing label capabilities in one package.

"Jack combines the convenience of a personal filer with the power of a calc package, and handles most word-processing tasks, providing all of the functions that people usually want from a personal computer," says Alan Dziejma, president of Business Solutions. "Jack turns your computer into a jack-of-all-trades by performing all functions with a simple integrated set of commands. Besides being easier to learn, these functions can be combined in a single task."

Jack's unique features let users create letters and reports with embedded calculations, the company says. The word processing capability enables the creation of neatly formatted records and can include items that are automatically calculated as the document is being prepared.

Needing only a few simple commands, the word-processing functions create letters, memos and reports. Jack also inserts, deletes and copies text with automatic word wrap and flush-right margins.

Users can arrange information in files they design themselves using Jack's personal filer. The records can be as small as a mailing label or as large as 60 sheets of legal-size paper.

The calc features let users build decision-making logic into their files. With English language calculation rules and powerful IF/THEN/ELSE function, it is possible to perform complex calculations instantly.

PERSONAL COMPUTING February, 1983

NEW SOFTWARE FOR THE APPLE // e DOES THE WORK OF THREE PROGRAMS FOR THE PRICE OF ONE

Are you on a budget? Do the functions of file management, word processing, and calculation pretty much cover what you want out of your computer? Do you find that specialized programs in these areas often cost too much, take too long to learn or to keep current, and do more than you really need? Does having to load one program after another into memory as you go through the day get you down? Well, there may be one program in all computerdom that will make you happy: The Incredible Jack, from Business Solutions, Inc., for an Apple //e or Apple II Plus with 64K RAM and two disk drives.

Our test of Jack showed you could just load it into your computer and leave it there all day. Say you start a business letter, and halfway through, a client calls with a question. Saving your letter on disk, you switch to the file management function, get the data you need, switch to the logic function, get the calculations you need – give your client one-call turnaround on his question – and return to your letter without ever leaving your program!

A relative newcomer to computing became comfortable with Jack (working through the manual's tutorial) in an hour, with only occasional help. An experienced computer user took even less. In five hours you should be flying with Jack, regardless of your background, thanks to the 57 diskette-size pages of tutorial. The comprehensive 67-page reference section will help you thereafter. The reference section includes a troubleshooting guide, calculation templates, index, and more.

For $129 you get a remarkable program specializing in the generalist's needs. Jack lets you adapt the computer to your work flow, freely using the various functions as needed...if Jack's functions fit your needs, no combination of single-function programs will fill those needs at anywhere near Jack's price.

FOR MORE INFORMATION: BUSINESS SOLUTIONS INC., 60 East Main St., Kings Park, NY 11754

SOFTALK Vol. 3, February, 1983

The Jack of Apples. The appearance of *The Incredible Jack* from Business Solutions among the IIe specific software is almost a travesty. If there were any justice, Business Solutions would be the only company making a software announcement. This is the single current program that from the conception stages was intended for the IIe only. When Apple's development time on the new machine became extended, Business Solutions retrofitted it to the II Plus.

The Incredible Jack draws its name from your ordinary garden-variety jack-of-all-trades. That's what this program is: a spreadsheet, a database, and a word processor in one integrated package. It's the Apple and eight-bit answer to *MBA* and *1-2-3*, widely heralded and praised software packages for the IBM pc.

Microcomputer Software Letter Vol. I, No. 2 January, 1983

Low-Cost Apple"Jack" of All Trades

An easy-to-use, very low-cost package for the Apple II Plus combines simple spreadsheet analysis, fairly advanced word processing for reports and memos, a versatile mail list manager, and a very good personal filing system. Called JACK, this program is the only fully integrated package available for the Apple II; other new integrated products work on the IBM PC or larger machines. JACK costs $129, very inexpensive for a program with its capabilities.

JACK can also serve double duty as a good computer literacy package for novices or new users who can graduate to more powerful packages later.

Recommendation: Managers with Apples and especially start-up users should see if JACK's capabilities meet current needs. JACK has a two-week money-back guarantee, and requires a 64K Apple with two disk drives.

Source: Business Solutions, Inc., 60 E. Main St., Kings Park, NY 11754. **Call:** (516) 269-1120.
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Organize information your way.
The Incredible Jack lets you arrange your information in "records" you design yourself using the computer display. Each record may be as little as a mailing label or as large as 60 sheets of legal sized paper.

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With a few simple commands you can master in minutes, you can create letters, memos and reports. To help you edit, Jack lets you insert, delete, and copy portions of text all with automatic word wrap and flush right margins. The Jack does away with the mind boggling control codes and formatting options of other word processing packages.

Automatic decision making.
Jack even allows you to build decison making logic into your file. With English language rules and a powerful IF THEN ELSE function, you can instantly calculate complex discount tables, commission plans, contract terms, or tax rates.

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Try Jack. (You'll need an Apple II with 16K memory extension and 2 disks.) If you're not convinced it's the best investment you've made since you bought your Apple, send Jack back in good condition within 2 weeks for a full refund.

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BY KEN LANDIS

How do stock market analysts value securities? How do they decide that a stock is priced too high, or too low?

If you were to bring together the top five analysts in a given industry and ask each to pick the stock he thought would be the top performer, you'd probably get five different answers.

One of the analysts you queried might be a fundamentalist. The strength of a company as reflected in its financial statements would be that analyst's key criterion. Another analyst might be a technician who would chart and analyze the performances of various stocks in order to arrive at an answer. Still another might proclaim to be an oracle, capable of understanding the incomprehensible. Each analyst's techniques could be pure science, pure witchcraft, or a little of both. But no matter what its foundations, the sole purpose of any investment analysis system is to pick winners.

The Deciding Factor. A decision generator is a program that manipulates the information you put in and produces either buy/sell decisions or rankings based on measuring that information against specific predetermined criteria. There's nothing wrong with decision generators per se. A decision generator is, simply stated, a program that recommends action based on specific decision rules.

All too often, however, decision generators promise to produce results by means of a secret technique or system. Profit by magic, their authors seem to be saying; put some numbers in and out will come the investment of your dreams. Such programs are dangerous because they don't tell you what their decisions are based on.

A useful decision generator consists of a filtering program, which sorts through information the user inputs and picks out those items that meet preset criteria the user recognizes, and a set of calculations, which brings to bear analytic relationships and factors that the user understands and acknowledges to be meaningful. The result of this combination is a decision with which the user knows he can agree.

Market Maverick is the first fully documented, fully explained, and fully comprehensible decision generator we've seen.

Market Maverick, Financial Software (11401 Westridge Circle, Chardon, OH 44024; 216-338-6811). $175.

Backup policy: Copyable (program held under license).

System requirements: 48K Apple II, II Plus, IIe, or III, one disk drive.

Optional: Second disk drive, printer, modem (for use with *Dowlog* [Stock Market Software] or *Dow Jones Market Analyzer* [Dow Jones and Company]).

This package contains two disks, the *Market Maverick* program disk and the *Market Manager* disk. The *Manager* contains all the necessary inputs, including the current prices, for 905 common stocks, "compiled from the estimates of over two thousand analysts at fifty-seven brokerage firms." The program author recommends the use of consensus opinions, as they are more likely than one person's opinion to reflect the movement of an issue (unless, of course, that person controls a significant portion of the company's stock). Investors can choose between purchasing the *Market Manager* portion of the program on a monthly subscription basis or entering by hand the information *Market Maverick* requires.

Low Price, High Potential. The program documentation provides a thorough and clear explanation of the analysis technique *Market Maverick* uses. The technique is a mixture of statistical analysis and fundamental analysis developed originally by a brokerage firm in the mid-sixties. The analysis resulting from it is designed to identify promising, bargain-priced stocks before their merits become common knowledge and their prices rise.

The technique that *Market Maverick* uses is not based on the movement of the planets or the length of women's skirts; rather, it appears to be grounded in solid, rational theory. Every opportunity to clarify the theory and function of the model has been taken.

The author also provides a sober, well-written discussion of how to use the outputs of *Market Maverick* in making investment decisions. This discussion concerns not only the *Market Maverick* outputs but market psychology and an analysis of stock-price cycles. There is a conspicuous absence of hyperbolic claims; investors should be able to understand the author's arguments and should have all the information necessary to evaluate the promise of the model.

In addition, the program code is unlocked, so you can look at it and determine what the program is doing and make appropriate modifications.

As many as 1,200 stocks can reside in memory at any given time. You specify the stock price input mode (decimals or eighths) you prefer, the name of the database you'll be using most often, and whether or not you plan to use the *Market Manager*.

Creating a Database. Once your system is configured and you've initialized a data disk, you're ready to create a database of stocks to analyze. The author suggests you begin by choosing ten stocks contained in the *Manager*. As you work your way through the easy-to-use menu structure, you'll go through the processes of adding stocks to the database and getting the Standard & Poor's parameters on-line.

Market Maverick uses the Standard & Poor's 400 statistics to represent the market as a whole. The statistics are drawn from a compilation of 400 industrial issues carried on the New York Stock Exchange. You can accept the S&P 400 or vary them as you see fit.

The Standard & Poor's 400 statistics used are the inflation rate, inflation pass-through (the ability of a company to pass along its increasing prices to its customers), normalized earnings per share (EPS that are "normalized," or adjusted, for high cyclicality), and earnings volatility (historic fluctuations in the EPS).

When the Standard & Poor's implementation is complete, you can add up to two hundred stocks to the database. *Market Maverick* then collects all the necessary background information from the *Manager* on

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any stocks it carries. You can include stocks that aren't contained in the *Manager*, but you'll have to supply the historic information yourself.

Once the *Maverick* has the necessary historic information, you're asked for the current price quotation for the stock.

Let's Analyze. Once you've entered all the required information, you're ready to execute the *Market Maverick* analysis. Any combination of stocks in the database, from a single stock to as many as 200, may be analyzed.

The two available analyses are stock valuation and sensitivity. The program gives each security a symbol; during analysis, the symbol of the security being analyzed is displayed. The final computation sorts the stocks in the order of their attractiveness for purchase. The results may either be interpreted directly from the display or printed out.

What exactly does the *Market Maverick* do? The valuation-analysis portion of the program is designed to forecast the fair price, or *target value*, of the stock being analyzed. Knowing this value enables an investor to identify undervalued stocks, buy them, and make money as they appreciate.

The sensitivity-analysis portion automatically adjusts the input parameters for a stock until the target value is equal to the current price. This shows the investor what growth rate or level of earnings is implied into the current stock price. The sensitivity analysis provides an investor with additional analytic data on which to base investment decisions.

The results of the sensitivity analysis can be displayed on the Apple's hi-res screen in the form of a graph. The graph displays the stock's price along the vertical axis and either the growth rate or the normalized EPS along the horizontal axis.

In most cases the point at which the parameter being studied is implied by the current price is marked by an asterisk on the plotted ray. The author calls this intersection the equilibrium point. The cases in which the equilibrium point will not be displayed are those in which there is no growth rate above zero that will yield the current price, and those in which the equilibrium is at the intersection of the axis (0).

According to the author, the *Market Maverick* program analyzed 300 securities during the period from December 31, 1973, to June 30, 1982. Of the stocks picked by *Market Maverick,* the top 10 percent rose 139.1 percent in a market that was up only 16.7 percent. The bottom 10 percent declined 31.6%. On an annual basis, the top 10 percent appreciated 10.8 percent per year, 15.9 percent with dividend income. This represents a reasonable return on investment. T-bills during the same period were yielding 8.6 percent, with inflation averaging 7.8 percent.

Decision Time. The *Market Maverick* does not claim to be a money generator. What it claims to be is an automated analytical tool that will help in the decision-making processes of those subscribing to the theory behind the model.

But no one can manage your money better than you can; so if you don't understand *Market Maverick* or any other piece of investment software, don't buy it, even if your broker recommends it. The purpose of an advisory tool or service is to help you make your own decisions, not to make your decisions for you.

Overall, *Market Maverick* is a well-executed, thoroughly thought-out program. It is well error-trapped and easy to use. The documentation is well written, clear, and comprehensive and follows a unique instruction scheme. Each page is divided into two columns, with the left-hand column representing the prompt that the investor would see on the screen and the right-hand column showing the appropriate responses to the prompt. This can be a little disconcerting at first, but once you get used to it, it's a very effective instruction method.

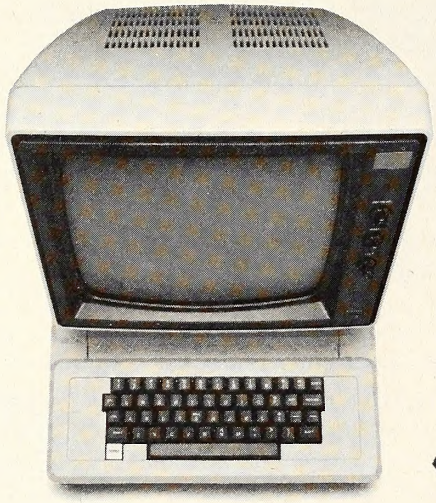
The program's only evident weakness seems to be its reliance on auto-price-update files generated by either the *Dow Jones Market Analyzer* or *Dowlog*. If you don't already own one of these programs, you may find it expedient to make an extra purchase in order to take full advantage of *Market Maverick*; even if you own one of these programs, switching back and forth between it and *Market Maverick* is a clumsy affair.

If you're serious about investing, this program is worthy of your consideration. Your decision on whether to purchase this package should be based on your understanding of and belief in the theory behind the package, and on your personal investment style. ◨

IF YOU'RE CONFUSED PERSONAL COMPUTER,

At this moment, there are no less than 50 personal computers on the market. And more are being introduced every day.

On one hand, having all those options is a good thing. On the other, it can make picking the right one pretty difficult.



Computers come in two parts. You have to buy both.

We'd like to help. So here are a few suggestions about how to buy the computer that's right for you.

Computers come in two parts.

One part is the "hardware," which is the machinery itself. The other is the "software," or a program, as it's sometimes called.

Software is the part that tells the computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything.

And vice versa.

You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration, keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

The simpler the better.

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.

Meaning there are no complicated routines to follow to perform a simple task. And no programming language to learn.

Some people, however, will tell you that software has to be complicated to be powerful.

Nothing could be farther from the truth.

Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

ABOUT BUYING A HERE'S SOME HELP.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, three products make up the family. PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way. Here's a little more about each of them.

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.

You can also mix and match line and bar graphs, or even stack or compare up to four bar graphs simultaneously.

And GRAPH will work with PFS:FILE, VisiCalc® files, or data entered directly into the computer.

Best of all, compared to the cost of hand-drawn graphics, GRAPH can save you enough money over the course of a few months to pay for the computer it runs on.

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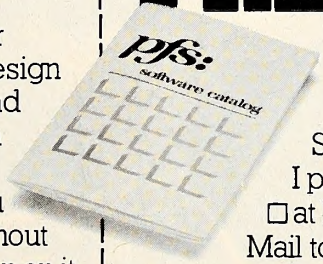

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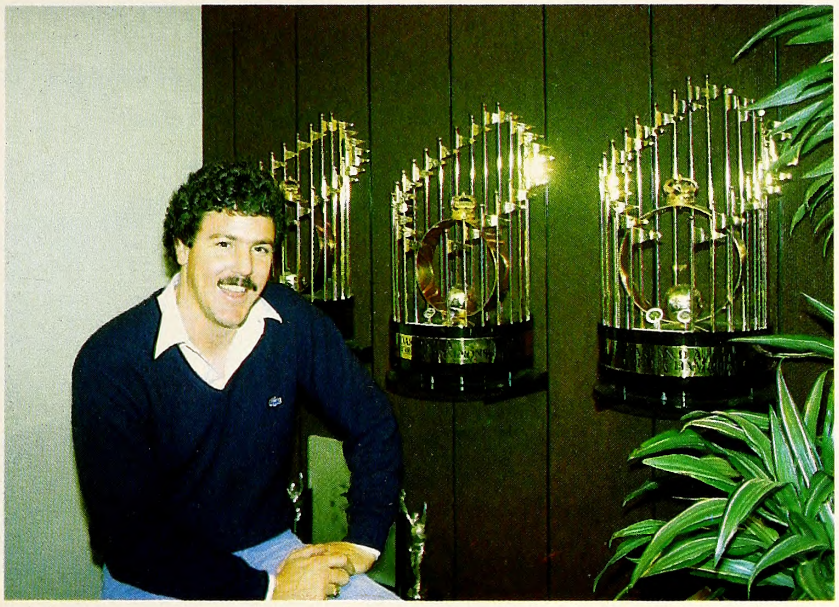

A's Play Ball With Apples

Big-league baseball is customarily played by brilliant outfielders, veteran hurlers, powerful sluggers, knuckle-ball artists, towering first basemen, key moundsmen, fleet base runners, ace southpaws, scrappy little shortstops, sensational war vets, ex-college stars, relief artists, rifle-armed twirlers, dependable mainstays, doughty right-handers, streamlined backstops, power-hitting batsmen, redoubtable infielders, erstwhile Dodgers, veteran sparkplugs, sterling moundsmen, aging twirlers, and rookie sensations.
—From "The Cliche Expert Testifies on Baseball," by Frank Sullivan

It was almost seventy-nine years ago—on May 5, 1904—that Denton True "Cy" Young pitched his perfect game. The Philadelphia Athletics sent twenty-seven men to the plate against the Red Sox hurler and they all went away empty-handed. Cy, short for cyclone, knew he had to pitch a good game, because the Athletics pitcher, Rube Waddell, had blanked the Red Sox twice in a row.

Young, with perfect control and a good curve ball, struck out eight, got ten batters on fly balls, and nine on ground balls. Young faced a formidable team in the Athletics, boasting the likes of Harry Davis, Danny Murphy, Socks Seybold, and Lave Cross.

In the ninth inning, Young struck out the Athletics' shortstop Monte

by David Hunter

Jay Alves, statistician and Apple caretaker for the A's, poses next to the A's three World Series trophies won in 1972-1974.

Alves in his office at the Oakland Coliseum, where the A's play all their home games. The Apple goes on the road with the A's during the season and down to Arizona during spring training.

Cross on a called third strike. Ossie Schreckengost came to the plate next and promptly grounded out to the Red Sox shortstop Fred Parent. Rube Waddell, the Athletics' ace pitcher, made the last out, hitting a fly ball to Chick Stahl, the Red Sox center fielder.

Young's perfect game (his second of three no-hitters) was the first pitched at the present pitching distance of sixty feet six inches. It was the shining centerpiece of a career that would eventually make Young the winningest pitcher in the game and a legend.

It's a remarkable feat that might never have happened if the Philadelphia manager, Connie Mack, had had an Apple.

Guiding the Oakland A's' Destiny. Mack's present-day counterpart, Stephen Boros, manager of the Philadelphia Athletics' present-day descendants, the Oakland A's, uses an Apple. It helps him plan strategies before a game and provides information to help make decisions during a game. The kinds of decisions the Apple helps Boros make are basic—what hitter to send against a certain pitcher, how to play a certain hitter in the field.

In Young's perfect game, for instance, Connie Mack used only ten different hitters. If he had had the kind of information that's now available to Boros, Mack would have searched his bench for the one hitter who could break Young's spell. Whether or not that hitter existed is unimportant. Actually, Young and Waddell squared off again the next year, with Waddell the victor in a twenty-inning thriller.

The point is that microcomputers have become a part of the game, and, though they may not bring radical changes at first, they're currently taking over the fact-finding and information-storage tasks for several professional clubs. Keeping statistics, managing player data, creating scouting reports, and improving player training represent areas in which microcomputers are well-suited to lend a hand.

Last July, *Softalk* showed you how the Philadelphia Phillies and Texas Rangers were using Apples in their training programs. This time around we'll visit the Oakland A's and, briefly, the Chicago White Sox. Both American League teams are using programs created by Dick Kramer of Pacific Select Corporation, a marketing and management firm. Pacific Select specializes in consulting for sports teams through its STATS (sports team analysis and tracking system) division.

Baseball is a strategic game. You plan your moves in advance, but you must be ready to make changes on the spur of the moment. It's a game of chance and intense mental concentration. Finding the thin line that separates good luck and a successful calculated risk has obsessed baseball managers for more than a hundred years, as has finding the line that separates bad luck and miscalculation.

Many aspects of baseball strategy stay the same from game to game: send a left-handed pinch-hitter against a right-handed pitcher, look for the pitcher to bunt if there's a runner on base, have all your base runners running on a 3-2 count with two outs. A typical game is played with

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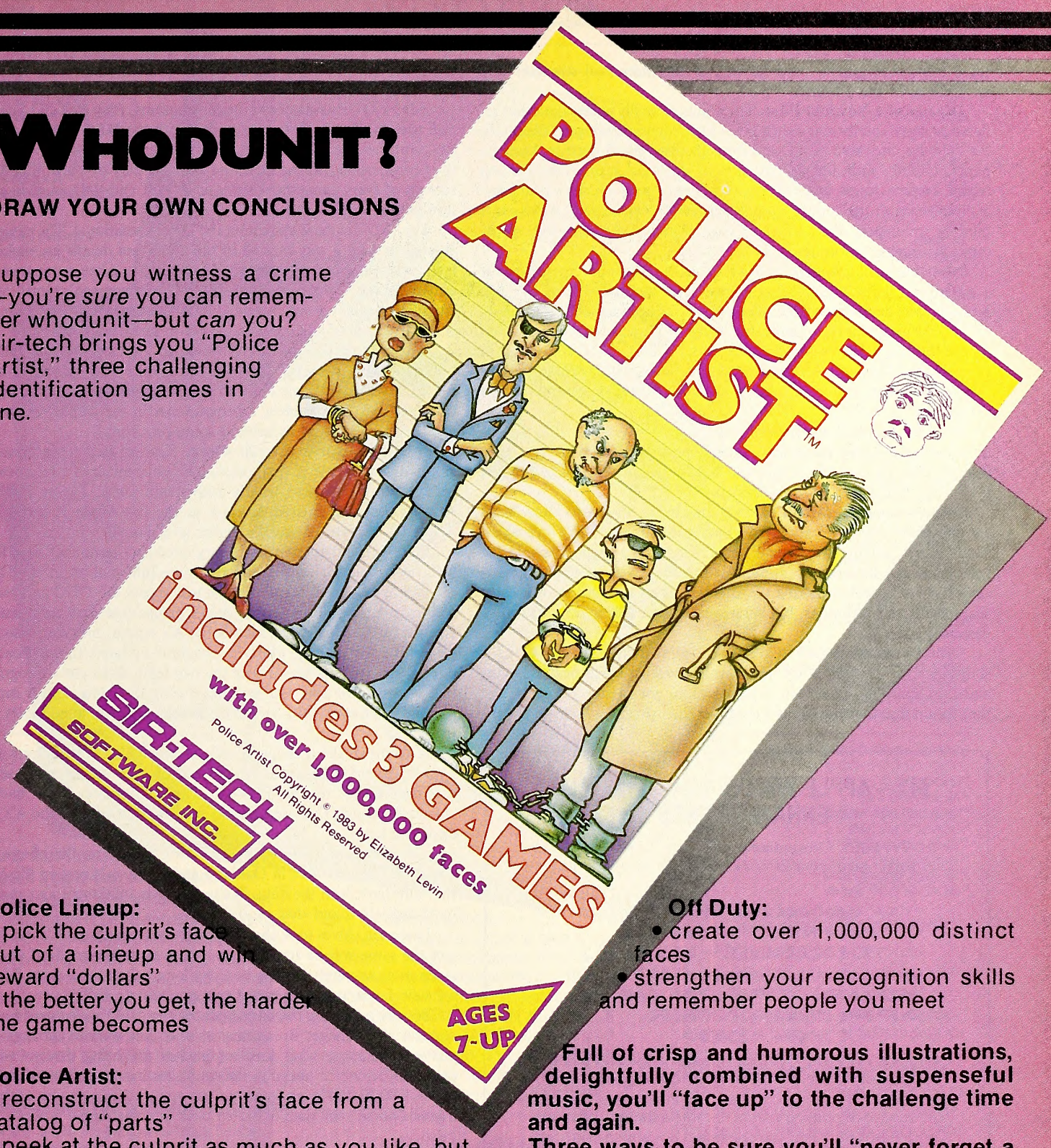

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these basic strategies in mind as well as the individual strengths and weaknesses of the players.

Dreams of a Youthful Pilot. The ability to easily access data that reflects a player's performance in a given situation is a manager's dream. In the old days, that kind of information gathering was all done by hand on paper. Usually with a small battalion of statistical support people and record keepers, teams made extensive written reports on their own players and those of the competition. Managers combined seat-of-the-pants piloting (managers don't manage) with reams of disorganized, sometimes inaccurate, information.

Now that is all changing, at least in that the reams of paper come off a computer printer. Pacific Select's Edge 1000 package, created by Dick Kramer, was designed to take over the task of keeping records on players and creating reports on opposing teams. With Kramer's program, an Apple II Plus, a Hayes Smartmodem, and a DEC PDP-10 located in Philadelphia, Oakland A's manager Steve Boros can have more accurate information made available to him faster than any of his predecessors.

Nineteen hundred eighty-three will be the first full year that the A's have used the Apple for actual managerial applications. All last year, though, the A's used the Apple and Pacific Select's system to support their radio and television broadcasters.

Besides managers, fans of baseball are always hungry to know hard-to-remember details of a player's past performance. Like managers, broadcasters usually have a small army of statistical support people and record keepers. Kramer was approached by the A's to put together a system that would update batting averages during a game and provide other features for Lon Simmons, Bill King, and Wayne Hagan, the A's broadcasters.

"The broadcasters had to get used to it at first," says Jay Alves, a statistician for the A's. "They were hesitant because it was new. Bill King and Lon Simmons have been in broadcasting for twenty-five years. But they found that the Apple was a lot easier than shuffling through papers. I broke them in on a black-and-white monitor. For some reason they didn't like green."

Edge 1000 consists of two main programs, *Play Ball* and *Scout*. *Play Ball* uses the Apple II in conjunction with the DEC PDP-10 and is the program that the A's use both for managerial purposes and to support the broadcasters. On the DEC are kept the play-by-play, pitch-by-pitch records of every game the A's played in 1981 and 1982, including exhibition games.

The 1022 database system on the DEC is relational. The game data is entered in such a way that all of the important details are included for later recall. Kramer says they tried to make the game summaries and inning accounts as detailed as possible. A whole season's worth of games amounts to six or seven thousand individual events, which Kramer says is too much data to expect an Apple to keep track of.

The programs allowing the Apple to interact with the DEC were written mainly in UCSD Pascal by Kramer. He has nothing but praise for UCSD Pascal. Some Fortran programs were required as well. Kramer says that Pete Palmer, a programmer in the employ of the American League, "steered us around some problems."

A Microcomputer Circuit Clout. Kramer had some minor problems with the Apple at first, because he's not much of a microcomputer person, having worked mostly with mainframes. Taylor Pohlman of Apple Computer advised Kramer to use the Apple II instead of the Apple III because of the II's higher-level Pascal.

The A's use the Apple as "a very intelligent terminal," says Kramer. "It's very clever at getting and returning information to the DEC."

Before playing a team, the A's will access the DEC and record on disk in summary form all the recent games that that team has played against the A's. Jay Alves, who is the A's Apple caretaker, also keeps a disk of the A's' players, which is constantly updated. In the broadcasting booth, the Apple is set up with the two team disks and a program disk that updates averages and statistics during the game, and is capable of pulling interesting bits of information for the announcers to use on the air.

In terms of the managerial side of baseball, *Play Ball* provides several different applications. At the end of each game, Alves sends the game summary to the PDP-10. The mainframe sends back daily "canned" reports that are basically updated statistics on the A's and the opposing team.

The only muff, says Alves, is having to rely on the phone system. "Suppose I'm out here in Oakland and there's a storm in the Midwest that interferes with the data. We're seriously thinking about purchasing hard disks to avoid that problem."

Last year, Alves took the Apple with him on all the A's' road games, and the same will be true this year. "I was on the road off and on for seven months, rarely staying in a city longer than three days. The carrying case I was using for the Apple got beat to hell."

Besides providing the daily updates, the DEC is also used for special queries. A's manager Boros may want to know more about one of his pitcher's patterns, what kind of pitches are being thrown when the pitcher is behind or ahead in the count, for instance. Alves winds up his trusty 1200-baud Hayes Smartmodem and pitches a request at the mainframe. Shortly, the data is batted back and the Apple makes a routine catch.

One of the most useful features available to Alves and the A's graphically shows where a batter hits the ball. A rough estimation of the baseball diamond is represented on the Apple's screen and the path of balls hit is plotted. The data for these computations is generated manually during the game by treating the field as a grid map and simply noting where a ball is hit.

By requesting an entire year's worth of data, it's possible to see in five minutes or so where a player hit every ball, whether they were home runs, bunts, or pop flys. It's possible to see where a slugger hit all his home runs and where an average hitter made all his outs. With the relational database it's possible to see how a batter fared in a myriad of different situations—against a particular pitcher, during the day, at night, on artificial turf, on grass, early in the season, late in the season, and so on.

This graphics feature is particularly helpful in determining defensive

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Online Update Service

The Softronics Online Update Service is provided as an additional support service at no additional cost to Softerm users. Its purpose is to allow fast turnaround of Softerm program fixes for user-reported problems using the *automatic patch facility* included in Softerm as well as a convenient distribution method for additional terminal emulations and I/O drivers which become available. *User correspondence* can be electronically mailed to Softronics, and *user-contributed* keyboard macros, file transfer macros, and host adaptations of the Softrans FORTRAN 77 program are available on-line.

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strategy. As long as the information is available it's possible to see graphically how an opposing hitter has fared in past meetings with A's pitchers. This helps the manager to adjust the infield or outfield accurately for each individual match-up in a game, assuming that the batter and pitcher have met before.

Finding out where a batter hit balls is a typical special query that the A's may send off to the DEC. The Apple by itself is capable of making reports on "last-time" match-ups. It's possible to search through the opposing team's disk and pull all the recent meetings between a particular hitter and batter in summary form.

This ability to call up accurate data on last time match-ups could have drastically changed the outcome of the first and second innings of the 1934 All-Star Game. You may remember the event.

King Carl the Legendary Twirler. The National League pitcher Carl "The Meal Ticket" Hubbell got into trouble early in the first inning, with two men on and nobody out. The next five batters were Babe Ruth, Lou Gehrig, Jimmy "Double XX" Foxx, Al Simmons, and Joe Cronin. Who could have predicted what happened next.

Ruth struck out looking. Gehrig struck out swinging. Foxx struck out swinging. That got Hubbell out of the first. In the second he promptly struck out Simmons and Cronin. The next batter, Bill Dickey of the Yankees, hit a single, breaking the spell. But Hubbell had already made history fanning in succession five of the most fearsome hitters to play the game of baseball. Few people bother to mention that he almost struck out six in a row, mowing down Lefty Gomez after Dickey's hit.

Now suppose that Foxx (who hit fifty-eight homers in 1932 and a total of 534 in his career) or Ruth had faced Hubbell and his killer screwball in an earlier exhibition game. The American League manager before the All-Star game could have seen the results of the earlier meetings and determined how best to approach Hubbell.

You say what more knowledge do you need when you have Ruth, Gehrig, and Foxx in the same lineup? Then how come they all struck out with men in scoring position, one of baseball's most embarrassing feats? The answer is also the reason why computers will never take away the excitement of baseball: It's a game of chance, of inches. The impossible is always possible.

How would the Chicago Cubs have fared against the Philadelphia Athletics in that most famous of comebacks—the seventh inning of the fourth game of the 1929 World Series—if they had had Kramer's program? They might have recognized patterns that indicated their ace pitcher Charlie Root was getting tired when he faced Al Simmons at the opening of the seventh. By having an accurate pitch-by-pitch report of Root's previous games, the manager could have compared the number of pitches thrown with their speed and placement and evaluated Root's condition in relation to his past performances.

But the Cubs were winning comfortably 8-0 and there seemed no good reason to take Root out or even warm up the bullpen.

Simmons led off the inning with a home run. Jimmy Foxx followed with a single. Bing Miller, Jimmy Dykes, and Joe Boley followed Foxx with three more singles. The next batter, pinch-hitter George Burns, popped out. Then Max Bishop smacked another single to center for the Athletics. Root left the game. His replacement, Art Nehf, fell on equally bad times.

The next batter with one out and the score now 8-4 was Mule Haas. He hit a wild in-the-park home run that made the score 8-7. After another three runs and two more Cub pitchers the Athletics were finally retired. But they had scored ten runs in the inning and secured a crucial victory in the series. They went on to beat the Cubs for the 1929 World Championship four games to one.

Avoiding Slugfests and Batting Orgies. If the Apple can help the Oakland A's avoid giving up ten runs in an inning it will become popular in a hurry, even more so if it can help them *score* ten runs in an inning. The Apple should prove a very valuable tool, complementing the real central computers, the truly remarkable baseball minds of Boros, Alves, and the A's coaching staff.

Managers are justly famous for pulling off the improbable and impractical, defying logic, tradition, and the wishes of the fans. Connie Mack surprised everyone in the opening game of the same 1929 World

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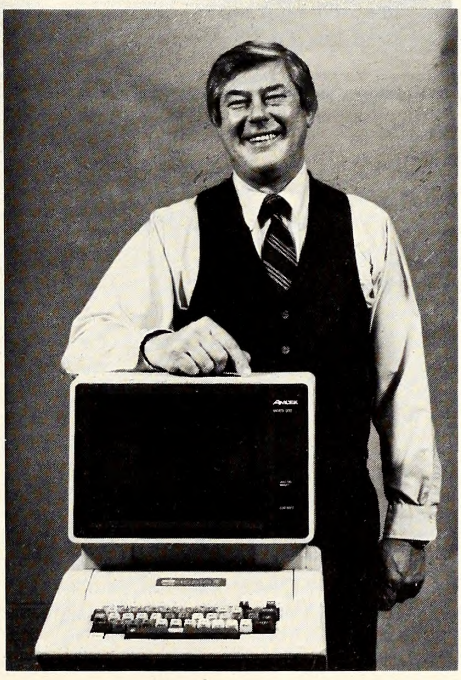

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Series against the Cubs. A week before the Fall Classic, Mack had pitcher Howard Ehmke (a ho-hum seven-game winner that year) secretly scout the Cubs in preparation for pitching the opener.

The fans thought Mack was daft. Why doesn't he start Grove or Earnshaw? But few Athletics fans complained when Ehmke completely baffled the Cubs, striking out thirteen and winning the game easily. It's not hard to imagine the Apple helping out in preparing some of the elaborate, secretive schemes that managers love to indulge in.

Next year the A's will start using Kramer's scouting system. Once again it's a case of entering player data in such a way as to flag the items needed for possible searching later. These would include age, position, condition, different scouts' ratings, previous performance, and salary information.

The Chicago White Sox are already using Edge 1000's scouting program with an Apple connected to a twenty-megabyte Corvus hard disk. Like the A's, the White Sox are also using Kramer's *Play Ball*, for defensive purposes.

The Chicago White Sox broadcasters are also using the Apple and Kramer's programs to complement their reporting of games. With a video interface they visually update batting averages and display on-screen for the audience the results of a batter's last few at-bats and other bits of information.

Kramer is currently talking to other interested parties. He believes that the Edge 1000's help in presenting cases to an arbiter can justify the cost very rapidly. "Win one good size judgment and you've paid for it." The A's themselves lost $185,000 this year in an arbitration settlement in favor of master base stealer Ricky Henderson.

Mighty Batsmen and Veteran Hurlers. Another project Kramer has going is creating a separate database by player of every big leaguer to play from 1970 to the present. He's just about licked the data entry part of the program.

Eventually the A's would like to have an Apple in the dugout during the game, mainly for defensive purposes. Woe to the innocent chip that overheats and blows the system in the eighth inning of a 5-5 tie. There are plenty of spare willows, wagon tongues, and pieces of lumber in the dugout.

Generally, though, Apples are more dependable than humans, particularly legendary characters like Rube Waddell—who injured his shoulder in a wrestling match at a Boston railroad station and missed the 1906 World Series. Fans were denied the dream duel of Waddell against Christy Mathewson. The New York Giants won the series, beating the Philadelphia Athletics 4-1. Mathewson pitched three shutouts, an awesome twenty-seven scoreless innings with only fourteen scattered hits.

"Baseball is an old-style sport, slow to make changes," says Alves. "But we're excited about the Apple. The manager, Steve Boros, really likes it and he's been very cooperative. He's got a real baseball mind." Boros managed the Kansas City Royals for several years in the mid-seventies and most recently the Montreal Expos for two years.

Alves is beginning to notice some interest in the Apple among the players themselves. They're curious about how they performed and ask to see the charts and reports. Individual printouts to be given to players before a game are another thing the A's will be investigating this year.

As the A's Wend Their Way South. For the last three or four weeks, Alves has been with the A's in Scottsdale, Arizona, for spring training. This spring training went a lot easier for Alves than the last one. He only had to keep track of fifty-eight hopefuls.

"Last year we had more than a hundred guys in spring training camp," he recalls. "The Apple couldn't handle that many players at once and started freaking out."

With a new manager, a new computer system, and a brand-new season where anything is possible—even the World Championship—the A's are just about ready for their April 4 opener against the Cleveland Indians.

"We're looking forward to the 1983 season," says Alves.

What he means to say is the A's are planning to nip, top, trounce, rout, subdue, wallop, drub, paste, crush, erase, bop, batter, hammer, clout, thump, larrup, flatten, shellac, blast, slaughter, topple, whack, baffle, thwart, foil, and maul the opposition. ■

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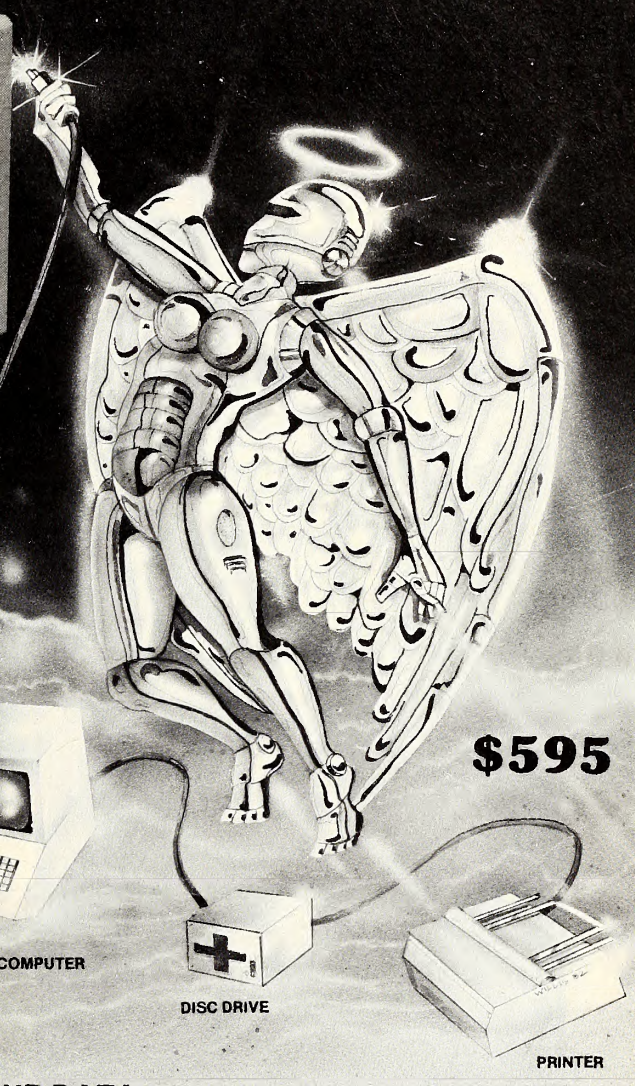

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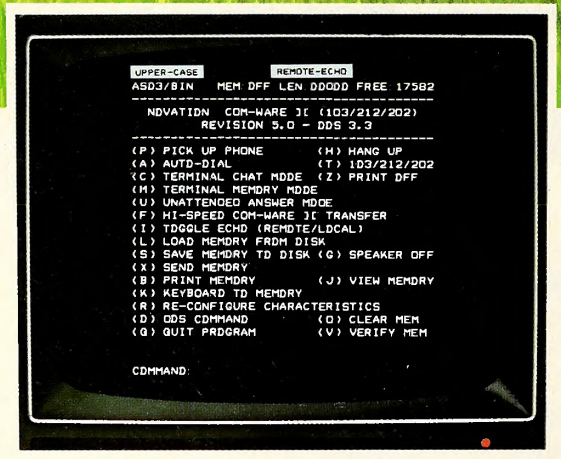

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Before we get started, will everyone who is sitting in the rear of the class please move forward and fill these empty seats in the front. No dozing off in this column.

If you came here wanting to learn how to write games, databases, and word processing programs, you're in the wrong class. This is the Beginners' Corner and is, just like it says, for beginners. There are plenty of other tutorials for the advanced students, so if you came here looking for an easy A, forget it. This class is for those who don't know RAM from ewe, control-C from Hi-C, or escape from Rungistan. Beginners with a capital B.

We're assuming that everyone here has just bought, won, stolen, or otherwise acquired an Apple and has minimal knowledge of how to work it. It doesn't make any difference whether you use one at work for a single application and want to learn more about it or you bought it for the kids and don't want to feel left out of dinnertime conversation. This is the place to get started.

The focus of the class will be toward the Apple IIe, since that's the machine on the market. However, anyone using a II Plus can also join in the fun, since most of the basic principles apply to both Apples.

We'll start off nice and slow to give everyone a chance to warm up to the machine; then we'll gradually pick up the pace as you become more familiar with computer words and the Apple in general. By the time we're through, you won't be a programmer extraordinaire, but you will have an understanding of the way things work. In a way, this will be like driving school; you won't become a Cale Yarborough of drivers, but you'll be able to handle Los Angeles freeways and New York's East Side Drive.

Who's In Charge Here? The first thing we ought to understand is that computers are dumb. Really dumb. If you think the kid at the supermarket who throws the cantaloupes on top of the eggs in your grocery bag is a bit dim, wait until you see some of the stuff the Apple can do if you're not careful. Yes, the computer performs calculations faster than we can conceive them, and yes, it does remember a lot of things you tell it. But it's not "smart"; it's obedient.

The family dog, for instance, can probably run faster, jump higher, and hear better than you can. He can probably remember under which tree he buried your slippers long after you've forgotten all about them. But that doesn't make him smarter. After all, how can you call an animal that eats dog food, and loves it, smarter than you? By the same token, how can you call a machine that sleeps all day—until you wake it up—smart? Even Fido wakes up by himself.

If you have any apprehensions about operating a computer, just remember this: it won't do anything you don't tell it to do. You're the one in control here, not it. Sure, it can do things that you can't; but so can a toaster. Let's not put ourselves on the same intellectual level as a toaster; save those kinds of comparisons for the person dropping cantaloupes on top of your eggs.

Enough lecturing, let's have some fun. We're assuming that you have everything all set up and are ready to rip. If you don't, then go through the first chapter of the owner's manual. It explains all you need to know to get the system set up. There are plenty of color pictures that help in case you get caught up in words that seem to make little sense. When you have everything set up, come back and join us in the next paragraph.

If you're sitting in front of the keyboard and wondering what the heck all those funny-looking keys are for, welcome to the club. Most of them are in the same place you'd expect to find them on a standard typewriter, and Apple's even added a few.

One way to become familiar with all those keys is to turn on the computer, start hitting keys, and take notes on what makes smoke come out the back and what doesn't. An even better way is to break out the disk called *Apple Presents . . . Apple.* It's nothing like any typing classes you might have taken; it's a bit more fun. By the time you get through that (it takes less than a half hour), you'll be familiar with all the function keys and editing keys.

It's Kickoff Time. Take the Sample Programs disk and insert it into the disk drive. Make sure you insert it with the label end toward you and the label facing upward. Close the disk drive door, and boot the disk. Go ahead. Done? If you picked up the disk and kicked it across the room, you're good at following directions, but you're on the wrong track.

Boot is one of those computerese words; it means nothing more than, "Put the disk in the drive, and turn the computer on." The term comes from the phrase, "Pulling oneself up by the bootstraps." For us it means that the main program on the disk starts by itself when the power is switched on.

The power switch is located on your left-hand side on the back panel, right next to where the power cord plugs in. For very good reasons, the power switch is located in this awkward spot. It's a safeguard. You can't accidentally shut off the computer when you're working on something very important (or if you're on your way to a high score on your favorite game).

When you switch the computer on, it will beep, the red "in-use" light on the disk drive will light up, and you'll hear all sorts of whirring and clicking coming from the drive. Don't worry; that's how the drive sounds when it wakes up. Sort of like, "Aw, geez, is it time to go to work already?" Actually, what's happening is the computer is looking at the disk, trying to find the set of instructions that tells it how to operate the

disk drive. Whether you're switching on the computer for the first or the thousandth time, it always looks for those instructions before it does anything else. It's dumb, remember?

DOS Boot. The set of instructions it's looking for is called DOS (rhymes with "boss"), which stands for "Disk Operating System." Every time you want to do anything that has to do with your disk, the computer has to be told how to do it. The instructions that tell it how to operate the drive are complicated, lengthy, and hard to remember. So, to save you from having to type them in each time you want to get, put, or even look at something on the disk, DOS is loaded into a corner of the computer's memory whenever you boot a disk, and all you have to remember are a few English words that tell the computer what you want it to do.

The English words are often referred to as "DOS commands." Whenever you use one, you can think of yourself as a monarch commanding your machine to carry out your wishes. Remember, you're the one in charge around here, not the computer.

With all those instructions in its memory, the computer then looks for the greeting program. That's the program that runs first, no matter what else you might have on the disk. In the case of the Sample Programs disk, the greeting program, *Hello*, displays a message on-screen and then loads the Integer Basic language from the disk into another corner of the computer's memory.

Now you have a message on-screen and a blinking box below it, better known as the cursor. Having absolutely nothing to do with cursing, all the cursor says is, "What would you like me to do next, boss?" and "Whatever you type next I'll display at this spot on the screen." In other words, it's waiting for you to type something and showing you where it will appear. But it won't do anything until you give it permission.

Let's have a look at the disk. If you pulled the disk out, squinted at it, and said, "Looks okay to me," put it back in the drive; that's not what we meant. To see what kinds of things are recorded on your disk, type in the command *catalog*. Be sure you have the caps-lock key down when you type because the Apple refuses to listen to you unless you use all capital letters. The same goes for any kind of command you give it. The Apple is very fussy when it comes to taking orders. Even though that's what its job is, it won't listen to you unless you are very specific in what you type.

Nothing will happen until you hit the return key because you haven't told the computer to do anything yet; you're just preparing the message. In a way, it lets you get your command in a nice understandable form before it looks to see what you want it to do.

After you hit return, the disk will spin around, and a list of things will come up on the screen. If none of this happens, check your spelling. Remember, the computer is dumb. If you typed in *catlog*, *catalag*, *catalogg*, or any other variation of the word, the computer will look at it, scratch its head, and reply, ?syntax error. (That's the computer's way of saying, "Huh?") You know what you meant, your fingers know what you meant, and anybody who has read this far knows what you meant. But the computer hasn't the faintest idea; it has to know exactly what you mean before it acts. No sense of initiative.

What it's showing you is the disk's catalog, a list of programs you can run that are on the disk. The list is incomplete, though, because the computer wants you to be able to see the first part of the catalog before it pushes it up and off the screen, making room for the rest of the catalog. When you see the blinking cursor, hit any key, and the catalog will continue scrolling by until it reaches the last program. After it's done, you'll see the cursor again, eagerly awaiting your next command.

There's a lot of information in the catalog. On the far left-hand side of each program name is an asterisk, indicating that the program is locked. Don't worry too much about this yet; we'll get back to it later. Next, you'll see the letter A, B, I, or T. This tells you what kind of program you're looking at, Applesoft Basic, binary (machine language), Integer Basic, or text file. Knowing what kind of program helps you know what commands to use with it.

Right after the letter comes a three-digit number. That's just an indication of how large a program is; it tells you how much space it takes up on the disk and in the computer's memory. Last comes the program's name.

Programs are really nothing more than a series of instructions telling the computer what to do. For example, if you wanted to write a program that would make breakfast for you, it would go something like, "First, get the box of cereal from the cupboard. Second, get a bowl, a spoon, and some milk. Third, pour some cereal into the bowl, and then add some milk. Don't add any sugar because it's bad for the teeth." Realistically, the Apple can't do that for you . . . yet.

None of the programs you see listed in the disk catalog will make breakfast for you, but they do have their uses. Let's have a look. Running progams is a lot like playing records on the record player. Before you get to hear the music, you have to put the record on the turntable, then wait for the grooves to be translated into an understandable form (music) before it comes out through the speakers.

With the computer, you first have to load the program from the disk into the computer's memory and then have it translate the program into a form you can comprehend (words, pictures, sound). We could do it that way, but people are lazy, always looking for a shorter, faster, easier way to do things (that's why people buy computers). Fortunately, the people at Apple have combined the loading and translating functions into one command, *run*.

Here's How It Works. Type the command, *run Applevision*, and hit the return key (remember, you almost always have to press the return key before your command will work). The computer searches through the disk, the same way you flip through your record collection, looking for a program called *Applevision*, and then loads it into memory. When the program's all there, the computer tells it to begin doing whatever it's supposed to do, the same way you lower the needle onto the spinning record.

Now, just sit back and watch the action. Not exactly the latest in programming applications, nor even the most useful, but it is kind of neat. When you're through being amazed, hit the escape key to stop the program.

In *Applevision*, the program is telling the computer, "Print this message, and when the human hits the return key, draw a bunch of lines in these places to make this picture. Then draw the person in the television set and make him dance while you play the following song. . . ."

Another way we could have done it is the long way, the way we try to avoid. Type in the command, *load Applevision*. The computer will load the program into memory as before but will not run it. To run the program, just type in (you guessed it) *run*.

In case you're thinking that it's dumb to have a long way to do something when a short way will work just fine, you'll be happy to know that the long way came first. When you pull out an album from your record collection, you don't have to listen to it. You can look at the artwork on the cover, you can read the liner notes, or you can play Frisbee with it. Likewise, when you load a program, you can modify it, put it on another disk, or just look at the program listing.

Try it now. Load the program called *Address* into the computer, and then type *list*. The moment you hit return, a whole bunch of stuff that looks like it's written in a foreign language will begin rolling by faster than you can possibly read it. In fact, it is a foreign language, called Applesoft, and what you're seeing is the list of statements that make up the program. Unlike the catalog, the program listing will not stop and wait for you to tell it to continue; it just whisks by without even saying hello.

To get a better look at the listing while it's scrolling by, type control-S. You do this by holding down the control key and then pressing the S key. Control-S will stop the listing until you give it permission to keep on going. Hitting any key will start it going again, and every time you hit control-S it will stop. If you want it to stop listing completely, good old control-C is standing by. Play around with these control characters to get a feel for them. Don't worry; you can't wreck anything on your disk.

Killer Bs. The commands catalog, load, and run are DOS commands. The last two, when used with the name of a program following them, cause the disk drive to perform some kind of action with a program. You can use load and run with Applesoft and Integer programs, but not with binary ones. To run a binary program, type *brun* (pronounced, bee-run) followed by the name of the binary program you want to run. Brun does the same as run; it loads the program and makes it go.

You can load binary programs into memory by using *bload* (bee-load) plus the program name, but once it's in memory, a simple brun without the program name will not run it. To run binary programs, you have to do it the short way.

Remember when we said you "almost always" have to hit return to execute your commands? Well, control characters, as we saw, don't wait for the return key, they work the moment you type them in. Run *Applevision* again. After it begins drawing the room, type control-C. This is a command that stops what's in progress. It tells the computer, "Stop what you're doing; we're going to do something else."

You'll notice also that the cursor is nowhere to be found. Actually, that's not true. It is on the screen, waiting for you to type something in, but you can't see it. Just to prove that, type in catalog and hit return. You'll have to be especially careful when you type because the letters won't appear on the screen. The disk spun around, didn't it? You couldn't see it, but the catalog scrolled up the screen, too. Just have a little faith. Now that we've agreed the cursor is there somewhere, why can't we see the darned thing?

At first, you'd say the cursor is invisible, but that's not an accurate way to describe it; a better way would be to say that it's hidden. The monitor functions very much like the front of a classroom. When you're typing in commands, programs, or other text, it's like writing on a chalkboard. When you want to draw pictures or do things with graphics, you have to go into a graphics mode, which is sort of like pulling down a movie screen when you want to show films or slides.

So, when *Applevision* wants to do its thing, it goes into the graphics mode before it starts drawing pictures. Control-C stops the program in its tracks but leaves the monitor in the graphics mode. It's as though you pulled the plug on the movie projector; the film stops, but the screen is still covering up the chalkboard.

To be able to see what you're typing, you have to get back into the text mode, which is done by simply typing the command, *text*. Voila, the movie screen is gone, and the chalkboard is visible again.

Get Out the Crayons. If you have a color monitor or color television with your Apple, another program to have fun with on rainy days is *Color Test*. It doesn't sound like much, but the *Kaleidoscope* option might help you meditate away the hours. And if you have a joystick or game paddles hooked up, you can play around with the *Sketching Screen*.

The *Sketching Screen* demonstrates another way you communicate with the computer, much like the way you communicate with it when you play your favorite game. Inputting DOS commands is one way to talk to the computer; manipulating the game controllers is another.

Every time you play video games on the Apple or in the arcades, you're telling the program what to do, which in turn tells the computer what to do. For example, in *Pac-Man*, when you move the joystick forward, you're telling the program to make the Pac-Man character move toward the top of the screen. The program tells the computer to draw a series of Pac-Men in such a way that it looks like he's moving upward. Despite what some video games might make you feel like, you really are in control of the machine, not the other way around.

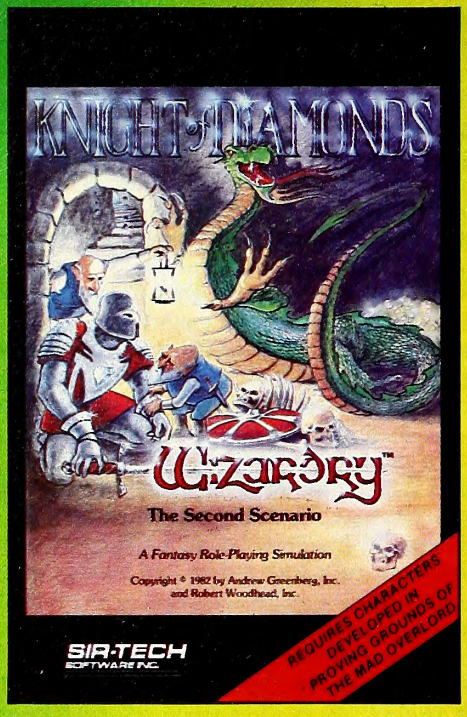
To demonstrate that point a little more, there's a game on the Sample Programs disk called *Brick Out*. It's one of the original *Pong*-type games where you bounce a ball off a wall, trying to knock out all the bricks.

There's a variety of programs on the System Master and Sample Programs disks that you can have fun and experiment with until our next meeting. If you have the Apple manual around, it won't hurt to go through it very briefly. That should be enough to keep you busy for a while. Next time, we'll take a close look inside the Apple to see how things work.

In the meantime, remember that the Apple is a tool for you to use (though some programmers might feel the reverse is true). If you start feeling frustrated, it's only because the Apple can't read your mind; it does only as it's told.

Be patient. It's not as smart as you. ■

Wizardry!



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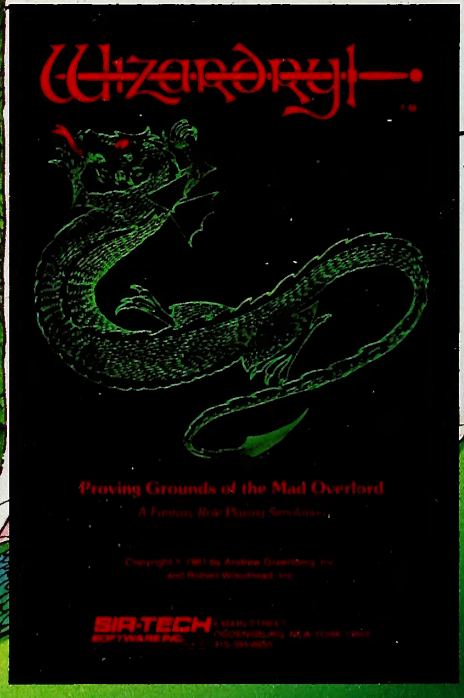

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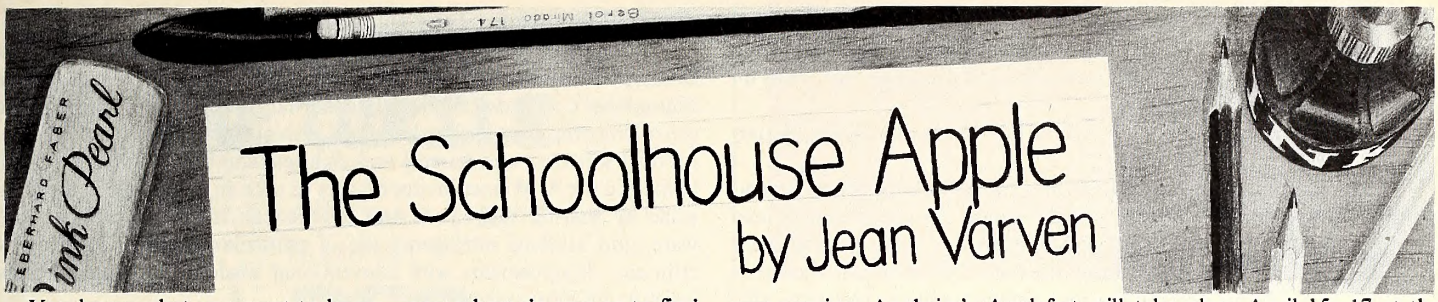


The Schoolhouse Apple

by Jean Varven

You know what you want to know—now where do you go to find out? So much is happening so fast with regard to computers in education that it sometimes seems impossible even to know where to begin looking to keep up. With that in mind, let's look this month at various information sources, including bulletin boards, conferences, magazines, and directories. Perhaps one or more of these will come in handy later on when you know what you want to know but you don't—well, you get the idea.

Education On-Line. Electronic bulletin boards can provide an effective way for teachers, parents, and others interested in education to interact with and learn from one another. Here's information about four such systems. All focus on education and all are free—that is, users do not pay for the service, only for the telephone call. Of course, all require that you have an Apple (or some other micro) and a modem.

The Department of Educational Technology at San Diego State University established the Ed Tech PMS (People's Message System) last November. Since then, reports educational technology professor Bernard Dodge, calls have come in from people in thirty different states. Callers can use the system to share information about education, ask and answer questions, announce new products, and publicize upcoming classes and conferences. Soon, there will also be files of education-related information for users to download onto their systems.

The Ed Tech PMS operates between the hours of 4:30 p.m. and 8:00 a.m. on weekdays and twenty-four hours a day on weekends. The access number is (619) 265-3428.

San Francisco's Living BBS, cosponsored by Computer Using Educators and Far West Regional Educational Laboratory, is another education-centered bulletin board worth knowing about. Living BBS is a good name for this system. Its tree-structured format gives organization to the system and encourages dialogue among users. It also promotes a feeling of immediacy and connectedness with real people on the other end of the line. Because of the tree structure, it's easy to follow the course of a discussion that has been going on over time. A password system enables users to send and receive private messages.

The Living BBS can be reached twenty-four hours a day, seven days a week. To log on, dial (415) 565-3037.

The Leprechaun is an electronic bulletin board supported by the University of Notre Dame. Provided by the office of the assistant provost for computing and the Byteing Irish (the Apple user group at the university), this new board is intended to provide members of the academic community with a means of communicating with one another about computers in education. It features an Apple tips board and help commands that guide new users as they learn about the system. Users can send messages to one another privately by using a password system, and it's also possible to download certain information and programs.

The Leprechaun can be reached twenty-four hours a day, seven days a week. To hook up, dial (219) 239-5875.

Connecticut's Education-80 was set up "to permit free exchange of information and to allow dialogue about the uses of computers in education." System organization is logical and instructions to new users are clear and straightforward. You can make connections twenty-four hours a day, every day, by calling (203) 629-4375.

Conference Corner. Computer fairs, conferences, and other such events can provide excellent opportunities to give and get information, have new experiences, and make personal contacts. Of course, you just may leave one of these gatherings with more questions than you had when you arrived, but that's better than being bored, isn't it?

Apple owners living in and around Anaheim, California, or Boston, Massachusetts, can look forward to Applefests in both these cities come spring. Anaheim's Applefest will take place April 15–17 at the Anaheim Convention Center; Boston's gathering will be happening May 13–15 at the Bayside Exposition Center. In addition to hundreds of exhibits, both shows will feature seminars, workshops, panel discussions, and "software spotlights." To find out more, contact Northeast Expositions, 826 Boylston Street, Chestnut Hill, MA 02167; (617) 739-2000 or (800) 841-7000.

Ed-Com Spring '83 will be held April 28–30 at the Convention Center in Washington, D.C. Hardware, software, and computer-related publications will be on display in the exhibit hall, with demos, seminars, hands-on sessions, and microcourses for educators planned. Presentation topics will include CAI, administrative and class management uses of computers, computer literacy, programming, authoring languages, and research applications. For more information, contact Judco Computer Expos, 2629 North Scottsdale Road, Suite 201, Scottsdale, AZ 85257; (800) 528-2355 outside Arizona; (602) 990-1715 in Arizona.

And then there's the event that people at North Carolina State University are calling "the little conference that grew." According to Professor Sarah Burton in the department of English, the Sixth International Conference on Computers and the Humanities promises to be an informative, impressive, and well-attended event (preregistration is essential). General areas being addressed by speakers will include the moral, social, and philosophical implications of using computers in the humanities; creative writing and microcomputers; linguistic analysis; CAI programming and artificial intelligence; and CAI in foreign language instruction. Dictionary production, lexicography, and linguistics will also be discussed, and presentations on computer literacy and telecommunications are planned.

The conference will take place June 6–8 at North Carolina State. For more information, contact Sarah Burton, ICCH, Department of English, North Carolina State University, Box 5308, Raleigh, NC 27650.

Magazine Madness. The number of magazines devoted to computers in education (or to some specialized facet of the subject) seems to have doubled in the last six months or so. Three new ones to watch for are *Teaching and Computers*, *Family Computing*, and *Microzine*, all from Scholastic (730 Broadway, New York, NY 10003; (212) 505-3000).

According to editorial director Jack Roberts, *Teaching and Computers* was created in response to teachers' requests for nontechnical information about computers and practical ideas on how to use them in the classroom. The monthly magazine is designed "to help teachers learn about the computer, to help them teach their students about the computer, and to help them teach on a daily basis with the computer." It will be published eight times a year, starting in September 1983; meanwhile, a pilot get-acquainted issue is being sent to teachers, school principals, and other educators across the country.

Scheduled to begin publication in September 1983 is Scholastic's *Family Computing*. According to the company, the monthly magazine is intended to supply "practical, easily understandable information on how to use computers for learning and fun on a day-to-day basis." *Family Computing* will address parents but will contain articles for young people as well.

Microzine is a bimonthly publication especially for kids ages eight to fourteen. According to Scholastic, it's a magazine on disk (or cassette, if you prefer) "designed to allow kids to participate in each of its features, rather than simply read them." The company plans to have the first issue in retail outlets some time this month.

Another magazine on disk, available now, is *Window*, a bimonthly. *Window*'s regular components include a feature article, a feature program (in the second issue, the program was *Notebook*, a simple, well-ex-

plained file-management system for home and classroom use), columns on Logo and *VisiCalc*, and reviews that allow readers to see samples of programs before buying them. Future plans call for issues that focus on music, graphics, and language.

To learn more, contact Window, Suite N, 469 Pleasant Street, Watertown, MA 02172; (617) 923-9147.

Still another magazine on disk is *The Political Science Micro Review*, an ambitious new publication from the Public Service Research and Computer Laboratory at North Carolina State University's department of political science and public administration. The nonprofit venture is designed to promote communication among political scientists who use micros.

Published quarterly, the *Review* consists of a twenty-five-page newsletter (primarily Apple-oriented) and a disk for the Apple II. Each disk issue contains at least one public administration program, one tutorial on some aspect of programming, and one utility program, while each newsletter installment includes reviews of software for political scientists, programming tips and listings, and reports from readers about their experiences using microcomputers in political science and public administration. Professor Dave Garson, *Review* editor, encourages readers to participate by submitting articles and letters to the newsletter and programs to the disk version of the publication. For more information, contact Micro Review, PSPA Link 215, North Carolina State University, Raleigh, NC 27511.

Another University-based publication is *Collegiate Microcomputer*, edited by Brian J. Winkel, an associate professor of mathematics at Rose-Hulman Institute of Technology, and published by the institute. According to the publisher, this new quarterly publication is intended to be "a forum for the exchange of ideas on the role of microcomputers in all areas of college and university life." It will include accounts of hardware and software uses, experiences with microcomputer consulting and workshops, and results of research using microcomputers, as well as analyses of experiments in microcomputer use, student projects, and reviews of software, hardware, products, and literature. University professionals and libraries are expected to be the journal's primary audience.

To learn more, contact Collegiate Microcomputer, Rose-Hulman Institute of Technology, Terre Haute, IN 47803.

The Interactive Education Foundation, a nonprofit research organization in Stony Brook, New York, has begun publishing *The Logo and Educational Computing Journal*. The journal is addressed to teachers who use microcomputers in the classroom, educators who use or create educational software, and parents and children who use microcomputers at home. Editor Al Weiner invites readers to take an active role in the magazine by sharing their ideas and experiences; Logo, educational software, and artificial intelligence are of particular interest. Constructive criticism, disagreements with conventional wisdom, and cantankerous insights are also welcome, says Weiner.

For more information, contact *The Logo and Educational Computing Journal*, The Interactive Education Foundation, 1320 Stony Brook Road, Stony Brook, NY 11790.

The February issue of *The Arithmetic Teacher*, published by the National Council of Teachers of Mathematics, is a "focus issue" on teaching mathematics with microcomputers. If you're interested in seeing how microcomputers can be used to teach mathematics better, you'll want to get a copy of this outstanding issue. It contains separate articles on teaching mathematics in the primary and middle grades as well as in junior high school, an article on training teachers to work with microcomputers, and a thought-provoking piece about micros and the mentally gifted. You'll also learn how microcomputers can be used in the teaching of mathematical concepts, computational skills, problem solving, estimation, and reasoning. Information on where to learn more about computers is also included, as is an excellent glossary of computer terms.

Copies of this issue are available from The National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091; (703) 620-9840.

Directory Details. *Instructor* magazine is now compiling information for its second annual *Computer Directory for Schools*, and questionnaires are being sent to companies that produce or distribute hardware, software, or computer-related materials for schools. New companies that would like to be listed are invited to request questionnaires by contacting Katherine Cipolla, Instructor's Computer Directory for Schools, Prentice Associates, 46 Saint John Street, Boston, MA 02130.

The Voice of THE TURTLE

A Schoolhouse Apple Tutorial

LOGO

DONNA BEARDEN

In the various designs and pictures we've created, we've taught the turtle to draw, and we've moved him with the FD, BK, RT and LT commands. It's also possible to move the turtle by means of the X and Y coordinates. But did you ever think about drawing a picture using the coordinate system.

First, let's figure out how the coordinate system works in Logo. Place the turtle at HOME facing the top of the screen. HOME is 0, and every step the turtle goes FORWARD toward the top of the screen is a positive step. Exactly how many steps can he go before he slips off the top of the screen and wraps around to the bottom? Return the turtle to HOME and this time go BACKWARD toward the bottom of the screen. Think of every BACKWARD step as a negative step. (In fact, one way to tell the turtle to go BK 10 is to tell him to go FD −10.) How far can he go?

Once you've figured out the up and down dimensions of the screen, there's a quick way to tell the turtle exactly where to go above or below the mid-line. It is SETY, followed by a space and a number. The number will be positive for the positions above the midpoint and negative for the positions below the midpoint. Remember to use the PENUP command first or the turtle will draw from one position to the next; right now we just want him to hop.

That takes care of up and down. What about side to side? Return the turtle to HOME and rotate him RIGHT 90. He should now be facing the right side of the screen. Figure out how many steps he can go forward before he wraps. Return him to HOME, rotate him RT 90 (or SETH 90), and this time go BACKWARD toward the left edge of the screen.

The positions to the right of HOME are positive and those to the left are negative. To tell the turtle to go to the left or right, use SETX, followed by a space and a number. Try several commands, using positive numbers and negative numbers, and watch the turtle jump back and forth across the screen.

By using both an X and a Y command, we can place the turtle anywhere on the screen. Try hopping the turtle, alternating between an X command and a Y command. Then try putting the two together into a single command, like this:

MIT LOGO: SETXY and two numbers, the first for X and the second for Y. If Y is a negative number, it must be enclosed in parentheses.

Apple Logo: SETPOS [____]. The two numbers for X and Y are enclosed in brackets.

Now let's have the turtle draw some "graph paper" on the screen. Then we can hop him around on the graph paper by giving him X and Y commands. To draw the graph we'll have to use recursion and a conditional.

Apple Logo:

```
TO XLINES :X
IF :X > 100 [STOP]
PU SETX :X
SETH 0
SETY -60
PD FD 160
XLINES :X +10
END

TO YLINES :Y
IF :Y > 100 [STOP]
```

```
PU SETY :Y
SETH 90
SETX -100
PD FD 200
YLINES :Y + 10
END

TO GRAPH
XLINES -100
YLINES -60
END
```

MIT LOGO: The MIT version of the procedure is like the Apple version. Just remove the brackets from the conditional commands in XLINES and YLINES.

Now just pick up the pen and hop the turtle from one point on the "graph paper" to another. With this setup two people can play "Hop the Turtle" by placing colored stickers at certain points on the graph and seeing how quickly they can figure out the coordinates.

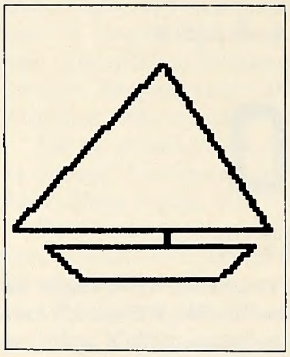
Connect the Dots. Does the fact that you have to pick the pen up before you give the X and Y commands to the turtle suggest another way to draw? How about keeping the pen down and trying to draw a picture by telling the turtle what coordinates to go to? It's like drawing a dot-to-dot on the computer!

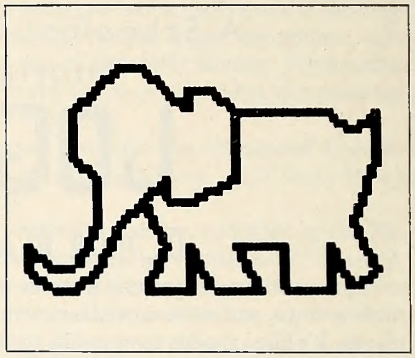
This connect-the-dots activity is also a good one for two people. The first person plots a picture on a piece of graph paper—the real kind that you can wad up and throw in the trash can if you're not happy with your artistic efforts. For starters, select a simple picture or design and transfer it to the graph paper. Figure out the coordinates for the outline and list them on a separate sheet of paper. The second person then takes the list, plots all the points on another sheet of graph paper, and connects them in the order they were listed.

Remember that the first number is always the X coordinate and the second number is always the Y coordinate. It's a good idea to start with simple designs and then move up to more complex ones. Included here are two designs for starters, a simple sailboat and a more difficult elephant.

Sailboat

X	Y
5	−10
−40	−10
5	40
35	−10
5	−15
−30	−15
−20	−25
20	−25
30	−15
5	−15



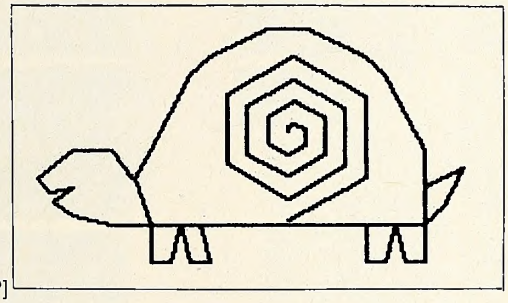


Elephant

X	Y
5	25
25	25
30	20
35	25
35	15
30	0
35	−10
30	−15
25	−5
25	−15
15	−15
15	−5
5	−5
10	−15
0	−15
−5	−5
−5	−15
−15	−15
−10	−5
−15	5
−20	0
−25	−10
−30	−15
−35	−15
−40	−10
−40	−5
−35	−10
−30	−10
−25	0
−25	10
−30	15
−30	25
−20	35
−15	35
−10	30
−5	25
−5	30
0	30
5	25
5	10
−5	5
−10	5
−10	10
−15	5

Let's check out how these designs work on the computer. First, pick the PENUP and go to the first coordinate listed. Now, put the PENDOWN and tell the turtle to SETPOS [____] (Apple) or to SETXY ____ (MIT). Continue down the list of positions for either the sailboat or the elephant; you'll discover that your turtle can draw quite well with X and Y.

Here's one more just for fun—a turtle, or course! Once he was drawn his shell looked so empty that it seemed to cry out for a design; hence the addition of a hexagon spiral. You're welcome to add your own design. The procedures are written in Apple Logo. To change them to MIT Logo, use the command SETXY instead of SETPOS. Remember, if the Y coordinate is negative, it must be enclosed in parentheses. The only other change to be made for MIT is to remove the brackets from STOP in the spiral procedures.



```
TO TURTLE
TURTLE
MOVE
SP2 2
END

TO SP2 :N
IF :N = 48 [STOP]
FD :N
RT 60
SP2 :N + 2
END

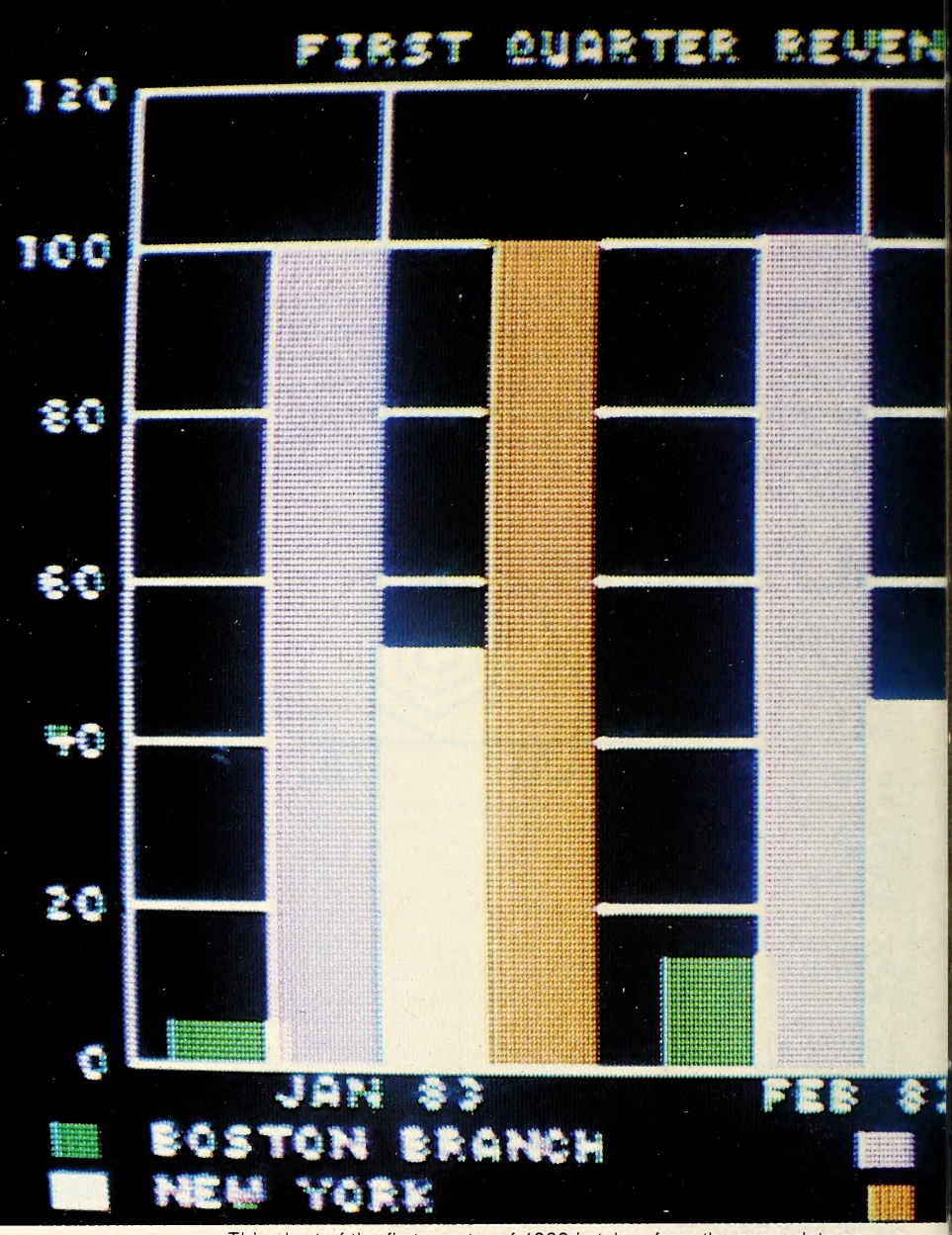
TO MOVE
PU RT 90 FD 80 LT 90 FD 25 PD
END

TO TURTLE
SETPOS  [0 0]
SETPOS [-60 0]
SETPOS [-68 25]
SETPOS [-60 40]
SETPOS [-40 80]
SETPOS [-30 90]
SETPOS [-10 100]
SETPOS [0 105]
SETPOS [20 105]
SETPOS [50 90]
SETPOS [60 80]
SETPOS [70 60]
SETPOS [80 40]
SETPOS [80 0]
SETPOS [90 10]
SETPOS [100 30]
SETPOS [80 20]
SETPOS [80 -20]
SETPOS [70 -20]
SETPOS [65 0]
SETPOS [60 -20]
SETPOS [50 -20]
SETPOS [50 0]
SETPOS [80 0]
SETPOS [-35 0]
SETPOS [-30 -20]
SETPOS [-40 -20]
SETPOS [-45 0]
SETPOS [-50 -20]
SETPOS [-60 -20]
SETPOS [-60 0]
SETPOS [-80 0]
SETPOS [-100 5]
SETPOS [-110 13]
SETPOS [-100 20]
SETPOS [-112 18]
SETPOS [-118 25]
SETPOS [-100 40]
SETPOS [-80 40]
SETPOS [-70 25]
END
```

SoftGraph

DO IT YOURSELF BUSINESS GRAPHICS

BY DAVID DURKEE



This chart of the first quarter of 1983 is taken from the same data as charts on subsequent pages. Moving the begin and end pointers limited this chart to the three-month period shown, even though the

Part 4: Bars and Lines

If your only experience with bars and lines to date is standing in lines at bars, you are about to see a whole new world open up to you. The *Bar/Line Chart* program is the culmination of the SoftGraph series—the most complex piece of code in the system.

The original intention was to have two programs, one each for bar and line charts; but so many of the calculations needed to create the two types of charts were the same that it was deemed more efficient to combine the two. This is fortunate, because it allows us to create combination charts fairly easily.

Before we begin entering *Bar/Line Chart*, we have to create some more shapes. If the memory of January's experience with shape tables still keeps you up nights, worry not. This batch is much smaller. It consists of the four symbols we'll use to distinguish one line from another in the line charts.

This program pokes in the new shape table. Type it, run it, and put it away. That is, save it under some innocuous file name in case the shapes mutate and you need to fix them.

```
10  SL = 26076:NB = 81
20  POKE 233, INT (SL / 256): POKE 232,SL - ( INT (SL / 256) * 256)
30  FOR CT = 1 TO NB
40  READ DT: POKE SL,DT:SL = SL + 1
50  NEXT CT
60  END
70  DATA 4,0,10,0,27,0,44,0,64,0
80  DATA 192,193,41,45,54,54,54,63,63,63
90  DATA 36,36,36,45,149,2,0,192,193,57
100 DATA 23,23,54,14,14,45,197,41,32.228
110 DATA 28,151,2,0,192,193,185,23,23,23
120 DATA 14,14,14,14,197,41,40,40,224,28
130 DATA 28,151,2,0,146,45,45,228,228,28
140 DATA 228,23,246,30,246,46,45,197,193,1
150 DATA 0
```

Having run this program, save the shape table generated by it with the command

```
BSAVE B/L.SHAPES,A26076,L81
```

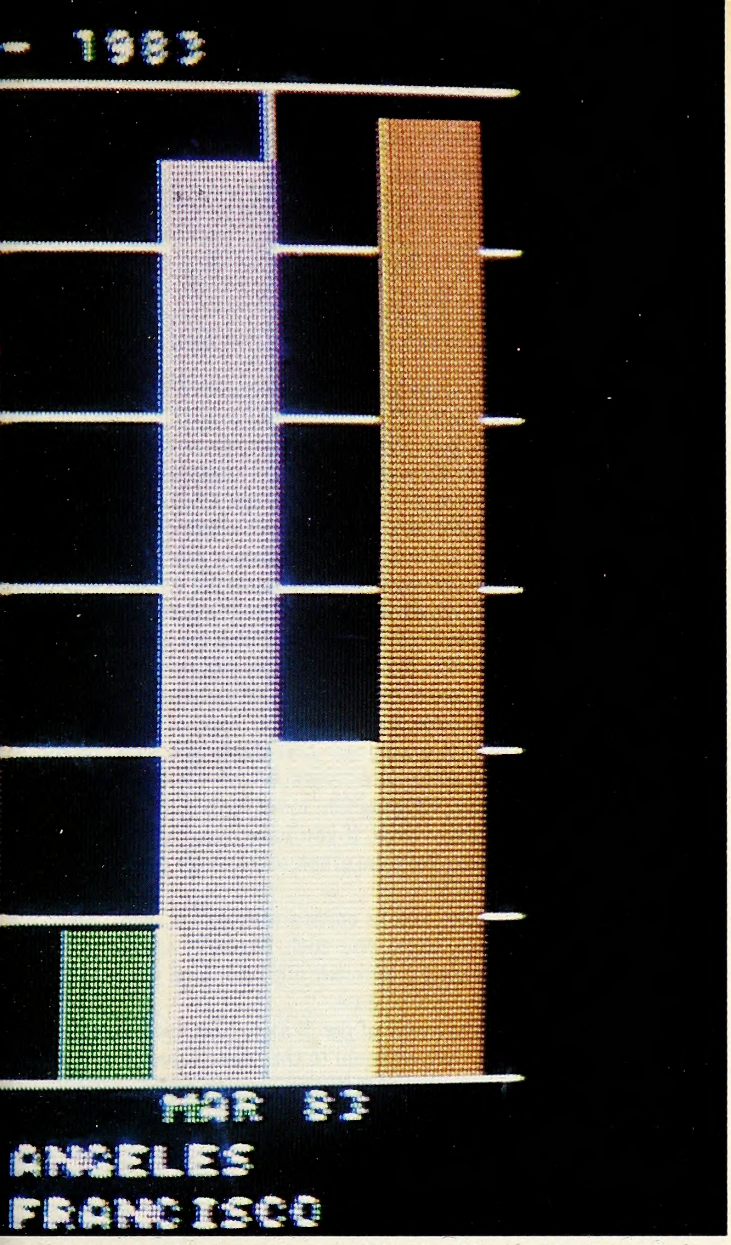
To see to it that the shape table gets put in when you use SoftGraph, add this line to the hello program:

```
55  PRINT D$;"BLOAD B/L.SHAPES"
```

And that is that. SoftGraph now loads and uses two shape tables. The only remaining task is to make sure that the program uses the right table at any given time. We'll go into that a little later.

A Software Organ Transplant. You may remember from last month that, instead of diving right in with the typing, you had to gather together some routines that had been presented previously and build the rest of the program around them. That was because some of the necessary functions performed by the programs in the SoftGraph system overlap.

For instance, we keep the data created by the *Data Editor* in a special place in RAM so that we can pass it effortlessly from one program to the next. All the programs that need to read this data need a routine to



data covered eighteen months. A grid density of four resulted in solid grid lines.

do it with. That routine was first presented in the *Data Editor* in February, as you may recall, and deftly spliced into the *Pie Chart* program during last month's extravaganza. We added to the read routine January's hi-res print routine, that useful device for getting letters and numbers to do our bidding on the graphics screen.

As you might expect, we need those routines again. This time, however, we can call them up without all the mumbo jumbo. Simply load the *Pie Chart* program and type:

```
DEL  10,2420
DEL  2700,3060
```

This action rids us of those parts of *Pie Chart* that we won't be using in *Bar/Line Chart*. Now we're ready once again to type our fingers to the bone in pursuit of a decent graph.

This first section, as usual, presets the values of certain variables, dimensions the array variables, defines certain functions, and does all the other preliminary things.

```
10  CLEAR : HOME : DIM L$(18): DIM V(18,4): DIM LE$(4): DIM
    CT(4): DIM T$(3)
20  T$(1) = "LINE":T$(2) = "BAR ":T$(3) = "NONE"
30  C$ = "LBETYCG" + CHR$ (17) + CHR$ (16):CO = 1:GD = 4
40  DL = 25056: REM DATA LOCATION
50  DEF FN Y(Y) = VR + 10 - ((Y - LY) / (GY - LY) * VR): DEF FN
    X(X) = YW + (X - .5) * (277 - YW) / (LX - FX + 1): DEF FN B(X)
    = FN X(X) - NB * BW / 2 + (BN - 1) * BW
60  VTAB 10: HTAB 13: PRINT "BAR/LINE CHART"
```

The variable C$ in line 30 contains the characters that *Bar/Line Chart*'s command mode accepts as commands. The last two, CHR$(17) and CHR$(16), are control-Q and control-P. When a command is keyed in later on, a routine will use this string to determine what the command was.

A Model of Functionality. The functions defined in line 50 are the calculating workhorses of *Bar/Line Chart*. FN Y(Y) determines the hi-res vertical coordinate associated with a given Y value. FN X(X) determines the horizontal coordinate. FN B(X) calculates the starting location of a given bar. The reason these expressions are so complicated is that there are many variables to consider in order to make the charts flexible.

The X locations (FN X) vary, depending on the number of X fields, which is determined by the difference between the last field selected and the first field selected (LX − FX + 1 in the function definition) and the width of the Y labels (YW, which is determined elsewhere). Of course, the value of X is a factor as well. And that's one of the simpler functions.

The other variables in the function definitions are VR, for vertical resolution (that is, the amount of space allotted to the chart after the size of the labels is accounted for); GY and LY, for greatest and least Y values; NB, for number of data columns to be graphed as bars; BN, for the number of the bar currently being graphed; and BW, for the width of each bar, which is calculated elsewhere. That's quite a cast of characters to keep track of.

A word about defined functions. Those equations don't do anything this early in the program. Instead, they tell the computer what we'll mean later on when we use one of the functions.

This next section reads the legends entered at the top of the *Data Editor* screen.

```
70  REM LEGEND READER
80  REM LEGENDS IN LE$(HF)
90  FOR HF = 2 TO 5
100   VF = - 1: GOSUB 2500:LE$(HF - 1) = W$
110   LE$(HF - 1) = LEFT$ (LE$(HF - 1) + "        ",8): REM EIGHT
      SPACES BETWEEN QUOTES
130   VF = 0: GOSUB 2500:LE$(HF - 1) = LE$(HF - 1) + W$
140   CT(HF - 1) = 1: IF LE$(HF - 1) = "        " THEN CT(HF - 1) = 3:
      REM EIGHT SPACES
150   NEXT HF
160   FX = 1
```

Gosub 2500, remember, goes to the read routine, which gets as many as eight characters from our data area. This routine does the gosub twice for each time through the loop because the legends are sixteen characters long, with the two halves stored in separate cells. Line 110 adds spaces to the first string to bring it up to eight characters before the second string is added to it.

Now the labels are read from the X field by this next routine.

```
170  REM LABEL READER
180  HF = 1: FOR VF = 1 TO 18
190  GOSUB 2500:L$(VF) = W$
200  LP = VF
210  IF LEN (W$) = 0 THEN LP = LP - 1:VF = 18
220  NEXT VF
230  LX = LP
```

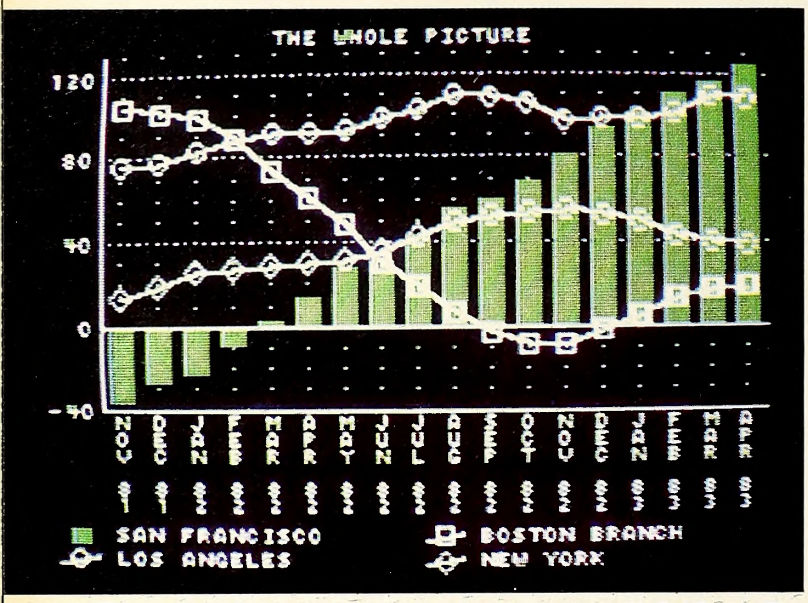
The only thing distinguishing this for-next loop from any other is line 210. The loop reads labels from memory until it comes across one that is blank, at which point it leaves the loop. It doesn't break out of the loop with a goto, however. If you do that too many times in a program the stack will fill up with return addresses that are never used and you'll eventually get an out-of-memory error. Instead, it sets the value of LP to the number of the last valid label and sets VF to 18. Then line 220 stops executing the loop naturally.

After the labels are read, the program goes on to read the values.

```
240  REM VALUES READER
250  FOR HF = 2 TO 5: FOR VF = 1 TO LP
260  GOSUB 2500
270  V(VF,HF - 1) = VAL (W$)
280  NEXT VF: NEXT HF
```

There's LP again in the VF loop in line 250. This routine won't read any data that appears after the last label read by the previous loop.

These loops take some time to execute when you first run the program, so there is a brief wait before anything is displayed on the screen.



This is as much data as you can put on a single chart with SoftGraph. The lower grid density makes the lines stand out.

After that, however, the program runs quite quickly. Like the *Pie Chart* program, *Bar/Line Chart* inputs parameters before plotting anything. Here's the section that prints the parameter input screen.

```
290  HOME : HTAB 4: PRINT "SOFTGRAPH BAR/LINE CHART
     GENERATOR"
300  VTAB 3: FOR HF = 1 TO 4
310  HTAB 6: PRINT "LEGEND ";HF;": ";LE$(HF);
320  HTAB 33: PRINT "-";T$(CT(HF))
330  NEXT HF
340  FOR VF = 1 TO 18
350  POKE 32,VF * 2: POKE 33,1: VTAB 9: PRINT L$(VF);
360  NEXT VF
370  TEXT : VTAB 8: HTAB 2 * FX + 1: PRINT "<";: HTAB 2 * LX + 1:
     PRINT ">";
380  VTAB 17: HTAB 2: PRINT "TITLE: ";T$
390  VTAB 18: HTAB 2: PRINT "LEAST VALUE: ";: HTAB 25: PRINT
     "LOW Y: ";LY
400  HTAB 2: PRINT "MOST VALUE: ";: HTAB 24: PRINT "HIGH
     Y: ";GY
410  HTAB 2: PRINT "COLOR: ";: IF CO = 1 THEN PRINT "YES";:
     GOTO 430
420  PRINT "NO ";
430  HTAB 19: PRINT "Y INCREMENT: ";YI
440  HTAB 2: PRINT "GRID DENSITY: ";GD
450  GOSUB 2950
455  IF LV = GV THEN HOME : PRINT "NO GRAPHABLE FIELDS
     FOUND. PUT THE": PRINT "PROGRAM DISK IN DRIVE ONE
     AND HIT A KEY.": GET A$: GOTO 2940
```

Most of this consists mainly of vtabs, htabs, and prints. Line 350 is interesting, though. The labels are printed vertically to make them relate visually to the way they will appear on the graph. The easiest way to do this is to set the text window to an area one character wide.

Window Dressing. Typing *poke 32,VF * 2* sets the left edge of the window to a different value each time, and *poke 33,1* sets the window width to 1. Whenever a character is printed, it hits the end of the window and the cursor moves down a line, so the string is printed vertically. The text command in line 370 opens the window back up to the full screen. (You can read more about the text window in Appendix J of the Applesoft manual or Appendix F in volume two of the IIe Applesoft manual.)

The gosub 2950 in line 450 goes to a subroutine that calculates the lowest and highest values in the data to be graphed, among other things. More on that later.

This next routine handles command input.

```
460  REM MAIN COMMAND INPUT
470  VTAB 23: HTAB 1: PRINT "COMMANDS: L,B,E,T,Y,C,G
     CONTROL-P,Q.";: CALL - 868
480  VTAB 24: HTAB 1: CALL - 868: GET A$
490  A = 0: FOR X = 1 TO LEN (C$)
500  IF A$ = MID$ (C$,X,1) THEN A = X
510  NEXT X: IF A = 0 THEN 480
520  ON A GOTO 530,660,780,3070,960,900,1080,2920,1200
```

Line 470 prints the command prompt. Because of space limitations on the screen and the multiplicity of commands available, there's no on-screen explanation of each of these commands, so we'll summarize the commands here and then discuss each of the routines in turn.

The loop from 490 through 510 goes through C$ (from line 30) one character at a time to determine whether and where the character accepted in line 480 has a match. If there is a match, it is assigned a number from 1 to the number of the commands, and the on-goto statement in line 520 speeds the program to the corresponding routine. This is a very elegant command handler, the idea for which (to give credit where credit is due) came from the All About Applesoft column.

A Command Performance. Now then, the commands, in brief. L allows you to set the chart type, bar or line, for each of the columns of data. Because chart types are assigned individually for each column of data, you can determine what data to graph and what to ignore.

B and E work as a pair, allowing you to set the beginning and end labels for the graph. In other words, if you have data ranging from January to December, you can limit the graph to a shorter period anywhere within that range.

The T command allows you to enter a title for the chart. Since the previous three commands allow you such flexibility in what data to graph, you may want to enter a different title each time you make a different graph from a given set of data.

Y allows you to set the range of the Y axis. You must enter a number for low Y that is less than or equal to the "least value" displayed on the left, and assign a high Y that is greater than or equal to the "most value," also displayed on the left. The increment must be large enough that all the labels will fit along the Y axis of the graph. The program will inform you if any of the values you enter is too small or too large, as the case may be.

The C command is a simple toggle for color. G allows you to set grid density. Control-Q sends you back to the *Menu* program, and control-P processes the chart.

This routine responds to the L command:

```
530  REM GRAPH DEFINITIONS
540  VTAB 23: HTAB 1: PRINT "B=BAR L=LINE N=NONE
     RETURN=DEFAULT";: CALL - 868
545  NG = 0
550  FOR X = 1 TO 4
560  IF LE$(X) = "        " THEN 640: REM EIGHT SPACES
570  VTAB X + 2: HTAB 34: GET A$
580  IF ASC (A$) = 13 THEN 635
590  IF A$ = "B" THEN CT(X) = 2: GOTO 630
600  IF A$ = "L" THEN CT(X) = 1: GOTO 630
610  IF A$ = "N" THEN CT(X) = 3: GOTO 630
620  GOTO 570
630  PRINT T$(CT(X));
635  IF A$ <> "N" THEN NG = NG + 1
640  NEXT X
645  IF NG = 0 THEN VTAB 24: HTAB 1: PRINT "ERROR- NO
     GRAPHS SELECTED"; CHR$ (7);: GET A$: HTAB 1: CALL -
     868: GOTO 550
650  GOSUB 2950: GOTO 460
```

This routine and many of the ones that come later begin with a prompt that goes at the bottom of the screen, and this one is no exception. The call -868 at the end of line 540 clears away any of the previous prompt. Then the routine loops through the four legends, asking you to assign a chart type to each. If the legend is empty (that is, it contains only eight spaces), line 560 will skip the input section, allowing no chart type to be assigned. Otherwise, line 570 would get a character and the lines following would handle it. T$(CT(X)) in line 630 contains labels, preset

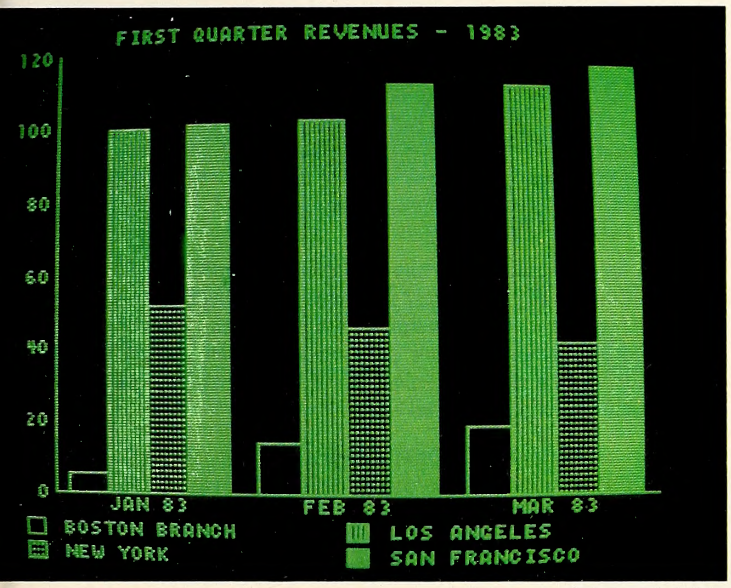
in line 20, for the three possibilities.

```
660  REM BEGIN POINTER
670  VTAB 23: PRINT "ARROWS MOVE POINTER, RETURN
     ACCEPTS";: CALL - 868
680  VTAB 8: HTAB 1 + 2 * FX: GET A$
690  A = ASC (A$)
700  IF A = 8 THEN FX = FX - 1: GOTO 740
710  IF A = 21 THEN FX = FX + 1: GOTO 740
720  IF A = 13 THEN 770
730  GOTO 680
740  IF FX < 1 THEN FX = 1: PRINT CHR$ (7);: GOTO 680
750  IF FX > = LX THEN FX = LX - 1: PRINT CHR$ (7);: GOTO 680
760  PRINT " ";: HTAB 1 + 2 * FX: PRINT "<";: GOTO 680
770  GOSUB 2950: GOTO 460
```

The begin pointer routine lets you set the beginning of the data to graph. A less-than sign appears over the first X label and a greater-than sign over the last one, marking the beginning and end of the data to be graphed. With this routine you can move the first pointer to a new location and it will reset FX, the first X field, to match it.

The next routine is virtually identical to the previous one, except that it moves the end pointer and changes LX, the last X field.

```
780  REM END POINTER
790  VTAB 23: PRINT "ARROWS MOVE PONTER, RETURN
     ACCEPTS";: CALL - 868
800  VTAB 8: HTAB 1 + 2 * LX: GET A$
810  A = ASC (A$)
820  IF A = 8 THEN LX = LX - 1: GOTO 860
830  IF A = 21 THEN LX = LX + 1: GOTO 860
840  IF A = 13 THEN 890
850  GOTO 800
860  IF LX < FX + 1 THEN LX = FX + 1: PRINT CHR$ (7);: GOTO 800
870  IF LX > LP THEN LX = LP: PRINT CHR$ (7);: GOTO 800
880  PRINT " ";: HTAB 1 + 2 * LX: PRINT ">";: GOTO 800
890  GOSUB 2950: GOTO 460
```



The same data from the opening bar chart is shown here displayed in black and white. Eliminating the grid makes the black bar easier to see.

The next routine toggles color.

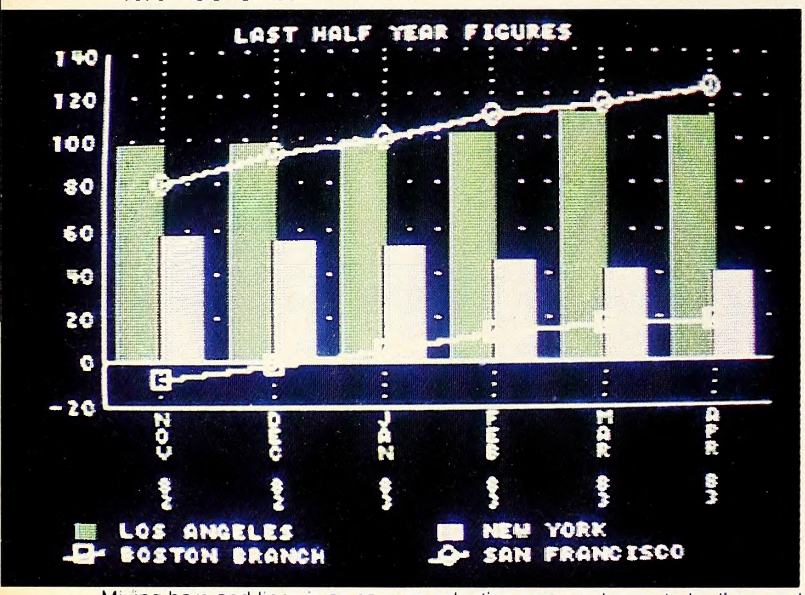
```
900  REM COLOR TOGGLE
910  CO = NOT CO
920  VTAB 20: HTAB 9
930  IF CO THEN PRINT "YES": GOTO 950
940  PRINT "NO "
950  GOTO 460
```

The most interesting things about this short sequence are the logical statements it uses in lines 910 and 930. The variable CO holds either a 1 (for color) or a 0 (for black and white). Line 910 neatly switches between

them. In line 930, *if CO* is the equivalent of saying *if CO = 1*, but more briefly.

The next routine sets the range of numbers on the Y axis.

```
960  REM Y RANGE SET
970  VTAB 23: HTAB 1: PRINT "ENTER NEW VALUES";: CALL - 868
980  VTAB 24: HTAB 1: CALL - 868
990  VTAB 18: HTAB 32: GOSUB 2610
1000  IF W$ <> "" THEN LY = VAL (W$)
1010  VTAB 19: HTAB 32: GOSUB 2610
1020  IF W$ <> "" THEN GY = VAL (W$)
1030  VTAB 20: HTAB 32: GOSUB 2610
1040  IF W$ <> "" THEN YI = VAL (W$)
1050  GOSUB 2780
1060  IF ER THEN 960
1070  GOTO 460
```



Mixing bars and lines is as easy as selecting some columns to be lines and others to be bars.

The Y range set routine is most noteworthy for the routines it calls. The routine at line 2610 is an eight-digit numeric input routine and the one at line 2780 checks to see that the values entered are legal. We'll discuss the routines themselves later.

The next routine inputs grid density.

```
1080  REM GRID DENSITY INPUT
1090  VTAB 23: HTAB 1: PRINT "ENTER NEW GRID DENSITY
      (0-4)";: CALL - 868
1100  VTAB 21: HTAB 16: GET A$:A = ASC (A$)
1110  IF A < 48 OR A > 52 THEN 1100
1120  PRINT A$;:GD = A - 48: GOTO 460
```

Like so many of the input routines in SoftGraph, this one doesn't accept answers that are outside of the legal parameters. It's unique in that it uses the ASC function to evaluate the input string (line 1100) rather than using VAL. This is because VAL evaluates most illegal input as zero, but in this case zero is within the legal range.

Now we get to the lengthy procedures the program uses to plot a graph. This first section determines the width of the longest label in the Y range you specified.

```
1200  REM DETERMINE Y LABEL WIDTH
1210  YW = 0: FOR X = LY TO GY STEP YI
1220  IF LEN ( STR$ (X)) > YW THEN YW = LEN ( STR$ (X))
1230  NEXT X
1240  YW = (YW + 1) * 6
1250  REM ERROR CHECK
1260  GOSUB 2780
1270  IF ER = 1 THEN 460
```

After a simple length-checking loop, the program executes a gosub to line 2780, the same error-checking routine mentioned before, to see if everything will be okay. If the Y range is illegal (ER = 1), line 1270 returns you to the parameter input screen with an error message.

If everything is okay, the action on the hi-res screen begins with the next routine.

```
1280  REM START PLOTTING
1290  HGR2 : HCOLOR= 3
1300  HPLOT YW, FN Y(GY) TO YW, FN Y(LY) TO FN X(LX - FX +
      1.5), FN Y(LY)
1310  REM GRID
1320  ON GD + 1 GOTO 1490,1400,1400,1400,1330
1330  FOR Y = LY TO GY STEP YI
1340  HPLOT YW, FN Y(Y) TO 277, FN Y(Y)
1350  NEXT
1360  FOR X = FX TO LX
1370  HPLOT FN X(X + 1 - FX), FN Y(GY) TO FN X(X + 1 - FX), FN
      Y(LY)
1380  NEXT
1390  GOTO 1490
1400  FOR X = FX TO LX
1410  FOR Y = LY TO GY STEP YI / 2 ^ (GD - 1)
1420  HPLOT FN X(X + 1 - FX), FN Y(Y)
1430  NEXT Y: NEXT X
1440  IF GD = 1 THEN 1490
1450  FOR Y = LY + YI TO GY STEP YI
1460  FOR X = FX - .5 TO LX + .5 STEP 1 / 2 ^ (GD - 1)
1470  HPLOT FN X(X + 1 - FX), FN Y(Y)
1480  NEXT X: NEXT Y
1490  D = 1:F = 2
```

Lines 1280 through 1490 draw the axes of the graph and the grid, if any. The grid-density variable (GD) exerts its influence on the step of the for-next loops beginning at lines 1410 and 1460.

After the grid is laid down, the bars are plotted, the zero line is put in and the line charts are then drawn. This order has the effect of overlaying things in an appealing way. First the bars:

```
1500  REM BARS
1510  BN = 0
1520  FOR N = 1 TO 4
1530  IF CT(N) <> 2 THEN 1920
1540  BN = BN + 1
1550  IF NOT CO THEN 1640
1560  REM COLOR BARS
1570  HCOLOR= BN: IF BN = 4 THEN HCOLOR= 5
1580  FOR C = FX TO LX
1590  FOR X1 = FN B(C + 1 - FX) TO FN B(C + 1 - FX) + BW
1600  HPLOT X1, FN Y(V(C,N)) TO X1, FN Y(0)
1610  NEXT X1
1620  NEXT C
1630  GOTO 1790
```

If the hplot coordinates in line 1600 don't make sense to you, go back to the discussion of the defined functions at the beginning of the program. The color bar routine is simpler than the black-and-white one that follows because color bars can be constructed with vertical lines of a given color. It is harder to establish four different patterns that are readily distinguishable in black and white.

```
1640  REM BLACK & WHITE BARS
1650  FOR C = FX TO LX
1660  HCOLOR= BN - 1
1670  IF BN = 3 THEN HCOLOR= 0
1680  FOR X1 = FN B(C + 1 - FX) TO FN B(C + 1 - FX) + BW
1690  HPLOT X1, FN Y(V(C,N)) TO X1, FN Y(0)
1700  NEXT X1
1710  IF BN = 3 THEN HCOLOR= 2: GOTO 1730
1720  GOTO 1760
1730  FOR Y1 = FN Y(V(C,N)) TO FN Y(0) STEP 2 * SGN ( FN Y(0) -
      FN Y(V(C,N)))
1740  HPLOT FN B(C + 1 - FX),Y1 TO FN B(C + 1 - FX) + BW,Y1
1750  NEXT Y1
1760  HCOLOR= 3
1770  HPLOT FN B(C + 1 - FX), FN Y(0) TO FN B(C + 1 - FX), FN
      Y(V(C,N)) TO FN B(C + 1 - FX) + BW, FN Y(V(C,N)) TO FN
      B(C + 1 - FX) + BW, FN Y(0)
1780  NEXT C
```

The four patterns for black-and-white bars are solid black, solid white, a color (which will appear on a monochrome monitor as vertical lines), and a pattern of alternating horizontal color lines (which will look

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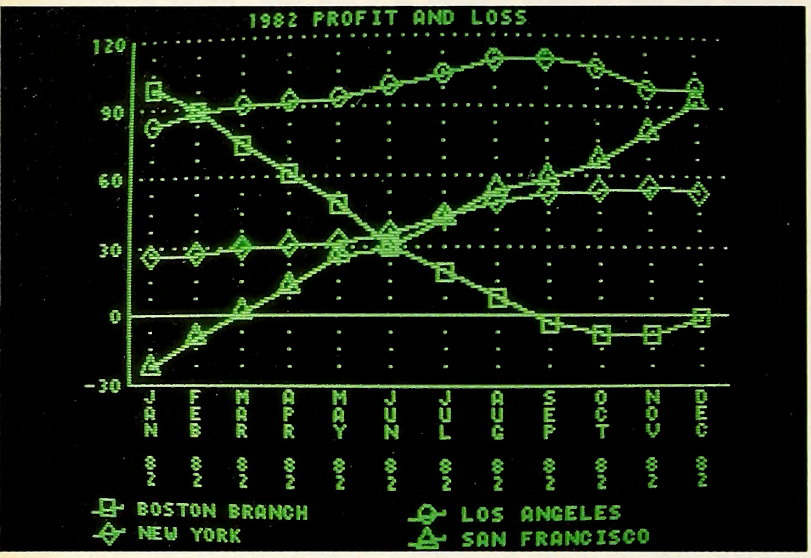
like a close dot pattern). Because the dot pattern will show the grid through it, we'll use an invisible bar composed of black vertical lines to erase that part of the grid, then plot the bar with horizontal lines (1730



A year's worth of data charted with lines. As many as four different lines can be distinguished by the four key shapes.

through 1750). All of the black-and-white bars are outlined with white (line 1770) to make them stand out better.

Next the bar legends are written in.

```
1790  REM BAR LEGENDS
1800  Y = 175: IF BN > 2 OR NG < 3 THEN Y = 184
1810  X = 10: IF BN / 2 = INT (BN / 2) THEN X = 150
1820  IF CO THEN 1860
1830  HCOLOR= BN - 1
1840  IF BN = 3 THEN FOR Y1 = Y TO Y + 5 STEP 2: HPLOT X,Y1
      TO X + 8,Y1: NEXT Y1: GOTO 1890
1850  GOTO 1870
1860  HCOLOR= BN: IF BN = 4 THEN HCOLOR= 5
1870  FOR X1 = X TO X + 8: HPLOT X1,Y TO X1,Y + 5: NEXT X1
1880  IF CO THEN 1900
1890  HCOLOR= 3: HPLOT X,Y - 1 TO X,Y + 5 TO X + 8,Y + 5 TO X
      + 8,Y - 1 TO X,Y - 1
1900  X = X + 20:W$ = LE$(N)
1910  HCOLOR= 3: GOSUB 9000
1920  NEXT N
1930  HCOLOR= 3: HPLOT YW, FN Y(0) TO FN X(LX - FX + 1.5),
      FN Y(0)
```

The procedure to create the key marker for the bar legends is much the same as the procedure to create the bars, whether the bars are monochrome or color. Then the word to be written is determined and a gosub to line 9000 is executed to write the string. Line 1930 plots a white horizontal line where Y equals zero to make that axis stand out.

The lines are plotted next.

```
1940  REM LINES
1950  LN = 0
1960  FOR N = 1 TO 4
1970  IF CT(N) <> 1 THEN 2130
1980  POKE 232,220: POKE 233,101
1990  LN = LN + 1
2000  HCOLOR= 3
2010  HPLOT FN X(1), FN Y(V(FX,N))
2020  FOR C = FX TO LX
2030  HPLOT TO FN X(C + 1 - FX), FN Y(V(C,N))
2040  DRAW LN AT FN X(C + 1 - FX), FN Y(V(C,N))
2050  NEXT C
2060  REM LINE LEGENDS
2070  Y = 175: IF NB + LN > 2 OR NG < 3 THEN Y = 184
2080  X = 10: IF (NB + LN) / 2 = INT ((NB + LN) / 2) THEN X = 150
2090  DRAW LN AT X + 3,Y + 2
2095  HPLOT X - 4,Y + 4 TO X + 10,Y + 1
2100  X = X + 20:W$ = LE$(N)
2110  POKE 232,0: POKE 233,96
2120  GOSUB 9000
2130  NEXT N
```

The lines routine is a piece of cake. Line 1980 sets the pointers to the second shape table, which contains the markers identifying the lines in the legend. Because the program charts the same lines for color or monochrome, the line plotting is all accomplished in a simple loop from lines 2020 through 2050. The legends for the lines are handled next, in lines 2060 through 2130, thus completing the outer loop. Line 2110 turns the first shape table back on.

Now the program finishes up with the axis labels and the chart title.

```
2140  REM Y LABELS
2150  FOR YL = LY TO GY STEP YI
2160  W$ = STR$ (YL)
2170  X = YW - 6 * LEN (W$)
2180  Y = FN Y(YL) - 2
2190  GOSUB 9000
2200  NEXT YL
2210  REM X LABELS
2220  FOR XL = FX TO LX
2230  W$ = L$(XL)
2240  Y = FN Y(LY) + 2
2250  IF LD THEN 2300
2260  X = FN X(XL + 1 - FX) - 3 * LEN (W$) + 3
2270  D = 1:F = 2
2280  GOSUB 9000
2290  GOTO 2330
2300  X = FN X(XL + 1 - FX)
2310  D = 2:F = 1
2320  GOSUB 9000
2330  NEXT XL
2340  D = 1:F = 2
2350  IF T$ = "" THEN 2380
2360  X = 140 - 3 * LEN (T$):Y = 2
2370  W$ = T$: GOSUB 9000
```

The positioning of the labels is designed to make them as readable as possible. The Y axis labels are placed flush right against the axis. The position calculation is made in line 2170. Line 2260 centers the X axis labels under their corresponding locations. In the same way, line 2360 centers the chart title on the top of the screen.

With the chart completed, the next routine presents your options.

```
2380  GET A$
2390  TEXT : HOME
2395  PRINT "CHART COMPLETED": PRINT
2400  PRINT "1. RETURN TO MENU"
2410  PRINT "2. SEE CHART"
2420  PRINT "3. RESET PARAMETERS"
2430  VTAB 7: HTAB 3: PRINT "WHAT NOW? ";: CALL - 868:
      GOSUB 2610: IF W$ = "" THEN 2430
2435  A = VAL (W$)
2440  IF A < 1 OR A > 3 THEN 2430
2450  ON A GOTO 2920,2460,290
2460  POKE - 16304,0: POKE - 16299,0
2470  GET A$: GOTO 2390
```

The options presented are the same ones as in the *Pie Chart* program when the graph is finished: return to the *Menu*, look at the chart, or reset the parameters.

Now we'll look at the subroutines called by the earlier sections of the program.

```
2610  REM GET NUMERIC INPUT
2620  W$ = ""
2630  GET A$:A = ASC (A$)
2640  IF A = 8 THEN 2700
2650  IF A = 13 THEN 2750
2660  IF LEN (W$) = 8 THEN PRINT CHR$ (7);: GOTO 2630
2670  IF A = 45 AND W$ = "" THEN PRINT A$;:W$ = A$: GOTO
      2630
2680  IF (A > 47 AND A < 58) OR A = 46 THEN W$ = W$ + A$: PRINT
      A$;
2690  GOTO 2630
2700  IF LEN (W$) = 1 THEN PRINT A$;" ";A$;: GOTO 2620
2710  IF LEN (W$) = 0 THEN 2620
2720  W$ = LEFT$ (W$, LEN (W$) - 1)
```

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```
2730  PRINT A$;" ";A$;
2740  GOTO 2630
2750  IF W$ = "" THEN 2770
2760  CALL - 868
2770  RETURN
```

This is a highly specialized numeric input routine. It accepts only eight characters, all of which must be digits, except for the first one; this can be a minus sign. This routine is used by the Y range input routine.

The next routine checks for illegal Y values in the assigned range.

```
2780  REM CHECK Y VALUES
2790  ER = 0: REM ERROR FLAG
2800  NB = 0:NG = 4: FOR X = 1 TO 4
2810  IF CT(X) = 3 THEN NG = NG - 1
2820  IF CT(X) = 2 THEN NB = NB + 1
2830  NEXT X
2840  BW = INT ((277 - YW) / ((LX - FX + 1) * (NB + .5)))
2850  LD = 0: IF (LX - FX + 1) * (LL + 1) * 6 > 226 THEN LD = 1
2860  VR = 170 - (LD * (6 * (LL + 1) - 10) + 8 * INT ((NG + 1) / 2))
2870  IF LY > LV THEN VTAB 24: HTAB 1: PRINT "ERROR- LOW Y
      TOO HIGH"; CHR$ (7);: GET A$:ER = 1: RETURN
2880  IF GY < GV THEN VTAB 24: HTAB 1: PRINT "ERROR- HIGH
      Y TOO LOW"; CHR$ (7);: GET A$:ER = 1: RETURN
2890  IF YI < = 0 THEN VTAB 24: HTAB 1: PRINT "ERROR-
      ILLEGAL INCREMENT"; CHR$ (7);: GET A$:ER = 1: RETURN
2900  IF (GY - LY) / YI > VR/7 THEN VTAB 24: HTAB 1: PRINT
      "ERROR- INCREMENT TOO SMALL"; CHR$ (7);: GET A$:ER
      = 1: RETURN
2910  RETURN
```

If this routine finds something wrong, it prints an appropriate message at the bottom of the screen, sets a flag (the variable ER) to 1, and returns control to the calling routine.

The next routine is the exit routine, which runs *Menu*.

```
2920  REM THE WAY OUT
2925  HOME : PRINT "PUT PROGRAM DISK IN DRIVE 1": PRINT
      "AND HIT A KEY. USE ESCAPE TO ABORT.";
2930  GET A$: IF A$ = CHR$ (27) THEN 290
2940  PRINT : PRINT CHR$ (4);"RUN MENU"
```

This is largely the same as the *Pie Chart* exit, except for the addition of the escape feature in line 2930.

The next routine finds the high and low values in the chosen data. The values it determines are used as the limits on the Y range input.

```
2950  REM HIGH AND LOW FINDER
2960  LV = 0:GV = 0:LL = 0
2970  FOR Y = FX TO LX
2980  IF LEN (L$(Y)) > LL THEN LL = LEN (L$(Y))
2990  FOR X = 1 TO 4: IF CT(X) = 3 THEN 3020
3000  IF V(Y,X) > GV THEN GV = V(Y,X): GOTO 3020
3010  IF V(Y,X) < LV THEN LV = V(Y,X)
3020  NEXT X
3030  NEXT Y
3040  VTAB 18: HTAB 15: PRINT LV; SPC( 8 - LEN ( STR$ (LV)));
3050  VTAB 19: HTAB 14: PRINT GV; SPC( 8 - LEN ( STR$ (GV)));
3060  RETURN
```

Finally, the last routine does the input of the title. We could almost have used a simple input statement for this, but if we hadn't limited the input length as we did, the input could have messed up the layout of the parameter page.

```
3070  REM GET TITLE INPUT
3080  VTAB 23: HTAB 1: PRINT "ENTER CHART TITLE";: CALL -
      868
3090  VTAB 17: HTAB 9
3100  W$ = " "
3110  GET A$:A = ASC (A$)
3120  IF A = 8 THEN 3170
3130  IF A = 13 THEN 3210
3135  IF A < 32 THEN 3110
3140  IF LEN (W$) = 30 THEN PRINT CHR$ (7);: GOTO 3110
3150  W$ = W$ + A$: PRINT A$;
3160  GOTO 3110
3170  IF LEN (W$) = 1 THEN PRINT A$;" ";A$;: GOTO 3100
3180  IF LEN (W$) = 0 THEN 3100
3190  W$ = LEFT$ (W$, LEN (W$) - 1)
3200  PRINT A$;" ";A$;: GOTO 3110
3210  IF W$ <> "" THEN T$ = W$
3220  VTAB 17: HTAB 9: PRINT T$;: CALL - 868
3230  GOTO 460
```

We didn't include any graph-printing programs in this system. The reason is that every printer works differently. The Silentype from Apple has a graphics dump program built in, as do several printer interfaces. Many dot-matrix printers have a graphics capability but need a special program to interpret the data. There are several programs available for various printers—too many to discuss here. Your dealer can probably answer any questions you have about your system's capabilities for printing graphics.

In any case, there are a few things to remember when printing charts generated by SoftGraph. First of all, all charts are on hi-res page two. If your program or printer has the option, unidirectional printing is usually better than bidirectional for graphics. Lastly, with some programs you will have to specify printing in inverse. The white-on-black of the screen should become black-on-white when printed out.

A Fond Farewell. That completes the SoftGraph system, or at least that's as far as we'll go with it together. It's been said that no work of art is ever truly finished, only interrupted. The same is true for computer software. There is a lot more that can be done with the system. Scatter plots and histograms are one direction to go in, if such is your bent. Another would be to incorporate the aforementioned graphics dump routines, or picture packers, or even *VisiCalc* file converters. We've really only begun, but it's a firm beginning, a solid foundation on which to build an even larger system.

The ball's in your court. ◨

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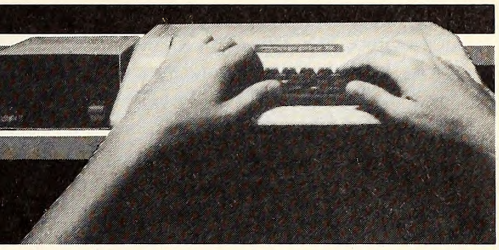


Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

☐ Some additions to computer furniture are available from **Walker Company** (1801 Pepper Road, Petaluma, CA 94952; 707-778-6642). All accessories are constructed of solid-red-oak and oak-veneer plywood. The first is the Apple Stand. The two-tiered model holds your computer and monitor, while the three-tiered model holds disk drives as well. Two-tiered, $44.50; three-tiered, $54.50. The Printer Stand lets you store paper underneath the printer. $34.50; extra wide, $39.50. The Disk Storage Box features a lid to protect your 5 1/4-inch disks from dust, leaking ceilings, and other hazards. Standard model holds thirty-five disks, $39.50. Double-width model holds seventy disks, $49.50.

☐ Each week throughout 1983, **GameMaster** (1723 Howard Street, Evanston, IL 60202; 312-328-9009), the computerized mansion of games by modem, will be giving away a certificate worth three free hours of time on the GameMaster System. To enter their drawing, call the GameMaster ABBS at (312) 475-4884 (modem), and leave your name and address.

☐ A microcomputer-software locator is available from **Technique Learning** (40 Cedar Street, Dobbs Ferry, NY 10522; 914-693-8100). The *Universal Software Market Identifier Market Directory* is a series of directories that provide a means for identifying products in the marketplace. The directories present information about software products by using several codes to identify the specific version of a product. Codes identify the publisher, product, computer model, and minimum hardware configuration. The *Market Directory* is a trade book listing all USMI-registered software publishers. $195 per year.

☐ **Real Time Microsystems** (Box 3081, Troy, NY 12181; 518-274-7149) has released *Real Time Frequency Spectrum Analyzer*, a program that turns an Apple and an AI13 analog-to-digital converter interface into a 10 kHz bandwidth spectrum analyzer. It receives data, performs a fast-Fourier transform analysis, and plots the magnitude of the frequency spectrum. $400.

☐ Electronic spreadsheet users now have their own magazine, *The Power of: ES*, from **Management Information Source** (3543 N.E. Broadway, Portland, OR 97232; 503-287-1462). Included are features on *VisiCalc*, *SuperCalc*, and on *Multiplan*. Also included are articles on individuals who have increased productivity and profits or have otherwise made improvements through the use of spreadsheet analysis. Bimonthly. $3 per issue.

☐ **Highlands Computer Services** (14422 S.E. 132nd Street, Renton, WA 98056; 206-228-6691) has introduced *E-Z Invoice*, an accounting program that allows you to generate invoices and then save them to disk. You can recall the invoices and print or edit them. It also has a keyboard macro feature that lets you build a name and address file or a file for items and prices, and then call the entire record into your invoice by entering a user-defined three-character code. $60.

☐ A microcomputer newsletter for school administrators has come on the market. Each month, *Microcomputer Digest* offers concise, easy-to-read summaries of articles from a wide variety of microcomputing magazines and journals, chosen for their educational focus. Topics include funding sources, new developments, product reviews, and practical applications of micros in education. Available from **C.E.O. Associates** (201 Route 516, Old Bridge, NJ 08857; 201-679-1877). $29.95 per year.

☐ *Diskazine* is a bimonthly magazine on a 5 1/4-inch disk and is directed toward the family or the new Apple owner. Each issue contains a crossword puzzle, game contest, and puzzle contest. Major sections of the magazine are the editor's corner, fun and games, general programs, tutorials, helpful hints, and art, music, and theatrics. From **Diskazine Publications** (Box 1537, Columbus, IN 47201; 812-342-3702). $36 per year; $6 for trial issue.

☐ **Synergetic Solutions** (4715 Shepherd Road, Mulberry, FL 33860; 813-646-6557) is offering *Checkbook-Checkwriter II*, a program that allows you to print checks individually as well as in batches. The product prints the check stub for a permanent record and creates data files. Packages include bundles of two hundred or five hundred continuous checks, two-window envelopes, and a cassette version of the *Checkwriter II* program. Two-hundred check version, $59.95; five-hundred check version, $79.95.

☐ **T & W Systems** (18437 Mount Langley, Suite B, Fountain Valley, CA 92708; 714-963-3913) has adapted its general-purpose drafting software to the new D-size DMP-41 plotter from Houston Instruments, providing a professional drafting system for architectural, electrical, and mechanical drafting. A package, which includes drafting software, digitizer, and D-size plotter, is available for the Apple II for under $6,500. A B-size package is available for under $4,500.

☐ **Starsoft** (4984 El Camino Real, Suite 125, Los Altos, CA 94022; 415-965-8000, 800-882-8000) has begun delivering five new software packages. The first is *The Scheduler*, a calendar and docket-scheduling program for professionals. It records client appointments and tasks and accommodates multiple-occurrence dates to prevent duplicate scheduling of time. Twenty-seven criteria can be included in the calendar or docket, including client number, action code, disposition code, control number, and due times. $995. *ESQ-1* is a professional time and billing program designed to meet the needs of the legal profession. It offers flexible report writing, providing more management control over professional time, accounts receivables, and analyses of productivity of individuals or the entire firm. *ESQ-1* integrates with *The Scheduler*. $2,000. *Magic Quill* is a bookkeeping and accounting program for accountants and bookkeeping and tax professionals. The software accommodates up to four hundred ledger accounts for an unlimited number of clients. It posts to the general ledger from summarized journals, reconciles bank accounts, and accommodates recurring entries. *Magic Quill* also prepares working trial balances, complete financial statements, depreciation schedules, and loan amortization schedules. $2,000. *Promot* is a time and billing system for consultants, architects, advertising agency personnel, and others who bill on an hourly basis. The program records revenues, including deposits, and reflects them in subsequent invoices. It offers automatic invoice preparation, allows for multiple invoice formats, and maintains complete accounts-receivable ledgers. $2,000. *Taxexec* creates federal and selected state income-tax returns. For use by professional accountants, the program performs all required computations, permits multiple changes, and reflects those changes in affected areas throughout the return. $995.

☐ **Transtar** (Box C-96975, Bellevue, WA 98009; 206-454-9205) has introduced the Model 130 daisy wheel printer, compatible with all word processing software and using Diablo routines. The printer prints bidirectionally at sixteen characters per second and offers elite, pica, or proportional style printing. It also prints boldface, underscores, subscripts, and superscripts. $895.

☐ **Class 1 Systems** (17909 Maple Street, Lansing, IL 60438; 312-474-4664) has published *TestRite*, an educational program that stores test items and makes customized tests. The software is for teachers of middle elementary through college and technical schools. Questions may be printed in multiple choice, true/false, matching, and completion formats. The program requires two disk drives. $139.

☐ Three new strategy games are available from **SubLogic** (713 Edgebrook Drive, Champaign, IL 61820; 217-359-8482). The first is *Zendar*,

an economic and defense simulation that puts you in charge of a collapsing empire. It's up to you to allocate aid and resources, annex other countries, make commerce agreements, and defend your borders from enemy attack. $29.95. Next is *Frontline*, which offers a faster-paced game of wits. Enemy forces are trying to break through one of your front-line sectors, which you defend with reserve troops, tanks, and planes. Also $29.95. Finally, there's *Roadblock*. As county sheriff, you send out patrol cars to surround and capture a couple of escaping bank robbers. Their car leaves yours in the dust, so you'll need a good strategy to catch them. $29.95. SubLogic also has a music utility out. *Music Maker* lets you create and play music with four or more voices, and you don't need any hardware. Notes are defined as short as 256th notes, and spread across more than four octaves. The song maker/editor lets you use dotted notes, triplets, quintuplets, staccato, legato notes, and all sharps and flats. $39.95.

☐ *Pick That Tune* is a game that contains one hundred popular songs divided into pop, country and western, children, and television categories. There are sixteen game variations, and one to ten players can play. Bid on how few notes it will take you to identify the tune, and then take turns trying to pick the name of the tune. A new one from **Swearingen Software** (6312 West Little York, Suite 197, Houston, TX 77088; 713-937-6410). $29.95.

☐ The New Hampshire Association for Computer Education Statewide (NHACES) is sponsoring the Second Annual Microcomputers in Education Conference to be held April 8 and 9 at the New Hampshire Highway Hotel in Concord, New Hampshire. The conference, which is open to the public, will offer vendors' displays and demonstrations, a hands-on lab for reviewing software, software swap sessions, and common interest sessions. For information, contact **Kimball School** (Concord, NH 03301; 603-225-9681) or Anne Knight, **Computer Services** (Stoke Hall, University of New Hampshire, Durham, NH 03824; 613-862-3517).

☐ **C. R. Hunter & Associates** (1527 Northwood Drive, Cincinnati, OH 45237; 513-761-9322) has announced its *Permanent Portfolio Analyzer*, an investment program allowing you to enter and analyze a long-term portfolio of investments that's planned for a period of ten years or so. Inflation, deflation, zero inflation, and uncertain economies can be selected to test various scenarios. The program then prints a ten-year projection analysis of the portfolio's future purchasing power, comparing its performance with that of the program's suggested portfolio for the chosen scenario. $295.

☐ *The Desecration*, the adventurecade game by **Mind Games** (420 South Beverly Drive, Suite 207, Beverly Hills, CA 90212; 213-277-8044), has a price tag of $42.95.

☐ For the modem-minded there's a newsletter from **Dial-Out** (175 Fifth Avenue, Suite 33712, New York, NY 10010; 201-653-5775) called *Dial-Out*. It comes out monthly and covers CompuServe, Delphi, the Source, GameMaster, Star-Text, and local bulletin board systems. $25 per year.

☐ **Software-X-Change** (12032 Wilshire Boulevard, Los Angeles, CA 90025; 213-820-2439) has published the CP/M edition of *Spectrum: The Microcomputer Software Directory*, which will be released quarterly. Products are grouped according to profession and industry. The emphasis of the directory is on specialized, hard-to-find packages. $3.95; $14 for a year's subscription.

☐ **Computer Expositions** (Box 3315, Annapolis, MD 21403; 301-263-8044) has announced two shows. The Virginia/Carolinas Computer Show will take place April 21 through 24 at the Pavilion Exhibition Center in Virginia Beach, Virginia. The Maryland Computer Show will run May 19 through 22 at the Baltimore Convention Center in Baltimore. For information, contact Linda Roth (1413 K Street N.W., Suite 1200, Washington, DC 20005; 202-289-4687).

☐ **Terrapin** has a new address. Now you can send them mail or contact them at 380 Green Street, Cambridge, MA 02139. If you need to talk to them, their phone number is 617-492-8816. Terrapin would also like to announce that *Terrapin Logo* can now run on two networks, the AROS network by SWI (7741 East Gray Road, Scottsdale, AZ 85260; 609-998-3986) and the Corvus Omninet from Unicom (297 Elmwood Avenue, Providence, RI 02907; 401-467-5600).

☐ **Technical Education Research Centers** (8 Eliot Street, Cambridge, MA 02138; 617-547-3890) is sponsoring several Microcomputers in Education hands-on workshops at the following locations: Raleigh, North Carolina, April 6 through 8; Cambridge, Massachusetts, April 28 through 30; Watertown, Connecticut, June 9 through 11. Contact Sharon Woodruff at TERC for more information.

☐ Striving to provide even better customer service, **Shugart Associates** (475 Oakmead Parkway, Sunnyvale, CA 94086; 408-733-0100) has increased the support of its disk drives and controllers by extending the warranty on new products from forty-five days to one year. The full-year warranty also applies to mature products purchased under contract renewals and covers parts and labor. Shugart will repair or replace defective drives within thirty days at no charge.

☐ *Business Card Filer* from **K & S Associates** (24 Palamos, San Ramon, CA 94583) organizes your contacts' information in one file, with a maximum ten-second search for any card. The program prints a personal telephone directory for you. A cross-referencing feature helps you track down infrequently called people. File capacity of about two hundred cards per data disk. $54.95.

☐ The Q-Pac from **Microtek** (9514 Chesapeake Drive, San Diego, CA 92123; 619-569-0900) consists of three components: the Q-Disc, a 128K disk-emulation system that functions as a 128K RAM board; an eighty-column screen card that's Videx-compatible; and the *Visi-Expand-80* software program that's used with the mentioned hardware in conjunction with *VisiCalc*. $699.

☐ You don't need two disk drives to run those programs that require a second one. **Aristotle Industries** (Box 21, Norwalk, CT 06853; 203-853-6683) brings you the Ghost Drive circuit board that plugs into any expansion slot. It's not a RAM board; it functions by freezing the microprocessor while you switch disks in the drive. A toggle switch lets you reactivate the microprocessor. $79.95.

☐ Your Apple can transmit and receive Morse code with the help of *Code Machine* from **Cotec** (13462 Hammons Avenue, Saratoga, CA 95070). You type ahead of the sending speed and the characters are

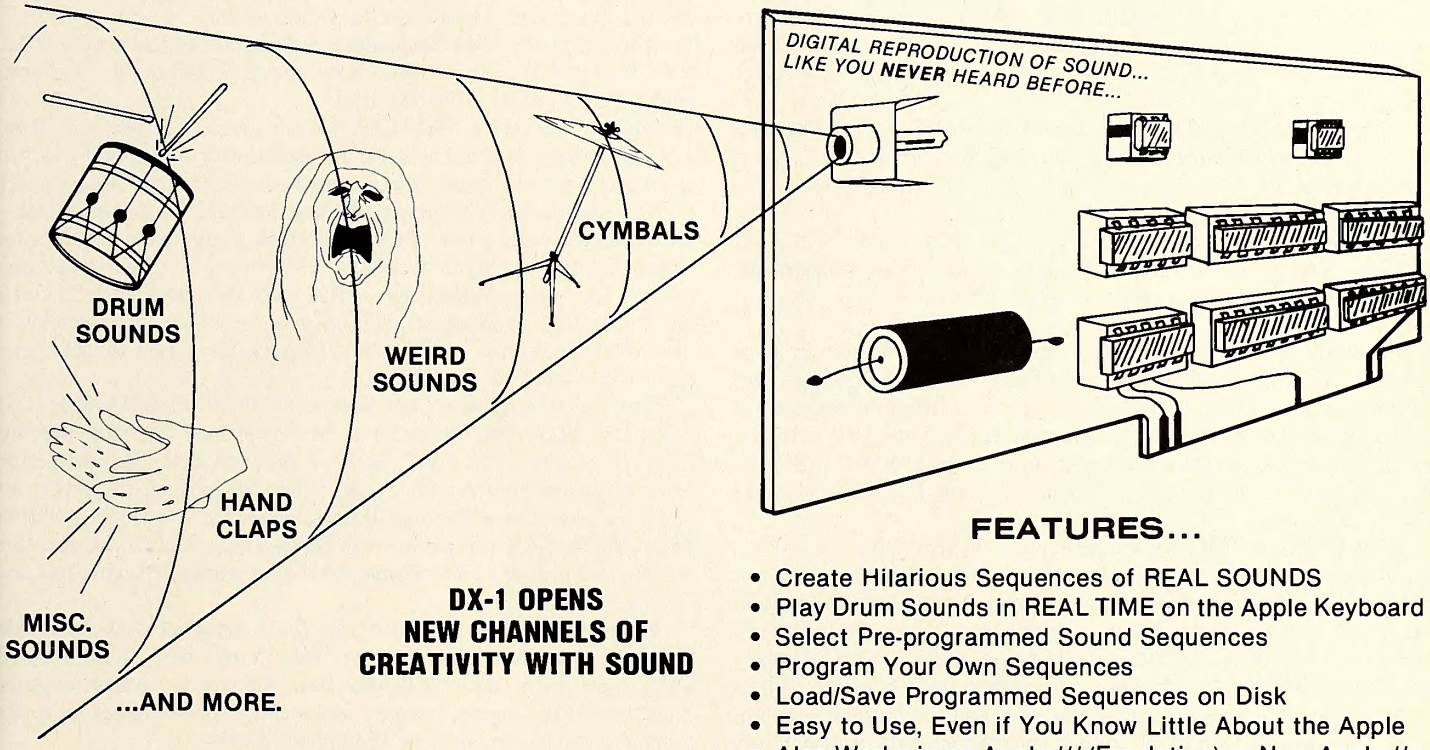
THE DX-1 PACKAGE

☆ NEW PRODUCT ☆

DECILLIONIX ANNOUNCES DX-1

AN EXCITING NEW
SOUND EFFECTS SYSTEM
FOR THE APPLE II,
FEATURING...

"DIGITAL REPRODUCTION OF REAL SOUND"



FEATURES...

- Create Hilarious Sequences of REAL SOUNDS
- Play Drum Sounds in REAL TIME on the Apple Keyboard
- Select Pre-programmed Sound Sequences
- Program Your Own Sequences
- Load/Save Programmed Sequences on Disk
- Easy to Use, Even if You Know Little About the Apple
- Also Works in an Apple /// (Emulation) or New Apple //e
- Connects to an Amplifier System or Directly to a Speaker
- Control the Output Volume From the Apple Keyboard

IF WHAT YOU READ LOOKS EXTRAORDINARY, LISTEN TO DX-1, IT SOUNDS EXTRAORDINARY.

CAUTION! WHAT YOU'RE ABOUT TO READ MAY SOUND EXTRAORDINARY...

★ DX-1 ★ ★ DX-1 ★ ★ DX-1 ★ ★ DX-1 ★

Imagine... at the touch of a key on your Apple computer, reproducing the sound of a hand clapping, sounding IDENTICAL to a real hand clap; or a whistle, a finger 'snapping' or even the sounds of an eight piece drum set (even cymbals). Sound amazing?

Imagine this... complete control over the actual reproduction rate of sounds — so sounds can be played faster than normal, or slower, or even in REVERSE.

There's more... there's the ability of the Apple to sequence these sounds in amazing ways. Select from PRE-SET sound rhythms to RANDOM sequences of sound to REAL TIME keyboard play. Or program DX-1. The software program is as easy to operate as it is to read a menu. Twenty-two pre-recorded (digitally) sounds are included, with countless ways to vary each one.

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THE SYSTEM INCLUDES: **PRINTED CIRCUIT BOARD**
PROGRAM DISKETTE
OPERATORS MANUAL

(REQUIRES 48K APPLE II WITH APPLESOFT BASIC)

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stored in the transmitting buffer that holds up to 320 characters. *Code Machine* features a tunable audio filter that improves noise rejection. The program converts the received Morse code to ASCII and has two methods of interfacing with a variety of printers. The game controller port is available for D.C. transmitter keying. $29.95.

☐ **Interlocking Consultants** (8320 Brecksville Road, Brecksville, OH 44141; 216-526-7222) has developed a set of integrated manufacturing management systems for the small to medium size manufacturing company. The *ICA-1* handles computerized work measurement. $500. *ICA-2* is direct labor performance reporting. $750. *ICA-3* is maintenance management. $750. *ICA-4* is inventory management. $2,000.

☐ **Kraft Systems** (450 West California Avenue, Box 1268, Vista, CA 92083; 619-724-7146) has *Quik-Vis*, a revision subroutine that adds joystick control to *VisiCalc*. Now you can move the cursor anywhere on the spreadsheet by means of a Kraft joystick. Also included in *Quik-Vis* are timesaving functions for the two buttons on the joystick; the red button moves the cursor to A-1, while the black one gives extra-fast cursor speed. $22.95.

☐ **Queue** (5 Chapel Hill Drive, Fairfield, CT 06432; 203-335-0908) has a free catalog of educational software for everyone from preschoolers to adults. *Queue Catalogue #14* supplements its earlier catalogues for educational software.

☐ The Info Guard data shield from **C-Line Products** (Box 1278, 1530 East Birchwood, Des Plaines, IL 60018) is a magnetically shielded enclosure that protects disks for transportation and storage. Eight-inch version, $14.50; 5 1/4-inch version, $9.50.

☐ *The Visible Computer* combines a graphic 6502 simulation program with a 150-page manual/tutorial to provide an easy way for Basic programmers to gain access to the speed and power of machine language. It graphically shows you how the 6502 executes programs; you see registers change and instructions executed, not just the end result. From **Software Masters** (3330 Hillcroft, Suite BB, Houston, TX 77057; 713-266-5771). $49.95.

☐ *Participation Management Skills* is a set of interactive tutorial lessons designed to help improve communications between employees and management, reversing trends toward declining productivity. From **Duosoft** (1803 Woodfield Drive, Savoy, IL 61874; 217-356-3111). $249.50. Also from Duosoft comes *Business Planner*, a business-modeling package that projects monthly income and expense figures, budget allocations, and sales forecasts, thus helping you analyze business assumptions. The program combines projects into models that predict future growth. $295.

☐ *FilePlan* is an electronic filing system from **Chang Labs** (5300 Stevens Creek Boulevard, Suite 200, San Jose, CA 95129; 408-246-8020) that's been designed for easy data entry. Multiple records may be viewed simultaneously, and existing records provide examples for data entry. CP/M, 64K, and two disk drives are required. $295.

☐ The California Library Media Consortium for Classroom Evaluation of Microcomputer Courseware has published *Courseware Reviews 1982*, a set of fifty classroom-based evaluations of programs. Available from **SMERC Library & Microcomputer Center** (San Mateo County Office of Education, 333 Main Street, Redwood City, CA 94063; 415-363-5446). $10.

☐ The new version of *Format II* from **Kensington Microware** (919 Third Avenue, New York, NY 10022; 212-486-7707) has several additional features. It automatically recognizes and supports Apple IIe features. Up to fifty pages of text can now be stored on each disk; text files are standard DOS 3.3 and can be used with most spelling and communications programs. Not copy-protected, *Format II Enhanced Version* can be backed up and placed onto hard disks. $150.

☐ Another move: **High Technology Software Products** is now at Box 60406, 1611 N.W. 23rd Street, Oklahoma City, OK 73106. The company's new number: (405) 524-4359.

☐ **Digital Marketing** (2670 Cherry Lane, Walnut Creek, CA 94596; 415-938-2880) makes the writer's job easier with *Bibliography*, a program that compares citations in a manuscript with entries in a card catalog and constructs a bibliography of all entries cited. Entries are added to the catalog by using a text editor. Each catalog entry has a keyname followed by bibliographic information. Entries may be of any length and format. The program also copies entries from the catalog to footnotes in the manuscript, and replaces citations with numbers corresponding to the order in which the works appear. Compatible with most word processors. You need CP/M. $125.

☐ The newest peripheral from **Videx** (897 N.W. Grant Avenue, Corvallis, OR 97330; 503-758-0521) is the PSIO Dual Function Interface Card. By using it, you don't need two different cards for two peripherals. A printer and modem or any other combination of parallel and serial peripherals can be individually connected to and controlled by PSIO. The board is compatible with Basic, Pascal, and CP/M operating systems and includes a nonvolatile RAM that remembers baud-rate configurations. $229.

☐ Programmers might find handy the *Quick Reference Guide* from **John Wiley & Sons** (605 Third Avenue, New York, NY 10158; 212-850-6000). The guide lists and defines Basic statements, system controls, input/output statements, memory statements, error messages, video and graphic controls, and arithmetic symbols. $2.95.

☐ **Commercial Software Systems** (7689 West Frost Drive, Littleton, CO 80123; 303-761-8062) has released *Real Estate Models for the Eighties*, a set of *VisiCalc* templates for real estate analysis. The package contains roughly three times the number of models as its competitors. In-

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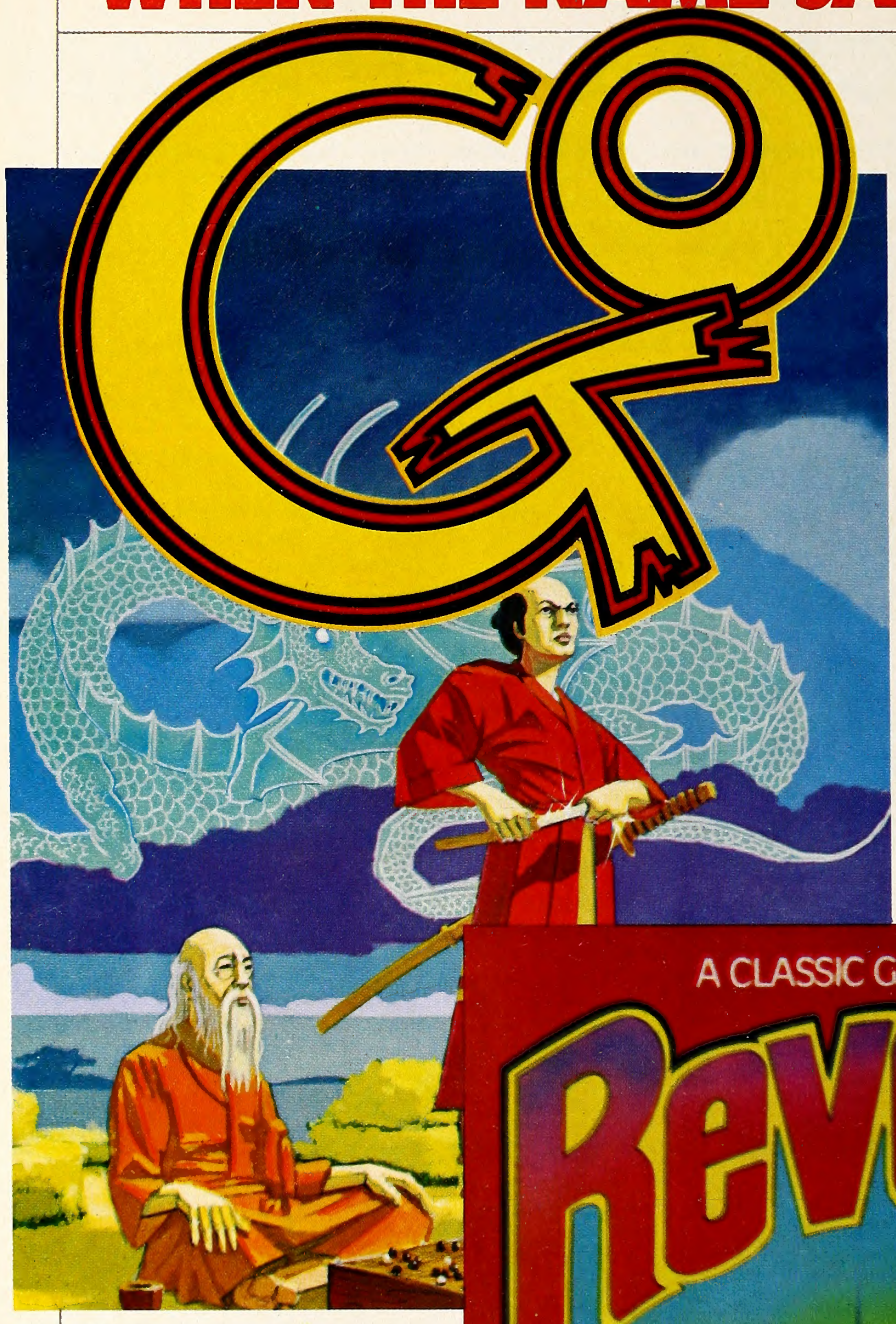
WHEN THE NAME SAYS HAYDEN,



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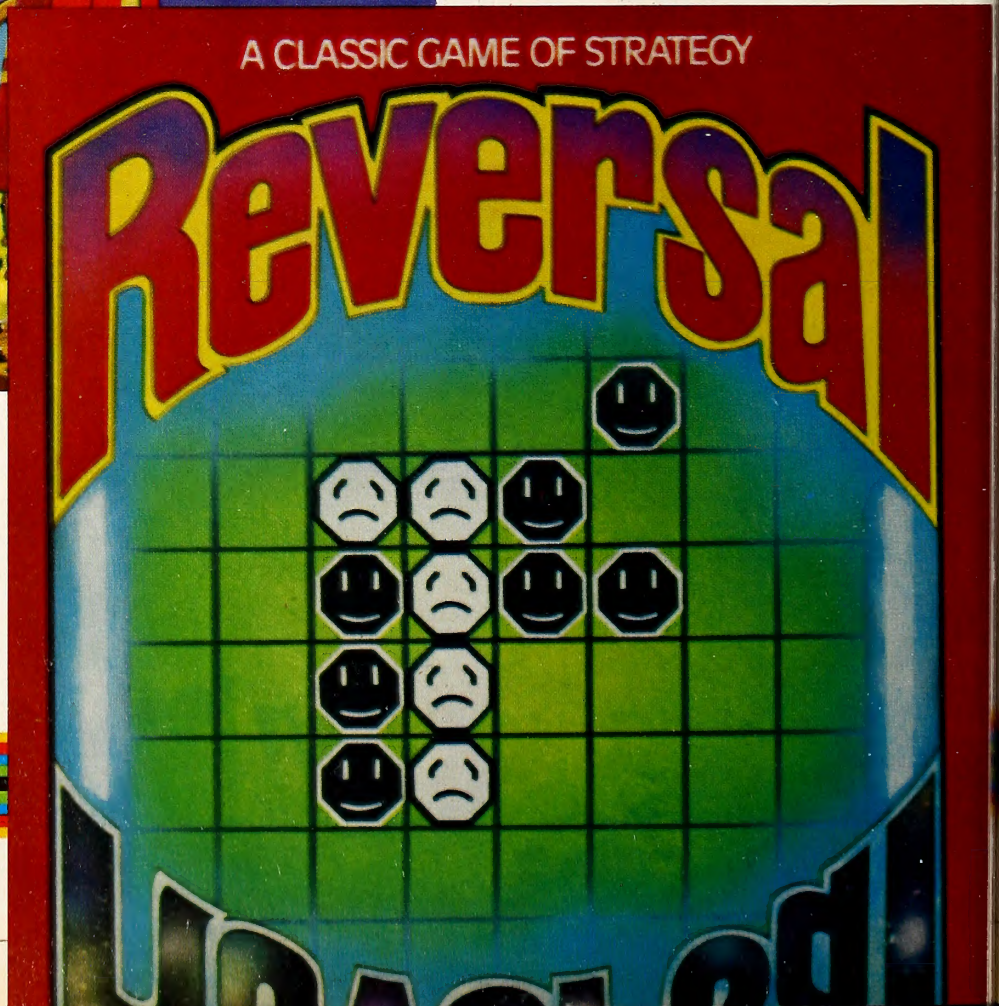
Reversal is another ancient game, with origins going back centuries. Simply trap your opponent's piece between two of yours, and capture the piece for yourself. But the move that captures the most pieces may not be the wisest. Reversal has a way of turning the tables on you! Hayden's Reversal has nine levels of play, with three strategy levels within each. It is a fascinating game even for young children—the playing pieces change expression as the advantage shifts from win to tie to loss. Yet Reversal will test the most gifted adult. It is the winner of the First Man-Machine Othello* Tournament and, at its top level, has never been beaten! You can even play against a human opponent—but that might soon be too easy for you!

*Othello is a registered trademark of Gabriel Industries, Inc.



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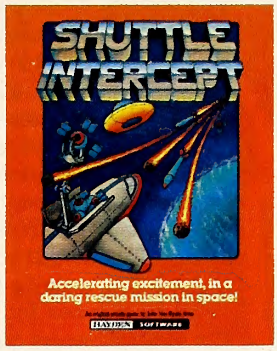

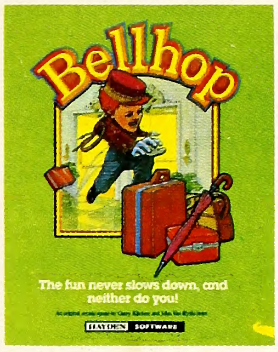

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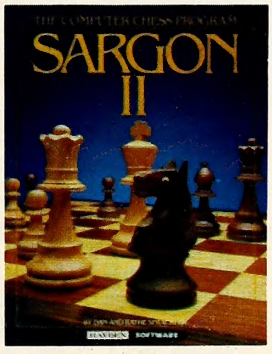

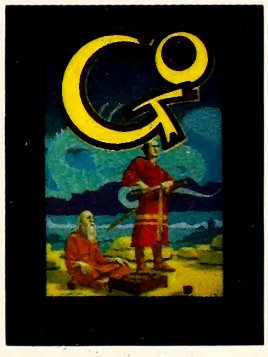

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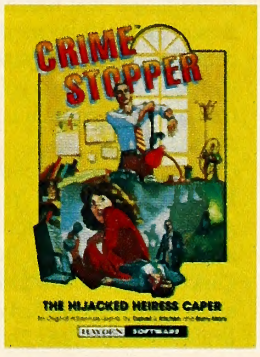

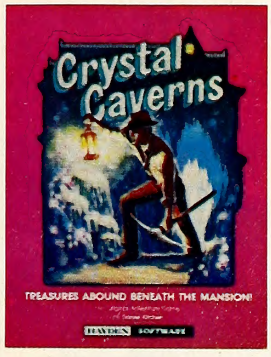

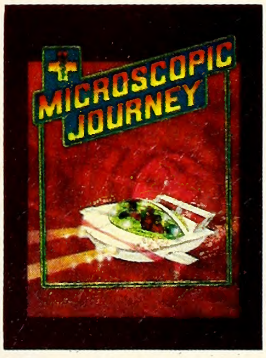

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cluded are a component calculator, detailed and summary amortization, comparative depreciation, wraparound mortgage, tax considerations, and more. $65.

☐ **Smart Systems** (499 Sulky Lane, Frederick, MD 21701; 301-694-8307) has developed *Smartscreen,* a utility that simplifies the development and use of screen-oriented Pascal software. *Smartscreen* features easy-form creation; you just type the form on the screen the way you want it to appear on your application. It offers field flexibility in editing, and you can print what's on the screen in a single keystroke. Supports forty or eighty-column display and requires only 5K-plus storage necessary for developed screen. $75.

☐ Pascal users can develop their own database with *Microbook: Database Management for the Apple II,* a book and software package from **dilithium Press** (11000 S. W. 11th Street, Suite E, Beaverton, OR 97005; 503-646-2713). The combination package is a collection of programs written in Pascal that create an electronic filing cabinet. The programs are on the disk; the book acts as a reference manual. Requires language card for Pascal. 320 pages. $34.95.

☐ For beginners in Logo, **Creative Computing Press** (39 East Hanover Avenue, Morris Plains, NJ 07950; 201-540-0445) has published *Logo: An Introduction,* a book designed to aid child and adult Logo beginners and written in a style that's parallel with the purpose of Logo. It provides a minimum of expository detail and acts as a catalyst for further individual activity. Sixty-six pages. $7.95.

☐ A versatile nutrition and diet-analysis program, *Health-Aide* includes thirty-two nutrient values for more than eight hundred foods, a computed recommended daily allowance for all nutrients for individuals, nutrient analysis by meal and by day, and many more features to help you develop better nutrition habits. It's from **Knossos** (422 Redwood Avenue, Corte Madera, CA 94925; 800-792-0990; 800-227-3800 outside California). $79.95.

☐ **Raging Bear Productions** (21 Tamal Vista Drive, Suite 175, Corte Madera, CA 94925; 415-924-1194; 800-732-2300 outside California) has announced the National Software Show, to be held October 19 through 21 at the Trade Show Center in San Francisco. The show will be complemented by a spectrum of seminars and conferences covering marketing strategies and future trends in microcomputer software.

☐ **HSP Computer Furniture** (Box 5545, Birmingham, AL 35207; 205-251-0500) has designed a computer work station with lots of work surface that adjusts horizontally to meet the needs of different sized people. Four-inch locking casters make moving from one classroom to another easy. The Model 8100 is $220. Options include a wire management tray for tucking in wires, $61; a multiplug outlet grounded for safety, $55.60; an auxiliary video shelf to hold a monitor and permit ventilation, $25, and a book compartment for books and other supplies, $48. Finally, the Deluxe School Workstation Model 8000 comes with all options. $395.

☐ Calc/Pad, a specially designed layout pad for electronic spreadsheet users, is available from **Compu-Quote** (6914 Berquist Avenue, Canoga Park, CA 91307; 213-348-3662). It allows you to work things out on paper before entering them into the computer. Plenty of room is provided in each box for entering text, values, or formulas. $4.75.

☐ *VisiCalc* owners can see more of what's going on when they add the VisiCalc Expand Gold Pack from **U-Microcomputers** (300 Broad Street, Stamford, CT 06901; 800-243-2475). You get an eighty-column-by-twenty-four-row display and an increased memory of up to 145K for models, all on one card. All Gold Packs include *Versa VisiCalc* software. 32K, $448; 64K, $576; 128K, $720.

☐ Critically disabled trauma and disease victims can now manipulate the standard computer keyboard with the help of Tetrascan II from **Zygo Industries** (Box 1008, Portland, OR 97207; 503-297-1724). This light-scanning device automatically presents all standard keyboard selections to the user. Operation of a single control switch initiates computer entries and commands. Only one voluntary physical motion is required to do so. $1,950.

☐ Fans of the United States Football League can use *The Predictor* from **Pickam Software** (14411 Vanowen Street, Suite 209, Van Nuys, CA 91405; 213-994-7944) to help pick the winners of the U.S.F.L. football season. The entire season schedule (barring player strikes) is already on disk. Predictions and previous statistics can be printed for permanent record. $39.95.

☐ More Rapidfire games from **Strategic Simulations** (465 Fairchild Drive, Suite 108, Mountain View, CA 94043; 415-964-1353) are here. *Galactic Adventures* is a science-fiction adventure with tactical combat. You gain experience, recruit adventurers, travel to bizarre worlds, and confront galactic foes in this game of strategy and tactics. $39.95. *Epidemic!* assigns players the task of stopping the spread of the worst epidemic ever. Armed with vaccine, gene splicers, microwaves, and other weapons of the sort, you're the director for the Center for Disease Control and must contain the epidemic to a limited area. Done in classic SSI style. $39.95.

☐ *Millionwaire* is a challenging educational game from **BrainBank** (220 Fifth Avenue, New York, NY 10001; 212-686-6565) that turns your Apple into a television-style quiz show. Hosted by that wisecracking master of ceremonies Bob BrainBank and assisted by the lovely Donna DiskDrive, *Millionwaire* offers a broad scope and vast number of questions drawn from forty-one categories. One to four players bet their Brain Bucks on their ability to answer questions on varying levels of difficulty to win $1 million. $49.95.

☐ **SSR** (1600 Lyell Avenue, Rochester, NY 14606; 716-254-3200) has announced the availability of *Infotory*, the inventory-management package, for the Apple III with ProFile hard disk. This version offers up to twenty thousand inventory items and thirty-six fields of information for each item. $425.

☐ The Prometheus Winchester hard-disk-drive system is available from **World Wide Data Systems** (17321 El Camino Real, Houston, TX 77058; 713-488-8022). The 5M drive has a self-test, LED error codes, transient protection, and error-code correction. $1,450.

☐ The latest in Sony Walkman options is available from **Vitalcomp** (Box 175, Chanhassen, MN 55317; 612-934-6166). The miniature personal blood-pressure and EKG recording system using a Walkman recorder and an Apple is called the Fitness Logger, and is designed for people interested in their bodies' responses to stress of daily activities. With a standard blood-pressure cuff, EKG electrodes, an interface card, and ac-

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Transpak 2 +	Transend 2	TransModem 1200 with serial interface and cable
Transpak 3 +	Transend 3	TransModem 1200 with serial interface and cable

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companying software programs, the Fitness Logger displays heart rate, blood pressure, body signals, and computed systolic, diastolic, and mean arterial pressure. $500.

☐ The Transmodem 1200 has been released by **SSM Microcomputer Products** (2190 Paragon Drive, San Jose, CA 95131; 408-946-7400). The modem offers 300 or 1200 baud rates, full duplex, auto answer and dial, automatic speed detection, Touch Tone and pulse dialing, automatic log-on, and password storage. Transmodem 1200 is included in SSM's Transpak packages. $695. SSM also announces that the *Magic Window* word processing package from **Artsci** (North Hollywood, CA) is being offered at a 70 percent discount as an option with SSM's *Transend.* An order form for *Magic Window* is included in every Transpak and *Transend 2* or *3.*

☐ **Howard W. Sams** (4300 West 62nd Street, Box 7092, Indianapolis, IN 46206; 317-298-5400) has introduced its freeform filing system, *Instant Recall.* The program has been designed to avoid making the user prepare field and formats. Instead, you can enter information on a fresh screen the same way you do on a blank sheet of paper or an index card. Varieties of information can be combined on a single disk file, or separate files can be made for specific purposes. $59.95.

☐ The first three volumes of *Cardiology* are interactive clinical simulations for physicians and other health-care professionals, and they're available from **Computer Medical Education** (Box 292414, Dayton, OH 45429). The series of patient-management problems uses hi-res graphics to present electrocardiograms, X-rays, and even animated angiograms. Given a patient's profile, you request data and must make clinical decisions based on the information. The computer selects different complications and outcomes, based on medical probabilities, producing a new challenge each time the program is run. $80 each.

☐ The *Copy Holder* positions sheets, manuals, and programming information in a place convenient for you when you're tapping away at the keyboard. You can put material next to or above your monitor or keyboard, no longer having to glance back and forth. It clamps to your work surface and can be positioned like a desk lamp. From **Universal Industries** (Box 63188, Los Angeles, CA 90063; 213-269-2117). $30.

☐ The Fifth Annual Computer Conference for Educators sponsored by **Lesley College** (29 Everett Street, Cambridge, MA 02238; 617-868-9600) and the Computer Education Research Coalition will be held May 14 at Lesley College. The conference will feature Samual Gibbon of Bank Street College, workshops in Forth and Pascal, and more than twenty presentations by teachers, researchers, and software producers from the Boston area.

☐ *Home Health Disk* is a program providing current information about emergencies, specific medical problems, and ways to save on medical expenses. From **Brahman Software** (Box 331, Castleton, VT 05735). $79.95.

☐ **Program Design** (95 East Putnam Avenue, Greenwich, CT 06830; 203-661-8799) has published *Step by Step Two,* a sequel to *The New Step by Step.* The latest version teaches intermediate Basic programming and consists of interactive programs with a voice narration, quizzes and practice problems, and a detailed workbook containing supplementary activities. $89.95. PDI also has announced *Preschool IQ Builder 2,* a course designed to teach shape, letter, and number recognition. Objects appear one at a time at the top of the screen and three objects appear at the bottom. The child moves the top object to cover the matching one at the bottom. $295.

☐ A powerful 6502 macro assembler for the Apple II and IIe is available from **Hayden Software** (600 Suffolk Street, Lowell, MA 01853; 617-937-0200). *ORCA/M* (Object Relocatable Code Assembler for Micros) features its own DOS 3.3, a coresident screen editor, relocatable code generation, a link editor, and macro and subroutine libraries that include more than one hundred fifty functions. The assembler supports parameter subscripting, parameter midstring and search functions, global communication between macros, and numeric, Boolean, and string parameter types. $99.95. Hayden's *Microscopic Journey* is an educational adventure within an arcade framework. Multiple diverse scenarios each require different skills. The mission is to save a dying man, using your keyboard and game paddle skills. $34.95. *Go* is a hi-res version of the classic strategy game. One or two can play; the program has a handicapping system and joystick or keyboard movement. $34.95.

☐ A new labeling approach for disks comes from **Hexco** (Box 199,

Hunt, TX 78024; 512-238-4964). Link-Labels uses serialized sticker labels so you can see which disks go with which envelopes. Envelope labels let you list on the envelope which programs are on the disk. $7 per dozen.

☐ **Island Software** (Box 300, Lake Grove, NY 11755; 516-585-3755) has announced its French and Spanish language series. The first program has nouns grouped in topic areas; the second uses verbs grouped according to verb endings; the third uses numbers, colors, months, and other words; the fourth lets the teacher create customized word lists. $80.

☐ Your computer and all its peripherals can be protected from transients and other hazardous interferences. The Stedi-Data from **National Field Sales** (Box 230, Broomall, PA 19008; 215-352-9214, 800-345-1280) guards printers, terminals, and modems against electrical line noise and power surges. Peripherals simply plug right in. Two models are available. SD428, $149.50; SD828, $249.50.

☐ **Human User-Machine Applications for Network Systems** (HUMANS) (Box 644, Falls Church, VA 22046) has announced two products. Text editor *Ted* is also a file clerk. It includes fifteen menus, eighty columns without hardware, and twenty-two single-key commands. *Ted* merges and transfers files between disks, creates disks that allow 8K more characters than DOS, makes copies of your data disks quickly, and prints files on any commonly configured printer. $49.95. Friendly editor *Fred* handles document processing. Editing is done with just twelve commands. You can have eighty-column display with or without hardware, upper and lower case shifts and shift-lock functions, and single-key commands. *Fred* processes documents for almost any type of form. $69.95.

☐ Agricultural users can have *VisiCalc* simplified with AgDisk *VisiCalc Templates* from **Harris Technical Systems** (624 Peach Street, Box 80837, Lincoln, NE 68501; 402-476-2811). Prices, costs, interest rates, and lengths of time can be changed on the worksheets to let farmers and ranchers instantly see the effects of changes in these variables before any capital is committed. Each product contains six to eight templates. Products now available are *Business Management*, *Cow-Calf Herd Management*, *Crop Management*, *Feedlot Cattle Management*, *Machinery Management*, *Swine Farrowing Management*, and *Swine Finishing Management*. $95 each.

☐ For students of English as a second language, **The Soft Spot** (800 East Arapaho, Suite 110, Richardson, TX 75081; 214-669-1779) markets *Teachers' Friend*, a program that teaches English to students who can read English at the second-grade level. The eighty-lesson curriculum lets the teacher tailor a program, having it concentrate on the student's deficient areas. Each lesson focuses on a basic skill such as spelling, punctuation, parts of speech, verb tenses, syntax, pronunciation, vocabulary, and others. $15 per lesson.

☐ *The Computer Tutor Series Four* is a series of four one-hour video cassettes that explain how to use the Apple II. Designed for use in high schools and colleges, *Series Four* is for the novice and experienced user. Cassettes cover fundamental computer terms, Basic terms, graphics, and various applications, from calculating to text editing. From **Computer Tutor** (Box 12756, Saint Louis, MO 63141; 314-966-9060). Cassettes, $100 each; complete series, $375.

☐ An intensive three-day course entitled "Microprocessor Background for Management Personnel" will be given May 24 through 26 in Palo Alto and August 2 through 4 at the University of California, Berkeley. Topics to be covered include principles of microprocessor operation, structures used within microprocessors, programming techniques, selecting a microprocessor, and software. For information, contact **Continuing Education in Engineering** (Department 532N, University of California Extension, 2223 Fulton Street, Berkeley, CA 94720; 415-642-4151). Fee: $565.

☐ Let your fingers do the walking across the keyboard. **Buy-Phone** (Box 29307, Los Angeles, CA 90027; 213-279-1074) offers a free on-line database service listing more than ten thousand retail businesses in the West Los Angeles area. Listings are constantly revised to include stores' specials, more than sixteen hundred restaurants, and the current movie at local theaters. Buy-Phone uses standard 300 baud ASCII communications and can be reached at (213) 474-0270.

☐ Users of *dBase II* can produce various types of graphs including bar, line, and pie charts by using *dGraph* from **Fox and Geller** (Box 1053,

Teaneck, NJ 07666; 201-837-0142). You simply name the kind of graph you want and identify the data to be used, and *dGraph* does the rest—loading data, computing sales, drawing grid lines, and labeling charts. Features include automatic shading, overlay graphs, summing, counting, and averaging functions. CP/M is required. $295.

☐ Software authors trying to sell their programs can get in touch directly with interested software publishers through **Programmers' Pipeline** (Box 666, Glendora, CA 91740; 213-914-4317). The Pipeline has an online database from which publishers can read your brief description of your program. The firm also puts out a periodical listing computer software for sale. Within hours of the Pipeline's receiving your program description, it is available to software buyers. Programs can be listed by category. $20 per listing.

☐ **Portware** (5724 Tucker Lane, Edina, MN 55436; 612-933-3510) now has the second in a series of Portaids utility programs available for portfolio management. The *MP/Cross* program is for multiple portfolio cross reference of selected securities. By using the program, brokers, investment advisors, and individuals with several portfolios can compile portfolio data into a single report with a cross reference to each portfolio. The program works with *Portrac,* Portware's record-keeping portfolio management software module. $69.50.

☐ You don't need any special lines or special equipment to send or receive international cables, telex messages, Mailgrams, or most other Western Union messages. **Telephone Software Connection** (Box 6548, Torrance, CA 90504; 213-516-9430) lets you do it from your Apple. You can send and "pick up" all messages from your terminal at your convenience, making it possible for you to receive messages when your computer is busy. You're assigned a telex number (for ads and letterhead, if desired), and all incoming messages are automatically routed to your mailbox, where you pick them up via modem. No charges while reading incoming messages. $35 setup charge, $35 per month. Per-message charge and traffic rates extra.

☐ *Home Controller* from **Simple Software Systems** (Box 41069, San Jose, CA 95160) lets you control your BSR system with your Apple, clock card, and BSR interface. The program features automatic calculation of sunset and sunrise, a recovery mode in case of power failures, support of all BSR commands, and a provision for daylight savings. Requires either a Thunderclock, Versacard, Mountain Computer Clock, or a Mountain Computer CPS card. $49.95.

☐ The ComputerDesks from **J. K. Products** (3020 Bridgeway, Suite 351, Sausalito, CA 94965; 415-332-8262) include a locking roll-top for security, solid-red-oak construction, venting for cooling, adjustable shelving, and a false back for the system's wires. Available in Models 101 and 102. Optional accessories include pencil drawers and secretarial boards for both models. Model 101's accessories also include a printer drawer and storage cabinet. Model 101, $1,595; Model 102, $1,095.

☐ *Solving the Mysteries of Light* is the first in a series of ten subjects being offered by **Visual Materials** (4170 Grove Avenue, Gurnee, IL 60031; 312-249-1710). Each subject consists of twenty-four lessons and is designed for independent study without need for supervision, for grades seven through nine. Lessons cover lenses, energies, the color spectrum, and other properties and functions of light. Lessons are $39.95 each; complete *Mysteries of Light* set, $850.

☐ Success in Software is a conference that will be held April 12 at Hyatt Rickeys Hotel in Palo Alto. Speakers will include Bill Gates, Mitch Kapor, Terry Opdendyk, Doug Carlston, Fred Gibbons, and other heads of top software companies and distributors. Sponsored by **Creative Think** (Box 7354, Menlo Park, CA 94925; 415-321-6775). Hours are 8:15 a.m. to 5:00 p.m. Registration, $295.

☐ *Computer Contents* is a biweekly compilation of tables of contents from publications covering computers, electronics, and telecommunications. From **Management Contents** (2265 Carlson Drive, Suite 5000, Northbrook, IL 60062; 312-564-1006; 800-323-5354 outside Illinois). $65 per year (twenty-six issues).

☐ In case you didn't know, the first Applefest of 1983 will be held April 15–17 at the Anaheim Convention Center. The next month it goes on the road to Boston, where it will take place May 13–15 at the Bayside Exposition Center. At both shows, between 10:30 and 5:30 each day you can visit more than three hundred displays and booths, plus seminars, panel discussions, conferences, workshops, and software spotlights. Sponsored by **Northeast Expositions** (826 Boylston Street, Chestnut Hill, MA 02167; 617-739-2000, 800-343-2222). Three-day admission, $48 for all exhibits and conferences, $18 for exhibits only. One-day admission, $23 and $8.

Also sponsored by Northeast Expositions, the Third Annual Southwest Computer Show and Software Exposition will run April 28–May 1 at Dallas Market Hall. Microcomputers and thousands of different kinds of peripherals will be featured. Hours are 10:30 a.m. to 6:00 p.m. daily. Admission: adults, $5; kids, $3. Northeast Expositions also has announced the Second Annual New York Computer Show and Software Exposition to be held April 14–17 at the Nassau Coliseum in Uniondale, Long Island. Hours are 10:00 a.m. to 6:00 p.m. daily. Admission: adults, $5; kids, $3.

☐ Anyone who purchased *Genesis: The Adventure Creator* before February may obtain a free update by returning the *Genesis* master disk to **Hexcraft** (Box 39, Cambridge, MA 02238; 617-354-4451). The updated version runs five times faster. The problems that were the result of Hexcraft's copy protection have been corrected. Versions purchased after February have already been updated.

☐ Videotex '83, an international conference and exhibition, will be held at the New York Hilton June 27–29 and will provide the latest information on the technology, current uses, and projections for videotex. For information, contact Pam Fendel at **London Online** (1133 Avenue of the Americas, Thirty-third Floor, New York, NY 10036; 212-692-9003).

☐ Multiplayer action is just part of *New World,* an educational fantasy game from **Automated Simulations** (1043 Kiel Court, Sunnyvale, CA 94086; 408-745-0700). Each of three players represents a leader of England, France, or Spain and leads an expedition to the New World, where colonists try to find gold and earn income for their countries. Bad weather, pirates, disease, bankruptcy, and warfare are obstacles in your way to political and financial control of the Western Hemisphere. $29.95.

☐ **Spinnaker Software** (215 First Street, Cambridge, MA 02142; 617-868-4700) combines adventure, strategy, and arcade games in *In Search of the Most Amazing Thing.* The educational game puts a fantasy world at the child's fingertips. The player must use strategy and learning skills, negotiate benevolently with aliens, and develop an understanding of simple economics and monetary principles on the way to discovering the game's mystery. $39.95.

☐ Educational arcade action is found in *Math Invaders* from **Winners Circle Education** (1308 Temple Building, Rochester, NY 14604; 716-325-6493). The learning game comes with pretested drills and a set of exercises that represent a new approach to learning math facts. Included is a drill maker that allows teachers to construct individualized drills. $39.

☐ The Nth Degree is a temperature measurer from **American Data Cable** (Box 2212, Placerville, CA 95667; 916-622-3465). The device reads temperatures accurately between −60 and 105 degrees Celsius and notes changes as small as 1/100 of a degree. It uses a handheld probe the size of a pen and attaches to the Apple by a six-foot cable. Temperatures can be displayed in Celsius, Fahrenheit, and Kelvin. Software included. $129. Eight-channel model, $189.

☐ Learn by doing. **FlipTrack Learning Systems** (526 North Main Street, Box 711, Glen Ellyn, IL 60137; 312-790-1117) offers *How To Operate Your Computer under CP/M,* a course that teaches in six hours what normally takes weeks or months to learn from manuals. Three audio cassettes teach common CP/M commands for formatting and copying disks, copying and erasing files, creating and editing documents, and using batch processing to run a series of application programs. The course includes an operator's guide. $49.95.

☐ With *Create-a-Test,* teachers can make formatted tests in minutes. The program is from **Cross Educational Software** (1802 North Trenton, Ruston, LA 71270; 318-255-8921). You can write your own questions with the built-in text editor or draw them from eight question disks, which cover chemistry, physics, biology, and other physical sciences. More than thirty-two hundred questions. $89.95. Question disks, $49.95 each.

☐ The computer bulletin board, **Video Fantasies,** is now on-line twenty-four hours a day. Members can post and read bulletins, send electronic mail, and download software programs. Other features include software and hardware reviews and contests in which you can win the latest bestselling game. Call (215) 363-0563 by modem to become a member.

☐ **Actuarial Microcomputer Software** (3915 A Valley Court, Winston-Salem, NC 27106; 919-765-5588) has announced *Risk Simulator,* which estimates probability distributions associated with risk situations. Applications range from the estimation of automobile maintenance expenses to employer funding of health benefits. $187.50.

☐ The fourth version of *DB Master* is available from **Stoneware** (50 Belvedere Street, San Rafael, CA 94901; 415-454-6500). This update of the popular database program lets you have up to one hundred characters in an alphanumeric field. Included is a field editor that lets you add, insert, and delete text anywhere in a field without having to reenter the entire field. Revised records can be stored as new entries or as revisions of existing ones. Easy file report format design and improved screen prompting have been added. $350. Owners of version three are offered a trade-in allowance toward purchase of version four.

☐ The latest game from **Muse** (347 North Charles Street, Baltimore, MD 21201; 301-659-7212) is *The Caverns of Freitag.* As a Thechu warrior, you must seek and slay the evil dragon, Freitag, and end its terrorizing of your land. Before that, you must encounter monsters, find a magic shield, use spells, and find the mysterious healer, all while fighting off monsters galore. $29.95. If you're still not comfortable with your Apple IIe, *Know Your Apple IIe* will help you get acquainted. Using screen animation, voice, and music, the program educates you in an unintimidating way. $24.95. In word processing, Muse has announced lower prices of its *Super-Text Professional (40/80)* and *Super-Text Home/Office (40/56/70)* programs. Both are now $99.

Pat Carroll

An Apple Is An Apple Is An Apple

BY MARGOT COMSTOCK TOMMERVIK

When Pat Carroll began working on her characterization of Gertrude Stein more than four years ago, even she didn't know why Stein held such a fascination for her. She had never much liked Stein's writing.

Carroll was bedridden at the time after a knee operation. Perhaps it was the need for a project to occupy her; or perhaps she recognized that she could convey Stein's physical presence.

It wasn't until the show, *Gertrude Stein Gertrude Stein Gertrude Stein*, had been on the boards several years that a shared spirit between these two women became clear. It wasn't until Pat Carroll bought her Apple.

Matisse, Cezanne, and Picasso. It was in 1904 that Gertrude Stein left her native San Francisco to make her home in Paris with her brother Leo. Leo Stein was an art connoisseur and a collector and Gertrude took an apt interest in his work. Together they discovered and began to collect Cezanne and later Picasso. An argument over who actually discovered Picasso ended amicably with the two agreeing that Leo had indeed discovered Picasso's painting, but Gertrude had discovered Picasso the man.

At the time, no one else had discovered either, nor Matisse nor Cezanne. The Steins were fascinated by the new ideas of these struggling young artists, concepts that were to be boiled down to the term *cubism*. Gertrude Stein especially worked to understand the theory behind cubism, and she saw it as the turning point in art, as the means by which art was to move into the twentieth century.

The ideas so moved and excited Stein that she sought to carry them over into literature through her own writing. Just as the rest of the world was not ready to accept Picasso, so it was not ready for cubist stories. Gertrude Stein worked at her craft and kept her faith in her work for more than a quarter century before anyone other than she herself saw fit to publish any of her writings.

She did publish her own works. And her friends read them. She had many friends, she and Leo at first, and then she and Alice B. Toklas. They opened their Paris home to their friends in the art colony every Saturday night for discussion and sharing and criticism in a series of *salons*. The Stein salon is familiar today to people who cannot tell you who Stein was, for it became the gathering place not only of Picasso and Matisse, but of the American expatriates living in Paris. Hemingway visited; so did the Fitzgeralds.

Gertrude Stein recognized a significant movement and embraced it with excitement and vigor. She would not be left behind; she had the vision to see the future and to know she wanted a place in it.

Wozniak, Turmell, and Sullivan. And here is where Pat Carroll and her Apple come in. Pat Carroll looks into the future and sees computers, everywhere—in art, in homes, in theater; they are our ticket into the twenty-first century. She sees a significant movement and embraces it with excitement and vigor. She will not be left behind.

Carroll has made this eminently clear. When she read recently in a national newsmagazine that anyone born before 1955 was too old to be part of the computer age, Carroll would have none of it.

"It was a challenge!" she declares. "An open challenge. I'd show them how left out we are."

And she did, and she wasn't.

Gertrude Stein's new world was cubism. Pat Carroll's new world is

Her marvelously expressive face is seldom still, seldom long without a smile (above). In years past, Carroll joined Doris Day in *With Six You Get Eggroll* (upper center) and spoofed with Sid Caesar on *Caesar's Hour* (upper right). Carroll expounds positively on something near and dear, at home as herself (lower left) and onstage as Gertrude Stein (lower right).

computers. The curiosity, the excitement, the gusto are the same.

Theater Theater Theater. Carroll was twelve when she fell in love with the theater; and she had never been to a live theater in her life. She was reading a play, the first play she'd ever read, a play called *The Passing of the Third Floor Back* by Jerome K. Jerome. An only child, she was an avid reader, and by the age of thirteen she'd read all of Eugene O'Neill.

Her mother wisely pointed her toward the local community theater, and fate was sealed. Carroll pursued community and little theater as a teenager; during college in Los Angeles and Washington, D.C., she acted with the USO and in radio, becoming a civilian actress technician for the Second Army. When school was through, she was ready to do just about anything in her chosen career.

The anything that was happening then was television. Carroll's first stint was on the *Red Buttons Show* in 1952; later she was a regular on the *Danny Thomas Show* and appeared on the Carol Burnett, Danny Kaye, and Red Skelton shows. And *Caesar's Hour*. Her work with Sid Caesar earned her an Academy of Television Arts and Sciences Emmy in 1956.

Pat Carroll was a working actress, not a skyrocketing superstar who could pick and choose her roles and her schedule. She had to be flexible, and she was flexible. She could play the cabarets, and she did, with great success in New York City and in the Pocono resorts doing weekly original revues. She could play light comedy, and she did, costarring in numerous movies of the genre. She could play games (even then), and she did, participating as guest celebrity on television game shows. And she could delight with the warm, generous, slightly irreverent personality that was her own, and she did, on the full circuit of talk shows. Today she has more than two hundred fifty roles as a stock actress in drama and musical comedy under her belt. She's a working actress and she's done her work well.

Pat Carroll feels strongly about working actors, meaning that vast majority of actors who aren't superstars and never amass superriches but who earn their living at their craft. She'd like more of us to realize they exist; the extraordinary salary for a few weeks' work, Carroll points out, often represents the only work an actor has in his field for a year or more.

Always, Carroll's fondest love is the theater. There are two kinds of watchers, she says; audiences and spectators. "Watchers are manipulated in movies and TV; they're spectators. But theater is two-way; it must be reacted to. At a live play, the audience participates." Audience reaction

and response interact with the players and affect the performance.

At one performance of *Gertrude Stein Gertrude Stein Gertrude Stein*, when Carroll as Stein muses about what she has just been saying, "I wonder if that was clear?" Carroll was startled to hear a woman's voice from the audience respond benevolently, "Absolutely, my dear; you may continue." The audience is a doer, not a viewer.

New Lore That Stretches and Saves. Carroll sees no incongruity between theater and computers. "Theater has a relationship to higher mathematics; you can feel it," she says. So has music, which is the one pure art. If she were to come back in another life, Carroll might choose to be a composer. Of computer-generated music, no doubt.

Carroll is like a good audience; she is a doer, not a viewer, in life. And among her favorite things to do is anything that involves learning.

"Anything you learn is exciting; learning itself intrigues me. That wonderful muscle, the brain, intrigues me. It needs learning to keep from being bored—otherwise it just wallows in its own juices."

And everything we learn enhances all our other knowledge. Carroll is not a talented painter, for instance; but some years ago she enrolled in a life-drawing class. At first, her attempts were awful, but a good teacher showed her how to look at the subject and transfer it to paper. She has

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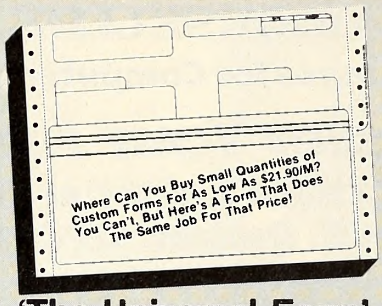

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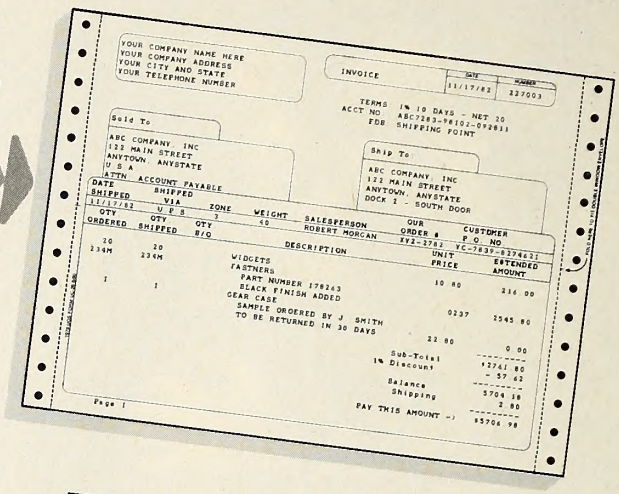

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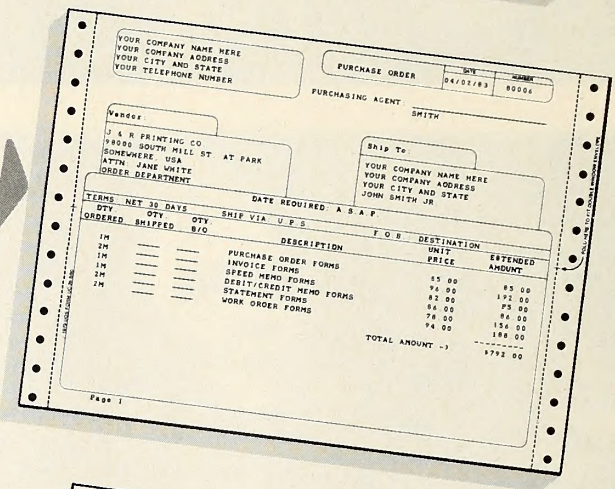

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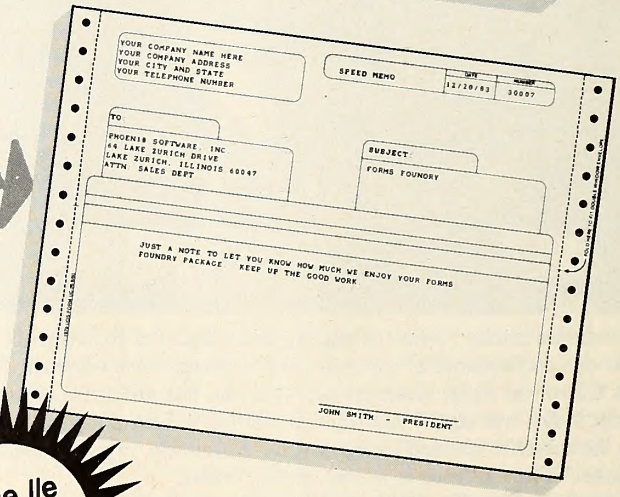

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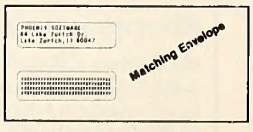

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no ambition of becoming an Escher, but she came out of the class with a much richer ability to see everything. The discipline served its purpose.

That Carroll saw her intellectual curiosity and respect for the mind reflected in Gertrude Stein is certainly one of the attractions that drew her to Stein. In an article in *Horizon* magazine in late 1980, Carroll said of Stein, "She was a woman who took pride in the mind and what it can do—see deep, think clear, say short. She made thinking itself a valid pastime, mandatory if we are to survive as civilized beings in this increasingly barbaric century."

The same could be said of Pat Carroll.

Computers present a new kind of learning, Carroll believes. The process requires and stretches the imagination; and the end result is immediate. Computers call on a new kind of concentration. "They'll have a tremendous impact on psychology," she muses.

"How exciting it is to be in on the new wave," Carroll exclaims. She feels fortunate to have been part of the early days of television, when shows were performed live and broadcast on the spot—what you might call real-time, in computer game lingo. When you saw Sid Caesar on *Caesar's Hour* in the fifties, he was at that very minute performing on a stage in New York exactly what you were seeing on your TV screen. And, incidentally, Carroll was probably with him.

Now Carroll is even more excited about the microcomputer wave. She sees it as having a much more far-reaching impact than early television. Not all that Pat Carroll foresees is good, but the microcomputer's part in it is.

"Ten years from now, we'll all have computers," Carroll says. "That will be our main means of communication."

As the world becomes less safe, and she is resigned that it will, our homes will become our fortresses; we'll not leave them unless we must. Our means of reaching out—and a wonderful, saving means—will be our microcomputers.

A Rose Is a Rose Is a Rose. When Pat Carroll found herself mysteriously drawn toward Gertrude Stein as the individual she'd portray in the one-woman play she'd always wanted to do, she immersed herself in Stein and Stein memorabilia. In an eighteen-year-old from Texas, she found a willing protege, a pen pal, and a playwright. Marty Martin had been writing plays since the age of ten, and had forty that he was proud of by the time he met Pat Carroll. He asked her to read a few.

He picked the right person, because Carroll has strong feelings for the new theater people just trying to make a go of it. She goes out of her way to help, giving generously of her time and herself—the irreplaceable gifts.

Martin did something else right. When Carroll pointed out that some of his plays were a good four hours long—much too long for modern theater—he responded, "Oh, that's all right—how's the writing?" Carroll loved his positiveness, and thence came their correspondence.

When Carroll felt the Stein piece was ready to be written, she called Martin. He leaped at the project, even decorating his home to simulate the atmosphere of Stein's while he wrote. The finished play ran much too long, as might have been expected, but Carroll liked it. She called Mary Ellyn Devery, a good friend and a producer with the Theatre Guild, to undertake the production. Devery, delighted, selected director Milton Moss, whose first task it was to help Carroll, via phone and tape because she was simultaneously on the road with a tour of *Pippin*, edit Martin's script to size.

From there rehearsals began—while Carroll did a movie—and finally they began trying the nearly finished product on willing friends. *Gertrude Stein Gertrude Stein Gertrude Stein* opened at State College, Pennsylvania, on May 4, 1979. Its first review, on May 5, was headlined, "Ms. Carroll Is Ms. Stein Is a Gift."

The play was a hit was a hit was a hit.

Off the Great White Way. Next stop was New York, where the respected Circle Repertory Theater asked the *Stein* group to play in rep that summer. They did, and they did it well, and they were told so. Carroll won the Drama Desk Award for Best Actress for 1980 and Mary Ellyn Devery took home the Outer Critics Circle Award for Best Production of a Play or Musical Off-Broadway. Later, the record album of the monologue was to take another laurel: a Grammy from the National Academy of Recording Arts and Sciences.

To date, *Gertrude Stein Gertrude Stein Gertrude Stein* has played fourteen months in New York and two years on the road in eighty-two cities in thirty-five states, and at the Jerusalem Spring Festival of 1980 in Israel.

Others were involved in the initial staging of the show, but the troupe that took to the road with *Stein* numbered just four: Carroll, Devery, production manager Ellen Zalk, and lighting designer David Lee Crist.

They traveled by van, these four, often with two vans and everyone taking turns driving in two-hour shifts. It came to pass that the first thing they'd look for in each theater town was a Laundromat; and the second was an arcade parlor. There Pat Carroll would pursue her newfound addiction, already determined not to let the youngsters hog the new world all to themselves. She enjoyed taking her turn among the skeptical young experts, only to see their eyes widen and grow friendly as they saw her skill.

But the quarters the machines were eating "would have paid off the national debt," says Devery. So they bought an Atari video cartridge system—a game machine. It doesn't take superior vision to recognize that the VCSs don't measure up to the real arcades. But the Apple comes close, and that, thanks to Ted Sherman, was where the *Gertrude Stein Gertrude Stein Gertrude Stein* family looked next.

Papa Geppetto, sometimes known as Ted Sherman, is the Father of Modern Day Cybernetics—as far as the *Stein* family is concerned.

Say Good-Bye to the Sun. During breaks between engagements, the *Stein* company takes up residence at a small farm near Kingston, New York, in the countryside Washington Irving made famous. Then the barn and the carriage house become the office and, despite its dissimilarity to Paris, the *Gertrude Stein* company salon.

Ted Sherman takes care of the audio and visual aids needs of the Poughkeepsie school system. On the side, he's passionate about computers.

So it occurred that Carroll and friends called on Sherman for advice about getting a computer.

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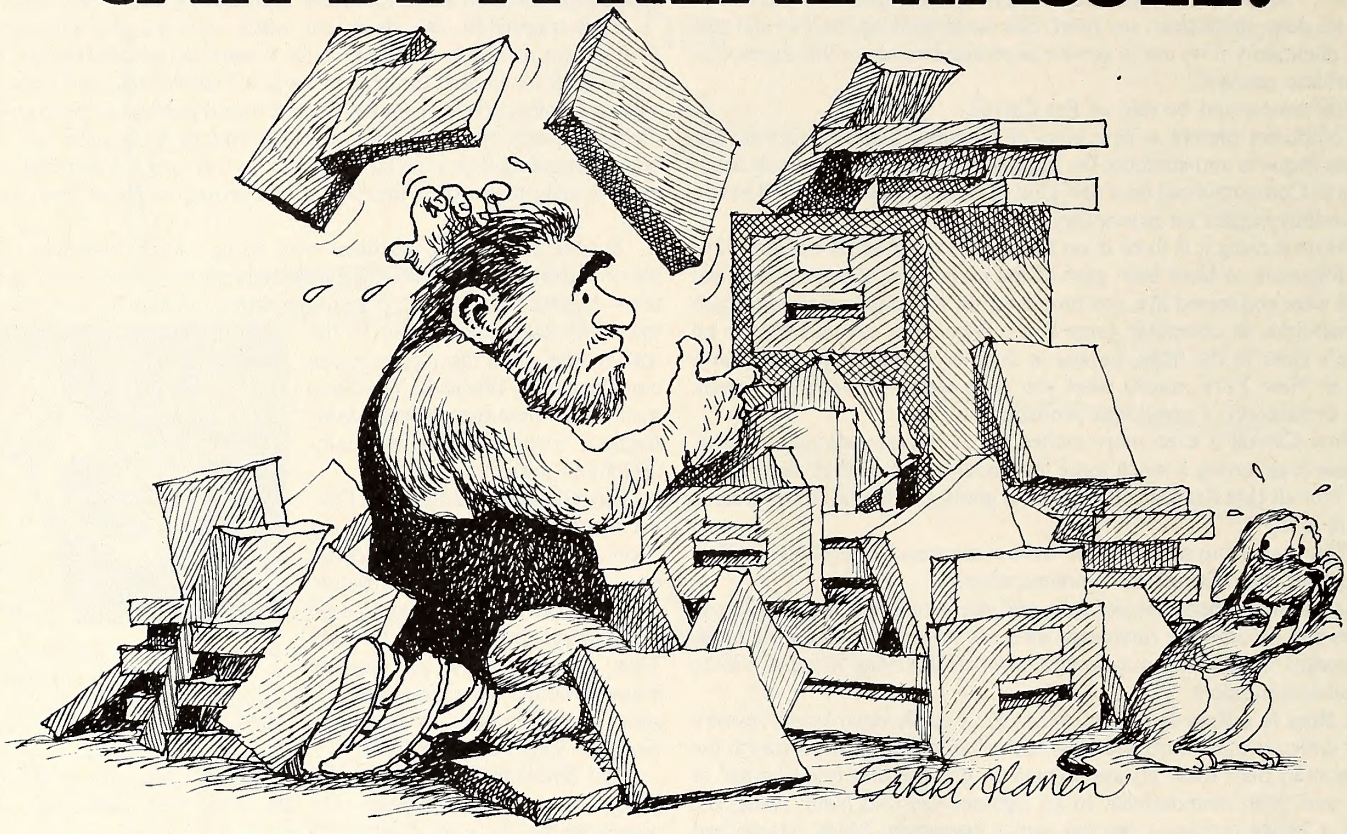

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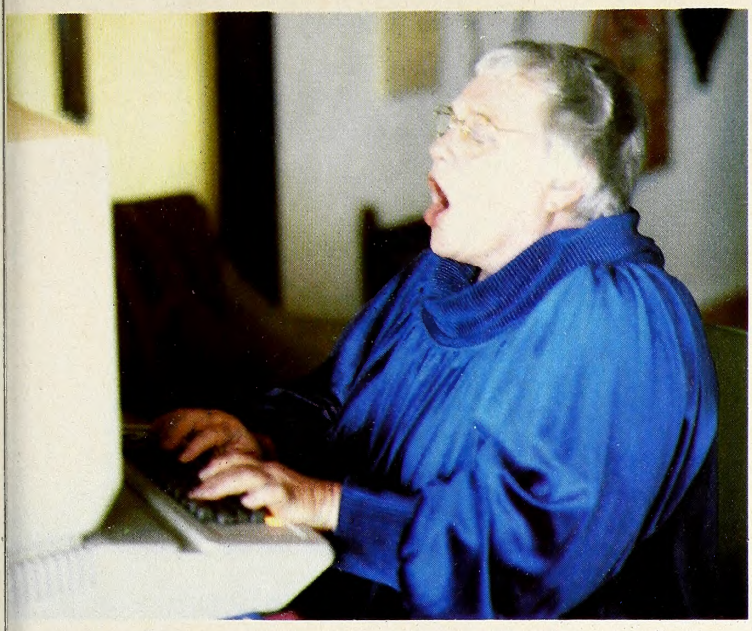

"Oh, shoot!" A lone Pat Carroll takes on the forty-eight opponents in *Crossfire*. *Sneakers* is another favorite, and *Castle Wolfenstein*, and *Olympic Decathlon*, and. . . .

Sherman insisted they investigate his own Apple. There, on the farm, he'd explain things about computers, and as soon as he saw a fidget, a wandering eye, a hint of confusion, he'd stop and say, "Play games." And they would. "Like kids together in a playpen," says Carroll. And as they played and forgot the medium, they grew familiar, and comfortable, and ready to learn more. Whence came Carroll's confidence: "I'm not beyond the pale," she realized; "I *can* learn about computers."

"It's playing games that's the way in," Carroll says now. "Teddy took our hands and led us into the maze.

"Learning from Teddy, the four of us had our progress customized, like having clothes fitted to us."

Sherman's method caused no fear, no compunction. "No matter how stupid a question we ask, he always says sincerely, 'Good question!' and treats it that way."

When he'd passed to them his passion and had set them up with the complete Apple system they'd need, Sherman said, "Say good-bye to the sun."

And Carroll and Devery took the computer home and pulled the drapes to get rid of the glare and watched a brilliant new sun rise on an Apple monitor.

Work Is Less Work Is Play. Mary Ellyn Devery uses the Apple to keep all the accounts for the *Gertrude Stein* company. She's using *Disk-O-Check* and *Home Accountant*, and likes them, but neither is precisely what she's after. A single-entry system that uses at least three-letter codes and can handle credit cards and petty cash would be ideal; a simple journal and ledger combined.

The Apple also keeps tabs on Devery's extensive Stein collection of rare books and memorabilia, gathered during preparation for the show.

Ellen Zalk uses *Screen Writer* and *Apple Writer* to serve the group's word processing needs. "We keep the bios of all the company people on *Screen Writer*," Devery says, "so we never have a bunch printed up, only to have them outdated before half are used." If a member of the company needs to send out a bio, she can update the *Screen Writer* file and print out a single up-to-the-minute document. Zalk produces contracts for theaters on a fourteen-page contract model on *Screen Writer*. The contract can be customized easily for each individual theater and situation.

Doing the theater circuit—those eighty-two cities in two years—loses its uncertainty. On *DB Master*, Zalk records all sorts of pertinent facts about each theater—the size and layout of the house, notes on quality, names of theater crew members, even the locations of bathrooms and notes on where to stay and eat in town.

David Lee Crist stores on the Apple the entire lighting schemes for all the theaters the company plays. His system serves on two levels. Prior to arriving in a town, Crist prints out an instrument schedule and hookup information to send, along with a light plot graph, to the next theater; so, much of the preparation can be done ahead by the resident theater crew. Then, when the company arrives at the theater, if the theater has an Apple-compatible computer running its lighting system, Crist merely runs a disk through the theater computer; voila, all the light cues are set. At theaters in which lighting arrangements involve other computers, setting the cues takes seven hours. Crist is working on designing an interface between the Apple and the various lighting system computers.

And then there's Pat Carroll.

Not yet does the Apple feed her her cue lines when she's studying a role. Not yet does her Apple serve when she's making notes or working on a new project or her planned book. Not yet has her Apple learned to respond appropriately with feedback to her reading of a new play (although it does very well at attentively listening). All in good time.

Just now, for Carroll, her Apple is her excitement, her fun, her companion, and, most important, her link with the new age, the age of computers of which she is so determined to be a part.

Just now, her Apple is *Sneakers* and *Castle Wolfenstein* and *Olympic Decathlon*.

And she loves it passionately.

Chances are, Gertrude Stein would have loved it too.

The Future x 3. Between evenings as Gertrude Stein and bouts with her Apple, Pat Carroll is mulling and inventing and forming her next venture.

"I'd like to develop four character studies, four one-person plays, to perform in repertory. Audiences would be able to return four times during a run and see four different shows"— each starring Carroll and each with its own unique identity.

The magnitude of that ambition is outshone only by the probability that this warm, outgoing, caring woman of rich humor and deep thought will indeed achieve it. And she will.

And when she does, there's no question that by her side will be her Apple be her Apple be her Apple. ■

Producer Mary Ellyn Devery may talk about accounting systems, but she's no slouch at games either. Here, she takes a concentrated approach to *Bolo*.

Inside Apple

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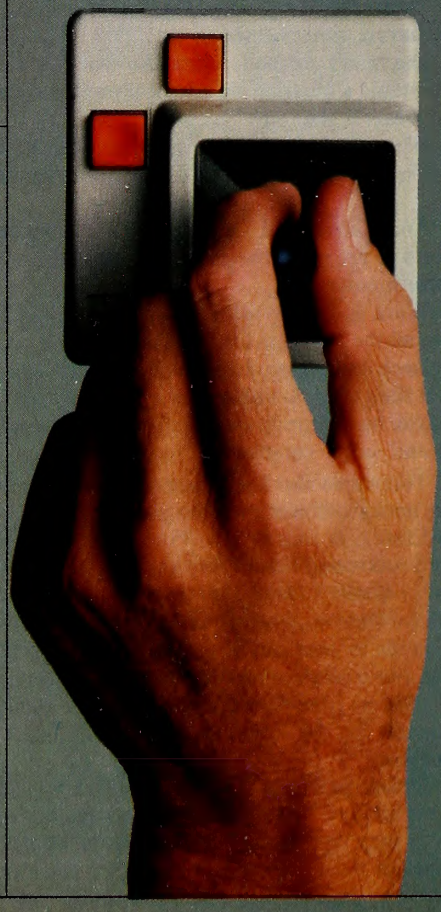

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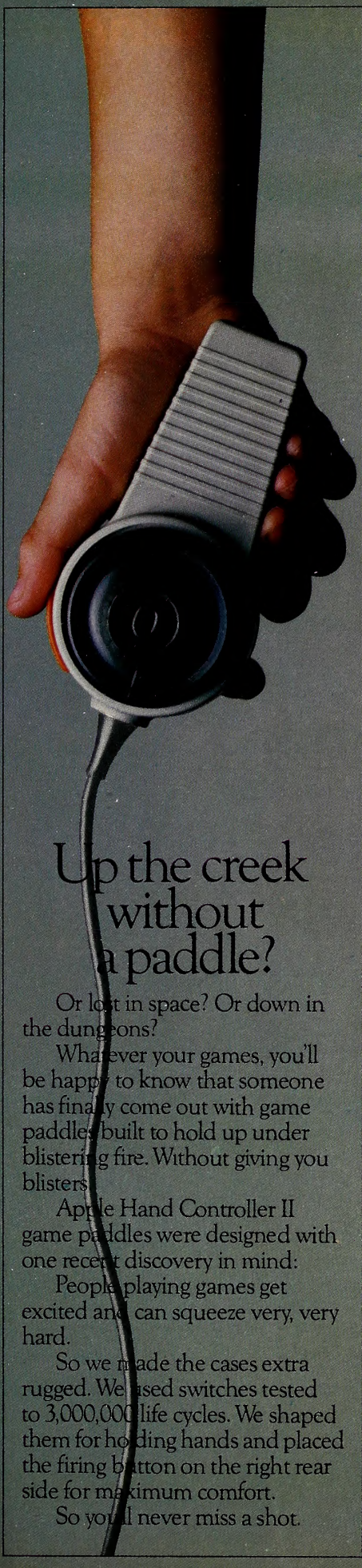
The Apple Letter Quality Printer, which gets the words out about 33% faster than other daisywheel printers in its price range, also offers graphics capabilities. See your authorized Apple dealer for more information and demonstrations. Because, unfortunately, all the news fit to print simply doesn't fit.



Up the creek without a paddle?

Or lost in space? Or down in the dungeons?

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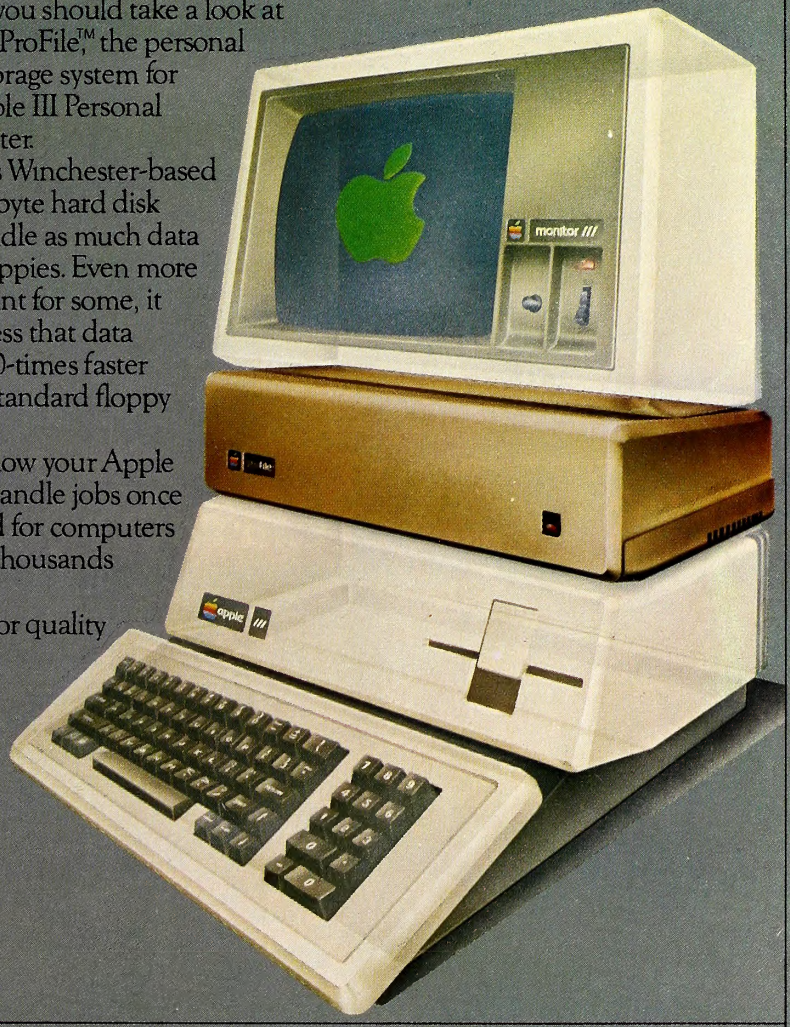

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Good tidings for crunchers of numerous numbers:

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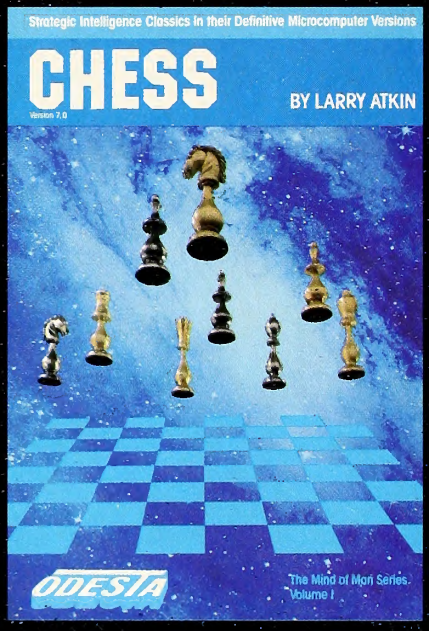

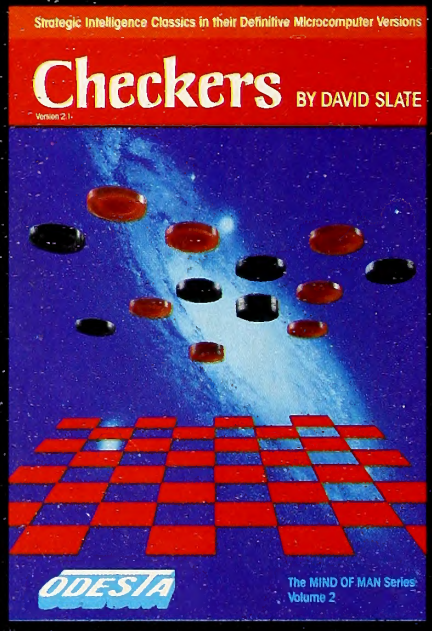

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Suspended. By Michael Berlyn. When Infocom released *Zork* two years ago, it was evident that this new company cared about quality and its customers. The full parser was an innovation—freedom from putting the cat in the hat in two words or less, and a vocabulary that seemed to want to understand even when it didn't.

On top of the technical excellence, the adventure story was entertaining and its puzzles logical and intelligent.

As new Infocom products arrived, they merely cemented these impressions. Innovation and excellence are a way of life for the folks at Infocom. A breakthrough is something they must make approximately once a week.

Meanwhile, high in the mountains of Colorado, a science-fiction writer was not plying his trade. He'd fallen in love with the Apple he'd bought to write his books on and had taken to writing computer adventures instead, under the banner of Sentient Software. But Berlyn couldn't stop plotting. The clever, rounded plots that make good fiction kept creeping into his adventures, bringing them critical acclaim despite their limited parser (cleverly done) and Berlyn's beginning programming status. *Oo Topos* was a promise that *Cyborg* began to fulfill.

Like the people at Infocom, Berlyn drove himself for the best he could produce; he would push beyond his capacity.

Wouldn't it be wonderful, adventurers might muse, if Infocom and Mike Berlyn could get together? It would, and they did, and it is.

The first product of Mike Berlyn at Infocom, working with Infocom's specially developed tools and methods and the input of the company's designers, Marc Blank and Dave Lebling, is exactly what you might expect in your wildest dreams: a highly intelligent, intricately plotted, totally playable, challenging and satisfying adventure, and, of course, a breakthrough.

Suspended takes place on a computer-controlled planet; the failsafe, in case of computer malfunction, is human—that is the role the player assumes; and, as you begin, the computer has just malfunctioned.

Awakened just enough from a cryogenic sleep to think clearly, but still in a vulnerably suspended state physically, you must direct the actions of (here's this week's breakthrough) six unique robots to manipulate the controls that maintain the planet manually and to ferret out the causes of the malfunction and correct them.

Each of the six robots is individual, with strengths and weaknesses. Auda can hear; she cannot see. Iris can see, but she is confined to a small section of the control center. Sensa can detect physical waves and emissions, but she cannot manipulate things well. Waldo can manipulate just about anything, but he cannot always figure things out. Whiz is terrific when he's getting information from the central computer, but he's little more than an errand runner away from his plug. And Poet, well, Poet's makers missed the boat in debugging; he does his job well—he understands much through touch—but he speaks in poems and riddles.

There's a good argument that the robots are essentially personifications of human senses; if that fascinates you, consider it now. Once you begin playing *Suspended*, you are apt to be so charmed by the individual personalities of the six robots that you won't want to think of them as symbolic of anything. They are themselves, varied and colorful and friendly.

The robots are independent of each other. You can send several to various places and have others do other things while the first are on their way. In fact, to win the game, you'll have to find efficient ways to keep all the robots working simultaneously. Infocom provides a full-color laminated map with stick-on symbols of the six robots to help you keep track of who's where.

The object of *Suspended* is to repair the malfunctioning parts of the control center with the least possible fatalities planetside. At first, it seems impossible to finish the job at all before angry humans from the planet storm the control center to replace you for a job poorly done. But once you've solved all the puzzles, the temptation to go back and do it all more efficiently is strong. Can you do it with no fatalities?

Berlyn has succeeded in devising an adventure that is so absorbing, so compelling in the pleasure of the achieving, that you can replay it again and again.

Recognizing this, Berlyn included three extra modes of play: advanced, configure, and impossible. Advanced starts you off later in the game with one robot out of commission. Configure lets you choose your own parameters—how many robots are functional, how soon angry humans come in from the planet. Impossible—well, impossible's a joke.

As usual with Infocom games, the vocabulary is even more extensive than the last Infocom game. If you are using your mind, *Suspended* will probably understand you. If there's an approximate common word for a concept and a precise uncommon word, try the precise one. That's the way the minds at Infocom work, too. It's a pleasure.

Suspended is an intelligent, logical, well-plotted, compelling and absorbing, challenging and satisfying text adventure that begs to be played over and over again.

What more can an intelligent adventurer ask? Graphics?

Bite your tongue. MCT

Suspended, by Michael Berlyn, Infocom (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031). $49.95.

Senior Analyst. By Business Solutions. *Senior Analyst* is Apple's try at a *VisiCalc*-styled electronic spreadsheet. Basically, the program, which requires 64K, handles the everyday fundamental spreadsheet work, the what-if modeling. However, in place of the typical spreadsheet cells designated by coordinates, *Senior Analyst* uses what it calls "tags." Each tag may be four characters, and thus can be a mnemonic, such as sls or wage. These tags are put into "definitions." *VisiCalc* and some other spreadsheet programs don't protect formulas. This lack of protection can undo a great deal of work if a formula is inadvertently changed. The longer and more complex the model, the greater the chance of an accidental change. If a number of people are entering data for a report, the chances for error increase as well. *Senior Analyst* protects against changing anything in the model but a value.

One odd shortcoming of the program, however, is that you can save only nine pages of figures per disk. A page can be up to 50 rows and 16 columns of values. This compares to 254 rows and 63 values available with *VisiCalc*. However, *Senior Analyst* gets around this deficiency by making it easy to link pages together, even when they are on many different disks. As a result, a model may be as large as required, and people in other departments or at other locations can make their own models. Later, they may transfer those models into one or more larger models.

Several special functions are supported. These functions allow the allocation of values, the creation of linear regression forecasts, and the illustration of various types of depreciation and growth.

The most special printing function is the spooling option. Spooling lets the computer hold up to 10,000 characters on the side, waiting to be printed, while you continue using the program. *Senior Analyst* will even reprint all spooled reports.

Its most serious weakness is its inability to transfer data to a word processor, a graphics package, or through a modem to a distant site. Major corporations frequently need to modem their financial data around the country to different groups.

Nevertheless, for those who are searching for a good forecasting and analysis program, *Senior Analyst* may fill the bill. The program is well geared to executives who are first-time computer users. DA

Senior Analyst, by Business Solutions, Apple Computer (20525 Mariani Avenue, Cupertino, CA 95014; 408-996-1010). Apple IIs, $225; Apple III, $350.

Dark Crystal. By Roberta Williams. You read the book, you saw the movie, now play the computer game! Does that sound familiar—yet strange? The movie was the much-heralded Christmastime release, *Dark Crystal*; the game is Roberta Williams's computer adventure version of the movie.

The direct conversion from movie to game is a first and, thanks to Williams's bright imagination and delight in puzzling, it works. In fact, *Dark Crystal* is actually better as a computer adventure than as a movie.

The world of the *Dark Crystal* was created by Jim Henson, master of Muppets. British illustrator Brian Froud breathed life into Henson's fantasy world. The movie marked a departure for Henson from the cute lovability of the Muppets to a foreboding world filled with strange and exotic creatures.

Dark Crystal is the tale of a small elflike creature's attempt to find and return a missing shard to the central energy source of his world, a mystical dark crystal, thereby healing the crystal and restoring good and balance in his world. The creature, a gelfling named Jen, must figure out what he must do, then overcome tremendous obstacles, escape ferocious beasts, and outwit the evil skeksis rulers to accomplish it. He finds friendship and a partner in his quest in gelfling Kira and her puppylike pet, Fizzgig. Jen's mentor is the mystic UrSu; the one-eyed Aughra is the key to their success.

Aughra is an immortal seer; the legend of the dark crystal is actually a translation of her arcane work, the *Book of Aughra*. All the characters in the movie are portrayed by Muppets.

When Henson Associates decided to produce a computer adventure game based on the movie, Roberta Williams seemed the logical choice to create it. Williams, originator of illustrated computer adventures and bestselling author of several, including the gargantuan *Time Zone*, has faithfully adapted the story to the Apple. While retaining many of the adventure problems from the movie, Williams has added clever new puzzles, which maintain the tempo of the originals. So, having seen the movie doesn't mean you'll instantly solve the adventure. The game is immense, occupying four disk sides. The puzzles are basically oriented toward the intermediate level adventurer, but figuring out how to get into the dreaded skeksis' castle, near the end of the game, will tax even the most jaded, expert gamer. The outcome is uncertain until the very last move. Do you have the right crystal shard—or one of the many imitations?

Artistic hi-res color graphics subtly capture the mood and eeriness of the *Dark Crystal* world and catapult the player into high tension adventure. Each panel was drawn, on paper, by Henson Associates's art director Jim Mahon and then transcribed to the Apple by Sierra On-Line via graphic tablets. Every aspect of the story and graphics was personally approved by Jim Henson to ensure authenticity.

This game represents an unprecedented accomplishment in the microcomputer industry. It is the first time that a computer adventure game has been directly translated from a movie.

The experiment works. Whether the concept can hold up for a mov-

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Beamscope II . . . again. The fourth sentence in the fifth paragraph of last month's review of the Beamscope II, as the reviewer wrote it, read "If you have a crummy little television and you buy a Beamscope, you'll have a crummy big television." Somewhere in the course of publishorial bureaucracy, someone evidently objected to the terms "little" and "big" and refined the line. The new, classier review implied that it was the fault of Beamscope and the good folks at International Marketing Services if the hypothetical crummy TV remained crummy when enlarged. Not so. A twelve-inch Trinitron looks fantastic when Beamscope turns it into a 25-inch panoramic vista. Kudos, Beamscope. Eat dirt, staff prude.

ie that wasn't already a fantasy, peopled with fantasy characters, is not certain; but that next step will be more interesting to watch for after seeing the success of *Dark Crystal*.

The collaboration of Roberta Williams and Jim Henson paves the way for similar projects throughout the industry. Computer adventure gaming is becoming the new link in the classic merchandising chain of book-play-movie-games-toys. *Dark Crystal* represents a coming of age for a very young industry. RRA

Dark Crystal, by Roberta Williams, Sierra On-Line (Sierra On-Line Building, Coarsegold, CA 93614; 209-683-6858). $39.95.

Genesis. By Salem-Pritchett. Breathes there an adventurer with imagination so dead who never to herself has said, "I'd like to write my own adventure!" Playing adventures whets the imagination, hones the diabolical mind, sparks the creative juices.

But few adventure players are programmers. The road to good adventures is paved with codeless plots, you might say.

There is an answer, and it's to be found in *Genesis*. No, reading the Bible won't make a programmer of you, but the program *Genesis: The Adventure Creator* will do all the programming for you.

You'll have to live with its limits, of course; and your finished adventure will resemble early Scott Adams in format. But its content can be whatever you want; it really will be your adventure, playable and fun for anyone you want to play it with.

The publisher has opened *Genesis* for anyone to use, even if the user plans to market the finished product. That's enormously generous, but the fact is that the finished product won't really be retail-marketable as is. But, if your story and puzzles are good, it will be sufficient to market to a publisher who'll do the actual programming in-house. Just the way it is, it's fine for making adventures for family and friends.

Genesis has a lot to recommend it. Its greatest strength is in its ability to help you organize your thinking and manipulate the pieces. It encourages you to develop your map, select your objects, plan your commands. It's a cinch to edit, so you can always go back and make changes or new connections and puzzles.

A side effect is that you learn just how complicated an adventure is and how detailed your thinking about it must be. You also learn that all that work is even more fun than you thought.

On the negative side, for some people, *Genesis* is limited in scope, but the imagination can take users far beyond its capacity to respond. You can't write *Suspended* or *Labyrinth of Crete* on *Genesis*, or even *Deadline*. But after all, they are programming tours de force—no fair. More to the point, you're limited to ninety-nine of everything: rooms, objects, flag messages. For the most part, that's quite a lot. But if you should get terribly ambitious and use all ninety-nine rooms, for example, you could have no more than one identifiable object per room.

Other innovations take up unexpected space. Normally, *Genesis* displays on the game screen all directions possible from a room. If you want the player to have to discover an exit, you must enter it as a command; the command often involves an object and a message. The object becomes one of your ninety-nine and the message counts as a flag message. There's no provision for synonyms either; if you want your players to be able to refer to a wall hanging as either a picture or a painting, you'll have to enter both picture and painting as separate objects—one for the price of two.

Still, so long as you keep your adventures to a reasonable size and complexity, you can do plenty with *Genesis* without knowing one single word about programming. And, if you're just beginning to toy with adventure making, *Genesis* is invaluable for putting you on the right track in your thinking and organization. MCT

Within its limitations, it's fun.

Genesis, by Salem-Pritchett, Hexcraft (Box 39, Cambridge, MA 02238; 617-354-4451). $49.

Crime Wave. By Scott Schramm. There's something very, very wrong with this game. The graphics are smooth, the colors are bright, the sound is subtle, and the action is mostly nonviolent (the only time you use violence is in self-defense). The plot is even respectable: you're a police officer on your city beat, and your job is to round up criminals after they've robbed banks.

So, there you have it. A playful way to simulate the preservation of American justice, all in 48K. Anyone who sees something wrong in that probably also sees Superman as a self-righteous vigilante and a showoff.

Well, there isn't anything wrong with the idea behind the game; rather, it's in the way you feel while you're playing it and for a considerable time afterward. The game is addicting because after you're done kicking yourself for letting the bad guys get you, you'll want revenge. Bad.

What you see on the screen is a bird's-eye view of the city and the bank robbers' hideout to the side. When the alarm sounds, you must get to the scene of the crime within seconds if you are to capture the robber before he makes it to his getaway car. If he manages to get to the car, it's a downtown chase with you in hot pursuit.

The hideout is where they stash the cash, and once there, robbers equip themselves with ramrodders that make them vulnerable only to bombs, of which you can carry just one at a time (use it wisely). If you can catch the gunsels before they reach the hideout, just tow 'em to the station and get back on your beat.

After the successful booking of several robbers, the next crime wave hits, only with more robbers and no reinforcements to help you. Seems that all your fellow officers are hanging out at the doughnut shops.

Gee, what a nice game. What could possibly be wrong with it? What's wrong is that after successfully jailing ten or fifteen or thirty robbers, you're still angry! Angry at your patrol car for not turning the wrong way down a one-way street (no one is above the law); angry at it for not turning the right way when you could swear you hit the right key; angry because their cars go through each other and they destroy yours.

What's wrong is that the game is smart. Escaping crooks *know* which way you turned or will turn. At least it seems that way. Penguin can pat itself on the back for releasing the first game that shows a corollary of Murphy's Law in action: "Whichever way you think they'll go, they'll go the other way."

Don't even think about playing just a few rounds of *Crime Wave* and then leaving the game satisfied. If steam comes out of your ears and you're muttering, "Grrr!" then you're perfectly normal. If you're doing neither of these things, you're either stubborn or a very, very patient player.

Games are supposed to be fun, aren't they? If you're not having fun, it has to be the game's fault. Yeah, that's it; the game's fault.

Right. Rationalize, rationalize. MTV

Crime Wave, by Scott Schramm, Penguin Software (830 Fourth Avenue, Geneva, IL 60134; 312-232-1984). $19.95.

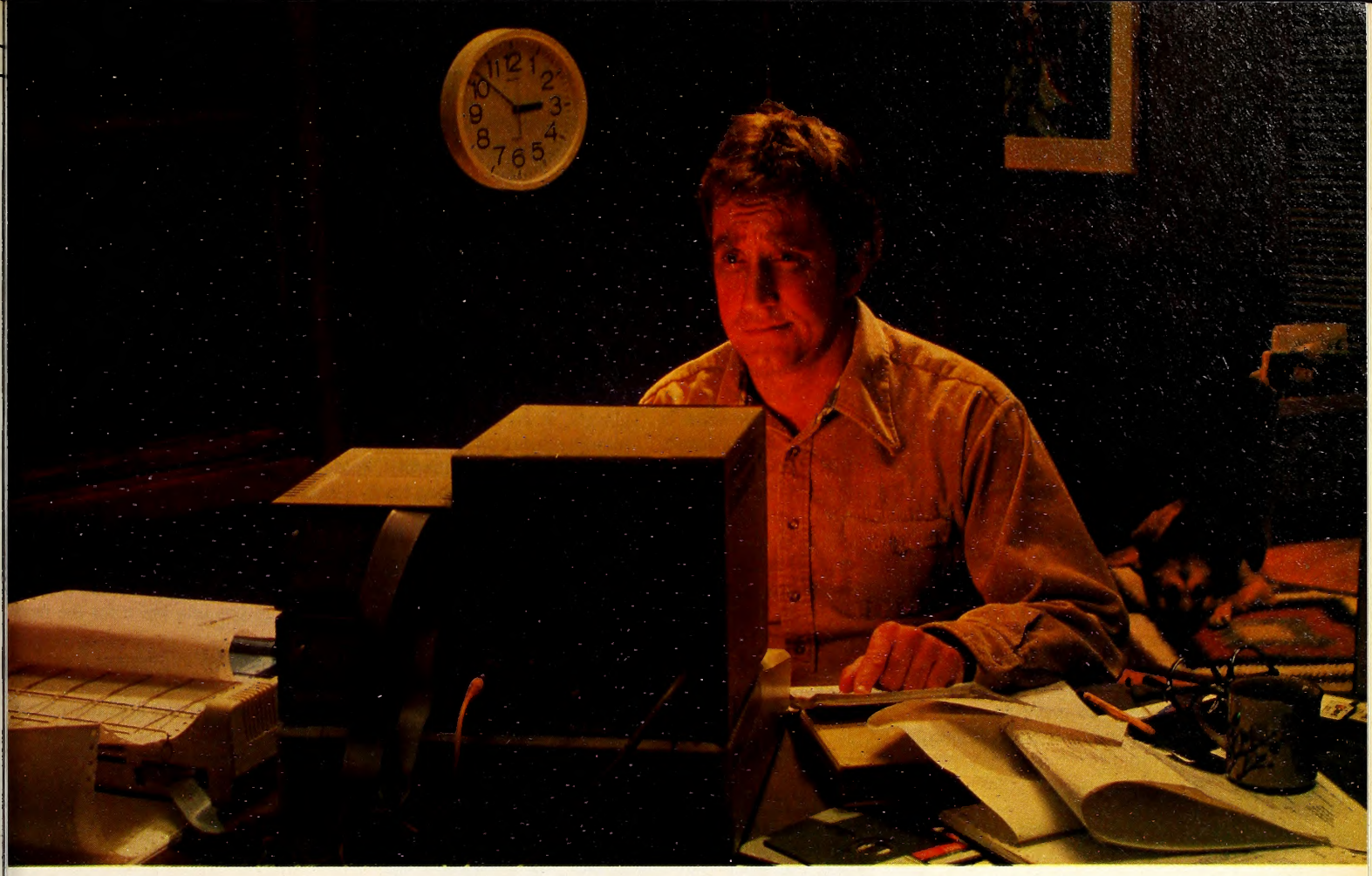
Serpent's Star. By Michael Ormsby, Larry Franks, Christopher P. Anson, Kristin Pearson-Franks, and Alan B. Clark. What does an intrepid explorer do for relaxation after battling an ancient Aztec sun god in the jungle of Mexico? He goes to Tibet to frolic in the snow! While there, he might as well search the Himalayas for the fabled Serpent's Star, no doubt to defray expenses.

Continuing the saga of its bestselling first release, *Mask of the Sun*, Ultrasoft is presenting *Serpent's Star*. At the end of *Mask of the Sun*, our hero, Mac Steele, had recovered the rare Lhasa scrolls of Tibet. Careful deciphering of the scrolls yielded a strange legend of an eternal city, Kara-Koram. That city exists mostly out of our time, making only occasional appearances. The scrolls also told of an enormous blue-star sapphire, called the Serpent's Star because it was supposed to belong to a dragon god. Usually, you openly scoff at such superstitions, but with the Aztec sun god coming to life and almost devouring you, perhaps a little tolerance of strange customs is in order.

Searching for a legendary city that appears only for one day each year is a difficult undertaking. Not having the luxury of a plane crash on the doorstep of Shangri-La, as had Ronald Coleman in *Lost Horizon*, the player must search the Himalayas. In your possession are ten of the thirteen Lhasa scrolls. Finding the other three will take the adventurer through the first two-thirds of the game. Talk to everyone encountered. Important clues and aid can be found through acts of generosity.

The teaching of the Buddha figures prominently in the solution of this game. The path to enlightenment requires humbleness, generosity, and introspection.

Mask of the Sun required no a priori knowledge of the Aztec religion



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or mythos for the game to be solved. The adventurer was not required to sacrifice virgins at the Well of Chichen-Itza or to know that the name of the Aztec love god was Checan. In *Serpent's Star*, however, familiarity with the basic Buddhist traditions is more than just helpful, it's necessary. Two difficult riddles, based on those traditions, must be solved before the adventurer can advance. Failure to solve either riddle can get the player fried or lost in oblivion.

While *Serpent's Star* breaks no new ground, the gaming aspect has improved. The adventure is more complex than *Mask of the Sun*, and its traps less obvious. Unfortunately, the high level of graphics that characterized the first game is not so prevalent in *Serpent's Star*. The illustrating of people, especially, seems to have suffered. The outdoor scenes don't have the richness of the previous game—partly because snow is simply less colorful than tropical foliage. Yet, some of the interior scenes are among the best that Ultrasoft has ever created. Ultrasoft's main claims to fame, the animated scenes and travel sequences, highlight this game. A levitating meditating monk is a real delight, as are the manifestations of the fabled city of Kara-Koram. The traveler sways from side to side like a drunken sailor. So much so that on a swaying bridge the two motions cancel each other out and the traveler appears to be standing still. A quick-travel option has been included to speed up the game for those not interested in the scenic tour.

This game also has two segments, a springing wolf and an avalanche, where the adventurer is required to have quick reflexes to go on. Even the mystical Yeti make an appearance.

While *Serpent's Star* is more of a sequel to *Mask of the Sun* than a new adventure concept, it still represents a sophisticated style of gaming that's entirely Ultrasoft's own. The two-sided disk will treat you to a glimpse of a faraway mystical land where feats of the occult are commonplace. RRA

Serpent's Star, by Michael Ormsby, Larry Franks, Christopher P. Anson, Kristin Pearson-Franks, and Alan B. Clark, Ultrasoft (12503 Bellevue Redmond Road, Suite 200, Bellevue, WA 98005; 206-451-8104). $39.95.

Flip Out. By Scott Huskey. Its reputation as an arcade game company notwithstanding, Sirius Software occasionally manages to come out with a good, solid thinking game. This time it's tried something a little further off the beaten track and has come up with a dandy: *Flip Out*.

The simplicity of the game may be its strongest point. For one or two players, it consists of nine different layouts of gates through which players must drop their or their opponents' marbles. There are two types of gates: one catches marbles, holding them, and the other switches marbles over to an adjoining track. The bottom ends of both types of gates allow marbles to pass by freely. These gates are set up in vertical passageways through which the player drops a marble. The marble either passes through to the bottom of the layout or stops at one of the catching gates. Each time a marble passes through a gate, it flips it so that the opposite end (either catching or switching) moves into place for the next marble coming through.

The object of the game is twofold. Of primary importance is getting all of your marbles through the gates. But trapping an opponent's marbles in the layout is important, too. The game continues until one player has gotten all of his marbles through the layout.

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Softline, the magazine Brent Shaw likes.

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The computer is not a very tough opponent in the one-player version of *Flip Out*. In fact, the only way to play a really challenging one-player game is to see how quickly one can win by holding the computer to the fewest possible marbles through the series of gates. The computer tends to drop its marbles right where the human last placed hers and thus is easily beaten with a little foresight and calculation.

As a two-player game, however, *Flip Out* really shines. Evenly matched players often (but not always, by any stretch of the imagination) end up in a tie. Each player has to estimate correctly all the possible paths a marble can take through the gates and then pick the best option. With as many as half a dozen or more marbles from both players trapped in the network of gates, this can be a tricky proposition. Generally the player who makes the fewest miscalculations wins. Every game seems different; for a while each of the nine layouts stays basically the same. The gates are set randomly each time you play, making for an endless variety of starting situations.

The real beauty of *Flip Out* is the fact that it is so utterly simple that people of virtually any age can comprehend the game and play it in little or no time. It is a leisurely game, much like chess or checkers, in which one takes as much time as needed to select the best move. It holds no attraction for the hand/eye-only crowd, nor will it dazzle anyone with its graphics. For an enjoyable, simple thinking game, it's hard to beat. Where else can you cause your opponent to lose all his marbles? DA

Flip Out, by Scott Huskey, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $29.95.

Shadow Vet. By Brian Scott and Gary Goodman. There's a certain intoxicating feeling that even the most jaded machine fanatic experiences when encountering such a truly novel system as the *Shadow Vet*. *Vet* stands for voice-entry terminal. Its name, *Shadow*, characterizes the way it's run. As a background peripheral to the Apple keyboard, the *Shadow Vet* simultaneously allows either spoken or keyed-in commands. Almost imperceptible flickers and pauses may be heard as the process unveils its wonders, making it appear as if the program is really thinking about what it is doing. Almost immediately, *Shadow Vet* reveals itself to be a very smart, very cleverly put-together system. The *Shadow Vet* is an Apple-sized harbinger of the forthcoming fifth-generation, artificially intelligent computer.

Shadow Vet's creators set out to design a system that would be as perfect a replica of the human ear as they could realize. Combining Scott's expertise in speech recognition and Goodman's in artificial intelligence, they came up with this system. The *Shadow Vet* is impressive in its ability to mimic the workings of one of the brain's most important peripherals. Although the system was designed for general use it should be of particular benefit to those handicapped people for whom it can provide total access to the Apple.

Shadow Vet is extremely easy to learn and use, even for beginners and nontechnical users. It is completely menu-driven, well prompted and assisted. Command vocabularies may be set for any standard program or operating system and for any combination of display formats (text with or without graphics, forty or eighty-column screen widths). CP/M programs do require the addition of a command file to the CP/M disk, but this step is well explained.

Installation is fairly well documented, though a little tricky, because it requires inserting a board that fits nicely in even the most "fully loaded" Apples. Two chips from the Apple motherboard (three, if you have a language card) have to be pulled and several connecting ribbon cables installed. The necessary surgery was performed with great ease. In addition to the board, the hardware includes a flat box containing the speech preprocessing circuitry, which may sit on top of the disk drive. A comfortable headset, which supports the microphone and leaves one's hands free, is also included.

The disk provided must be booted to use the *Shadow Vet* because it loads the *Shadow Vet*'s own Monitor, called SVS, into its on-board cache memory. At this point, the disk may be removed and any other DOS

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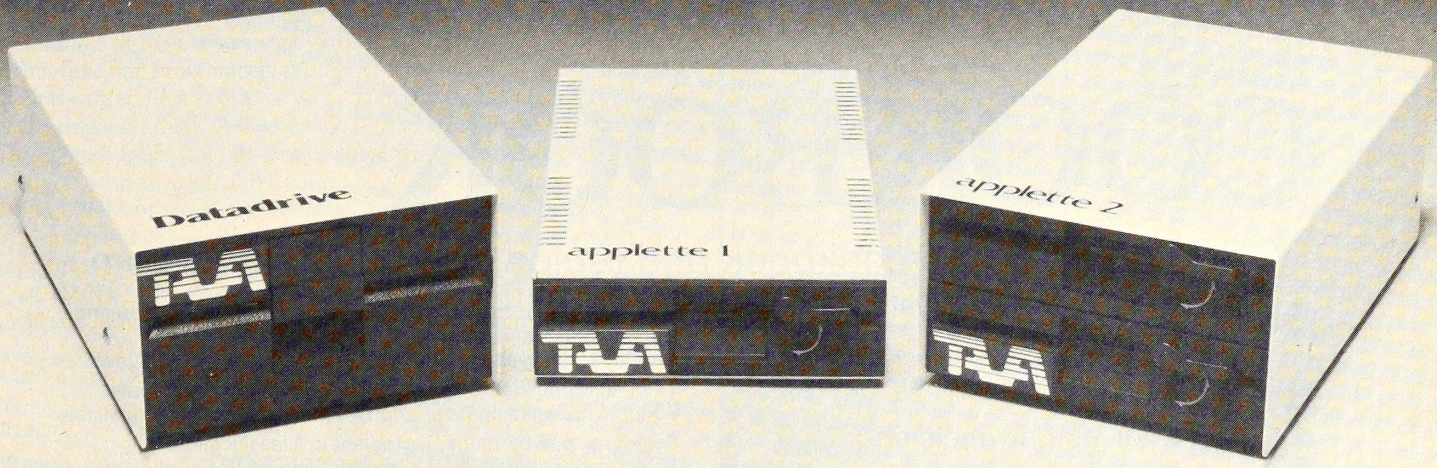

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booted. The *Shadow Vet* requires virtually no extra memory or drive space. Vocabulary files may be stored anywhere and easily loaded at any point in any standard program. This is accomplished by invoking the SVS Monitor and asking it to do so (in a nice tone of voice, of course!). Once vocabularies are created, the files may live on the same disks with unprotected programs. They may be loaded automatically with the hello program. Though vocabularies are limited to forty words, or command strings, each file uses only 4K of disk memory. Quite a few of these files may be scattered around on program and working disks. Because the *Shadow Vet* is completely transparent to the Apple, it may also be used with protected software.

The text of the "Teaching Your Computer To Listen" section in the manual is one of the most delightful pieces of computer-related prose. To wit: "Talking to a machine will likely be a new experience and you may feel a bit awkward at first. Relax—with a little practice, it will come naturally." For those of us who've been talking to our earless machines for years, at times cajoling or downright obsequious, at other times vengefully sputtering obscenities while kicking and beating them to death, a little behavior modification will be necessary: "Should mistakes occur, do not raise your voice in frustration; marked change in volume will impair recognition."

Even forewarned and forearmed, this may not always be as easy as might be expected. This is definitely one of the times in your computer life when you will find the difficulties encountered more interesting than the easy victories. The idea is to repeat the words a few times so that the system can create a unique template for each word. The process is fascinating to watch and works surprisingly well for most words. For the neophyte, or the user interested only in results, there's an easy fix. Try a few different enunciations, follow the directions in the manual (don't talk too slowly/quickly, softly/loudly, and don't get emotional!). If all else fails, use another, more easily trained word to represent the problem word.

This latter tactic, of course, presents the adventurous user with yet another wealth of possibilities: why not substitute your own vocabulary for all those boring commands? A user who hadn't seen you set it up would never figure out that you get a catalog by authoritatively saying "piggy." Or scroll the screen by following up with "ducky," and proceed to display the drive 2 catalog with a triumphant cry (careful, don't get too emotional . . .) of "horsie!" All of the above, including rapping your knuckles on the table or clicking or hissing, were fun alternatives to explore. As children enjoy experimenting with the *Shadow Vet*, its potential for educational use will be of significant interest.

The programmer's reference section contains a wealth of information for the more technical user. The information includes the utilities available for changing the system's parameters. Wonderful sounding things, such as noise, silence, vocalic, and acceptance thresholds, are listed. Writing custom software using the *Shadow Vet* routines is tantalizingly possible but is the least complete section of the documentation.

Technically ingenious, user-friendly, wonderful fun, the *Shadow Vet* has significantly more potential than its current capabilities might suggest. It inevitably educates, by raising questions about the mechanisms of perception and the role perception plays in intelligence. ❮❮

Shadow Vet, by Brian Scott and Gary Goodman, Scott Instruments (1111 Willow Springs, Denton, TX 76201; 817-387-9514). $995.

VIM. By Ron Runge. The sight of someone talking to a computer isn't too startling. When you work closely with one of these seemingly smart machines, it can seem to have a personality of its own. So if, perchance, you overhear a friend having words with his Apple, you are likely to think little of it. A sight that's sure to make you do a double-take, however, is that of someone talking to his Apple, and the Apple responding.

There are all kinds of misconceptions people have about computer voice input. Some might picture a computer you can talk to the way you talk to people, but this kind of sophistication just doesn't exist yet. On the other hand, you might expect that a voice input device for the Apple

would be totally incompatible with existing software, that it would require a whole new body of very specialized—and probably expensive—applications. Nothing could be further from the truth.

The VIM, or Voice Input Module, lets you teach your Apple a vocabulary of up to eighty words for use with any Apple program. Each word has a visual component, the word the computer prompts you with; a verbal component, the sound you make when you say the word; and a definition, a set of characters the VIM sends to the keyboard when you say the word. The Apple interprets the characters the VIM sends as if they had really been entered from the keyboard. The VIM physically intercepts the keyboard input, but you can still type at the keyboard; the VIM only blocks keyboard input when it is translating one of your utterances to the Apple.

The VIM comes with a utility called AVIM, which accomplishes all the tasks of training the module to recognize your voice. All the various training functions—entering and editing vocabulary and key definitions, training the VIM to recognize each word as you speak it, loading and saving vocabulary and voice patterns, and activating recognition—are selected through a series of menus.

Vocabularies are designed with specific applications in mind. With most serious applications, you should think out beforehand which functions are easy to do from the keyboard and which best lend themselves to voice command. Think of each command you train as a kind of vocal macro. Frequently used commands requiring complicated key sequences and commands you want to give the computer while looking for something else are best suited to voice input.

The words chosen for the spoken commands should be selected with the idea of making them easily distinguishable. For instance, you probably wouldn't want to use "correction" and "direction" in the same vocabulary. Instead, you could change one of them to some synonym that wouldn't cause confusion.

In training, AVIM prompts you one word at a time, making at least three passes through the list. If you say something differently the second or third time through, it prompts you to repeat it to make sure it has a good sample of the average way you say the word. If you said it wrong the first time, the program will prompt you several times on the next pass until it is sure enough about the way you meant to say it that it can throw out the original sample. When you're finished training, AVIM turns the VIM on and drops you into Basic, where you can load or boot the program you wish to control by voice.

The AVIM program also contains options to test the trained vocabulary for separability—which makes sure that no two words sound too much alike—to test for proper recognition and to retain difficult words.

Of course, voice recognition technology has yet to reach its logical conclusion. It has the potential, ultimately, to revolutionize the office, the factory, even the home. A machine that takes dictation, still within the realm of science fiction today, is not impossibly far off. DD

VIM, by Ron Runge, Voice Machine Communications (11522 Covington Circle, Villa Park, CA 92667; 714-639-6150). $825.

Germany 1985. By Roger Keating. The date is the summer of 1985, and the Soviet Union launches a massive strike into central Germany. The Red Army is on the march and only the NATO forces under your command can stop them—maybe.

During the height of the 1962 Cuban Missile Crisis, President John F. Kennedy and his brother Robert found themselves discussing the chances of war in the White House kitchen late one evening. Dave Powers, a longtime friend from Boston, was also there enjoying a hasty meal. The president remarked to his brother, "The way Dave is eating my food you'd think it was his last meal." Dave Powers looked up, thought a moment, and answered, "The way you and Bobby are talking, maybe it is!" After a few hours with *Germany 1985*, you will understand Dave Powers's point of view.

Germany 1985 uses an advanced version of the innovative game system first developed for SSI's *Southern Command, the 1973 Sinai Campaign*. *Germany 1985* is the first in a projected series of contemporary war games depicting different conceivable U.S. and Soviet conflicts on a global scale.

Documentation is thorough. A battalion-level simulation of two possible scenarios of "conventional" battle between NATO and Soviet forces in central Germany is included. An innovative feature in SSI's documentation is that a "Sample Turn" is outlined in the manual to familiarize the player with the game's command system. To assist in learning the game system, the novice player may watch the computer play a "demonstration game" against itself. The battlefield is a hi-res hexagonal grid representing one mile per hex. Terrain is varied, including forest, rivers, swamps, cities, and towns. Victory is determined by the number of occupied cities and towns controlled by the player's forces at the conclusion of the game.

A terrific new feature is an optional computer-assisted automatic movement and fire control. This feature enables the player to direct the strategic flow of the game without the tedium of managing every detail of game play.

Solitaire play is available, with the computer playing either the NATO or Soviet forces. Three levels of difficulty may be selected to accommodate novice or experienced war gamers. In addition, the player may select open or hidden movement, with enemy units only becoming visible when sighted by friendly forces.

Germany 1985's brigade level simulation is as contemporary as today's headlines and represents the full range of modern arms. Two new and exciting elements have been added with the introduction of divisional integrity and variable movement. Divisional integrity represents the tendency of a military unit's effectiveness to decrease with the unit's distance from headquarters. This is a vital concept in modern tactical warfare. Variable movement introduces the concept that when sighted by enemy forces the movement of friendly units tends to "slow down." Traditional elements of variable terrain, morale, fatigue, and restricted movement have been included. Even the use of smoke screens to screen attack or retreat is employed.

Germany 1985 uses one of the best graphic-display systems yet by SSI. The entire hexagonal display may be scrolled using the cursor to show all portions of the battlefield. To provide a single overall strategic view, an aggregated, hi-res color map may be toggled on or off. The quality of the terrain and unit counter graphics is first-rate. Troop unit types are clear, easily identifiable, and remain that way even with black-and-white displays. A considerable achievement.

The computer in solitaire mode plays a capable game. It capitalizes on obvious mistakes and presents some apparent tactical insight. Only in the end game does the computer lack finesse and fail to "see" a simple conclusion.

Germany 1985 is an intermediate level simulation, requiring three to four hours' playing time. Well-designed and executed, it's an excellent first entry in the "When Superpowers Collide" series. WHH

Germany 1985, by Roger Keating, Strategic Simulations (465 Fairchild Drive, Suite 108, Mountain View, CA 94043; 415-964-1353). $59.95.

Voice Box. "Wake up, Susan, it's time to go to work," the tiny speaker beside her bed announces. The monotone voice continues, "It is now seven fifteen; your coffee is waiting for you."

Speech synthesizers for microcomputers have been around for some time, and though they have found great acceptance by those with speaking difficulties or other communications handicaps, they can also be downright fun to play with! The latest generation is not only relatively inexpensive, but, with the addition of a "text-to-speech" converter, extremely easy to use.

The Voice Box is no exception, and with the text algorithm on a ROM instead of a disk, there is no longer a need to boot before it can be used. It may be plugged into any Apple slot, and will be ready to go with a simple "PR#" command. Any print statements that follow will be converted into the appropriate spoken words, though with the rules of English being what they are, don't be surprised at occasional mispronunciations. Of course, this is easily circumvented by spelling those words phonetically, which in time will become second nature.

The Voice Box isn't limited to a fixed spoken pitch; nor does it require setting an on-board trimmer. Its pitch and pacing are under independent software control. If desired, either may be changed for each word or part of a word, lending a much greater feeling of realism. Recent experiments have shown, however, that cats and dogs are smarter than we think, since they won't be fooled for more than about a second. Although, with

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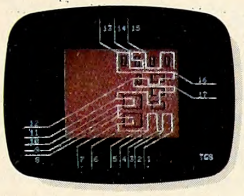

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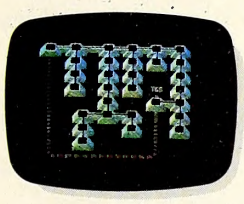

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enough patience, it is possible to generate an almost natural inflection. In fact, one of the product's featured selling points is its singing capability, though certain notes seem to suffer from a disturbing "gargling" quality.

The speaker has a two-position volume switch, eliminating the inconvenience of removing the Apple's cover just to change the volume. The documentation accompanying the Voice Box is well written and the setup instructions are easy to follow, though it would be nice if it were a bit more durable than mimeographed pages stapled together. Still, all of the relevant addresses are listed (for those who care), although the best part is that it can operate in five minutes or less.

Also included is an unprotected disk containing four different pronouncing dictionaries. One dictionary spells all words. There are also a variety of utility programs, including one that generates random sentences that actually make sense. It could be fun to add your own words and pep up a party. The dictionaries can be easily altered to include frequently used technical words or to pronounce the name of a friend correctly. In addition, there is a hysterical hi-res face that moves its mouth and eyebrows as it speaks.

Overall, the Voice Box is extremely easy to use, but more important, it is very intelligible. It is a pleasure not to have to strain to understand the words. Children really thrill at hearing their words repeated back to them by the computer. EW

Voice Box, the Alien Group (27 West Twenty-third Street, New York, NY 10010; 212-741-1770). $215; $139 without on-board ROM, speaker, or singing capability.

Galactic Adventures. By Tom Reamy. Something old, something new, something borrowed, something. . . . Strategic Simulations has taken one of the first of its RapidFire series, *Galactic Gladiators*, and turned it into a bona fide fantasy role-playing game. In doing so, it's created a very playable game. Ambitious in scope and complexity, the program is almost a classic.

Galactic Adventures places the player as the leader of a combat group of adventurers and mercenaries. Bent on increasing skills and financial well-being, the players undertake a galaxywide search for treasures and mayhem. The more successful the team, the better they become at their individual and collective skills.

A leader is chosen from one of seven regular species from the various far-flung planets. Each species has its benefits and disadvantages; they're fairly balanced in abilities and native skills. Then the player begins hiring or cloning a team to go adventuring.

The adventures themselves are miniscenarios in which there are half a dozen or so rooms to explore. Most rooms have opposing teams of single or mixed species and occasional loot in the form of K-devices—relics from an unknown culture, best described as magic devices from a scientific framework. Unfortunately, all references to that particular science have long since vanished, and without knowledge science becomes the occult, or magic.

The most striking thing about *Galactic Adventures* is its scope. It's vast! There are twenty-six possible scenarios. The areas to be explored are contained in the four Guild areas, where teams may embark either on special missions to fabled places or try to fight their way out of confinement—providing, of course, that the team isn't wiped out by berserk Robots, missile-slinging Orangaphins, or the dreaded Mole People. For those not strong enough to go on adventures, the Streets hold the answer to character development. Skills may be earned, or intelligence-raising RNA drugs bought.

But *Galactic Adventures*'s strength is also its primary weakness. A game of this size written mostly in Basic can be painfully slow at times. Combat resolution with teams of seven or eight players can take up to two minutes per round; that's how long it can take the computer to do its bookkeeping. The player's decision making, similar to chess in the sense of requiring thinking ahead a few turns, can take quite a while too. All in all, a single adventure, one day in game time, can take more than an hour to play. Unfortunately, the game can only be paused and saved during the periods between complete adventures. To savor the fruits of an expe-

dition, players must see it through to the end, regardless of prior commitments or emergencies. Most sessions last somewhere between three and eight hours.

Another weakness is *Galactic Adventures*'s documentation. Fans of Strategic Simulations have come to expect the most detailed and comprehensive documentation in the gaming world, but *Galactic Adventures* falls woefully short of that. The lack of explanation as to how the computer figures line-of-sight rules and why opponents disappear from sight while still being able to see and blast at the player's team are minor irritations. However, the documentation for playing homemade scenarios is almost nonexistent. One of *Galactic Adventures*'s finest features is the ability to create adventures. That segment of the program is a four-step, menu-driven set of editors for creating settings, populating them with treasures and opponents, and adding the various flavors and scents that make up a fantasy role-playing game. But, in fact, it is extremely difficult to figure out how to use these scenarios once they have been set up. Incredibly, there are no instructions for loading and using your own adventures in the documentation!

Nevertheless, *Galactic Adventures* is an excellent game to play, one of the most engrossing programs of the year. The game is open-ended, seemingly possessed of infinite variety. It could be better—but only in its mechanics, not in design. DA

Galactic Adventure, by Tom Reamy, Strategic Simulations (465 Fairchild Drive, Suite 108, Mountain View, CA 94043; 415-964-1353). $59.95.

Bubble Memory Module. You may have heard of bubble memory before, but chances are that, unless you're a dedicated hacker with a background that extends to other computers, you're a little hazy about what exactly bubble memory is.

Bubble memory has been under development for a while. It is a nonvolatile device for data storage. Nonvolatile is another of those terms that seem to ignore their English meaning when used in computerese. The RAM inside your Apple is volatile, meaning that it will lose its data when you turn the power off, not that it will ignite when exposed to open flame. Bubble memory is nonvolatile; it keeps its data whether the power is on or off.

Bubble memory won't be replacing the RAM in your computer in the foreseeable future because, sad to say, it passes data much more slowly than RAM. There are practical uses for those bubbles, however, and MPC has come up with a good one.

Sometimes referred to as Bubdisk, the Bubble Memory Module System uses a 128K Intel bubble chip and is one of the most convenient pseudodisks available.

But not the fastest. Any RAM-based pseudodisk worth the price will boast faster data transfer than the Bubdisk.

Now consider the advantages. The Bubdisk is the first pseudodisk that can actually free you from the disk drive. Put it in a higher numbered slot than the actual disk drive and the bubble memory becomes the boot disk. You can even leave the real drive out of the system entirely. The Bubdisk, with no moving parts, takes to travel much better than a disk drive does. Since it needs no power to keep its data, as a RAM-based pseudodisk does, it makes the whole system more portable.

The security-minded could easily create a password system for their computers. With the Bubdisk as the boot disk and a hello program with proper control-C and reset trapping, the Apple can be made secure against unauthorized users.

There are limitations to the module's use. Copy-protected software that has to be booted to run will replace the modified DOS in memory, cutting off access to the bubble disk but not overwriting its data. The bubble-disk capability can be restored by booting the bubble board.

The *Bubble Memory Module* is clearly not for everyone, but in the highly diversified Apple marketplace that isn't a great weakness. Hobbyists and programmers with a collection of frequently used, unprotected programs will appreciate its speed and convenience. It's a well-designed storage system and will certainly find its niche. DD

Bubble Memory Module, MPC Peripherals (9424 Chesapeake Drive, San Diego, CA 92123; 714-278-0630). $875.

War. By Stan Erwin. Adventure International's war game is a simulation of combat between two stylized armies consisting of bombers, tanks, infantry, and engineering units. Set on a colorful hi-res battlefield, human or computer opponents square off to mercilessly destroy each other's cities.

The battleground is made up of elements placed randomly within a basic structure. Two cities, on opposite ends of the screen, are separated by a river and forests. The cities are composed of rectangular areas; the number of these areas unoccupied by hostile forces determines the number of replacements available to the city's army during the course of the battle. Not particularly original, but serviceable.

The war and the game continue in that vein. Engineer units build bridges, armored units destroy bridges. Each opponent has one airplane, and each airplane has a dropable bomb. Incredibly, the high-flying bombers can be shot down by enemy ground fire.

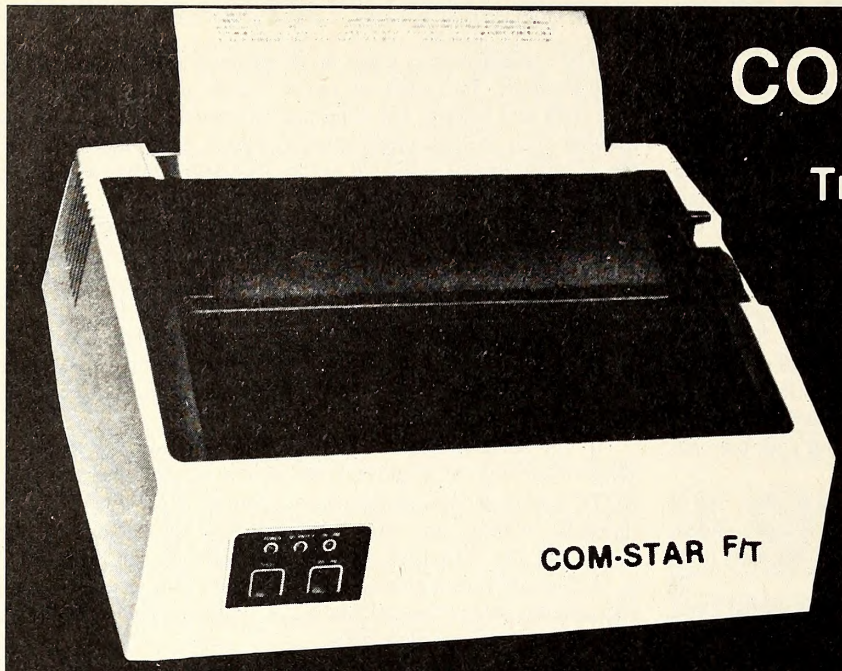
War comes brightly packaged (colorwise, anyway) with a cover depicting a World War I biplane dropping a bomb on a burning city. But one plane per player does not an air battle make; the game has little to do with aerial bombardment.

In the solitaire mode, *War* plays a weak and apparently random game. The computer deploys its forces in a manner reminiscent of an old ROTC battalion commander without combat experience. The scenario is simplistic, without any strategic depth. And the two-page documentation is not the "extensive manual" promised on the package.

Adventure International produces some of the most entertaining adventures this side of the Colossal Cave. Unfortunately, *War* doesn't meet the company's usual standards. WHH

War, by Stan Erwin, Adventure International (Box 3435, Longwood, FL 32750; 305-862-6917). $24.95.

SpeedSTAT Volume 1: Frequencies and Crosstabs. By Dennis W. LaRue, Tamara L. Sullivan, and Thomas E. Simpson. According to its designers, this statistical-analysis package is intended to be so simple that a market-research executive can hand it to his secretary, have her enter the data, run the analysis, and return neatly formatted, complete reports to him. While it might not be quite that simple, there's no doubt that extensive computer experience is unnecessary, and a relative newcomer to Appledom should be able to use it after only half a day or so of practice



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with the tutorial and well-documented reference manual. The program is entirely menu-driven, including loading and saving disk files, choosing printer or screen output, and selecting which statistics to calculate. Like all statistical analyses, however, interpretation of the results requires training and experience.

In keeping with its goal of user-friendliness, *SpeedSTAT Volume 1*, the first of five parts of the complete system scheduled to be issued over the next several months, comes in what must be one of the most attractive and expensive packages of any Apple software. The 7-7/8-by-9-1/8-inch notebook (a common size for expensive office packages) has double-jointed hinges (the pages thus lie flat even when the notebook is propped up on a copy stand) and comes in a heavy cardboard slipcase. Even the two disks (copy-protected program disk and copyable work disk for saving a certain file, but no backups) come in vinyl sleeves instead of paper ones. It's impressive-looking, both on the shelf and in use.

Unfortunately you're paying a lot for the trim and ease of use because *Volume 1* by itself will calculate only single-sample frequency-distribution statistics and selected two-way measures of association including joint-frequency tables. Single-set statistics include the first four moments about the mean (mean, variance, and measures of skewness and kurtosis), minimum, maximum, range, standard error of the mean, standard deviation and variance of the sample, and estimates of the latter values for the population. Two-way statistics are chi-square, Cramer's V, lambda, gamma, Kendall's Tau C, Somer's D, contingency coefficient C, Spearman's rho, and Pearson product-moment. All formulas for them are documented. Data limitations vary from 6 variables by 2,048 cases (the case maximum) to 128 variables (the variable maximum) by 25 cases. A data set must fit onto a single disk, and the program allows a disk to store just one data set even if it takes up only a few bytes. An upgrade to permit DIF files is scheduled for release this spring. No plots or graphs are available.

According to the publisher, each of the additional volumes in the package will cost approximately the same as this one. Scheduled are *Volume 2: Regression and Correlation* (mid-April), *Volume 3: Analysis of Variance* (mid-May), *Volume 4: Time Series Analysis* (July), and *Volume 5: Graphics* (this fall). (UL

SpeedSTAT Volume 1: Frequencies and Crosstabs, by Dennis W. LaRue, Tamara L. Sullivan, and Thomas E. Simpson, SoftCorp International (229 Huber Village Boulevard, Westerville, OH 43081; 800-543-1350). $250.

Max-Command. By Paul Mason, Louis R. Mayne, and Robert E. Siegling. Set in the early twenty-first century, *Max-Command* is a simulation of combat on the fictional plains of AlphaGorda. There, two superpowers square off. Equal in strength, each possesses, among more conventional weapons, the Max One—a long-range missile that renders the impact area impassible to the enemy.

AlphaGorda is divided into a large grid. The randomly drawn battlefield offers mountains, lakes, forests, swamps, and devastated areas in hires. An overlay showing the grid toggles on and off during game play to assist movement.

Prior to game play, the player is shown a series of screens depicting the deterioration of the diplomatic situation and confidential military commands. There are no selectable levels of game difficulty. Three separate game scenarios are available: Limited War, a specified number of turns; Victory Match, a specified number of victory points; and Shikari Version, a fight to the finish.

Play may be either two-player or solitaire. Each side begins combat with twelve counters composed of Shikari tanks, mobile laser artillery, dart fighters, Perseus missiles, and a Max One. Movement and deployment are affected by the random weather generator in the game. Simultaneous movement is not possible and the game proceeds in a series of discrete alternating single moves.

The game recalls chess, with identical numbers and kinds of pieces starting from opposite ends of a game board. Like chess, each piece possesses different movement allowances and capabilities. The difference is the randomized playing field or game board that offers unique opportunities with each game.

When you're ready to listen . . .

The game saves on the game disk. Sound is optional. There is no game manual! *Max-Command* is well documented on the disk; player game cards add all the support you need. The graphics are unfortunately completely different than those represented by the game cards. That certainly is an unusual discovery.

Max-Command is a good strategy game for those who prefer rigid, symbolic levels of computerized conflict. WHH

Max-Command, by Paul Mason, Louis R. Mayne, and Robert E. Siegling, RockRoy Inc. (7721 East Gray Road, Scottsdale, AZ 85260; 602-998-1577). $39.95.

Zendar. By Terry Eagan. The people of Zendar need help. The eight countries that make up this island continent have found themselves on the brink of economic collapse. Their usually harmonious international relationships have begun to deteriorate. One of the countries has decided to launch a war against its neighbors as a means of curing its economy, a la Mussolini. The whole continent is in danger of being engulfed in warfare. This situation will challenge the skills of any top-notch administrator or political leader. But does the average player have the time to accept this challenge?

Zendar can take eight to ten hours to play. During all this time, little feedback is provided for the player to determine how good or bad his decisions are. In fact, when the game is over, the player may feel as uneasy and uncertain in victory as in defeat!

Part of the reason *Zendar* takes so long to play lies in its complexity. On each turn, two hundred fifty assets and personnel need to be allocated among as many as eight countries. Each turn the player must find the optimal balance of assets, administrators, military personnel, scientists, and engineers. The player divides those personnel among seven categories of national effort.

All of these decisions are incredibly time-consuming. But there are even more serious delays in the game. The program has an unbelievably slow response time. There is a ten-second delay here, a fifteen-second delay there, and finally there is a minute-and-a-half delay at the end of each turn. It is all too easy to get in the habit of walking away from the computer between turns. After a while, the player may forget to come back.

Zendar could be a real challenge. The player is not given all the rules of a balanced enonomy but must guess at them. For example, transportation is surely essential; no use building up manpower and production facilities if there is a shortage of raw materials and/or transportation capabilities. Management is important to make things run but should not be overdone. There is no use putting a dozen administrators on a job, and only one engineer, although our government has done this many times in the past.

Unfortunately, after the game has taken forty mind-numbing turns, the thrill wears off. Within seven turns, even a novice will probably succeed in annexing or invading all eight countries on the continent. Holding on to them presents the next problem. Play can continue for eight hours and yet never result in "optimal" strategy. The strategy is good, bad, or just plain silly. The program is a very good, complex idea that completely got away from its author. PC

Zendar, by Terry Eagan, SubLogic (713 Edgebrook Drive, Champaign, Il 61820; 217-359-8482). $29.95.

Graphics Processing System, the professional version. By Richard Blum. Okay. You say you want a graphics system with the ability to save and edit, superimpose, manipulate compositions as full-screen pictures, and separate objects within a picture or group of objects? You say you want to create graphics displays that can be expanded within a graphic window four or sixteen times? You say you want a sophisticated screen-oriented editing system with a zoom option? Have we got a graphics processor for you. . . .

In the *Graphics Processing System* the author has created an option that rotates a drawing up to 360 degrees and has included the ability to create complex shapes, remove hidden lines, and reproduce three-dimensional objects. Another option allows the user to enlarge or reduce a drawing to virtually any size, and an extensive color editing function

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enables the user to select any standard color or mix the Apple II primary colors, creating wholly new shades and tones from a screen palette.

As with any good processor, the drawing on-screen may be duplicated on another disk or on a graphics printer or plotter. The save disk option may be used to create a boilerplate collection of standard graphic pictures.

GPS has a powerful graphic editing package. After a few minutes with the system, composing and editing graphics becomes possible with a fraction of the time and effort usually necessary.

GPS can be used with a choice of several graphic drawing tools: game paddles, joystick, Apple Graphics Tablet, or Symtec Light Pen. Optional hardware includes a 16K RAM card, second disk drive, Houston Instrument plotter, Apple Silentype, or other printers with graphic options. While the game paddles function in an Etch-A-Sketch-type mode, a full function joystick works better, and the Apple Graphics Tablet works best.

The *Graphics Processing System* comes packaged with two disks. One is the full system disk and the other contains special features that enhance the user's graphic compositions. The manual itself is a minor triumph of good technical writing. Clear and well organized, it paces the user through the many capabilities of the system, carefully documenting each procedure.

The *Graphics Processing System* operates via a series of nested menus. Program functions are then selected via the on-screen cursor. This may be a little confusing until the user gains some experience. The user creates in a variety of ways, from freehand composition to computer-assisted automatic straight line drawing. Compositions may be drawn, erased, or partially erased at any time.

The program is excellent, and the author has succeeded in creating a true graphic editing system with impressive capabilities and genuine ease of use. WHH

Graphics Processing System, the professional version, by Richard Blum, Stoneware (50 Belvedere Street, San Rafael, CA 94901; 415-454-6500). $179.

Wargle. By Mark Bernstein. Remember when generic blobs going putt-putt across the screen and firing wavering little missiles used to make the heart beat faster? It was the miracle of movement right there on your own personal computer. Return with us now to those glorious days of yesteryear. . . .

With all the Porsche Turbo and Ferrari Berlinetta-type home-arcade games now revving their RAMjets in the marketplace, is there still room for the kind of Basic transportation that *Wargle* represents?

Well, sure. This Nash Rambler of a game, which plays as though sired out of *Crossfire* in an unholy union with *Deathrace '82,* is a sturdy, workmanlike hunk of software, though priced dangerously close to self-extinction.

You're in the maze, waltzing with the usual crew of blind, blundering aliens. You had best make your shot count; if you miss, it must proceed the length of the mazes before you can fire again. With several of the little buggers on your tail, this is a potentially fatal situation. The possible strategies are several, and you can become reasonably proficient in a reasonable span of time.

There are six different maze configurations, with speed-ups from novice level to tournament. The animation of the program is not "smooth" by any definition, but unlike a lot of the new slick whippersnappers in town, it gives you the benefit of the doubt in those close-shave situations when you hit the key to fire at your nemesis a split second before skidding into the space it was occupying—safe!

The disk saves high scores permanently, even giving you the option of writing in your own score if you don't like the one that's there. Hmmm. . . .

That's all there is to it. The graphics, sound, and animation are nothing to write home about, but they are as good as need be for the intent and the scenario. After about ten minutes you will either curl your lip in a disdainful sneer or be totally hooked and keep coming back to it again and again.

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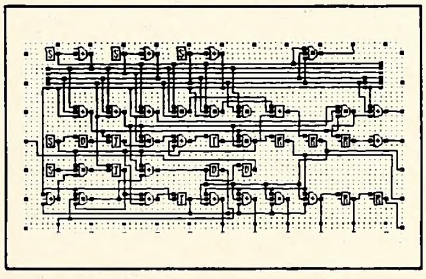

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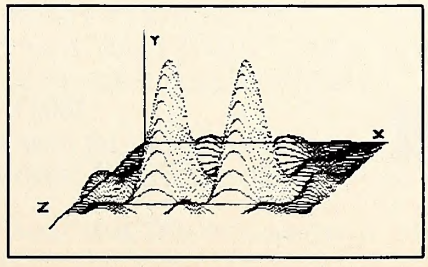

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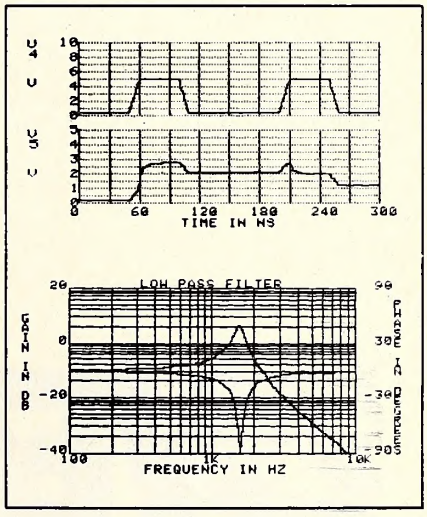

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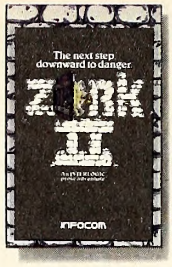

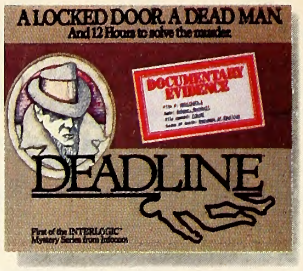

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make level 3, intermediate, and you just *know* if you play long enough you'll make level 4, how much do you care if it's "state of the art"? Given a chance, *Wargle* is the best game since *Bezman* for inducing a trance-like state of thrall (rapture of the monitor) for hours on end. AC

Wargle, by Mark Bernstein, Hayden Software (600 Suffolk Street, Lowell, MA 01853; 617-937-0200.) $34.95.

Elementary Pascal: Learning To Program Your Computer in Pascal with Sherlock Holmes. By Henry Ledgard and Andrew Singer. This is, of course, a teach-yourself-Pascal book—but this one is a bit different: here, the Pascal Analytical Engine is used to help solve the cases of the master detective of Baker Street!

You will remember, if you are a fan of the Great Man and his work, that he was a relentless stickler for logic—always trying to teach poor Watson how to observe properly and organize his thinking. It's certainly reasonable that he would have been fascinated by Pascal, if the language had been known to him.

It's a little harder to imagine a Babbage calculator running Pascal—that's the hardware Holmes uses in the book—but, what the hey, think of it as science fiction!

The book alternates between stories, in which Holmes uses the engine to help in his cases—programming it in Pascal, of course, and explaining each step to the bewildered Watson—and explanatory text, in which the authors develop the ideas brought out in the story.

Each story is plotted around a puzzle or some sort of question that a computer program could answer. There's a mystery with clues of the form, "The man in Room 12 had gray hair," "The man with tattered cuffs had red hair," and the like; several cases involving data analysis, from types of cigar ash to criminal records; a request from the Foreign Office for an unbreakable code, in which Holmes uses the engine to construct a double-substitution cipher; and so on.

After each story, the authors explain the new programming principle(s) in more detail and give you a wide variety of application examples. There is little emphasis on writing your own programs but plenty of examples of how it should be done.

The authors have tackled a difficult job here and have brought it off unusually well. It's not easy to have a literary legend teach a modern subject without hurling a major insult at either one. But here, the personalities of Holmes and Watson are re-created very well, as is the atmosphere of their time (the illustrations are perfect!)—and the Pascal teaching is clear, simple, and integrated with the story.

The really fanatical Holmes fans won't like it much—they hate to see the master doing commercials—and the dedicated Pascal student will find purer textbooks than this; but if you are neither of those, you might find this book an entertaining compromise. JR

Elementary Pascal: Learning To Program Your Computer in Pascal with Sherlock Holmes, by Henry Ledgard and Andrew Singer, Vintage Books, a division of Random House (201 East Fiftieth Street, New York, NY 10022; 212-751-2600). $12.95.

Pollywog. By Alan Wootton.

"When you were a tadpole, and I was a fish,
in the Palaeozoic time,
And side by side in the ebbing tide
We sprawled through the ooze and slime."
—Langdon Smith, *A Toast to a Lady.*

If they gave out a game award in the category "From Way Out There in Left Field," *Pollywog* would be a shooin.

Not that there's anything particularly wrong with this game; on the contrary, *Pollywog* is one of the most original arcade games on the market today. It is not, by any stretch of the imagination, a copy of any other game.

Just a mite strange. That's immediately obvious from the moment you first boot it.

Colorful lo-res graphics (remember those?) fill the screen with provocative abstractions, transforming and resolving themselves gradually into the title page.

The attract mode that follows is also composed of abstractions, representing the various "ponds" that serve as the game screens.

On entering the game, hi-res writing gives an immediate status report: level, score, eggs left, and so on, and even wishes you luck. An extremely jazzy color-bleed screen dissolve precedes each level.

Accompanying the action is the tastiest sample of Apple game music extant, serving the dual purpose of background music and win/lose sound effects. The melody of destruction blends remarkably well with the rhythmic counterpoint of survival (no kidding). It must be heard to be believed.

Conceptually, *Pollywog* is a "survival" game. Each level begins in a pond when your eggs hatch. You start out as a school of pollywogs swimming through rapidly growing patches of green algae. Eating the algae gains points; gain enough points and soon your pollywogs lose their tails and grow arms and legs. Poof—your pollywogs have become frogs. Eating all the algae completes the level.

The ponds are infested with creepies who also enjoy a good meal. Needless to say, creepies dine on pollywogs. Pollywogs can do nothing about the creepies, but once your pollywogs have become frogs, you may return the flavor (sorry) by getting in front of a creepie and pushing the fire button. No, your frogs don't fire nuclear frog rockets, but their pink tongues lash out and, gulp, goodbye creepies. This is a survival game, remember?

Enter the "killer fish" (sounds like a Bruce Lee movie). There is only one way to handle killer fish: avoid them. They're not the least bit fussy; they eat everything—eggs, pollywogs, frogs . . . definitely bad-news kind of guys.

Now for some good news. Frogs are female. That means that if they survive long enough they may lay eggs. (Aren't programmers logical?) If they do lay eggs, it's like gaining a bonus man. If one of these eggs happens to be blue, oh boy, it possesses "royal characteristics" and may grow up to become a prince! That's even better because now it's like getting two bonus men. That's assuming you last until the end of the level.

Because you're guiding the general direction of a "school" of creatures rather than the movement of a single character, control in *Pollywog* is of a more general nature than you're probably used to.

Also, in keeping with the abstract nature of the game, shapes are colorful and colors are plentiful, but the vague lo-res patterns are constantly intermingling with each other. It takes some getting used to. Don't even think about playing this in black and white!

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The overall look, sound, and feel of *Pollywog* is more like visual music than arcade, and more abstract art than action. It's a game that more than anything else proves that the potential for arcade game graphics is limited not by the computer, only by the imagination. But you already knew that. HAS

Pollywog, by Alan Wootton, Top-Notch Productions (1201 Montana Avenue, Suite 5, Santa Monica, CA 90403; 213-395-9591). $29.95.

Bibliotek. A bibliographic management system to aid researchers in maintaining a personal file of reprints and copies of literature pertinent to an area of interest, *Bibliotek* is a comprehensive tool that allows citation entry, selective retrieval, sorting, and printing of references.

The program requires two disk drives and will store approximately five hundred references per two-disk set. Any number of disks may be created (they're copyable), so backups are not a problem.

Each citation in a bibliography contains all of the information needed to reference the publication. Each file is designed to include authors' and editors' names (maximum of ten), specific title of the publication, title of the entire work, volume and issue numbers, page numbers, and dates, plus more, depending on the type of work. Up to six keywords may be stored with each citation.

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Bibliotek is slow at times, but the amount of time that the user has to be in attendance during the slower functions is small. For example, entries are stored in a temporary batch file as they're made. The *batch* command can be invoked later while you go have lunch; the citations will be integrated into the bibliography automatically. This process is the most time consuming in the program, so its incorporation as an option is a nice time-saving feature.

The documentation is very well written and takes the user through the program in an orderly and logical fashion. The program's only drawback is that only one hundred citations may be sorted at once. The entire bibliography would therefore have to be sorted into five different alphabetical or chronological lists if you were to have the maximum five hundred entries. However, the need for a command to sort the entire bibliography has been acknowledged in the documentation; apparently, future versions will have this feature.

The program as a whole does what it claims to, and, as an added feature, the predefined output format is the same one recommended by the Council of Biology Editors. *Bibliotek* is a useful tool for researchers in the science and technical fields. The price may seem a bit hefty, but the program appears to be worth every penny of it. MM

Bibliotek, Scientific Software Products (3171 Donald Avenue, Indianapolis, IN 46224; 317-299-0467). Two drives. $300.

Grapple. By Tony Lewis. On the remote planetoid Squelchem, the strongest prison in the universe has been built. The inhabitants of this maximum security facility are among the galaxy's worst mutations—creatures such as deviloids, robotesques, and horrible hoppers. To make matters worse, these outcasts have trained two local low-life forms, flippant flyers and sneaky snerds, as pets.

As prison warden, the player supervises android guards, named Alpha, Beta, and Gamma, and a reserve guard named Clyde to ensure that no one escapes. The game takes place during an attempted breakout; all the universe's dregs are loose and on the attack. Armed with stun guns, the android guards can only push the prisoners back a couple of steps at a time. With sufficient hits, they fall back over the edge of the prison floor and drop to their demise. Their pets, however, can be killed with one well placed shot, but they move much faster than their masters.

As new waves of prisoners come on, the stun gun loses power, knocking the monsters back fewer steps. The flippant flyers and sneaky snerds seem to attach with renewed anger.

Grapple is a fast-paced home-arcade game written in GraForth. You'll have your hands full trying to squelch 'em on Squelchem. DD

Grapple, by Tony Lewis, Insoft (10175 S.W. Barbur Boulevard, Portland, OR 97219; 503-244-4181). $29.95.

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from page 6

rescued the computers.

To Anthony Scott: your story, "The Gang in New York City," was a) sick, really sick; b) grody to the max; c) a fair representation of life in the Big Apple; d) enough to make Ray Hajduk look like a Boy Scout; or e) all of the above.

To Greg Grande: nice story. But we don't think the people at Apple would appreciate it if you did use your computer to wipe out cops.

To Duane Carroll: when we read your entry, we couldn't stop laughing. We don't care if you and Allen Frieson are "only in this contest for the money," or that you "will kill" if you don't win. Well, you didn't win. You ought to get together with Grande, Scott, and Hajduk; you guys could start a swell club.

To the rest of the school and all other contestants: aren't you glad we didn't embarrass you this month?

Little-Known Contest. Just as we finally got our front door repaired from the damage done by a deranged penguin driving a bumper car (Contest Winners, March 1983), the same beer-chugging penguin came careening through our *back* door. Pretty impressive driving skills; how he got up the rickety staircase is anyone's guess.

Swinging joysticks in the air, we chased (waddled) after the reckless penguin for a few hours before he finally surrendered and handed us the following note:

"Hi, gang, sorry about the door. This is just a note to let you know that the first winner of Penguin Software's *Spy's Demise* code contest has checked in.

"Despite some critics' vehement claims to the contrary, the code is solvable, as shown by Buell Hollister (Shelbourne, VT). He had to rack up more than thirty-three thousand points in order to get all the pieces of the code. Hollister wins an official *Spy's Demise* T-shirt as a reward for his excellence in elevator-dodging and general espionage skills.

"The contest continues until there are winners from each of the fifty states, each Canadian province, and other countries where spying is the favorite pastime it is here."

Even-Littler-Known Contest. Lawyers always tell you to read the fine print before signing a contract, and the same goes for reading *Softalk*. Readers of fine print in February's Marketalk Reviews discovered a chance to win even more stuff for their Apples.

We posed the question, "Which version of a game should be listed in Fastalk, the classic or the newer, improved version?" Entries poured in, some explaining the merits of listing the classic, some arguing that the new version be listed, and some missing the point entirely.

Barrister of the Month awards go to Alan "Vintage Version" Fedder (La Mesa, CA) and Shawn "Vamped-Up Version" Smith, who presented the most logical reasons for listing the classic and newer versions respectively. Fedder will receive the original version of *Beneath Apple Manor* and *The Prisoner*, and Smith will receive the newer versions of the two.

A special mention must go to Paul Parrish (Houston, TX), who rooted for the latest versions by telling us that classics are nice, but we must keep up with the times. "Someday your grandkids may ask what 'clockwise' means when we're living in a world of digital clocks. As long as we acknowledge the classics, there is nothing wrong with the advancements."

Gary Mugford (Bramalea, Ontario) almost had us convinced, until we read his closing analogy. "Like a wine that has become more refined with time, so has *Beneath Apple Manor*." Something's wrong here. "Refined wine?" Yuck!

Aliens and Other Bezare Things. The Bezardians finally got off their cans and announced the winner of the first part of their Contest That's Out of This World (way back in October, remember?). Dean Carter (Santa Barbara, CA) wins seventy thousand Bez Bucks' worth of Apple software and peripherals for having deciphered the game's ad. The direct conversion is worth about $15,000, but interplanetary tariffs and other levies reduce it to a mere $100.

The only news on the second part of the contest, deciphering the manual and screens of their game, is that the Bezardians are taking their darn sweet time about finding a winner. We're told that the winner will be announced in these pages next month. Sure, we're getting impatient, too; but if you're the one who ends up winning the Apple II Plus, won't the wait have been worth it?

See you in May, faithful ones.

The Sound of One Voice Talking (6/82)

Wilma: *Time out* (7/82)! I need *a minor diversion* (3/82) right now. I need to enjoy something *refreshingly avant-garde* (4/82), something really *tight and together* (8/82), something *beyond compare* (9/82), something *too cheap to be true* (11/82). Sam, will you turn on the TV? I need to experience *a real program* (5/82) filled with *unreal people* (7/82), *funny characters* (9/82), *prehistorically modern* (1/83) plots, *wooden acting* (12/82), *explosions* (9/82), *cowboys, tigers, and Indians* (12/82)!

Sam: Uh, there's an *Earth, Wind, and Fire* (3/82) concert *now on the air* (12/82). . . .

Wilma: *Good grief* (2/83)! *It figures* (8/82). I have no *tolerance* (5/82) for that! It's *too much to look at* (12/82)!

Sam: Well, *the possibilities* (9/82) are limited, my dear. *A quick review* (11/82) of the *TV Guide* shows *not a good rating* (4/82) in sight. (Click!) Wait a minute. . . . What's this?

Bob: For those of you just tuning in and *looking to get out* (12/82), let me remind you that it's *Friday* (5/82), *the big day* (4/82)! We're here at *NewTown* (11/82), *deep in the heart of Texas* (12/82), where *it's always fair weather* (11/82), continuing our series of *special reports* (3/82) about *the sport of kings* (7/82)—flying! If you come to *Critical Path* (5/82) Airfield now, you'll be in *the right place at the right time* (4/82), because today is the day of the Third Annual Amateur Computer-Designed Aircraft Race!

Looks like *the gang's all here* (12/82), and *all along the control tower* (1/83) I can see the spectators waiting with *a special excitement* (4/82) for *start-up time* (1/83), when three very brave and *daring young men* (1/83) will *reap the wild wind* (11/82) in *a challenge* (12/82) of the computer age!

So, here's *a review from the top* (3/82) of today's race, everyone! These three men—*the good, the gentle, the important* (4/82)—are going to *sail away* (1/83) on a fantastic *flight of fancy* (7/82), *a light trip* (3/82) across the great *jumble* (4/82) of prairie cactus and tumbleweed you can see here behind me, for *prizes* (12/82), of course!

Wilma: *Oh boy, a contest* (1/83). Whoopee. Is there *no reprieve* (5/82) from such drivel?

Sam: Well, it's got to be better than "The New *Pesticides* (5/82) and Your *Stagecoach* (11/82)." Why don't we just *grin and bear it* (1/83) for a while? There's nothing else on.

Bob: Yes, the *daring young man* (8/82) who arrives in *ComputerTown, USA* (5/82) first, which is just about five miles from where I'm standing, will win the grand prize of $1,000 and Douglas Adams's latest sci-fi bestseller, *"Keeping Your Cool* (12/82) at *the Other End of the Universe* (5/82)," which includes *a special note* (1/83) by *the editor* (1/83) concerning *the role of the interpreter* (5/82) on *Location* (3/82) V, a small planet in the vicinity of *Dial X* (9/82). *The also-rans* (11/82) may entertain some *great expectations* (1/83), but they won't be *luminously lucky* (12/82)! *What you gain* (4/82) for *place and show* (11/82) is $50 and a paperback copy of "The *Inner Workings* (9/82) of Scandinavian *Leftovers* (8/82)." Well, at least *it's in English* (5/82). Might be *good for something* (7/82).

But today we're *not talking* (4/82) to just anyone, ladies and gentlemen. We're interviewing *a new breed* (8/82) of racers: three *birds of a feather* (9/82) who will be flying their actual computer-built *chariots of the clouds* (1/83)! Each of *the big three* (9/82) will attempt to be a *winner* (11/82) in *the challenge* (1/83) of champions. But *behind every great man there's a little computer* (12/82), and you can't *beat the Apple* (2/82) for designing the best!

Wilma: *For the love of Mike* (4/82), I wish he'd get *on with it* (7/82)!

Sam: *Why bother* (11/82)? These guys are just *bad amateurs* (9/82). I'd *go with the pros* (12/82) if I were planning a race like this, although computer-built airplanes do sound neat.

Bob: Well, let's find out *who's who here* (1/83). First we'll be *chatting with Peter* (5/82) Johnson, one of those *memorable characters* (6/82) with *true grit* (11/82), a *lust for life* (3/82), and a penchant for *setting his goals high* (11/82). Peter, *before you leave* (9/82), can you tell us about the aircraft your Apple

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designed for you to fly today?

Peter: Hey, Bobby ol' buddy, I've been *talking to Apples* (3/82) for years, and I've got *the winning answer* (7/82)! I feel I'm *blessed for success* (7/82)—*excessive success* (4/82)! I'm no *prehistoric pilot* (1/83), Bobby boy. No, my plane, the *Teachers Pet* (6/82), *be it ever so humble* (5/82), has some *special features* (1/83) I've been *invariably pleased* (1/83) with: *a delicate balance* (12/82) of *unlimited potential* (4/82), plus some *other functions* (4/82) for *getting control* (7/82).

Bob: Some *more Applesoft internals* (12/82)? For *inner control* (8/82), I suppose.

Peter: *But that's not all* (9/82)! Oh, sorry. . . .

Bob: No, *go ahead, interrupt me* (3/82).

Peter: Okay, well anyway, *it has a streamlined body* (6/82), it's *faster than a speeding bullet* (9/82), and it gets 15 *MPG* (12/82) to boot! My personal Apple has been *reviving an old technique* (9/82) in aerodynamics, called the *switcheroonie* (7/82). All it took was a little *manual dexterity* (8/82), *some experiments* (9/82), and my *magic fingers* (1/83) and, *voila* (9/82)! A little *bag of tricks* (9/82) to reduce the *overseas competition* (11/82)! The *Teacher's Pet* is *crammed with goodies* (7/82), all right. I've been *building an Applethrottle* (6/82); that's *the secret* (3/82) to winning. *Using the Applethrottle* (6/82) is easy; *it's automatic* (8/82)! My Apple designed this plane well. *It keeps secrets* (6/82) like my Applethrottle well hidden!

Bob: Say, Peter, we're a little short on time.

Peter: No problem, Bob ol' buddy. I've got to adjust *the scanner* (9/82) anyway.

Bob: Alrighty, *so long* (11/82). And *keep it legal* (7/82), Pete; no *jumping the gun* (9/82) at *the starting lineup* (5/82)! Hey, how about *a round of applause* (8/82) for this man?

Wilma: *Holy Toledo* (6/82), what an airhead that Peter is. *Ha, ha, ha. Apples? He, he, he* (12/82). . . . Designing for *that* guy? I wish we could watch something with *a little more finesse* (12/82)!

Sam: Oh, it's not so bad, dear. I happened to see this race last year.

Wilma: How interesting. *What happened* (8/82)?

Sam: Well, there was a three-hour *rain delay* (7/82), a real *thunderstorm* (7/82). And one of the pilots had *double vision* (8/82). He was a *big hit* (9/82) with everyone; they called him *The Searcher* (11/82).

Bob: For *a bit of background* (3/82), let me say that in our *last challenge* (8/82) this man, Jacques Groslaid of France, won the grand prize, as in the time before that. So, we'll be *getting some answers* (9/82) about Jacques's *travel plans* (5/82) for today.

How about it, Jacques? Let's hear some *words from a winner* (3/82) in the *strength of tradition* (4/82) of a champion. Will the *remembrance of things past* (1/83) prove helpful here? Can you tell us about your plane and *how it works* (9/82)? *Which method should you use* (9/82) if you want to win? What are your secrets for *making it fly* (1/83)? Any *parting remarks* (7/82)?

Jacques: I'm *just doing what comes naturally* (5/82), Bob. *Because it's there* (4/82). I mean, *birds do it* (5/82), right?

Bob: Uh . . . right. Okay, uh, hmmm. Moving right along, now, let's *follow the tail* (9/82) of this next, rather bizarre aircraft, and get *some additional thoughts* (3/82) about this race from Huey Fuse, our third competitor. *Everything in order* (9/82), Mr. Fuse? Tell us about yourself and your unusual Apple-designed aircraft.

Huey: Well, I can't say much about myself. I didn't pass *ground school* (3/82); they made me leave *after the seventh day* (8/82). I failed *basic training* (3/82), but I have started *a new training season* (11/82) and at least I'm *gaining momentum* (9/82) now. I tried *a crash course* (5/82) in flying once, but the *homework* (7/82) was overwhelming, and I couldn't pass the first *essay test* (1/83). The instructor said I had what he called a *dislocated memory* (3/82). Right now, I'm *making up time* (4/82); *no more fooling around* (11/82) for me! I need *new responsibilities* (4/82); there's *lots to see and learn* (4/82) in flying, Bob. I figure, *old dogs learn new tricks* (6/82), so why couldn't I? I know the *rules* (1/82). If you want *the plain truth* (1/83), *only fools rush in* (6/82) where there's danger. Glad I have my trusty Apple.

Bob: *Just a moment* (7/82), Huey, perhaps you could tell us about your plane now.

Huey: Well, the *Saturn Express* (12/82) is *shorter and faster* (9/82) than most. I took it for *a test flight* (3/82) once. Had some *tiny troubles* (9/82) at first, but not after I switched from an inferior computer system to the Apple. I mean, *how can you soar with the eagles when you're working with turkeys* (11/82)? I know my *limitations* (1/83), though, and I've got *a flight plan* (6/82) all worked out. I'm ready to get *down to business* (8/82). My motto is, "Never go *out without a route* (12/82)." Usually, I start by *charting a course* (7/82); then I get in *motion* (3/82) and start *homing in* (3/82) on the *landmarks* (3/82). You gotta *check for effect* (7/82) if you want to do it right! Listen, I've got *ten hours* (4/82) of experience. Guess I just believe in *doing one thing well* (4/82). And *that's a quote* (12/82)!

Bob: Well, we've just heard some *parting words to the wise* (9/82) from an obvious *heavy thinker* (9/82), Huey Fuse, the third in *a collection of drivers* (3/82) here at our race; and in *summary* (1/83), I'll say that *success is what you make it* (1/83)! *And finally* (12/82) the *hour of decision* (1/83), when our pilots will be *getting the green light* (1/83) is *coming up* (1/83) in just a few minutes. So, I'll be *wrapping it up* (4/82) for now, and remember, there's *more to come* (4/82)! So, *stay tuned for more exciting action* (8/82)! (Click!)

Sam: *Calling it quits* (8/82) already? Don't you want to see who wins?

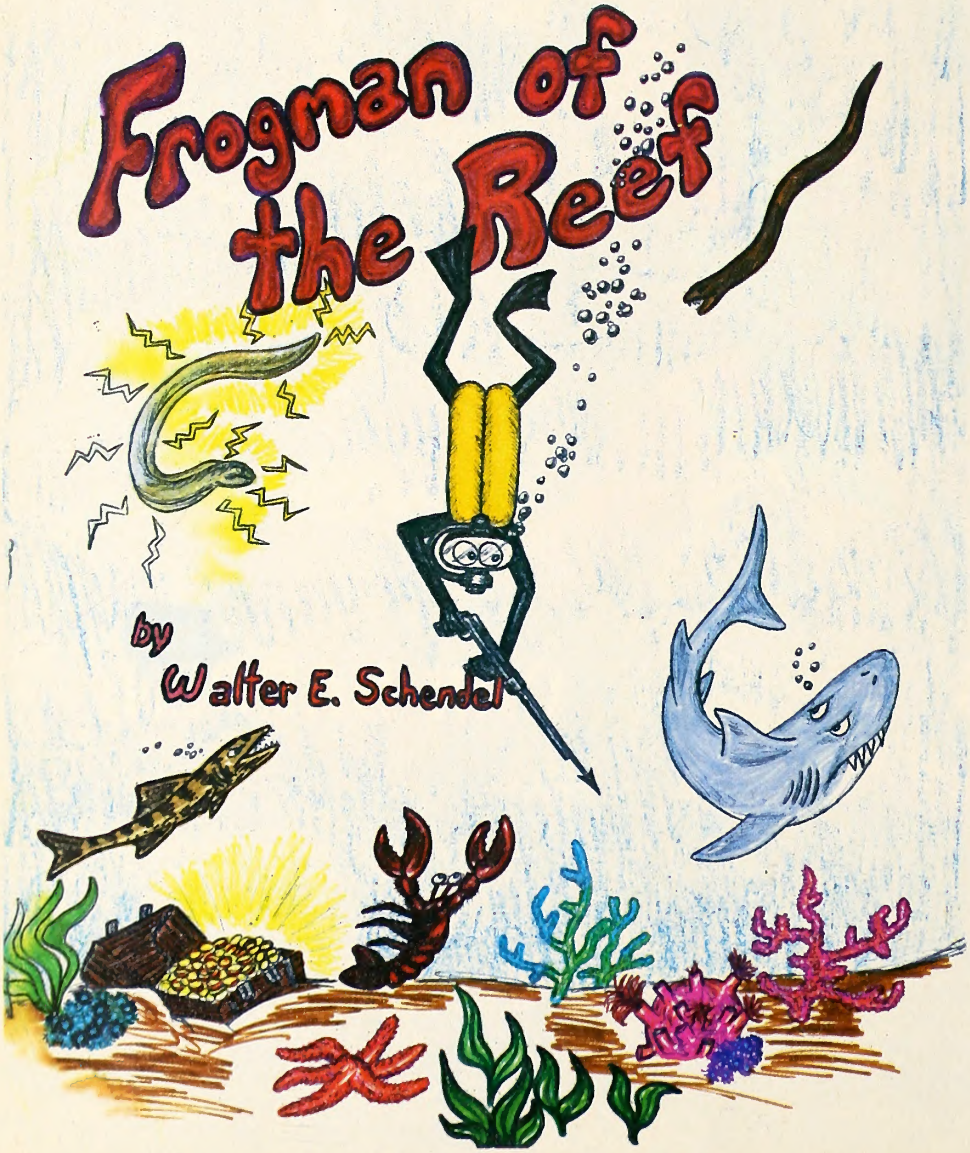
Wilma: *Funny you should ask* (8/82). Yes! I'm drowning in *a sea of words* (5/82)! *Words about nerds* (12/82), that is. Those pilots are all spaced-out *clones* (3/82)! *Let's make peace* (12/82) around here, so I can enjoy one of my *true obsessions* (5/82). All this talk about Apple computers makes me want to get to those *paddles* (4/82) right now!

Sam: That's *the best argument* (3/82) I've ever heard! I *see the light* (8/82), Wilma. Let's go!

Wilma: *Now we're cooking* (8/82). I'm really grateful for your *continuing support* (9/82) of my computer habit, Sam.

Sam: And they say *opposites attract* (9/82).

Finale (9/82)! ■



Here's the artwork for Walter Schendel's (Stacy, MN) Subhead story. Schendel didn't win, but his art is on display in the aquatics wing of the Softalk Museum.

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THE PASCAL PATH

By Jim Merritt

Tools of the Craft, Part 22

It is midnight. In a secluded alcove of the catacombs, illuminated only by the flickering gleam of a single candle, several cowled figures stand, encircling a young girl who kneels in reverence before the Holy Altar. The soft, droning sounds of a ritual chant fill the air and echo through the endless, twisting passageways. Suddenly, the chanting ceases as the young one takes a deep breath and recites the ancient incantation:

> Here, your Omniscience, is my poor oblation,
> presented in all its humility.
> May it please the gods, and earn their approval,
> thus granting me inner tranquility.
> But should they find flaws in this, my creation,
> please know that I have the facility
> To find what is bad, and cause its removal,
> if they'll point out my culpability.

Then, with one hand, she pushes a slim, square object through a slot that has been cut into the altar. With the other, she attracts the attention of the gods by tapping out a staccato rhythm with her fingers upon a sculpted, uneven surface near the slot. After a moment, the hopeful expression on her face turns to one of anguish, as the following image forms in the mystical looking glass at the top of the altar:

```
PASCAL COMPILER II.1 [B2B]
<    0>.....
FIRSTPRO [   2334 WORDS]
<   13>.....

  WRITE[ANSWER < < < <
LINE 20, ERROR 104: <SP>(CONTINUE), <ESC>(TERMINATE),
E(DIT
```

Those who are new to the game of programming tend to approach the compiler as if it were the Delphic oracle. Only slowly do they realize that the compiler is no harsh judge of their programming competence but merely the meticulous *reporter* of their success or failure in following Pascal's rules of grammar.

In truth, the compiler is nothing more (or less) than a mechanical tool that helps you exert rational control over the electronic complexity that is your Apple computer. Tools are made to be mastered, and it's high time you quit offering up your programs to the compiler as if they were sacrificial lambs. From now on, you should treat the compiler as the hired hand it really is; and learning to give it proper orders is a good first step in that direction.

When activated, the compiler assumes that it has been called to translate a beginner's program into p-code. In doing so, it takes certain steps that may be inconvenient or even objectionable to the experienced programmer. It's possible, however, to override the compiler's initial assumptions and so alter the nature of the compilation process. This can be done by placing *compiler directives* within the text of your Pascal programs.

The Format of Compiler Directives. A directive forces the compiler to do things your way and thus identifies you as an experienced programmer. It looks like a comment, and it must occur within the text of a Pascal program in order to be effective. Yet, no compiler directive is really part of the Pascal language, and none is ever translated into p-code (at least not in the way that Pascal statements are). Instead, compiler directives constitute a tiny, separate language of their own, understood and obeyed only by the compiler, and only during program compilation.

The special *opening delimiter*

```
(*$
```

introduces a compiler directive in the same way that

```
(*
```

introduces a comment. The *closing delimiter*

```
*)
```

marks the end of either a compiler directive or a comment. This similarity between delimiters in directives and comments is intentional and permits you to move programs written in Apple Pascal to other computer systems, in which the Pascal compilers may not recognize compiler directives. (Such compilers will ignore any Apple Pascal compiler directive, believing it to be a comment.)

There must be no blank space whatsoever between the star and the dollar sign in a compiler directive's opening delimiter or the compiler will fail to recognize the directive for what it is, classifying it instead as a comment. In general, the compiler is quite intolerant of blanks within compiler directives; you may use them only in special circumstances, which will be described soon.

The text between the opening and closing delimiters must consist of one or more special instructions to the compiler. Each instruction begins with one of several special *key-letters*. In recognizing key-letters, the compiler does not distinguish between upper and lower case.

In this and succeeding columns, we'll investigate the compiler-directive instructions summarized in figure 1. This is not a complete list, as you can see by referring to chapter 4 of the Apple *Pascal Language Reference Manual*. With one exception, however, these instructions are the ones that experienced programmers find most helpful and use most often. Instructions of a somewhat more exotic nature will be presented and explained in columns yet to be written, as necessary to round out discussions of important advanced features of the Apple Pascal language and operating system.

Many compiler-directive instructions act as *switches*. That is, you may use them to accept or refuse certain services provided by the compiler. This kind of instruction consists of a key-letter, followed immediately by an appropriate *switch setting*, usually either the plus sign (+) or the minus sign (−), although a double-plus (++) is appropriate for one particular instruction that will be examined shortly. The plus sign is used to enable a service, the double-plus to enable a more comprehensive ver-

Iname	Include a text file as part of the source
S−/+/++	Disable/enable/enable maximum compiler Swapping
Lname	Send a Listing to a device or file
L−/+	Disable/enable Listing capability
P	Start a new Page in the listing
I−/+	Disable/enable automatic checking of IOResult
R−/+	Disable/enable assignment Range checking and array bounds checking
V−/+	Disable/enable strict enforcement of type compatibility between actual and formal String VAR parameters
U−/+	Disable/enable "user program" compilation mode

Figure 1. Some useful compiler-directive instructions.

sion of it, and the minus sign to disable it.

Some compiler services involve files of I/O devices that you must specify by name. Each directive instruction corresponding to such a service requires a *name parameter*, which is simply an arbitrary sequence of printable characters, such that the first character is *not* the plus sign or the minus sign. In order to access the object specified by a name parameter, the compiler itself calls Reset or ReWrite, using the name parameter as the file name argument to these procedures. This implies that you may use one or more blanks to separate a key-letter from a name parameter so as to improve the readability of your program. Although such blanks are assumed by the compiler to be part of the name parameter, they are of no consequence, since the operating system subsequently ignores them. Bear in mind, however, that this is the only exception to the "no-blanks" rule for compiler directives. In particular, you may not use blanks to separate key-letters from switch settings.

Several instructions may occur in one directive, provided that they are separated from one another by commas. For instance,

```
(*$I-,R+*)
```

is a compiler directive containing two different instructions. Every compiler directive must fit completely on one text line, no matter how many instructions it contains.

An instruction requiring a name parameter must be the last one in a directive. Examine the two following directives. The first is legal, the second illegal.

```
(*$I+,L LISTING.TEXT*)        (*$L LISTING.TEXT,I+*)
```

In the second case, the compiler takes ' LISTING.TEXT,I+' as the name parameter for the L instruction; the I+ instruction is "swallowed up." A name parameter extends from its first character up to (and not including) the directive's closing delimiter, so you must not only be sure to place an instruction with a name parameter at the end of a directive, you must also take pains to guarantee that no directive contains more than one instruction that requires a name parameter.

Compiling Large Programs. At one point or another, you'll begin writing programs that contain hundreds or even thousands of lines of Pascal code, and this will put you squarely at odds with one of the Pascal compiler's primary assumptions: that all programs are short and unsophisticated. The UCSD Pascal System, on which Apple Pascal is based, was originally developed for the benefit of fledgling computer-science students at the University of California, San Diego. To enhance the learning experience, the designers of UCSD Pascal optimized not only the compiler but the entire system to permit quick entry, compilation, and revision of the relatively brief and simple programs that students tend to write. Unfortunately, these optimizations serve as hurdles in the paths of those who would develop substantial programs. Key facilities for clearing these hurdles are provided through several compiler-directive instructions.

Include Files. Any program that fits in one text file and can be manipulated by the screen editor must also be reasonably short, since no file produced by the editor can contain more than a few hundred text lines. To write a larger program, you must apportion its text among several different files. For instance, a program consisting of 600 lines of Pascal code might be split into two files, MYPROGA.TEXT and MYPROGB.TEXT, each containing 300 lines.

Unless told otherwise, the compiler knows only to draw source text from the file that you name at the beginning of the compilation, which we'll call the *master source file*. However, the "I" (Include) instruction permits the compiler to turn its attention temporarily from the master source to another, *included* source file. To illustrate, the directive

```
(*$I MYPROGB*)
```

tells the compiler to postpone reading the master source file and to draw subsequent program text from the file MYPROGB.TEXT. When all the text in the included source has been processed, the compiler resumes its scan of the master source at the point of postponement.

Note that the name parameter to an I instruction need not include the ".TEXT" suffix—the compiler first tries to open the file, given the name as written. If it fails, it appends ".TEXT" to the name and tries again. If unsuccessful in its second attempt to access the included file, the compiler complains of "error 403" ("Error in reading include file"). It then abandons the entire compilation.

In effect, the I instruction stands for the entire text of an included file, in much the same way that a constant identifier can stand for some data value. You might be tempted to draw a parallel between an I instruction and a Pascal procedure call, since both permit textual abbreviation for arbitrarily large chunks of source code. Unfortunately, the analogy would be a weak one; although a procedure may call another procedure, an included file may not itself contain an I instruction. Only master source files may "include" other files.

The I instruction may be used to "chain" two source files together during compilation. In the case of MYPROGA.TEXT and MYPROGB.TEXT, for example, the directive

```
(*$I MYPROGB*)
```

may be placed at the end of the file MYPROGA.TEXT. Then you may compile the entire program by responding to the compiler's question, "Compile what file?" with the single file name MYPROGA. When it reaches the end of MYPROGA, the compiler will encounter the directive containing the I instruction and will pass smoothly on to MYPROGB for the rest of the source text.

What if you expand the program so that the complete source text is apportioned among *three* files, say MYPROGA.TEXT, MYPROGB.TEXT, and MYPROGC.TEXT? Most people would be tempted to put the directive

```
(*$I MYPROGB*)
```

at the end of MYPROGA.TEXT and

```
(*$I MYPROGC*)
```

at the end of MYPROGB.TEXT. This, however, would be a mistake and would cause the compiler to report "error 406" ("Include file not legal"). MYPROGB.TEXT is an "included file," and it is illegal to use an I instruction within a compiler directive that occurs inside an included file. The correct way to handle this problem is to place both directives, in the proper order, at the end of MYPROGA.TEXT.

When writing very large programs, it is not uncommon for a programmer to place all the source code in included files and leave only a string of compiler directives in the master source file. For instance, you might create a file MYPROG.TEXT, which would contain simply the following:

```
(* INCLUDE LIST FOR MYPROG *)
(*$IMYPROGA*)
(*$IMYPROGB*)
(*$IMYPROGC*)
```

Stylistic Tricks with Included Files. The fastidious programmer may employ the "included-file" mechanism to enhance the modularity of her programs. Suppose you've written a program named *MasterWork*, which needs to use Capital, GoodInteger, InToString, and other tools we've developed in past columns. Clever programmer that you are, you have probably started to group such handy routines together in one or more "toolkit files." Using the editor, it's a simple matter to copy these routines into your programs as necessary, without having to enter them from scratch each time. On the other hand, why clutter your source programs with redundant copies of commonly needed procedures and functions?

You can save time, not to mention your Apple's disk space, by using the I instruction to force the compiler to "include" any "toolkit" of routines at the appropriate locations in your program. Of course, using an included file is an all-or-nothing proposition; either all routines in the toolkit are included with your program, even some that you may not want or need, or none are. The only way to be able to include just a single routine at a time is to put that routine in its own separate text file.

A rarely exploited aspect of the "included-file" facility enables you to improve the clarity of your programs by "clustering" related data declarations together. Within an included file, there may be several CONST, TYPE, or VAR sections at any procedure nesting level, and these sections may be placed in any order. Thus, the following declaration area is acceptable so long as it occurs within an included file:

```
(* DECLARATION LAYOUT POSSIBLE WITHIN INCLUDE FILE    *)

(*---------- DEFINE HOUSE NUMBER RANGE----------*)
  CONST
    MinHNum= 1;
    MaxHNum= 999;

  TYPE
    HouseNumber=
      MinHNum .. MaxHNum;
(*==========================================*)


(*------ DEFINE CUSTOMER ACCOUNT NUMBERS-------*)

(* Customer account numbers range from 1 to
  MaxAcctNum; 0 as an account number signifies
  that the home in question contains no subscribers.
*)
  CONST
      NoSubscriber=
            0;
      MaxAcctNum=
            MaxInt;

  TYPE
    AcctNumType=
      NoSubscriber .. MaxAcctNum;
```

```
(*==========================================*)

(*---------- DEFINE PRIMARY MODEL ----------*)


  (* 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.
  *)

  TYPE
    Home=
      AcctNumType;

  TYPE
    Street=
      ARRAY[HouseNumber] OF Home;
    StreetName=
      (Redwood, Tanglewood, Sandalwood, Driftwood);

    Town=
      ARRAY[StreetName] OF Street;

  VAR
    Smallville
      :Town;

(*==========================================*)


(*---------- CABLE PROGRAM COMMANDS----------*)

  TYPE
    CComType=
      (Change, Display, Quit);

(*==========================================*)

(*---------- MISCELLANEOUS VARIABLES ----------*)

  VAR
    UserQuits
      :Boolean;

(*==========================================*)
```

Here is the same declaration area, written using conventional Pascal restrictions:

```
(* CONVENTIONAL DECLARATION LAYOUT *)
CONST
  (* Minimum, maximum house number—unrealistic *)
    MinHNum= 1;
    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=
    MinHNum .. 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;
```

Included Files: Points To Ponder. Several crucial points regarding the usage of included files should be studied carefully:

1. For any given level of procedure or function nesting, all declarations—both those that occur in the master source file and those contained inside included files—must precede the procedure and function declarations at that level. As an example, it is improper to interleave global data declarations and global procedure definitions, since all global objects exist at the same level of nesting (level 0—unnested).

2. All declarations in the master source file at a given level of procedure nesting must come before declarations at the same level contained within included files. Assuming that the file DECS.TEXT contains arbitrary data declarations, the following text in a master source file would cause an error condition:

```
(* BAD MIXTURE OF DECLARATIONS AND INCLUDE FILES *)
CONST
  ProgName=        'NETWORKER (VER 1.0 // 1-Feb-83)';

(*I DECS*)

VAR
  NumUsers
    :Integer;
```

Fixing the problem requires only that you switch the order of the I instruction (relative to the declarations in the master source file) as follows:

```
(* GOOD MIXTURE OF DECLARATIONS AND INCLUDE FILES *)
CONST
  ProgName=        'NETWORKER (VER 1.0 // 1-Feb-83)';

VAR
  NumUsers
    :Integer;

(*I DECS*)
```

3. Any declarations occurring in the master source file must follow the order prescribed by the Pascal syntax diagrams.

Compiler Swapping. Now that you are able to create programs of any length by stringing together several text files, you will soon find that the compiler runs out of RAM memory space during the compilation of large and complicated programs. This happens primarily because the compiler must consume a certain amount of memory each time you declare a new object in order to keep track of the object's name and other characteristics during the compilation. Such information is kept in a tree-

structured aggregate of data called, for historical reasons, a "*symbol table*."

While the compiler is running, it and the operating system occupy most of the RAM available in your Apple. Very little space is left for the symbol table. Consequently, your Pascal program will not be able to declare very many different objects before the symbol table grows too large to exist within memory. At this point, a "stack overflow" occurs.

All stack overflows require that the Pascal system be restarted as if from a press of the reset key or a flip of the power switch. Sometimes, the p-machine can recognize an overflow as it occurs. In this case, you'll receive a brief indication of the problem on your console screen. Often, however, the p-machine is totally overwhelmed by a stack overflow and doesn't even have time to say "good-bye." In this situation, the reset appears to occur spontaneously: the Apple's video screen is covered with asterisks, then wiped smoothly to black, and in seconds the Pascal system greets you once again. It is one of the system's great weaknesses that even a program of modest size and complexity can cause this catastrophic seizure.

The compiler-directive instruction S ("compiler Swapping") may be used to increase the amount of memory available for symbol table storage—at the cost of compiler execution speed. Let's pause for a moment and consider how this is done.

How Is RAM Like a Time-Shared Condo? You know that Pascal programs, in the form of p-code, are kept on disks or other mass-storage units until you choose to execute them. At your command, the Pascal system retrieves an executable program from the code file in which it resides and copies the p-codes into RAM memory for quick access during execution. However, it is not always necessary (or possible) to copy an entire program into memory at once. The programmer may specify that only a certain part, or *segment*, of the program should reside in RAM memory at any given time. Other segments remain on disk until they're needed during execution, at which point they're loaded into RAM, replacing one or more segments that are no longer being used.

When a segment is loaded into RAM from disk, it is said to be "swapped in." A discarded segment is said to be "swapped out," even though the copy of it that resides in RAM actually goes nowhere. Instead, it is simply destroyed—overwritten by incoming segments, perhaps. After all, the unfortunate segment may always be reloaded from disk whenever it is needed again.

We'll return to the detailed study of "segment swapping" when in future columns we investigate the keyword SEGMENT and the concept of UNITs. For now, it's easy to see that swapping tends to slow program execution somewhat, since each disk access takes around a second to complete.

The Compiler's Interchangeable Parts. The S instruction accepts three switch settings. S− indicates "no swapping"; in other words, it forces the entire compiler program to reside in RAM throughout the compilation (which is also what happens when you don't bother to use the S instruction at all).

S+ indicates "standard swapping." In this case, the segment of the compiler that processes declarations will share RAM space with the segment that processes procedure, function, and program bodies. These two parts of the compiler are mutually exclusive, since no executable code may occur in a declaration area and no declarations may be placed in a routine's body. When the "declaration segment" is no longer needed, it may be replaced in RAM by the "body segment" and vice versa. This is, indeed, what happens when the compiler operates under the influence of the S+ instruction. Of course, S+ forces a time-consuming segment-swap at *every* transition between data declarations and executable code. Thus, the typical procedure or function triggers two swaps: one for its declaration area and one for its body. On the other hand, "standard swapping" frees approximately fifty-three hundred words (10,600 bytes) of RAM for symbol table growth, which is sufficient for most medium-size programs, as well as for many large ones.

S++ is the third possible variant of the S instruction, and its story requires some prefacing. In previous columns, we've identifed several "anomalous" constructs in the Apple Pascal language—procedures and functions that use somewhat bizarre syntax and so seem to bend the otherwise strict grammatical rules of Pascal. For instance, the Reset procedure may take either one argument or two, despite the Pascal rule stating that all procedures written by *you* must take a fixed number of arguments.

A third segment of the compiler has sole responsibility for dealing with anomalous constructs. Whenever it's not needed, the space that it occupies in RAM—about fifteen hundred words (3,000 bytes)—may be considered open territory for symbol-table expansion.

When you use the S++ instruction, you tell the compiler to swap all three of its special segments as necessary to maximize the availability of RAM during compilation. So long as you avoid the use of anomalous constructs, the third swapping segment is never brought into memory, and your symbol table is free to grow into the space that would otherwise be occupied by that part of the compiler. Beware, though! If at some point your program *does* make use of Pascal's anomalies and the symbol table has grown too big by this time, the system will try to bring the third segment into the insufficient area of free memory that remains, thus causing the same stack overflow that you hoped to avoid by using S++ in the first place!

It's very easy for your programs to require the compiler's "anomaly segment." Many of the most convenient features of Apple Pascal, including almost all of the facilities for manipulating strings and many of those for dealing with files, fall under the classification of "anomalous." Here's a reasonably complete list of such built-in procedures and functions, most of which have not yet been discussed in this column:

Reset	ReWrite	Close	Open
Seek	Get	Put	Page
EOF	EOLn		
BlockRead	BlockWrite	UnitRead	UnitWrite
Concat	Insert	Delete	Copy
Length	Pos	Str	
MoveLeft	MoveRight	FillChar	Scan
Ord	Pred	Succ	
Abs	Sqr	Trunc	
SizeOf	GotoXY	New	Exit
Time	IDSearch	TreeSearch	

The list is accurate, but by the time you read this, it may not be exhaustive for the version of Apple Pascal you use. It is presented here only to give you a feeling for the wide variety of circumstances requiring the attention of the "anomaly" segment. Luckily, the anomalous constructs Read, ReadLn, Write, and WriteLn do *not* involve this special segment. Since they are used so often, these standard procedures are handled by sections of the compiler that are always resident in RAM.

By now it should be clear that S++ is a very tricky and dangerous form of the S instruction, to be used with extreme caution, even by very experienced programmers. Strategies *do* exist for permitting the safe use of anomalous constructs in large programs, even though the symbol table is sure to leave no room for the "anomaly" segment during compilation. Sadly, space does not permit us to investigate such methods at this time. If you'd like to learn more about them, please drop Jim Merritt a line at *Softalk*.

One final piece of advice regarding the S instruction: always remember that it was designed to influence an entire compilation. Consequently, it should appear once (at most) in the text of any program and should always be situated ahead of the PROGRAM keyword. If you fail to follow these recommendations, undefined (and potentially disappointing) swapping behavior will result.

Coming: More Directives. Most people find it nearly impossible to comprehend the workings of a large program by studying it one screenful at a time. It's also hard to repair or improve any program unless you can be looking at the source text while the program itself is running. To assist you in these pursuits, the compiler will generate a handy program listing on paper, provided that you issue the order through the appropriate compiler-directive instructions, which we'll study next month.

In addition, we'll look at several of the ways the compiler protects the Pascal system from poorly written, renegade programs. As we'll see, however, you'll occasionally need to use "renegade methods" in order to achieve some desirable end. In such situations, you may employ several of next month's compiler-directive instructions in disabling Apple Pascal's "immune system," thus enabling your programs to compile and execute without undue restraint. ❑■

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BY JEAN VARVEN

It's a typical morning before school has started. Most families in Reily, Ohio, are just finishing breakfast, but a half dozen first-graders at Reily School are already hard at work. They're taking turns battling the dragon, moving left, right, up, and down through a maze—totally engrossed in trying to beat the clever beast at his own game. Captivated by the first-graders' involvement is Rich Hofmann, professor of educational psychology at Miami University in Oxford, Ohio. Hofmann is fond of dropping by Reily School for a few minutes every now and then on his way to the university, where he teaches statistics, research methods, and psychometrics.

Rich Hofmann is far from a casual observer. When he's not teaching or writing the manual to accompany his upcoming theoretical and applied statistics package, Hofmann creates "software fantasies" on the Apple for young children. *Dragon Maze*, with its blinking-dot "dragon" that growls and talks, is one such program.

The Computer Graduate. Hofmann is a former schoolteacher. His twenty-year association with computers began in the early sixties when he was in graduate school. When the time came to fulfill the foreign-language requirement, Hofmann talked the school into allowing him to substitute a computer programming language. His fascination with programming and the potential of computers has been strong ever since.

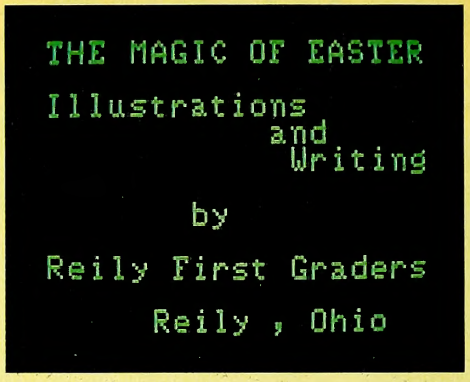
In the course of his professional life, Hofmann's work has been multifocused, spanning theoretical statistics and testing theory, child psychology and cognitive development, and microcomputer software development. Most of his past work with computers has been concerned with developing statistical applications programs on mainframes. He speaks of the last three years as among the most satisfying. That's how long he's been working with microcomputers and young children.

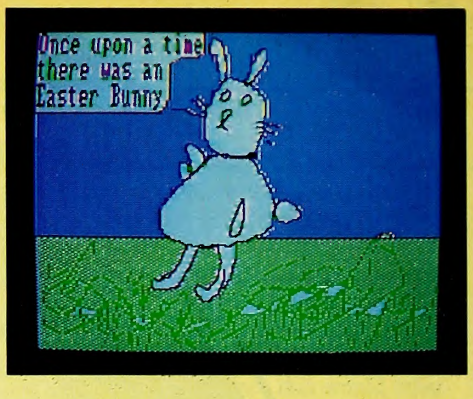
Talking about his work with computers is a relatively new experience for Hofmann. For the first seventeen years, he didn't say much about it, even to his family. The closest he came to "bringing his work home" before was when he recycled used computer paper and old punched cards by passing them on to his family. The kids drew pictures on the backs of the printouts and his wife Lydia, a teacher, made the punched cards into flash cards for use in the classroom.

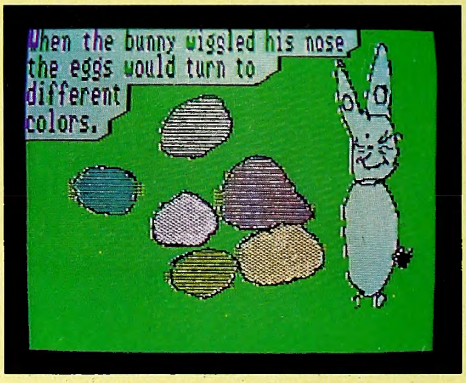
Hofmann is finding that he enjoys talking about his work. "Now," he says, "people are more interested in my thoughts than in my equations.

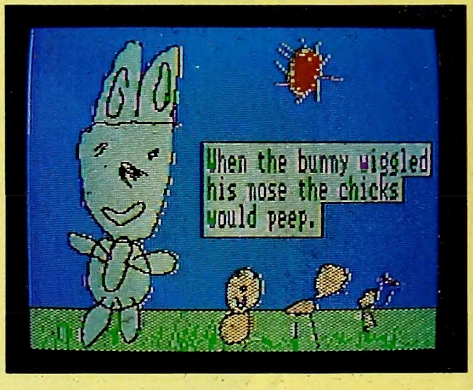
"My first love is fantasy. And I'm intrigued by the power of the computer to create a learning fantasy for children."

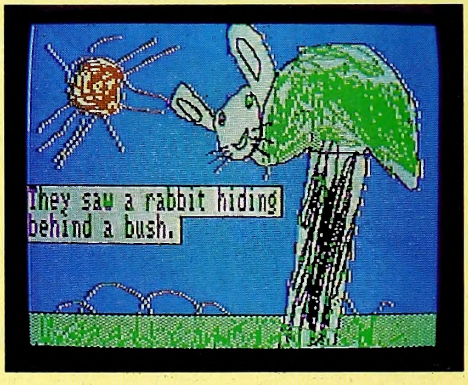
One of Hofmann's primary goals is to make the computer a desirable companion for children, because when they like something they're learning from and feel comfortable with, they





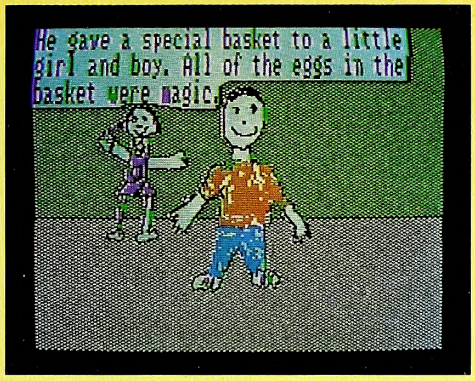






A Schoolhouse Apple Feature

The first-graders from Reily School wrote and illustrated the talking Easter story. Rich Hofmann input the words from the child-generated script. Read the story from left to right across the tops of both pages. Directly above, two of Hofmann's micro pals work on the Apple. Bottom right, Hofmann's touch pad makes it easy for all kids to use the computer.



When Rich Hofmann's Apple Talks, Children Listen

learn more. Hofmann has found that involving multiple senses in the learning process helps children relate to microcomputers.

That's why most of his programs make the computer talk. The voice component helps young children relate to the computer, so much so that the machine becomes akin to a well-loved doll or a favorite teddy bear.

How To Make Your Apple Wacky. Working with computers and speech can present some problems, says Hofmann. When people talk, they tend to run their words together; whatever comes before and after a particular word or phrase affects how it sounds. Synthetic speech is created by decomposing a spoken word into phonemes, basic language sounds, and then putting it back together. Satisfactorily imitating the sounds and patterns of natural speech involves taking into account all the verbal variations in pitch, flow, and timing.

In endowing his programs with the gift of speech, Hofmann uses the Echo II speech synthesizer from Street Electronics. The Echo synthesizes speech by replicating the patterns associated with different phonemes. A programmer can then arrange the phonemes into word sequences. Word files can be created, reviewed, modified, and used in other programs. Levels of stress and intonation can be varied via additional commands.

Some of Hofmann's programs require the Apple to be a good listener. First, the Apple is trained to "recognize" a particular voice by means of a "very general voice training algorithm." Once a user has entered and pronounced a limited vocabulary, the Apple is able to recognize and respond to that speaker's voice.

In teaching young children to work with a voice recognition unit (the Heuristics 2000 Speech Link), Hofmann uses a gamelike program called *Froggy*. Before a child can play *Froggy*, he or she must pronounce the words *jump*, *hop*, *left*, *right*, *turn*, *speak*, and *quit*. Once the speech training algorithm "learns" the new voice pattern, the child is able to talk to the computer and command the frog to jump, turn, and hop around the screen.

Hofmann's talking programs can open up the world of microcomputers to kids who have trouble reading the traditional keyboard, kids with visual problems that make it hard for them to read the standard television or monitor display, and kids who have auditory or other learning difficulties that affect their ability to read.

Having Fun and In Control. Hofmann's introductory programs—*Dragon Maze*, *Torpedo*, and *Pronouncer*—are designed to be a child's first exposure to the microcomputer. His emphasis in these programs is on providing "fun experiences in which children are in control of the microcomputer environment." Even children who tend to be afraid of anything new open up to the computer when they see Hofmann's programs.

The kids at Reily School are doubly lucky.

They get to use everything Rich Hofmann makes and their teacher is Lydia Hofmann, Rich's wife and valued partner in the making of computer learning materials for young children. Lydia recently returned to classroom teaching after several years as a school psychologist. Many of her ideas are incorporated into the programs her husband writes.

Collaboration, it seems, is the key to many successes for the Hofmanns. Working together, they wrote the grant request that got Reily School its Apple. And, Rich Hofmann explains, "virtually all our projects are the result of our own emerging ideas that are refined after working with kids in the classroom." Typically, it is Lydia who conducts the field tests and suggests refinements to the original programs.

Rich Hofmann is a frequent visitor to another place where children use his programs—Dr. Mary Link's kindergarten room at McGuffey Laboratory School. He enjoys talking with Dr. Link and the children about their experiences with the computer.

The school of education at Miami University shares its microcomputer facility with McGuffey students. There are five Apples at the school of education computer lab and four more shared among the classes at the laboratory school. When the Apple is in the kindergarten room, the kids can use it from eight in the morning until school starts and also after school until five o'clock.

Located on the Miami University campus, and named for the McGuffey of Reader fame, McGuffey is one of the oldest laboratory schools in the country. At McGuffey, teachers are trained and children are observed, with permission, for educational research purposes. There's even a balcony with one-way mirrors from which teachers and children can be observed as they work together.

Many McGuffey students are the children of faculty members. Classes are small, the kids are motivated, and the teachers are dedicated. Innovative teaching methods and instructional tools are encouraged. The tools Hofmann has contributed include programs for teaching primary schoolers about directionality, spelling, pronunciation, and color. He has also created an ever-expanding computer dictionary, a story bulletin board, and a little bit of magic he calls a touch pad. Most of these programs talk.

"I typically work on the children's programs as a change of pace from my statistical work. There's something special about working with kids and communicating with them."

Graphically Teaching. At various times during the past couple of years, Hofmann has also taught programming to fifth through eighth graders. He has found it particularly effective to teach programming to kids by introducing them first to graphics.

"The nice thing about the graphics approach is that it enables them to conceptualize what the end result should be. Then if at first they don't get it right, they usually have some idea why." Traditional methods of teaching programming don't always have this advantage, he notes.

Hofmann's experience has been that kids can learn programming faster than most college students can. The explanation for this may lie, he proposes, in the fact that college students are beginning to assume adult responsibilities, while younger children have more time to experiment. They also tend to have more patience. Unlike older students, kids don't expect to be proficient in a short time; therefore, they get less frustrated and learn more readily. (A case in point—now that Hofmann is devoting more time to some of his other projects for kids, several former students from his grade school programming classes are carrying on with the teaching on an informal basis.)

Is there some quality or characteristic that makes some people better prospects than others for learning about computers and programming? Hofmann says yes, but he doesn't cite superior intelligence as the factor.

"Average intellect is fine," he says. "Intellectually normal children seem to be just as capable of programming as intellectually gifted children. Being a good programmer requires a freedom of the thought process—being less inhibited and having a mind that's free to wander." The same way of thinking, he points out, characterizes a good scientist.

"A good scientist will never tell you what you can't do." Similarly, he explains, "children never tell you what you can't do—children don't know what they can do, and therefore they do more than we expect."

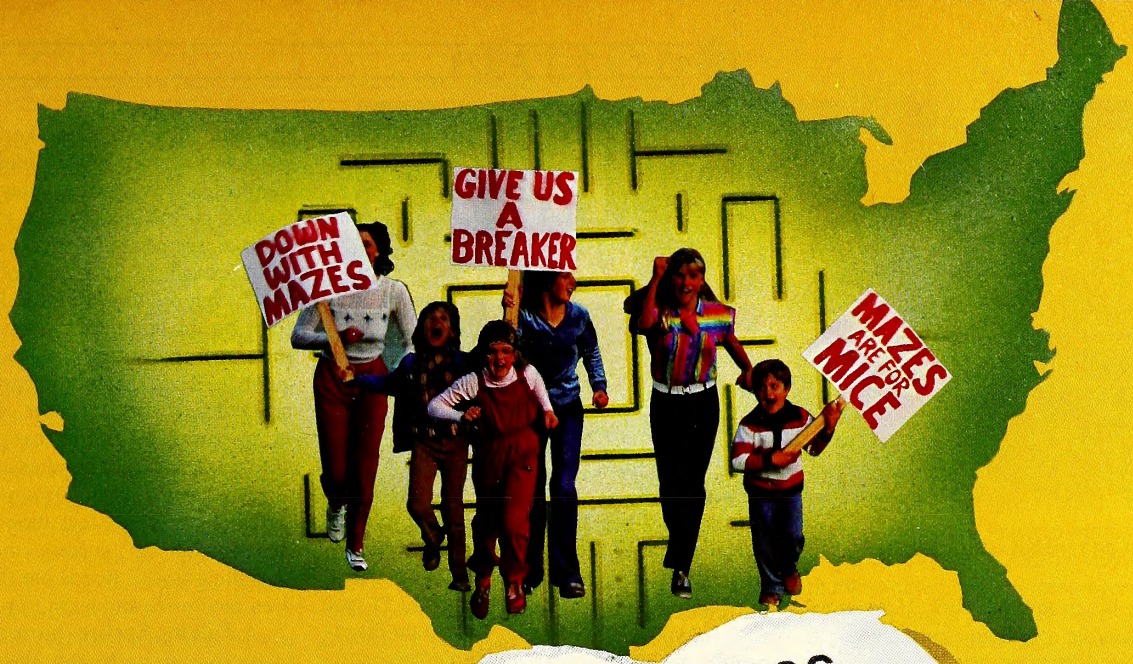
You Can't Always Get What You Want. What about older people—teachers and parents? How can they catch up?

Hofmann has some unexpected yet sensible ideas to share. He suggests that when you're just beginning it can be good to "accept the computer as a tool and to recognize the fact that you may never be a terribly proficient programmer. There's nothing wrong with not being a programmer." After all, he points out, if you're an adult, you just don't have the time children have.

He also believes that teachers would do well to realize that "they're learning with the children and that it's impossible to know everything there is to know. Too many teachers are really worried about using computers because they think that they have to be programmers." What's most important is "being a facilitator, and that means being a very intelligent user."

Hofmann predicts that more useful instruction about computers will occur "as we move computers into the existing curriculum. We need to have teachers become comfortable with computers in their own areas." Then, he suggests, they can share their excitement and enthusiasm with children in those areas. This is preferable to having only one teacher, who may have a very specialized or limited perspective, covering the subject. "Let's not create new courses," he says. "Let's work with what we have."

Someday soon Hofmann would like to conduct a summer computer camp for elementary schoolteachers who know nothing about computers. As he envisions it, from "sunup to sun-



Kids Protest Maze Games

COARSEGOLD, Calif.- Carrying placards and shouting slogans, kids across the United States took to the streets today to protest tedious and outdated computer maze games.

No injuries were reported, and damage was limited to games based on stale mazes.

"The turnout doesn't amaze me," said R. Kaid, chairman of "M.A.D. - Mazes Are Dumb."

"Kids are tired of moving in and around stationary walls," he said.

News of the demands struck to the heart of the computer software industry, and Sierra On-Line, Inc. responded with the NEW Jawbreaker.

"The entire screen moves - the happy faces, the set of chompers, even the walls," said Chuckles, creator of the innovative game for Sierra On-Line.

"No maze creates as much excitement as our Jawbreaker," he said, and added, "The colors are brighter, the figures bigger, the action faster."

While maze makers waited for someone to buy their games, kids and other M.A.D. members were buying their NEW Jawbreaker for $29.95 from dealers or directly from:

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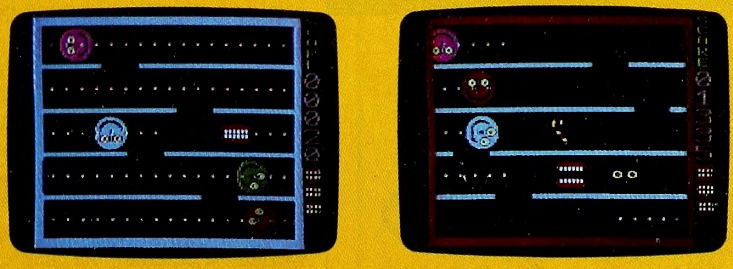

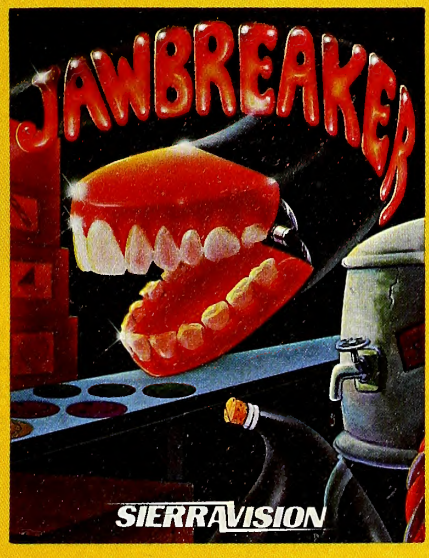

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Rich's Riches

Rich Hofmann and friends share an Apple.

In designing his programs, Rich Hofmann strives to incorporate synthetic speech, good graphics, and sound learning principles, believing that these elements can be brought together to create effective learning tools for young children. Good programs for primary school kids, says Hofmann, should also reflect the author's knowledge of "cognitive development, learning theory, and fine motor development."

Amazing Dragon. The programs that children at McGuffey Laboratory School and Reily School (both in Ohio) are using offer them a variety of experiences and activities. When they play Hofmann's *Dragon Maze*, they're learning the directional concepts up, down, left, and right and they're becoming comfortable with the keyboard. Since the keys are labeled with directional symbols, the ability to read is not required. And when the dragon talks to them, even when he's gloating triumphantly, "I got you; yum, yum!" (courtesy of Mountain Hardware's Supertalker and Hofmann's own software) the kids are delighted.

Another simple yet imaginative program is Hofmann's *Torpedo*. In this game, children reinforce their knowledge of directions and their familiarity with the keyboard. They also learn to think ahead, to plan their moves rapidly in advance. The element of risk and the consequences of taking a chance (firing a torpedo) are also introduced.

Next come the color-recognition programs. *Color Guesser* is a talking program for kids who are learning to recognize and spell the names of colors. The program features ten colors. When the child hits any letter key, the Apple pronounces the name of that letter and displays the jumbo-sized lower-case letter in a color to be guessed by the child. When the correct word is typed in, the computer speaks and displays a colorful reward. In *Painter*, another speaking program, children use game paddles to color in pictures on the computer screen. First, they move the cursor to the area of the picture they want to color in. Then they are prompted for the name of a color. If they enter the color word correctly, the computer fills in that part of the picture with the color they've chosen.

Hofmann's spelling programs incorporate a collection of words that have been identified as fundamental to success in reading. These "building-block" words are the ones most children memorize and learn to recognize on sight.

A Talking Speller. More sophisticated than *Color Guesser* or *Painter*, the spelling programs require learners to be fairly comfortable using the keyboard. The first, titled simply *Spelling Program*, is set up by the teacher, who can use it to create a unique spelling test for each child in the class. When a child uses the program in the practice mode, each word the teacher has entered is displayed on the screen and pronounced by an Echo II speech synthesizer from Street Electronics. The child must then type in the correct spelling of the word. As soon as the child presses a wrong key, the Apple intervenes, allowing three more chances to push the correct letter. Then the Apple supplies the problem letter.

down" attendees would have all kinds of new experiences. They'd be exposed to word processing, *VisiCalc*, elementary programming, and programs for children. They'd learn what to look for when evaluating courseware, how to use Logo to simulate nature, and even how to replace a chip in a disk drive. Teachers would also learn more about synthetic speech and other new technology and assess how these developments might affect their work in the future.

Although there's value in some of the educational software he's looked at lately, Hofmann has also seen numerous programs that don't seem to have much purpose. "Often," he says, "there's nothing there that couldn't be done with flash cards. That turns children off." One of the problems may be that "a lot of the people who are writing educational software have forgotten that learning is supposed to be fun."

Some people also seem to have forgotten a natural resource—kids as critics. Hofmann finds it valuable to ask children what they think and then to listen to what they have to say. In an article published last summer in the *Journal of Learning Disabilities*, Hofmann suggested that in some ways, when it comes to programs written for children, the children themselves are more capable evaluators than the adult experts.

The Critical Choice. For one thing, he says, "children are much franker than adults. That's what makes them good critics. I'll be doing some work, and adults will come along and say, 'That's terrific,' because it's something they

ter and the child continues. This way, the learner never ends up with a misspelled word. In nonpractice mode, the word is pronounced by the Echo but is not shown.

The follow-up to *Spelling Program* is Hofmann's talking version of *Hangman*, the traditional game that children always seem to like.

With the aid of the Echo's text-to-speech algorithm, Hofmann has created two pronunciation programs, *Pronouncer* and *Dictionary*. *Pronouncer* helps very young children become comfortable with the Apple keyboard by saying the names of letters as the children enter them and displaying them in jumbo-sized form on-screen. Entering a sequence of letters and then pressing the return key prompts the program to attempt to pronounce the combination of letters as a word.

Dictionary, one of Hofmann's more ambitious ongoing projects, is a software "module" (he compares it to a subroutine) that can be used on its own or in conjunction with other programs. Children learning to read and having trouble pronouncing a word simply "look it up" by typing it on the Apple's keyboard. If the word is currently in the *Dictionary*, the Apple pronounces it accurately. If the word is a new one, the program tells the child and makes an attempt at pronouncing the word anyway. Any new words *Dictionary* encounters are stored away, to be analyzed and added to the permanent file later on.

The program's vocabulary, expanded almost daily, includes the words particularly important for children to know "on sight," along with other words. A graduate student knowledgeable about phonetics does the initial work of adding and saving new words to the *Dictionary*, using a program Hofmann wrote. Later, Hofmann can review the new words, modify them, test them in the classroom, and perhaps modify them again. When necessary, he programs new words himself, breaking them down by means of a phonetic coding system. He then puts the appropriate sound pieces together and stores the word for future use.

Easter Magic. In the story bulletin board, voice synthesis and simple animation techniques work together to produce "talking stories." "The Magic of Easter" written and illustrated by first-graders at Reily School, was created in this way. The story and illustrations are developed on paper first. Then the children enter their pictures by tracing over them using an Apple Graphics Tablet, and Hofmann enters the desired words over the pictures. The synthetic speech is added last. The final product moves, talks, and entertains.

The project Hofmann is most excited about lately is the touch pad, an input device that works by means of an interface card and a touch membrane with a graphic overlay. The touch membrane is of the sort used by Children's Television Workshop in the computer programs at Sesame Place.

Now that Hofmann has developed an algorithm that makes the touch pad and interface card work together, young Apple users can bypass the traditional keyboard entirely. The touch pad offers upper and lower case alphabets, the numbers from zero to fifteen, mathematical operators, directional symbols, colors, circles, and squares. Since it's a talking touch pad, it also contains a pair of bright red lips.

The touch pad allows children to indulge their natural tendency to experiment. By pressing the appropriate symbols on the pad, they can move around the screen, play with colors, and manipulate numbers, letters, symbols, and shapes. When the red lips are pressed, the talking program repeats the letter, number, or word that has been entered. It's also possible to do simple math problems with voice accompaniment; if the child enters "5 + 2," the computer will say "equals seven." If a child creates a math problem with an incorrect answer (by entering "5 + 2 = 8," for example), the computer will display and repeat aloud what has been entered, but will then tell the child that this is not correct.

It wasn't long, Hofmann reports, before children using the touch pad were entering not just random letters or the letters in their names, but words—both words they knew and words they had invented. Through experimentation, the kids discovered that including certain "magic letters" in the combinations they entered resulted in words that the talking program could say. The magic letters the children had found were vowels. ■

don't know how to do themselves. An eight-year-old kid will come along and say that it's awful; a kid will tell you what's wrong so you can fix it.

"In so many instances," he adds, "the real finishing touches are suggested by the children. They'll say, spontaneously, 'I really think the program would be better if. . . .' " One of Hofmann's favorite examples of this happened in connection with the Easter story written by the children at Reily School. He had shown these children page-flipping between the first and second hi-res pages, and they liked the animated effect. The hi-res grass in the Easter program is animated, because the children told him how it should look and that it should move.

How does Hofmann fit everything in? He'd like to say he's very disciplined, but he's not sure it's true. Rather, it would seem, he is carried along by the excitement and satisfaction that comes from doing work he really enjoys. Further, he attributes his success and ability to do so much in so many areas to the cooperation he gets from the kids, teachers, and others he works with—and to his wife, whose support and ideas he values tremendously.

Hofmann gets so involved in his work with and for kids that he sometimes feels ready to abandon statistics altogether and work entirely with computers as they relate to children. He likes the energy and wide-open sense of possibility the microcomputer field offers.

"Walls haven't been built up," he explains. "We don't know what we can't do. That's what makes it really exciting." ■

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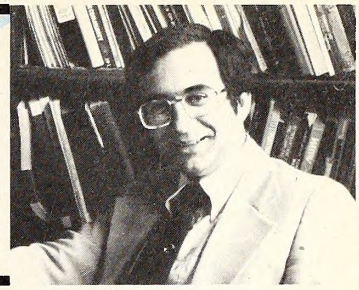
Mind Your Business

BY PETER OLIVIERI



It seems that every time a person begins to catch up with what's going on in the computer field, something new comes along. There are now well over a hundred models of microcomputers available for purchase. And more than two hundred additional models have been announced for sale in the coming year. Software abounds. And the variety of peripheral equipment you can add to your Apple is endless. It seems clear that change is the one constant we can count on; we'll just have to learn to live with it and find new ways to adapt to it.

For example, now that many of us have learned to use *VisiCalc*, database management systems, word processing programs, and graphics utilities, vendors are releasing all-in-one packages that offer all of these capabilities under one roof. Meanwhile, the new Lisa business computer from Apple has one million bytes of RAM (not our standard 48K). And, in a very few years, communicating with the computer via the keyboard may be an obsolete skill; we'll use the "mouse" or some other means instead.

Other developments include prototype disks that can store eight times more data than our familiar floppies and sixteen (and even thirty-two) bit machines that can process information at much greater speeds.

Why is all this happening now? Why weren't these innovations available when we bought our Apples? Well, that's the age-old process of technological change at work. In many ways, we've been an experimental group of sorts for the microcomputer manufacturers. No one really knew at the outset what people wanted in a personal computer, and in fact many doubted that such a beast would sell at all. It did, of course, and over time manufacturers have gotten feedback from users that has enabled them to design even better machines than the originals. The various incarnations of the Apple II are a good example of this. In the case of the Apple IIe, the memory has been expanded, there's built-in eighty-column display with upper and lower case, and the keyboard has been redesigned to incorporate additional capabilities.

When will it all end? In truth, probably never. We're just at the beginning of the computer age; and while it may sound trite, we can only speculate about what will be available to all of us in the 1990s (only seven years away). Meantime, expect much of the advancement to be in software. The machines available now are still not as friendly as they could be, and the new software that's created over the next several years will help make them easier and easier to use. We'll also see significantly increased disk storage capacity and faster processing speeds.

Take heart. You're already a knowledgeable computer person. You'll have an edge.

The Teaming Power of Lisa. As you may know, Apple's new Lisa business computer comes with many features of the future, including one million bytes of RAM, a five-megabyte hard disk, and two floppy disk drives capable of storing more than eight hundred thousand characters each.

But the Lisa's real revolution is in software, which by the way uses two million bytes of that five-megabyte hard disk. The system includes an integrated software package that incorporates a database management system, a word processor, a graphics package, list processing, and a PERT-like scheduling package. In addition, another package that comes with the system allows the Lisa to emulate a VT100, a VT52, or a TTY data communications terminal. All of the programs can communicate with each other and data can be passed back and forth between them quite easily.

The machine itself is very easy to use. Because of the mouse, which enables users to make menu selections by pointing rather than by means of the keyboard, very little typing is necessary.

Why call it Lisa? A variety of explanations have been put forth. According to one popular story, it was not uncommon for Apple executives to find themselves traveling in the same plane as some of their Atari counterparts. In order to be able to communicate about their products while in flight, they decided to give their products the first names of their wives or friends, hence Lisa. When it came time to release the product, the marketing department at Apple came up with another name for the machine, but by that time the people who'd worked long and hard on the project had grown to know and love Lisa, and Lisa it remained. As you might guess, Lisa is also an acronym; it stands for Local Integrated Software Architecture.

Keywiz! For many people, the interface with the keyboard is the most difficult part about learning to use the computer. For example, when executives come together to learn to use a software package (*VisiCalc*, for instance), they often get frustrated with the amount of keyboarding necessary to enter commands. In some cases, telling the computer what to do requires several keystrokes.

One creative company, Creative Computers, has fashioned a solution to this problem. Its product is Keywiz.

Keywiz is, in effect, another keyboard. It attaches to your Apple via a board placed in one of the peripheral slots in much the same way that a disk drive does. You must also connect a cable from the board to your keyboard connector. At first, the instructions saying that you have to take off the Apple case by removing ten screws from the bottom of the machine are a bit intimidating. But the instructions are clear and the installation goes smoothly. When you finish installing the device, what you have essentially is a second keyboard sitting next to your Apple's keyboard.

The Keywiz contains two pads, one being the standard numeric keypad, the other a pad designed specifically for accepting the *VisiCalc* commands.

The numeric keypad functions as a quick data-entry device. Many Apple owners have complained about the lack of such a pad on the Apple II. If you do a lot of numeric-data entry, the pad is a godsend.

The *VisiCalc* keypad allows you to enter many (but not all) of the *VisiCalc* commands. There are four arrows on the pad for controlling cursor movement. Most of the other keys have two functions. Each key has one command written on it in white and another in yellow. Hit the key and the white command is executed; hold down the shift key and the yellow command is carried out.

It's very easy to get used to working with this pad, and the single-keystroke commands are much easier to use than the commands within *VisiCalc* itself. For example, in *VisiCalc*, if you wish to change the column width of your spreadsheet, you must press three keys (a slash to bring up the command line, a G to specify a global format, and a C to indicate a change in column width). Using the keypad, you hold down the shift key and press the key labeled "column width." The *VisiCalc* commands are written out fully on the keys.

Clearly, Keywiz has the potential to speed up considerably the process of *VisiCalc* model building. In truth, if this were all Keywiz offered, it might be something you could live without. However, there's more; the numeric keypad can serve as a word processing keypad. Pressing the shift-lock key on the numeric keypad makes the keys take on twenty-two common word processing functions. The current version of Keywiz supports *Apple Writer II*, *ScreenWriter II*, *Super-Text*, *Magic Window*, *WordStar*, *Executive Secretary*, *Word Handler*, *Pie Writer*, and *Easy Writer*. Included in the package is a set of stick-on labels (how many times have we mentioned labels?).

If you do a lot of word processing, this product can really save you time and effort. Hitting single labeled keys now accomplishes the same

things that sometimes used to require several keystrokes. For example, you may indeed find it much easier to press a single key labeled "delete word" in order to delete a word instead of having to type escape control-P (as in *ScreenWriter II*).

Keywiz sells for $299 (*VisiCalc* and numeric keypads only), $339 if the word processing option is included. That's a bit steep, but you are getting three products in one and it's nicely designed. It may not be for everyone, but if you do a lot of word processing and you also use *VisiCalc*, it's well worth considering. Try it out at your dealer's. It's easy to learn to use, and you should be able to tell within a few minutes whether Keywiz is worth the price for your applications.

PFS People. If you're a PFS database user or have an interest in graphics, read on. Software Publishing Corporation's PFS series of products includes *PFS* (formerly *Personal Filing System*), *PFS:File* (a database management program), *PFS:Report* (a report writer for *PFS:File*), and *PFS:Graph* (a graphics program).

Two things about the PFS series of products stand out—high-quality user manuals and ease of use. It takes very little time to feel like an expert with any of the PFS packages. Some people will argue that there are more powerful database packages and more thorough graphics programs; that much is true. On the other hand, there are an awful lot of PFS users, and a great many database and graphics applications don't require a lot of fancy features.

The program we'll look at here is *PFS:Graph*, a standalone graphics package that can be used whether or not you own any other PFS packages. It does "talk to" the *PFS:File* database, however; so if you own that package as well, you'll be able to graph some of the data in your database.

Using *PFS:Graph* calls for an Apple II or II Plus with at least 48K, a television set or monitor, at least one disk drive, and if at all possible a printer or plotter. A new *PFS:Graph* compatible with the IIe allows users to pull eighty-column PFS files. There's also an Apple III version of the program.

You can use *PFS:Graph* to create, display, and print a graph in well under thirty minutes. Most users find this relatively simple to do and enjoy the creative aspects of the task. The six functions available from the main menu are get or edit data, display a chart, define a chart, save a chart, get or remove a chart, and print or plot a chart.

Up to forty-five graphs can be stored on one disk. Each graph can have as many as thirty-six points, and data can be cumulated so that each data point represents the total of the Y values up to that point. Data reduction is automatic (that is, if two or more X values have the same Y value, they will be combined automatically). In addition, colors, pattern filling, and symbols (for multiple-line graphs) are all chosen by the program automatically.

The get-or-edit-data function allows you to enter data direct from the keyboard or to retrieve data from a *VisiCalc* DIF file or a PFS file. You indicate the items that will provide the X and Y values for your graph; as many as four graphs can be created on one chart. Once you've entered some data, you can merge new data into it; this means you can combine data from several sources.

Charts can be either 3 inches by 4 inches or 8½ inches by 11 inches. If you like, you can have both lines and bars in the same chart.

The define-chart function lets you add explanatory information to your chart. You can display information in three forms—bar chart, line graph, or pie chart, and you can stack individual graphs on top of each other or display them side by side. If you have a color monitor, charts you create can be displayed in color. You can adjust the Y axis to whatever scale you choose. You can provide legends to identify the information in each graph, and you can label the X axis, the Y axis, and the graph itself.

Among *PFS:Graph*'s other features is a special mode for drawing charts on transparency masters.

The Readers Speak. "I just wanted to share with your readers some of the ways I currently use my Apple. I have a simple database program (*PFS:File*) that I use to keep records of importance to my family. For example, I have a file that contains an inventory of all our household possessions, another that lists birth, health, and educational records of each of our children, a file of phone numbers and addresses, and a file of my coin collection. I have kept these files not merely for ease of access to the information but also as a hedge against any destruction to or loss of my records. I have made two copies of each file and keep one of them in a safety deposit box at the bank. My insurance company liked that idea, since serial numbers of all my valuable equipment were readily available. It is a simple system to use and could prove invaluable one day"—J. Pareto, Reston, Virginia.

Your example is a good one. The disk provides a very convenient way of storing information. Perhaps your suggestions will motivate other readers to keep similar records. It's fairly common for people to keep their tax records on disk, but this is the first time someone has described this particular application.

Another good point is raised by your letter. You mention that your insurance company looks favorably on this method of record keeping. It would be interesting to know if insurance companies would reduce the premiums of people who maintain systems of this type.

Speaking of insurance, business users and personal users alike would do well to contact their respective insurance companies to determine whether their computer equipment (both hardware and software) is covered by their policy. It's easy to forget how valuable one's system has become now that hardware and software have been added.

Some companies include coverage of a computer within the limits of the existing policy; others require that you add an attachment to the existing policy. Still others agree to cover losses only up to a certain amount. Forewarned is forearmed! A phone call to find out now whether (and to what extent) your computer is covered under your existing policy is a dime well spent.

Well, that's it for another month. See you in May. ■

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Exploring Business Basic, Part 19

Here's hoping all of you got a chance to see the March article in this series, because there's going to be lots of information in this month's edition, which will build on that exploration of character graphics and the associated game that was dubbed *Bug-Mania*. As was said last time, Business Basic wasn't exactly designed for games (the name is one clue!), but with careful design, reasonable graphics performance is possible, and the techniques can have a lot of business applications. In fact, the concept of redefining characters to new shapes can add tremendously to the effectiveness and readability of your screen displays. For proof of this statement, take a look at Apple's *Mail List Manager* program. Special character sets in that program make it one of the best-appearing and easiest-to-use applications on the Apple III.

But First, a Word from Our Sponsor. The mailbag this month brought a couple of items of general interest. First, the question came up as to why Business Basic does not allow programs larger than 64K bytes. That is, the Basic program statements cannot total more than 64K, excluding variable and array space. This question rarely comes up, because 64K is enough space for more than three thousand program lines, which is a very impractical size for a single program. One of these articles someday will cover all the tricks you can do with the chain statement to break your program up into logical segments. But the question deserves an answer, and while we answer it, we'll note some other limits of Business Basic as well.

One of the reasons that limits like 64K keep coming up relates to the fact that a sixteen-bit pointer can store all the possible addresses in a 64K address space (2^{16} = 65,536). The Apple III can address more than 64K because it uses extended indirect addressing, which makes use of three-byte, twenty-four-bit pointers. Three-byte pointers take up more space, however, and therefore are used only when it makes sense. The designers of Business Basic built in several such limits to save space and improve performance. For example, you are only allowed to have 64K of string variable space and 64K of simple numeric variable space. You are allowed as many numeric arrays as will fit, but each one must be no more than 64K. These may sound like limits, but remember, most personal computer Basics have an absolute limit of 64K of total space—program, data, the works. Ask your friends with an IBM pc what they get when they print FRE(0)—right, about 61K, no matter how much memory (above 128K) is actually installed!

It would be remiss not to note another, though more esoteric, reason for the program size limit. Since Business Basic saves and loads programs with a single SOS call, and SOS has a 64K limit on the total number of bytes in a single read or write, it would be impossible to use a program larger than 64K, even if it could be written. So now you know.

The other question is one for which we know no ready answer, so your comments are solicited. It concerns using the Qume letter-quality printer as a graphics-output device. The *Apple III Business Graphics* package supports the Qume, producing hi-res screen dumps and other graphic images, but those routines are written in Pascal. If anybody has developed Qume output routines, drop a note in care of *Softalk* and it will be passed along to the inquirer and to the rest of you in a later column.

Finally, we have a bug to report in our February font editor. As you may recall, the Apple III stores fonts in a format that is the reverse of the way they are displayed on the screen. The program deals with this by reversing the font when it is loaded into memory. Unfortunately, it fails to reverse it again before saving it back to disk. The following lines will handle this task:

```
1178 IF choice < > filtyp THEN GOSUB
     2000
1179 IF filtyp = 3 THEN GOSUB 3950
1182 IF choice = 3 THEN GOSUB 3950
```

Back to Work. Last time, as you may remember, we used the fact that the Apple III has a RAM-based, and therefore modifiable, character set to create some high-speed animation effects. These were accomplished by redefining certain characters and then printing them rapidly to the screen, taking advantage of the fact that printing to the text screen goes very rapidly, compared to writing to the graphics screen. Since the Apple III has a sixteen-color text mode, it can be tough to tell whether the action is occurring in text mode or graphics, especially if you do a lot of work with the character definitions.

There are, however, other ways to accomplish the rapid changing of characters on the screen for animation and other purposes. For example, suppose you wanted to change every occurrence of one character shape on the screen to another shape. You could simply reprint the character and rely on the fact that printing in text mode is pretty fast, or you could take advantage of a little-known capability of the .Console driver, the partial-character-download feature. This is a control call to the driver (remember our previous sessions about console capabilities?), specifically control call 17. More information about how it works is in the *Standard Device Drivers Manual* in the section on the Console driver. Basically, it allows you to change up to eight character definitions on the fly, and it does this very fast. To give you a feel for how this process works, let's try the following program:

```
10 DIM a%(511)
15 INVOKE"/basic/download.inv","/basic/
   request.inv"
20 q$=CHR$(34):array$="a%"
25 text40$=CHR$(16)+CHR$(1)
30 INPUT"Name of font file: ";flname$
35 name$=q$+flname$+q$
40 PERFORM getfont(@name$,@array$)
```

The lines above set up the array that will hold an alternate character set, invoke the necessary modules, and load the font into the a% array. Although we don't need all these characters, it saves us the trouble of entering the definitions manually. The next section extracts two character definitions:

```
45 ltr.a$="":ltr.b$=""
50 FOR i=260 TO 263
55 lt$=HEX$(a%(i))
60 ltr.a$=ltr.a$+CHR$(TEN(MID$
   (lt$,1,2)))+CHR$(TEN(MID$(lt$,3,2)))
65 NEXT i
70 FOR i=264 TO 267
75 lt$=HEX$(a%(i))
80 ltr.b$=ltr.b$+CHR$(TEN(MID$
   (lt$,1,2)))+CHR$(TEN(MID$(lt$,3,2)))
85 NEXT i
```

The routine above looks a little complicated, but it's really straightforward. Since the

SOS control call mechanism in the Request.Inv invokable module uses a string variable as the parameter list, it is necessary to convert the contents of the integer array a% into equivalent ASCII characters. This is done in lines 55 and 60 and 75 and 80 by first converting the integer into hex format and then treating the result as a pair of two-digit hex numbers converted into ASCII characters by the CHR$ function. Notice also that since the integer format requires four locations for each character, the locations 260 through 263 and 264 through 267 correspond to upper-case A and B respectively (which probably explains the variable names).

Now that ltr.a$ and ltr.b$ contain the definitions for the two characters, we'll load the font into the character generator, turn on forty-column mode, clear the screen, and print several lines of As and Bs on the screen, like this:

```
90 PERFORM loadfont(@array$)
95 PRINT text40$:HOME
100 FOR i=1 TO 10:PRINT
    "ABABABABABABABABABAB":
    NEXT i
```

Next, we'll change those characters on-screen by using the partial character download mentioned before:

```
110 name$=".console"
120 ctrlist1$=CHR$(1)+CHR$(65)+ltr.b$
130 ctrlist2$=CHR$(1)+CHR$(65)+ltr.a$
150 PERFORM control(%17,@ctrlist1$)
    name$
160 GET a$:IF ASC(a$)=27 THEN 500
170 PERFORM control(%17,@ctrlist2$)
    name$
180 GET a$:IF ASC(a$)<>27 THEN 150
```


In line 110, we define the name of the device driver to be called, and then lines 120 and 130 set up the parameter string for the control call. Notice that the format is the number of characters to be loaded, then the character number, followed by the character definition. If you load more than one character, the first value changes, and then each character definition in the string is preceded with its character number. In this case, character 65, which is normally an upper-case A, is being defined in ctrlist1$ as a B and in ctrlist2$ as an A. Lines 150 through 180 do the character switching, with get statements in between to allow you to see what's going on. By pressing any key, you can switch the As to Bs and back. Holding down a fast repeating key will give you an idea of just how fast these changes can take place. Pressing escape will allow the next routine to clean up and end:

```
500 REM restore screen
510 PRINT CHR$(22);CHR$(14)
520 TEXT:HOME
530 nam$=q$+"/basic/standard"+q$
540 PERFORM getfont(@nam$,@array$):
    PERFORM loadfont(@array$)
550 PRINT CHR$(15);
560 END
```

Well, there you have it. The routine above could just as easily change every character on-screen to a different definition, since the change is in the character generator and not in the screen memory itself.

Some Relevance Rears Its Ugly Head. What, you ask, does this have to do with *Bug-Mania* and character-set animation? Good question, and one about to be answered by the next program. Remember, just because we changed one letter to another doesn't mean that that's the only use of the principle. Last time we looked at redefining characters (we used control characters 21 through 26) to make little creatures to populate our game. The character definitions were created by the font editor from a few episodes back, or could be created with any font-editing program. The next program takes those character definitions and demonstrates how they can be used to make our little critters move. It is similar in structure to the previous program, with a more general-purpose design, and has some similarities to the game program from last time:

```
10 DIM a%(511)
20 INVOKE"/basic/download,inv",
   "/basic/request.inv"
30 q$=CHR$(34):array$="a%"
40 fg$=CHR$(19))bg$=CHR$(20)
50 mblue$=CHR$(6):white$=CHR$(15)
60 bw$=fg$+mblue$+bg$+white$
70 text40$=CHR$(16)+CHR$(1)
80 GOSUB 700:REM get font
90 GOSUB 800:REM load up the bugs
100 GOSUB 600:REM set up screen
```

After the initialization in lines 10 through 70, three subroutines are called to set things up for the animation to follow. Here's the first of them (in order of use):

```
700 RESTORE
705 head1$="":head2$="":body1$=
    "":body2$="":tail1$="":tail2$=""
710 FOR i=1 TO 4
715 READ a%,b%,c%,d%,e%,f%
720 h1$=HEX$(a%):h2$=HEX$(b%):b1$=
    HEX$(c%):b2$=HEX$(d%)
725 t1$=HEX$(e%):t2$=HEX$(f%)
730 head1$=head1$+CHR$(TEN(MID$
    (h1$,1,2)))+CHR$(TEN(MID$
    (h1$,3,2)))
735 head2$=head2$+CHR$(TEN(MID$
    (h2$,1,2)))+CHR$(TEN(MID$
    (h2$,3,2)))
740 body1$=body1$+CHR$(TEN(MID$
    (b1$,1,2)))+CHR$(TEN(MID$
    (b1$,3,2)))
745 body2$=body2$+CHR$(TEN(MID$
    (b2$,1,2)))+CHR$(TEN(MID$
    (b2$,3,2)))
750 tail1$=tail1$+CHR$(TEN(MID$
    (t1$,1,2)))+CHR$(TEN(MID$(t1$,3,2)))
755 tail2$=tail2$+CHR$(TEN(MID$
    (t2$,1,2)))+CHR$(TEN(MID$(t2$,3,2)))
760 NEXT i
765 RETURN
780 DATA 7215,7215,14462,14462,0,0
785 DATA 32545,31555,27519,22399,
    1090,580
790 DATA 838,16156,32546,32546,
    16932,26640
795 DATA 15360,0,8806,4369,6144,0
```

The routine above uses some of the techniques from the last program in defining the characters, except that this time we are reading the font definition from the data statements in lines 780 through 795. These numbers may look like gibberish, but, in the immortal words of many a programmer, "trust me." These values define our tiny creature's head, body, and tail, and were, in fact, extracted from a font created by the font editor from the February column. In the event you have a working version of that editor, or a similar one that produces system font files, you could use the *Bug-Mania* font from last month, substituting the following lines for lines 700 through 795 above:

```
700 INPUT"Name of font file: ";flname$
702 name$=q$+flname$+q$
714 PERFORM getfont(@name$,@array$)
716 head1$="":head2$="":body1$="":
    body2$="":tail1$="":tail2$=""
718 FOR i=92 TO 95
720 hd$=HEX$(a%(i))
722 head1$=head1$+CHR$(TEN(MID$
    (hd$,1,2)))+CHR$(TEN(MID$
    (hd$,3,2)))
724 NEXT i
726 FOR i=104 TO 107
728 hd$=HEX$(a%(i))
730 head2$=head2$+CHR$(TEN(MID$
    (hd$,1,2)))+CHR$(TEN(MID$
    (hd$,3,2)))
732 NEXT i
734 FOR i=88 TO 91
736 bd$=HEX$(a%(i))
738 body1$=body1$+CHR$(TEN(MID$
    (bd$,1,2)))+CHR$(TEN(MID$
    (bd$,3,2)))
740 NEXT i
742 FOR i=100 TO 103
744 bd$=HEX$(a%(i))
746 body2$=body2$+CHR$(TEN(MID$
    (bd$,1,2)))+CHR$(TEN(MID$
    (bd$,3,2)))
748 FOR i=84 TO 87
750 tl$=HEX$(a%(i))
752 tail1$=tail1$+CHR$(TEN(MID$
```

```
    (tl$,1,2)))+CHR$(TEN(MID$ (tl$,3,2)))
754 NEXT i
756 FOR i=96 TO 99
758 tl$=HEX$(a%(i))
760 tail2$=tail2$+CHR$(TEN(MID$
    (tl$,1,2)))+CHR$(TEN(MID$(tl$,3,2)))
762 NEXT i
764 RETURN
```

That seems like a lot of repetition, and it is, mostly for clarity. As set up, the subroutine will extract the characters from last month's game set, if you have defined that font. By changing the parameters of the for-next loops and in the build routine below, you could use any set of characters from any font. To simplify the screen display and show how powerful the character download capability is, we'll build strings of creature characters to populate the screen:

```
800 char$(0)=" ":char$(1)=CHR$(149):
    char$(2)=CHR$(150):char$(3)
    =CHR$(151)
810 m$="..23..123.1223..13.123.3.23...
    123.1223.."
820 FOR i=1 TO 40:SUB$(m$,i,1)=
    char$(VAL(MID$(m$,i,1))):NEXT i
830 RETURN
```

This routine uses a technique borrowed from the last article to create m$ with the appropriate characters for the head, body, and tail of the creatures. Notice that character values greater than 127 are used in order to map into the printable control character space. Characters 149 through 151 correspond to 21 through 23 in the standard ASCII set and are the same as used in last month's game.

Now on to the subroutine at 600, which sets up the screen and prints many bug-filled strings:

```
600 PRINT text40$;bw$;:HOME
610 PERFORM loadfont(@array$)
620 FOR i=1 TO 11
630 PRINT m$
640 NEXT i
650 RETURN
```

Now that the setup is done, it's on with the show:

```
110 name$=".console"
120 ctrlist1$=CHR$(3)+CHR$(23)+
    head1$+CHR$(22)+body1$+
    CHR$(21)+tail1$
130 ctrlist2$=CHR$(3)+CHR$(23)+
    head2$+CHR$(22)+body2$+
    CHR$(21)+tail2$
140 ON KBD GOTO 200
150 PERFORM control(%17,@ctrlist1$)
    name$.For i=1 TO 10*pause:NEXT
160 PERFORM control(%17,@ctrlist2$)
    name$.FOR i=1 TO 10*pause:NEXT
170 GOTO 150
```

This section is also similar to the corresponding part of the last program, except that this time we load three characters at a time. Also, instead of requesting input between each character switch to slow the display changes down, for-next loops are introduced, with a variable speed depending on the value of pause. Exits and speed changes are taken by pressing keys that use the on kbd routine in line 200:

```
200 OFF KBD
210 IF KBD=27 THEN 500
220 IF KBD>47 AND KBD<58 THEN
```

```
    pause= KBD-48
230 ON KBD GOTO 200
240 RETURN
```

Notice in line 210 that if escape (ASCII 27) is pressed, a jump is done to line 500, where the program ends. If a number key is pressed, then the pause factor is set to that numeric value. This allows you to see the speeds possible with this technique, while the program is running. Obviously, the routine could do lots of other interesting things. The cleanup routine, very similar to the one in the earlier program, looks like this:

```
500 PRINT CHR$(21);"="
510 PRINT CHR$(22);CHR$(14);
520 TEXT:HOME
530 nam$=q$+"/basic/standard"+q$
540 PERFORM getfont(@nam$,@array$):
    PERFORM loadfont(@array$)
550 PRINT CHR$(15);
560 END
```

The only noticeable change in the routine above is that the CHR$(21);"=" in line 500 sets all console options back to normal. While this is not necessary in this case, it is good practice and will be required in some later programs.

That's All Fine, but Was It Good for You? Running the program (the data statement version is recommended for starters) will demonstrate that this technique can produce some really fast stationary animation. With pause equal to zero, the critters will run in place so fast that you can hardly see their little legs move. However, running in place is not what we're after. The really interesting part is in using the character-redefinition capability to produce smooth motion. Remember in the last article where we achieved animation by printing several different versions of the characters in different places on the screen? That looked okay, but it suffered from one fact of life about printing characters—namely that there are only a limited number of horizontal locations where you can print them. In the case of the forty-column mode that we have been using, the characters appear to jerk from place to place, because there are only forty columns to draw them. But are we doomed to jerky animation? Not the MicroKids!

One obvious solution to the dilemma, and one discussed in a moment, lies in using the hires graphics screen instead of the text screen that we have been using. Since you can draw any character at any dot location on the graphics screen, it's just a matter of repositioning and printing. Later on, and especially in the next article, we'll see how that can open up a whole new bag of tricks, but we're not finished with what text-mode graphics can do for us yet.

It Ain't the Mode, It's the Motion. The text-mode character sets are so fast that a whole new possibility exists to make motion out of multiple-character definitions, and therein lies the solution to our dilemma. If we could create a definition of an object in all the phases of moving from one character cell to another, and could download these redefinitions rapidly, the object would appear to move smoothly from one cell to another. Since a character cell is seven dots wide, this implies that creating smooth horizontal motion will require seven different definitions of the same character, each one moved over one row of pixels into the next character cell. All of which leads us to the following program:

```
 10 DIM a%(511),ctrlist$(13),head1$(6),
    head2$(6)
 20 INVOKE"/basic/download.inv","basic/
    request.inv"
 30 q$=CHR$(34):array$="a%"
 40 fg$=CHR$(19):bg$=CHR$(20)
 50 mblue$=CHR$(6):white$=CHR$(15)
 60 bw$=fg$+mblue$+bg$+white$
 70 text40$=CHR$(16)+CHR$(1)
 80 GOSUB 700:REM get the head definitions
 90 GOSUB 800:REM load the print line
100 GOSUB 600:REM set up screen
```

If the program above looks familiar, it should. With the exception of array dimension statements for the seven versions of the head, and the fourteen versions of the control list necessary to define the different versions of the head, it's the same as in the last program. As in the description of that program, let's take the subroutines in order:

```
700 RESTORE
710 FOR i=0 TO 6
715 head1$(i)="":head2$(i)=""
720 FOR j=0 TO 3
725 READ a%:h$=HEX$(a%)
730 head1$(i)=head1$(i)+CHR$(TEN(MID$
    (h$,1,2)))+CHR$(TEN(MID$
    (h$,3,2)))
735 NEXT j
740 FOR j=0 TO 3
745 READ a%:h$=HEX$(a%)
750 head2$(i)=head2$(i)+CHR$(TEN(MID$
    (h$,1,2)))+CHR$(TEN(MID$
    (h$,3,2)))
755 NEXT j
760 NEXT i
765 RETURN
770 DATA 7215,32545,838,15360,0,0,0,0
772 DATA 14430,32322,1548,30720,0,
    256,1,0
774 DATA 28732,31748,3096,28672,1,
    769,2,256
776 DATA 24696,30728,6192,24576,258,
    1794,4,768
778 DATA 16496,28688,12384,16384,773,
    3844,8,1792
780 DATA 96,24608,24640,0,1803,7944,
    17,3840
782 DATA 64,16448,16384,0,3607,16144,
    291,7680
```

The code in lines 700 through 765 above looks simpler (certainly shorter) than in the last program, but notice that there is much more data. Simply put, each line of data defines two adjacent character cells. If you look back at the data in the previous program, you'll notice that the first four elements of line 770 in this program match the data in the first column in the other program. That's because 7215, 32545, 838, and 15360 are the four elements of the font definition that make up the creature's head. These are loaded by 720 through 735 into the first head1$ definition.

The next four numbers, all zeros in this case, make up the definition of the adjacent cell. This is logical, since the head starts in the first cell completely, with the second cell blank. The next row of data (line 772) describes what the head looks like when it is shifted one dot over in the first cell, and the second cell picks up the column of dots from the rightmost column of the first cell.

The definition proceeds, each row representing the head shifted over one dot column into the adjacent cell. Since there is already a definition for the head completely in a cell, there is no need for an eighth definition; we can just switch the character definitions around. More on that later. Also, as you might have guessed, these numbers came from defining the characters with the font editor and then printing out the results. Changing the program to accommodate font-editor output directly would be done in a similar way to the alternate subroutine in the previous program.

Next, the subroutine at 800 through 830 builds the character string in a similar fashion to the last program, with some notable exceptions:

```
800 char$(0)=" ":char$(1)=CHR$(128):
    char$(2)=CHR$(129)
810 m$="12121212121212121212121212
    12121212121212"
820 FOR i=1 TO 40:SUB$(m$,i,1)=char$
    (VAL(MID$(m$,i,1))):NEXT i
830 RETURN
```

Notice that this time we use ASCII 0 and 1 as our characters to redefine (converted to 128 and 129 to make them displayable). We don't need seven different characters; that will be han-

dled by successively redefining the two on the screen. Note also that we fill up m$ completely, because we want smooth motion from one side of the screen to the other.

Next comes the routine to put our character strings on the screen. This time we've chosen to fill nearly the whole screen up with characters, to wit:

```
600 PRINT text40$;bw$
610 HOME:PRINT:PRINT
620 FOR i=1 TO 21
630 PRINT m$;
640 NEXT i
650 RETURN
```

Okay, now to make all these little heads pay attention:

```
110 name$=".console"
115 FOR i=0 TO 6
120 ctrlist$(i)=CHR$(2)+CHR$(0)+
    head1$(i)+CHR$(1)+head2$(i)
125 NEXT i
130 FOR i=7 TO 13
135 ctrlist$(i)=CHR$(2)+CHR$(0)+
    head2$(i-7)+CHR$(1)+head1$(i-7)
140 NEXT i
145 ON KBD GOTO 200
150 FOR i=0 TO 13:PERFORM control
    (%17,@ctrlist$(i))name$:NEXT
155 GOTO 150
```

This time we create a series of control strings for efficiency. The first seven definitions in ctrlist$ describe how the head moves from character 0 to character 1. The second seven (in lines 130 through 140) show how the head looks moving from 1 to 0. Recall that, since the screen lineup is 010101..., the steady cycling through the definitions will create the desired motion. Lines 150 and 155 accomplish this, endlessly repeating the whole sequence.

The on kbd routine is simpler this time, and just gives us a way out:

```
200 OFF KBD
210 IF KBD=27 THEN 500
220 ON KBD GOTO 200
230 RETURN
```

The cleanup routine at 500 is identical to the one in the last program. Just copy it and you'll exit to the normal world properly with the escape key.

At Long Last, Bug. When you run this, the effect is somewhat amazing. With a simple Basic program, you're creating smooth animation, which takes quite a bit of assembly language on an Apple II, IBM pc, and most other computers. In fact, even the best assembly programmers would be hard put to create smooth motion over such a large area of the screen. But wait, you say. You've seen smooth animation on the Apple III before. What about that running-horse demo on the System Demo disk? If you haven't seen it, take a moment to run the demo that comes with each Apple III and select the horse section. You will see magnificent full-color animation that you probably always thought was done on the hi-res screen. Think again, bucko! That demo uses the same character-set redefinition techniques we've just been discussing. If you are patient enough, you might create the horse by defining all the characters, each a small piece of the big puzzle. By creating multiple definitions of these characters, both in place and in motion, you can duplicate that display yourself, using the principles in this article.

RAMbling Onward. As you might guess, there are enough suggestions in the last paragraph to last a lifetime, but since it's only one short month until next month's article, we had best move on to the promised treatment of the high-resolution graphics mode. As previously mentioned, smooth motion on the hi-res screen is trivial, and there's nothing like a trivial program to demonstrate that fact:

```
10 INVOKE "/basic/bgraf.inv"
15 OPEN#1,".grafix"
20 m$=" ** **** ** **** *** * **** ** ***"
25 PERFORM initgrafix
30 PERFORM grafixmode(%3,%1)
35 PERFORM fillcolor(%4):PERFORM
   pencolor(%13)
40 PERFORM fillport
45 PERFORM grafixon
50 FOR i=0 to 139
55 PERFORM moveto(%i,%180):
   PRINT#1;m$
60 NEXT i
65 GET a$:IF ASC(a$)<>27 THEN 50
100 PERFORM release:PERFORM release:
    PERFORM release
105 CLOSE:INVOKE
110 TEXT
115 END
```

This just prints the string m$ starting at each successive location on the hi-res screen, in this case the 140 × 192 sixteen-color mode. One or two things should be noted here that will become important later, especially in the next article. First, we can print off the screen without any apparent problem and without wrapping onto the next line. Second, the display seems to move faster as less and less of the string is actually printed in the display area. Watch this closely; it's a clue to what's happening in the graphics driver. Another thing is interesting and it's worth experimenting with. Try changing the text character set before opening the .grafix driver, using the techniques previously described. This allows you to print special characters like the bug's head onto the graphics screen, just as you would any other character.

If positioning were the only virtue of the graphics driver, it would not be nearly as useful. The next little program provides a clue to some of the graphics driver's special capabilities, which will be used fully in the next exciting episode of this long-winded serial. Try the following:

```
10 INVOKE"/basic/bgraf.inv"
15 OPEN#1,".grafix"
20 m$=" ** **** ** **** *** * **** ** *****"
25 PERFORM initgrafix
30 PERFORM grafixmode(%3,%1)
35 PERFORM pencolor(%13)
40 PERFORM fillcolor(%4):PERFORM fillport
45 PERFORM
   setctab(%4,%9,%9):PERFORM
   setctab(%13,%9,%9)
50 PERFORM fillcolor(%9)
55 PERFORM viewport(%0,%6,%0,%191):
   PERFORM fillport
60 PERFORM viewport(%133,%139,%0,
   %191):PERFORM fillport
65 PERFORM fillcolor(%4)
70 PERFORM viewport(%0,%139,%0,%191)
75 PERFORM grafixon
80 FOR j=7 TO-77 STEP-1
85 PERFORM moveto(%j,%180):
   PRINT#1;m$
90 NEXT j
95 GET a$:IF ASC(a$)<>27 THEN 80
100 PERFORM release:PERFORM release:
    PERFORM release
105 CLOSE:INVOKE
110 TEXT
115 END
```

Getting Your (Color) Priorities Straight. Looks pretty much like the last one, right? Not right. Notice that our primary colors are 4 and 13, the fillcolor and pencolor respectively. Notice also the color-priority definition in line 45. This says that any time color 4 or color 13 is printed over color 9 (the color of two border strips set up at each edge of the screen), the result should remain color 9. Run the program and see how this works. You should notice also that this time the print string runs backward, not forward. The color-priority table is a very powerful feature of the Apple III graphics driver, one exploited very little by programmers.

Next time we will work this feature to death, and in the process do things that would challenge the best of the hi-res jocks on less capable machines. Until then, remember that a pixel a day keeps boredom away, which gives you 107,520 days to enjoy your Apple III!

BUILD YOUR APPLE A MOBILE DESK

BY ROBERT STANG

Looking for a place to deposit your Apple and its associated side dishes and goodies? Here is a plan with detailed instructions for building your own inexpensive computer cupboard made basically from one four-foot-by-eight-foot sheet of plywood and a few accessories, like wheels. The finished desk will house an Apple II, two disk drives, a printer with box of paper, a twelve-inch monitor, a gaggle of small manuals or books and notebook-size references, a drawer full of disks and you'll still have desktop space for controllers and writing and a shelf for stacking stuff.

With the monitor placed on the lower desk surface, the unit is a compact forty-eight inches wide by thirty-nine inches high by eighteen inches deep, which can be rolled into a pretty small space. Adding electrical expansion and switch control outlets can provide one-plug convenience, making the whole thing easy to move from one site to another; just plug in and run.

The cost to make a computer cupboard starts at about forty dollars for the early-poverty model and goes up, depending on your

choice of materials and accessory options. For example, using a sheet of fir shop ply and painting it runs considerably less than walnut veneer (about one hundred dollars a sheet) stained and lacquered.

Required	
1 each	3/4" × 4' × 8' plywood
1 each	2" × 2" × 4' clear fir
2 each	1 3/4" #12 flathead wood screws
4 each	2" shepherds casters
	White glue
	4d (1 1/2") finishing nails
	Paint
	Wood Dough or spackling compound
Optional	
1 pair	16" drawer slides (side mount)
	Stain, lacquer, polyurethane, or other finish of your choice
	Veneer trim

Table 1. Bill of materials.

From 3/4" Plywood			
1.	18 × 47 3/4	11.	1 × 47
2.	18 × 24	12.	4 1/2 × 12 1/2
3.	18 × 23 1/4	13.	2 1/4 × 24
4.	9 1/4 × 47 1/2	14.	2 × 22 1/2
5.	9 1/4 × 12 1/2 (2 ea.)	15.	8 1/4 × 3 1/2 × 1
6.	9 1/4 × 22 1/2	DF.	7 × 12 1/4
7.	18 × 23 1/4	DS.	7 × 16 (2 ea.)
8.	18 × 9 3/4	DR.	W × 6 1/4 **
9.	18 × 9 1/4	DB.	W × 16 **
10.	18 × 13 1/2		

** If DG then W = 10 3/4.
If drawer slides then W = 10.

From 2" × 2"

DG. 1 5/8 × 3/4 (2" × 2" cut in half) × 16
FR. 1 5/8 × 1 5/8 (nominal 2" × 2") × 24

Table 2. Part dimensions (inches).

The required and optional materials are listed in table 1. Tools required for this program are an electric hand saw, a hammer, a screwdriver, a paintbrush, sandpaper, a good straightedge, and a tape measure. A table or radial arm saw and a jointer-planer would improve the quality of the joints; but spackling compound does wonders to fill in the joints if they're not perfect.

Start by laying out the parts on the sheet of plywood, as shown in figure 1, according to the dimensions in table 2. Use a fine veneer or cabinet blade and cut very carefully, as there is little room for error. The shaded area designates the leftovers, which can be saved for use in sampling paints.

After each piece is cut to size, make the special cuts according to table 3. Refer to figure 1 to locate the position and orientation of these surgical incisions. Sand any rough edges but do not chamfer or round them yet. The two-by-two-foot clear fir is cut for the foot rest (FR) and the drawer guides (DG). However, if you prefer to use purchased drawer slides, ignore the DGs and use the smaller W dimension for DB and DR.

Part Number	Incision
2.	1/2 × 3/4 rabbet* on both ends
3.	1/2 × 3/4 rabbet on one end
5.	1/2 × 1/2 rabbet on one end (each) 3/4 × 1/4 deep Dado 2" from other end
7.	1/2 × 3/4 rabbet on one end
9.	3/4 × 2 notch (for (14)) 2" from corner

* That's a long, open groove along the edge, not a hare.

Table 3. Special cuts.

Assemble the pieces, using a good-quality white glue. To hold the joints till set, you may simply use finishing nails (set and fill them). If you have a set of long furniture clamps, you may omit the nails where they would show and trust the glue to do the holding. The sequence of assembly goes like this (pretend each part is a string):

A = 7 + 8 + 6 + 9 + 14
B = 10 + 2 + 3 + 12 (goes at top edge in back of drawer position)
C = 4 + 5 + 5 + 11 + 15 + 15
D = B + 1 + 13 + A + FR (use a wood screw on each end plus a nail or two to prevent rotation)
E = DB + DR + DS + DS + DF (where D = drawer, B = bottom, R = rear, S = side, and F = front)
F = D + (DG + DG) or drawer slides + E + casters + C

You are done, but not finished! What about all those nail holes, cracks, and that unsightly plywood edge? That's where the Wood Dough or spackling compound comes into play. Even if you use a hardwood veneer plywood and want a natural or stained finish, the simple method for the cover-up is to brush or spatula the filler on those eyesores, sand smooth, and paint the edges with a trim color.

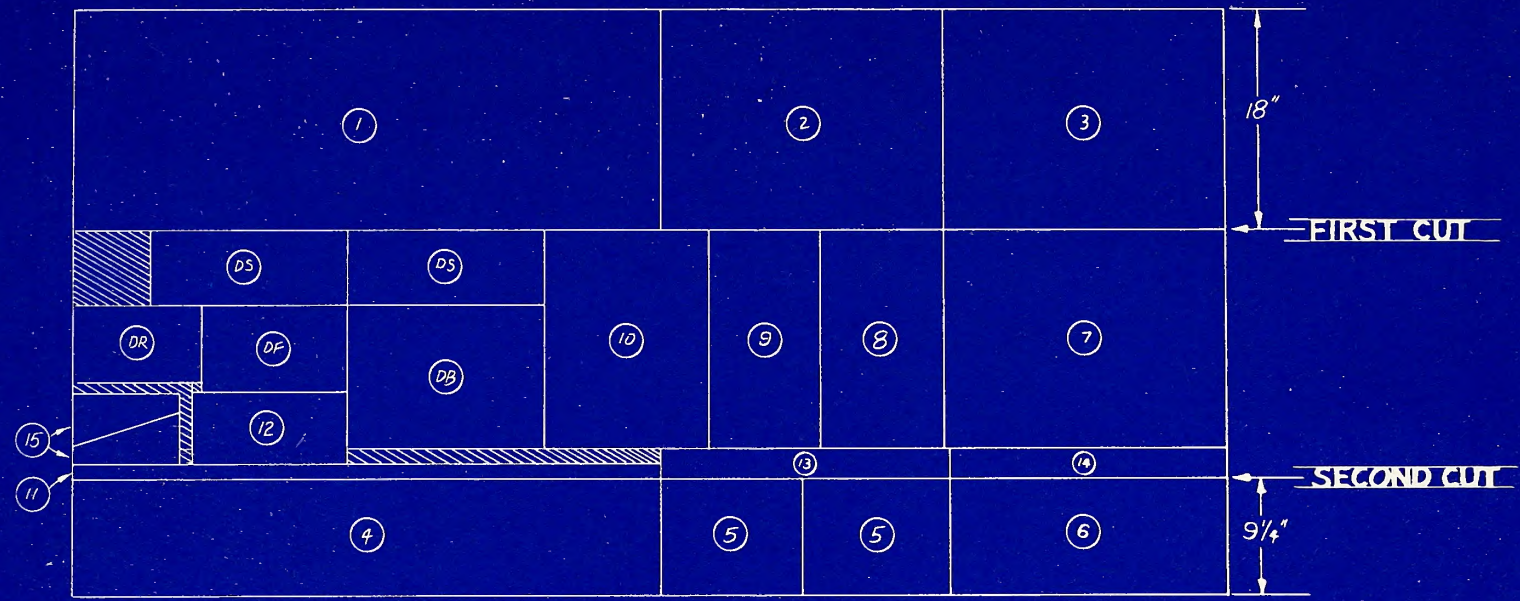
If you're a purist wood butcher, you may want to buy strips of veneer trim to match the plywood and attach these to the exposed edges by contact cement or other adhesive (also stain your crack and hole filler to match the final finish). For backwoods decor, just fill, sand, and paint. Whichever finish you choose, be sure to sand all surfaces as specified by the finish and round off or chamfer edges to suit your pleasure before you apply the finish.

What you add from here depends on your needs, desires, and budget. Here are a few ideas:

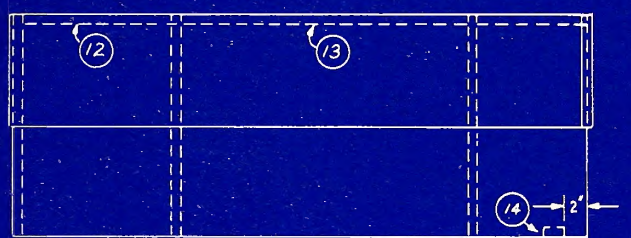
1. Independent lighted switches for each equipment unit with a common cord supplying the whole desk.
2. Dividers in the drawer for disk filing.
3. A vinyl window shade attached to the back of the top shelf for a pullover dust cover.

The resulting computer cupboard should be a compact, portable, yet safe and efficient place to keep your whole system within reach of your fingers and pocketbook. ■

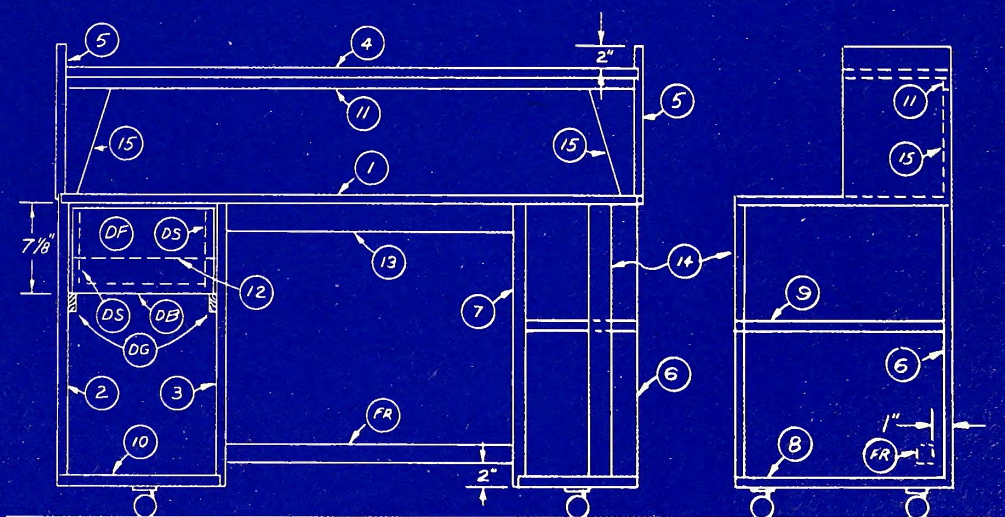
FIGURE 1. PLANS.



PLYWOOD CUTTING LAYOUT



PLAN



FRONT ELEVATION

SIDE ELEVATION

SCALE: 1" = 16"

PROJECT: BUILD A DESK	
FOR: SOFTALK MAGAZINE	
DESIGN BY: ROBERT STANG	
O.K.'ED BY: RLW	DATE: 4-1-83

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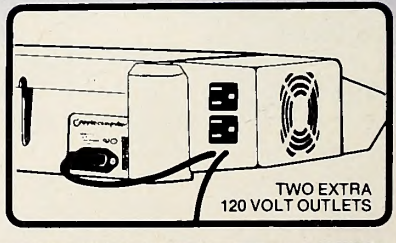
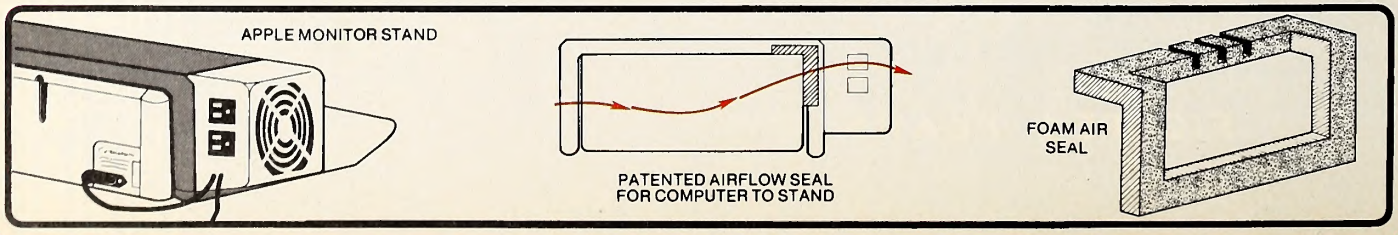




HARD TALK

BY JEFFREY MAZUR

Test Your Knowledge of the Apple's Video Capabilities. True or false?

1. The Apple can display sixteen different colors in the lo-res graphics mode.

2. When two adjacent dots on the hi-res screen are "turned on," the complementary colors from each dot blend in the eye to form a white spot.

3. Since the Apple's video signal is described as "NTSC-compatible," it should be possible to use the Apple with other video devices such as video-tape recorders, processing amplifiers, and so on.

If you answered *true* to any of these questions, then you may not understand the Apple as well as you thought. This month's column marks the beginning of a two-part article that explains why all of the statements just listed are false.

Many articles have been written about the Apple's hi-res graphics capabilities. In particular, because of the machine's rather unorthodox design, the system has a number of quirks that take some study to understand fully. Unfortunately, much of the existing literature is riddled with inaccuracies and gross oversimplifications. Some of these simplifications make the vital information easier to comprehend. After all, no formal understanding of the principles of color video is necessary to create images with the Apple from Basic. However, since this column is devoted to hardware, our discussion will indeed focus on the technical aspects of the Apple's circuitry. To this end, we will even explore the actual components and interconnections responsible for the computer's amazing video capabilities. This may get a little rough for readers unfamiliar with electronics, but the fundamental points should get through.

Hi-res graphics is only one of three video modes within the Apple's capabilities. Since the text and lo-res graphics modes share much of the same circuitry, it is useful to study the three modes together.

Video Basics. It would seem that the best place to start is at the beginning—with a primer on what video is and how it works. In its broadest definition, *video* refers to the presentation of information as a visual image, usually by some electronic means. Nearly all video displays are created through some form of cathode-ray tube (CRT), better known as a picture tube.

A CRT consists of an electron gun assembly (similar to the long, narrow neck shown in figure 1) and a relatively flat viewing area coated with a phosphorescent material. The electron gun contains a small wire filament that is heated by passing a current through it, working much the way an incandescent light bulb does. This heating element gives off electrons, which are attracted toward the face of the tube by a high voltage (generated by circuits within the television set or monitor). This voltage accelerates the electrons to a very high speed.

When the electrons strike the phosphors on the CRT screen, they cause it to glow, creating a small speck of light. The intensity of this spot is controlled by an electrode, which varies the number of electrons leaving the heater area. Finally, the location on the screen where the electrons hit must also be manipulated. This is accomplished by deflecting the beam of electrons either electrostatically or magnetically. In most video displays, the deflection is accomplished by means of two magnetic coils wound around the neck of the cathode-ray tube. These are known as the deflection yoke(s). When the proper electric signals are applied to these yokes, the electron beam can be directed left or right, up or down, at will.

With few exceptions, video displays use a *raster-scan* technique. This means that the electron beam is constantly being swept, in a consistent pattern, across the entire screen. Starting in the upper-left corner of the screen, the beam is made to scan towards the right. Wherever information is to be displayed, the electron (or beam) current is modulated so that it illuminates only the desired areas. When the beam reaches the far right edge of the screen, it is turned completely off (or "blanked") and then rapidly returned to the left side in preparation for scanning the next line. During this time, the beam is also moving toward the bottom of the screen so that the next line will appear slightly below the previous one. When the beam eventually reaches the bottom of the screen, there's a similar blanking period, during which the beam is brought back to its "starting" position.

To standardize the American television industry and to reduce the information needed to transfer a video image, the National Television System Committee (NTSC) was formed in 1953. This committee set down the specifications for a raster-scan video system and further defined the frequencies, levels, and timing of the video signal. Some of these specifications are shown in table 1 on the next page.

It turns out that the electrical signal needed to deflect the electron beam horizontally and vertically in the appropriate fashion is quite easy

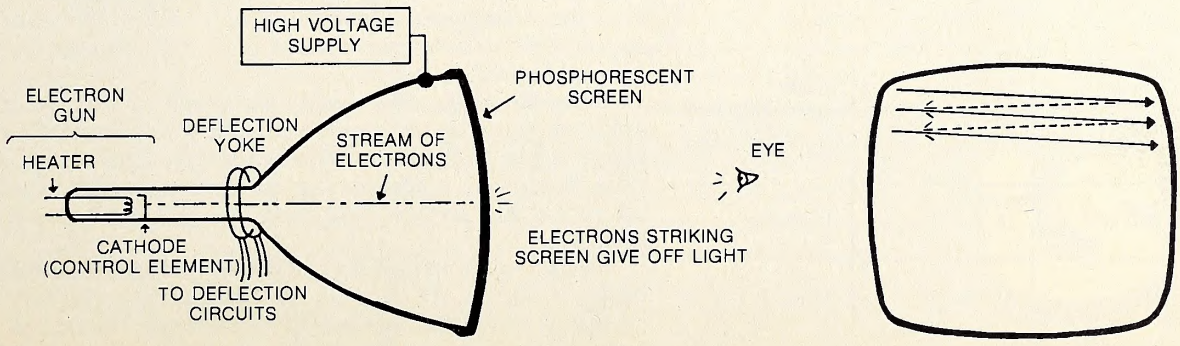
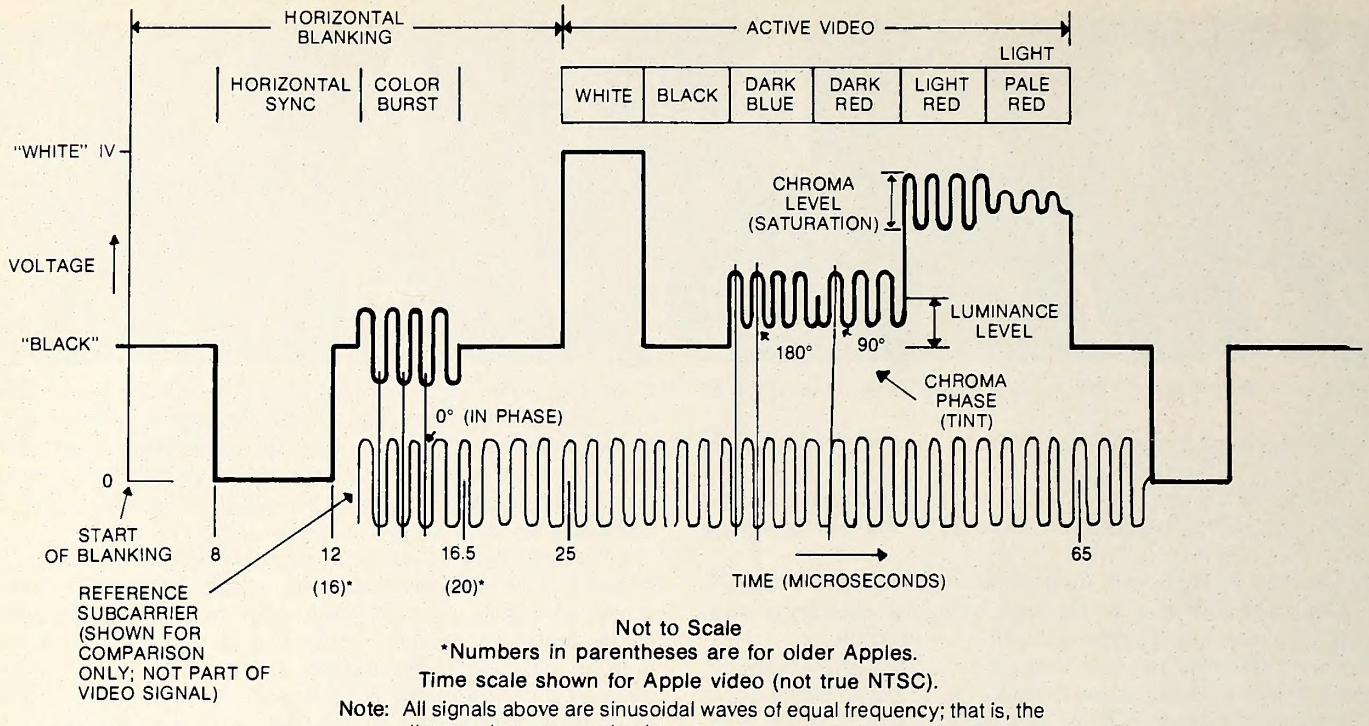


Figure 1. Diagram of a cathode-ray tube.



Not to Scale
*Numbers in parentheses are for older Apples.
Time scale shown for Apple video (not true NTSC).
Note: All signals above are sinusoidal waves of equal frequency; that is, the distance between cycles is constant.

Figure 2. Details of the NTSC video signal.

to obtain. The waveform for this signal is known as a *sawtooth*, (so named for its resemblance to the ragged edge of a saw), and since this signal can be created by an oscillator circuit within the monitor or television, it need not be sent along with the video information from the camera, computer, or other video source.

In a camera, for instance, there might be another sawtooth oscillator that causes an electron beam to scan the face of a video pickup tube. The output of this tube would vary according to the brightness level of the scene at the exact location of the beam. Thus, if the pickup tube's output were connected to the CRT's input, it would "paint" an image on the screen of whatever the camera was focused on.

There is, of course, one hitch. For the system to work properly, the pickup tube's scanning position and the CRT's beam deflection must coincide with and track each other. Although the NTSC specification sets the frequency for these oscillators, some means of getting them "in phase," or *synchronized*, must be provided. This is accomplished by adding some special features, (known as *horizontal* and *vertical sync*) to the video signal. See figure 2.

The preceding holds true for both black-and-white and color transmission. When color television was first considered by the NTSC, it was decided that some means of adding the color information, while remaining compatible with black-and-white standards, needed to be found. The NTSC's solution was to add a high-frequency subcarrier that could be both amplitude and frequency modulated (actually phase modulated) to carry the *hue* (tint) and *saturation* (color intensity) information. This subcarrier would ride along the video waveform so that to a black-and-white receiver it would pass unnoticed. With the proper circuitry in a color set, however, this extra signal could be reconstituted into the proper red, green, and blue signals needed to drive a typical color CRT.

As was the case with the horizontal and vertical sync signals, another "color sync" signal needed to be added so that the receiver's color oscillator could be synchronized to that of the original video source. This additional signal is called the *color burst* because it consists of a burst of approximately nine cycles of the originating subcarrier reference oscillator.

To summarize the NTSC color video system, let's consider its three separate parts. Both the sending and receiving devices contain three oscillators: a vertical one at a rate of 29.97 Hz, a horizontal one at 15,735 Hz, and a subcarrier riding on 3.579545 MHz. Through these oscillators, the sending device creates a video signal with the following properties:

1. There is a negative-going pulse to signify the start of each horizontal line and a similar signal to signify the beginning of each vertical field.

2. The color reference subcarrier is modulated by signals representing the red, green, and blue content of each portion of the active video field. These signals in turn create an AM and FM signal that rides along with the brightness or *luminance* signal. In actuality, the phase of this subcarrier represents the hue, and the amplitude of the subcarrier corresponds to the saturation of the color. This subcarrier signal is referred to as the *chrominance* subcarrier, or simply *chroma*. The center point around which the subcarrier oscillates is thus the luminance level (refer again to figure 2).

Inside the Apple. Now that we understand the basic principle by which television and video monitors function, we can begin to look at the circuits within the Apple that generate the video signal. From the previous discussion, it is apparent that this signal must contain horizontal and vertical sync portions, color burst, chroma information, and video luminance.

Figure 3 represents the heart of the Apple and, in particular, its video display capabilities. We start with the master oscillator that feeds a timing chain for all of the computer's functions. Here's where the cpu clock is established, memory timing signals are created, and video generation begins.

Frequency	Monochrome Television	Color Television	Apple II
Subcarrier	—	3.579545 MHz	3.579545 MHz
Horizontal	15.750 kHz	15.734 kHz	15.700 kHz
Vertical Field	60 Hz	59.94 Hz	59.92 Hz

Table 1. Video timing constants.

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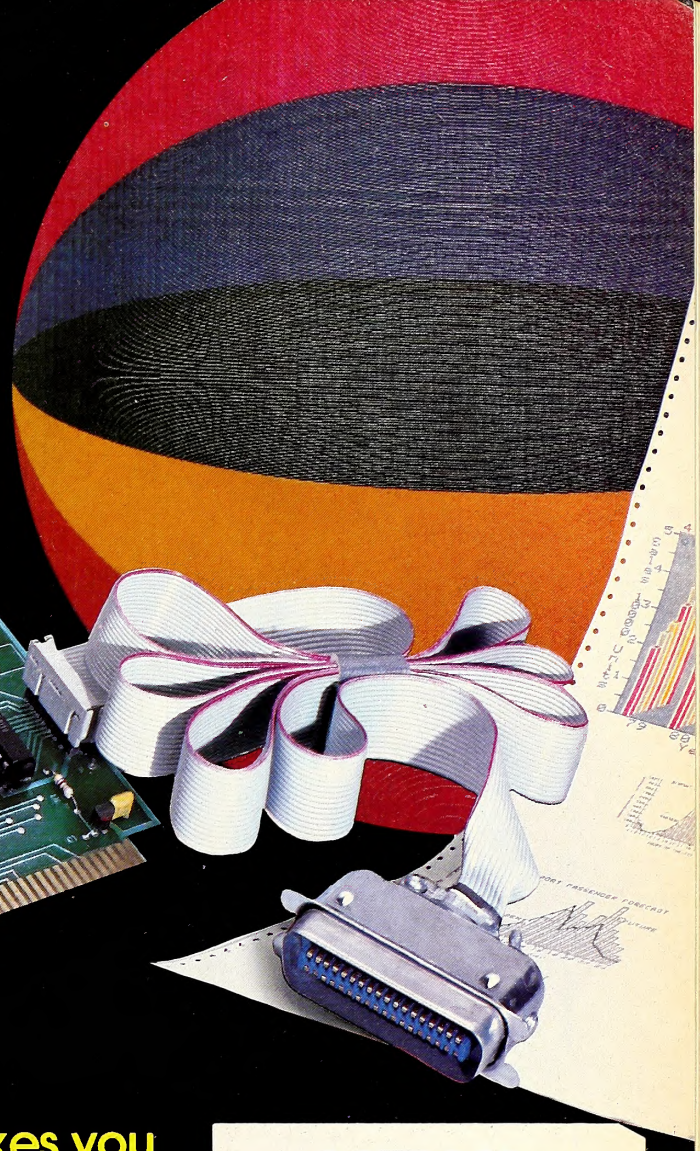

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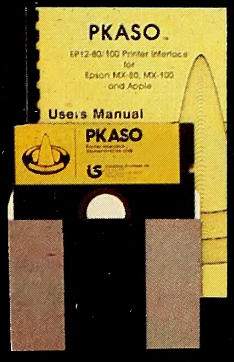

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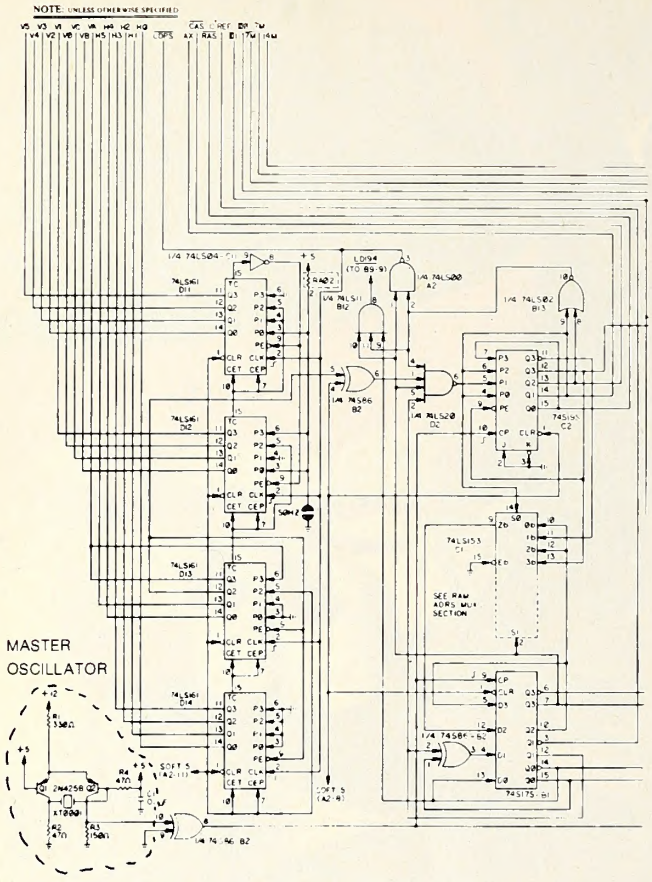


Figure 3. Apple timing circuits.

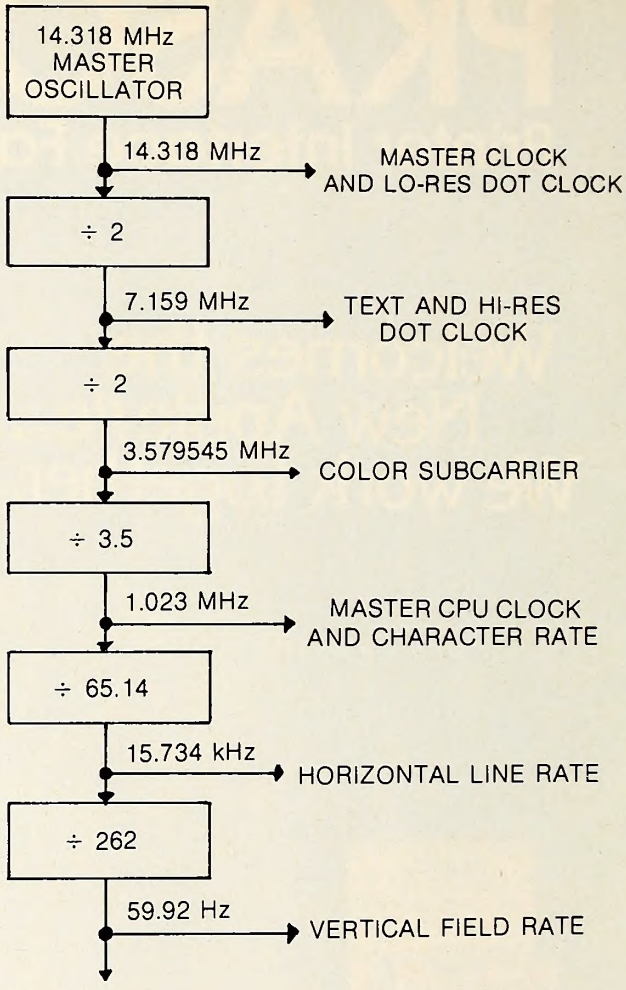


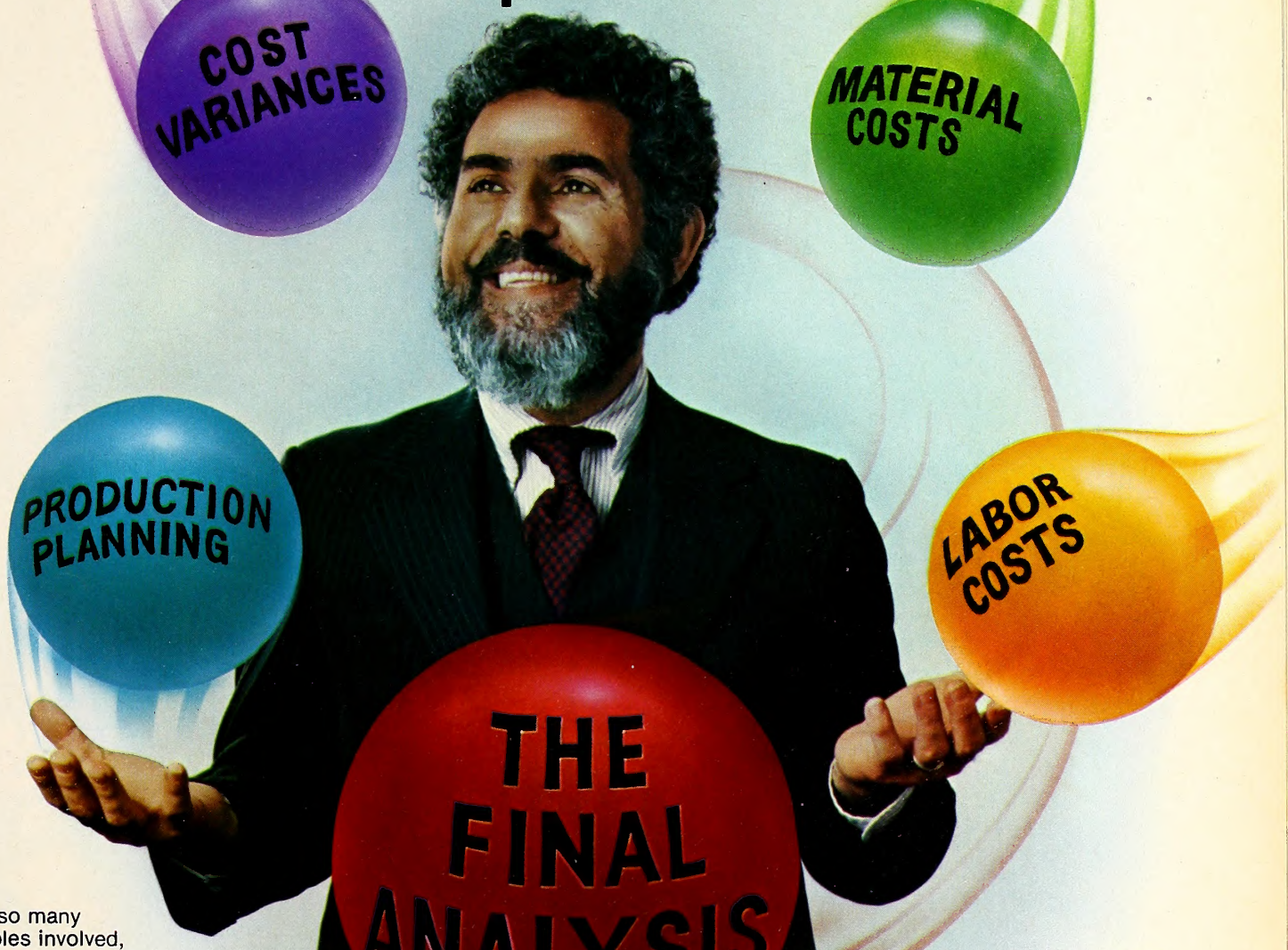
Figure 4. Video timing chain.

The most important devices here, as far as video is concerned, are the counters D11 through D14. These integrated circuits divide the 14.3 MHz master oscillator into signals representing the horizontal and vertical positions of the raster scan signal being created by the Apple. The signals labeled H0 to H5, for example, represent in binary the current horizontal position or cell being displayed. The next signals—VA, VB, and VC—are used to specify one of the eight horizontal scan lines within a row of characters. The rest of the signals, V0 to V5, signify which row (or blanking) is currently active. Figure 4 outlines the major functions of this circuit.

The Apple simplifies things a great deal by creating a *digital* video signal—that is, the level of the signal is either high or low, appearing on the screen as either a bright or dark spot respectively. Each line of the video display is divided into two segments—the *blanking plus sync portion* and the *active video area.* The latter zone is where the text or graphics data is actually presented. This area is further divided into 560 cells. Each cell can be turned on or off according to bit patterns stored in the Apple's memory. The exact representation depends on which of the three modes the Apple is currently in: text, lo-res graphics, or hi-res graphics.

To get color, Apple's designers chose its clock rate to be a multiple of the 3.58 MHz subcarrier frequency. This meant that the individual dot cells could be set up to produce an appropriate chroma signal. In fact, there really is no separate luminance or chroma signal generated by the Apple. When the digital output from the video circuits alternates on and off at the 3.58 rate, a color pixel (picture element) is created. When the ratio of on-to-off time is uneven (as it can be in the lo-res mode), the brightness level of a pixel can be controlled. If the on time exceeds (or is less than) one 3.58 MHz period, the color circuits ignore it and that pixel appears as black, white, or gray, depending again on the relative "on time" for that pixel.

In Cost Accounting . . . You Can't Afford To Drop The Ball



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BLUE = TEXT
RED = LO-RES

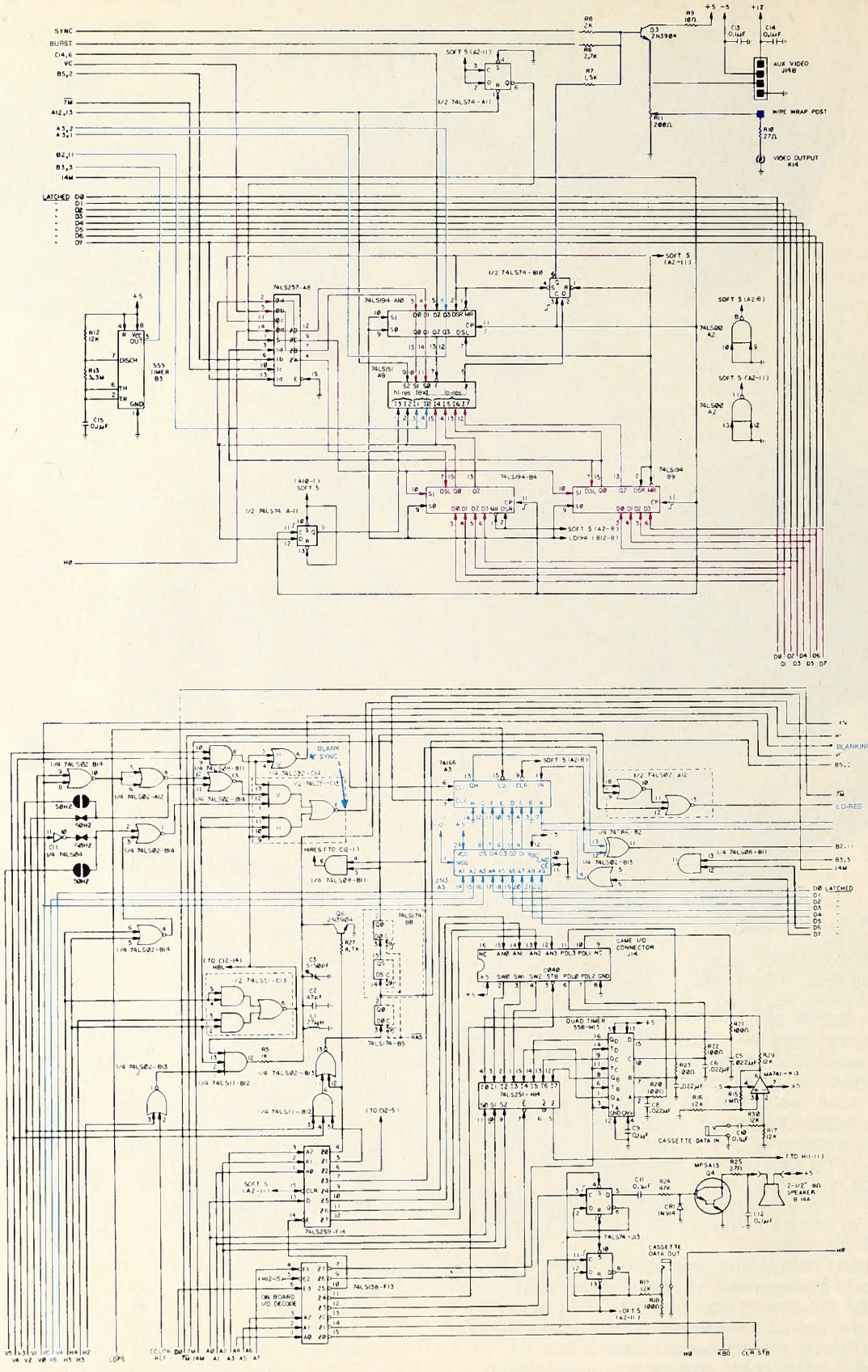
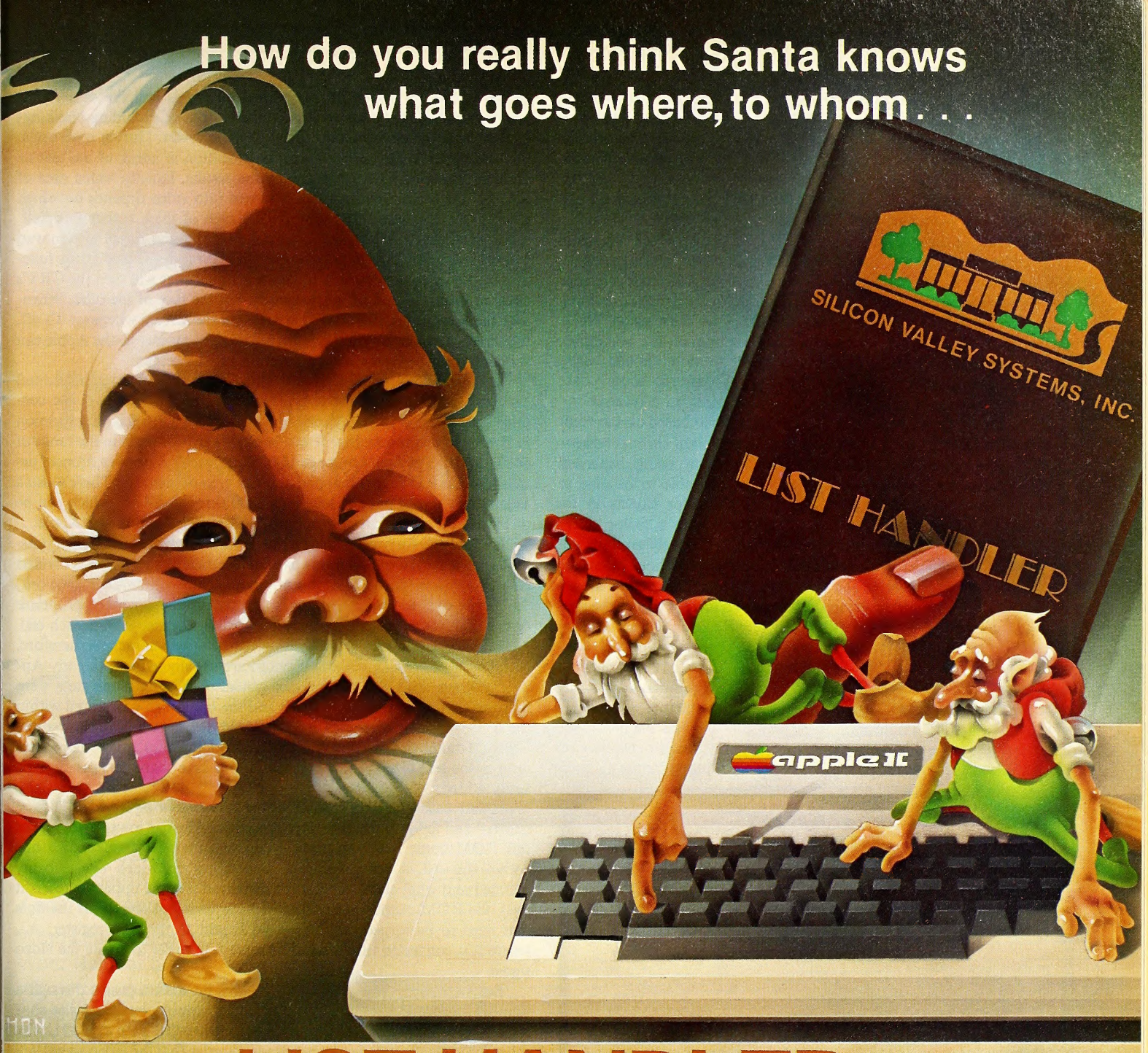


Figure 5. Video generation circuits.

Before discussing each of the Apple's video modes in detail, let's examine those circuits that are common to all three (refer to the schematic in figure 5). Working backward from the video output connector through the video level control, R11, we come to the output of a buffer amplifier, Q3. The purpose of this emitter follower stage is to isolate the video output from the summing point of R6, R7, and R8. Each of these resistors supplies one portion of the composite video waveform; their values were chosen in order to give the appropriate levels for sync, burst, and video.

Taking R8 first, we can follow it back to C13, an AND-OR-INVERT package that derives horizontal sync in the upper AND gate and vertical sync in the lower AND gate. These two signals are then ORed

How do you really think Santa knows what goes where, to whom . . .



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and inverted to form the composite sync signal. (The real hacker won't find it too difficult to trace back further for a closer look at what provides the two sync signals, but this analysis would only complicate our discussion here. If you do trace back any further, however, note that the circuits shown in these figures are for Revision 7 Apples and up. Earlier motherboards had a slightly different circuit that actually caused sync to be too wide and burst to appear too late.)

Returning to the summing point and to R6, we can trace this signal back to the output of B12, pin 12 (B12-12), and the LC ringing network of C3, C2, and L1. The inputs to B12 consist of the 3.58 color reference signal and a gating circuit at C13 that turns on B12 during the color burst period. The output of this gate is thus a square wave burst signal. Working together, R5 and the LC network turn this signal into something closer to a sine wave, which is more acceptable to monitors and television sets. The adjustable trimmer capacitor C3 affords some phase adjustment and thus acts much like the tint control on a receiver.

Since the Apple creates digital-square-wave video based on the color reference frequency, there will obviously be quite a bit of chroma noise—spurious 3.58 signals even when noncolor images are being displayed. When viewing text, for example, it would be desirable to be able to eliminate these color fringes by shutting off the color circuits in the monitor. All Revision 1 and above motherboards have a "color killer" circuit composed of Q6 and R27. The transistor effectively grounds out the burst signal whenever the text mode is enabled. Without burst, the Apple's video will appear to the television set or monitor as a monochrome signal, and it will revert to that mode. To further reduce the possibility of color noise in very sensitive sets, the Revision 7 modifications include a gate at A14-1 to disconnect the color reference signal completely in the text mode.

So far we have a composite sync signal with color burst added only when in a graphics mode. The final element is the picture video itself, which comes into the summer via R7. This signal is by far the most complicated of the three and comes from a variety of sources, depending on the active video mode of the Apple. The only thing common to these modes is that the video display/refresh timing is still the same. This means that during the active video portion (that is, excluding blanking) of each line, the cpu executes forty machine cycles. During each cycle, the video generation circuits access one location in either of the text or graphics pages of RAM and display the results. Exactly which area of RAM is used and how that data is turned into video depends on which video mode is in use. Let's now discuss each of these modes in detail.

Text Mode. As we said earlier, the color burst signal is removed from the video signal when the Apple's in text mode. Thus the only function of the video generator is to create a signal that will turn the CRT's electron beam on and off as it scans across the face of the tube. Whenever the beam is on, it creates light areas on the screen; whenever it's off, the screen is black. By turning it on at the right moments, the Apple can produce some recognizable information on the screen.

To accomplish this, the Apple's video circuits divide each horizontal line into a finite number of pixels. We already know that each line contains forty cells, where each cell corresponds to a given memory location in RAM. In text mode these RAM locations are normally in the range of $400–$7FF. The figure on page 16 of the *Apple II Reference Manual* details how the text page is mapped into this area of memory. There's also a second text screen page at locations $800 through $BFF, which can be displayed by setting an appropriate "soft switch" within the Apple.

Each of the forty cells on one line is further divided into seven dots; the result is a total of 280 pixels per line. Vertically, the screen is divided into twenty-four rows of eight scan lines each. Within this framework, the Apple tries to create text characters by turning on the appropriate dots within the seven-dot-by-eight-line matrix associated with each cell. Actually, there must be some blank space between characters; therefore, two dots and one line within every cell are usually left off. In early Apples with the 2513 ROM character generator IC, the blank dots were hardwired into the shift register A3 and the blank line was stored within the ROM. In later machines, a 2316 ROM SPCL or a 2716 compatible EPROM takes the place of the 2513. This allows for much more freedom in the text display. For example, lower-case characters can now be easily added.

In any case, the data read from the screen area of RAM is latched (stored) and fed into the character generator, A5. The lower three bits of this ROM come from the vertical counters that determine which line within the cell is being scanned. Depending on which line is being scanned and what character is to be displayed (via the upper six to eight bits), the ROM outputs a five or seven bit *word* that represents the dots that need to be turned on. This word is sent to the shift register, A3, where it is converted into a serial bit stream in order to create the video signal.

Before leaving the Apple, however, this bit stream passes through a number of important channels. First, after coming out from the shift register at A3-13, it passes through an exclusive-OR gate at B2-11. The other input to this gate is normally high in order that the video signal will pass through unchanged. However, when the high-order bit of the video RAM data is a 1, this causes B13-4 to place a low at B2-12 (remember that A10 is just a latch and that its D inputs just pass through to the corresponding Q outputs). This causes the video data to be inverted, and therefore the characters show up on the screen in inverse (black-on-white). Likewise, whenever bit 7 is low and bit 6 high, the output of the flash oscillator, B3, is sent to the exclusive-OR gate. Note that the Revision 7 boards have extra provisions to control these signals from the ROM character generator IC.

After leaving B2, the video signal passes through a selector switch at A9. The function of this IC is to select either the character generator or the graphics shift registers B4 and B9 as the source of video. Because of the signals from A12 and A8, the text video passes through A9 and finally into B10-2 where it is clocked once more at the 14 MHz master clock rate. The output finally gets combined with sync through R7. This signal then goes out to the monitor, where it turns on the appropriate dots across the screen. Thus the first line of one character has been created.

Immediately after sending out these seven dots (or undots), the data latch grabs the next byte to be displayed. This again is fed into the ROM and shift register whereby the first line of the next character is displayed. When forty consecutive bytes of memory have been read, an entire ras-

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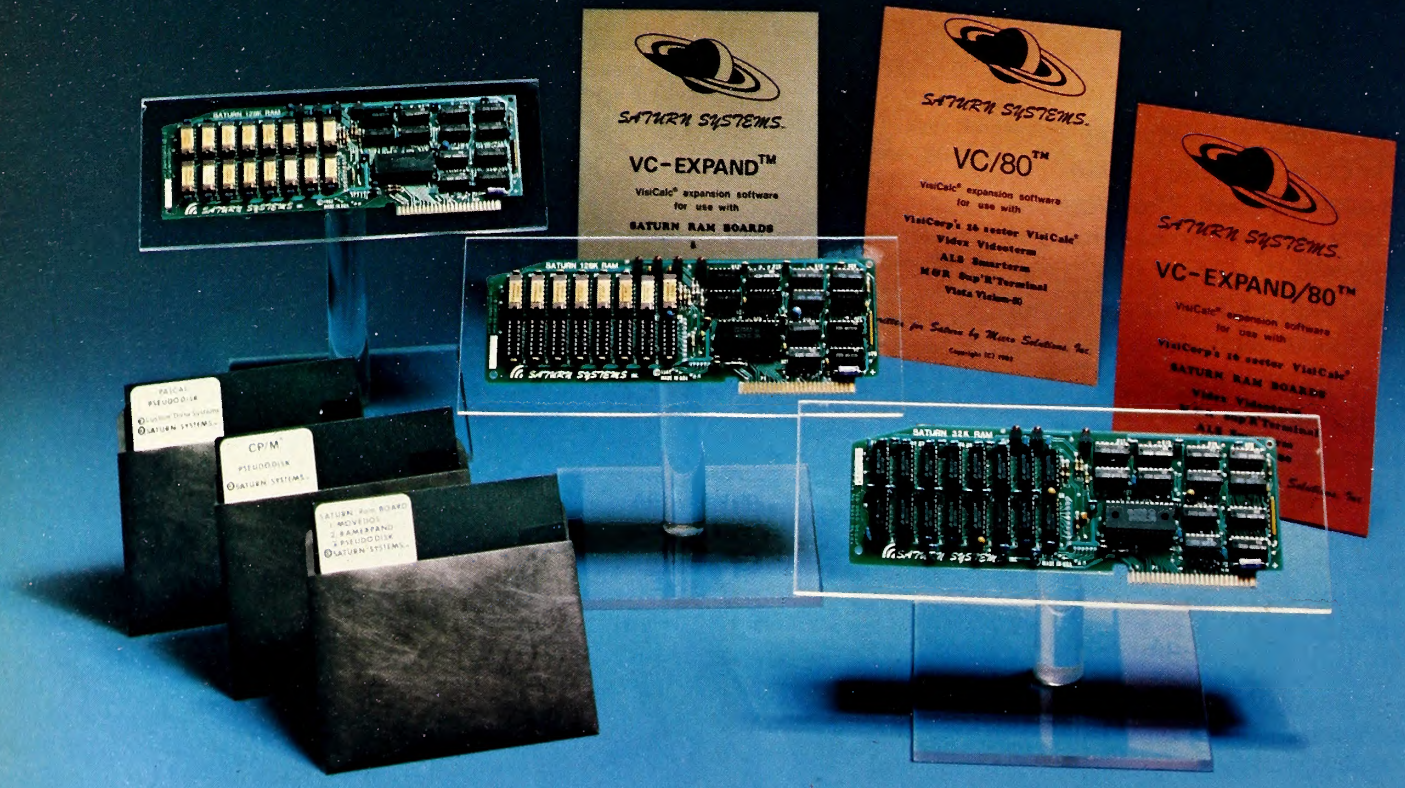

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ter line has been scanned and the beginnings of forty characters have been drawn on the screen. After retrace and blanking, the beam is ready to create the next line. The same memory locations are accessed again, only now the vertical line counter has incremented by one. Therefore the addresses presented to the character generator ROM have been changed so that the necessary dots on this next line will be displayed.

After seven passes (eight if you include the blank line), the complete dot patterns for all forty characters on the line have been presented. Now the vertical *row* counters advance so that a new area of RAM is used and the process continues, displaying another forty characters in the same way. After twenty-four rows and vertical blanking, the whole thing starts over again.

This technique, known as a *memory mapped display,* has several advantages. To begin with, it provides a quick and easy way to create text displays—simply put the appropriate data into the video display RAM. This can be accomplished by means of ordinary machine language instructions, including the powerful extended addressing modes. Changing one character in the display requires only one memory access. Since cpu activity and video generation are interleaved, there are no memory conflicts and the video display contains no "glitches." And lastly, a memory mapped display provides a convenient way to refresh the dynamic memory chips used in the Apple.

Lo-Res Graphics. When the lo-res graphics mode is being switched to, the most significant change takes place at A9. This IC now takes the output of either B4 or B9 as the source of video information. Which of these is chosen is determined by the VC signal that makes its way to A9-10. This signal divides each of the forty cells into two parts: an upper part during the first four scan lines and a lower part during the remaining four. (Since this has the effect of creating forty-eight rows out of the normal twenty-four, it explains the forty-by-forty-eight resolution of the lo-res-graphics screen.) Furthermore, we can see that the information for the upper half of each cell comes from B4, while the information for the lower half comes from B9.

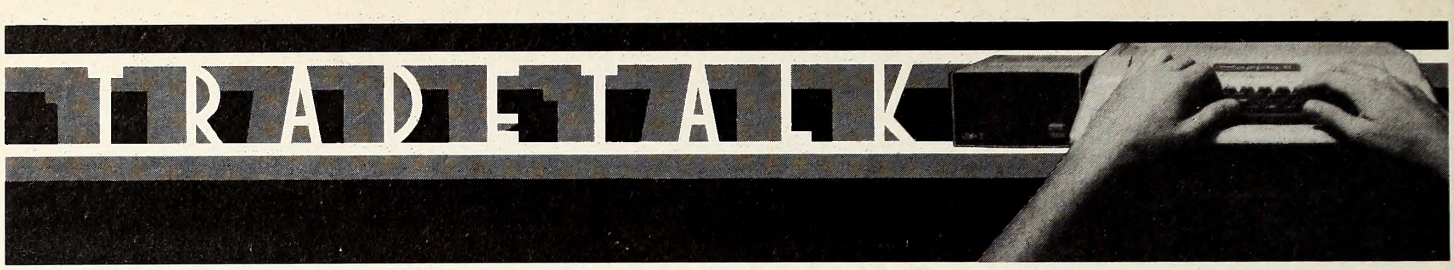
These shift registers get loaded at the beginning of each cell by the LD194 signal from B12-8. The lowest four bits of the RAM data get loaded into B4, while the higher bits go to B9. If you follow the shift register control lines around, you'll find that they enable the register to shift the data around continuously in a loop at the full 14 MHz clock rate. Note that the cpu clock cycles, and thus the LD194 pulse, occur once every fourteen master clock cycles. Thus the four bits in the shift register will be read out three and a half times for each of the four lines of a given lo-res color pixel. It is the exact bit content of these registers that determines the color to be displayed.

Because of the chosen clock rate, all but three patterns will contain a 3.58 MHz component. Of course, all bits off results in black and all bits on makes white. Alternating bits causes a 7 MHz signal to be generated—this creates a line of "half-size" dots on a high-resolution monochrome monitor and does not carry any color information. The effect is a luminance level halfway between black and white. Since there are two possible patterns of alternating bits (0101 [decimal 5] and 1010 [decimal 10]), there are two values that give a gray color. (Therefore the lo-res mode has only fifteen distinct color possibilities—how did you do on question number one?) All other possible bit combinations yield varying hues and luminance levels. Basically the transitions from high to low determine the phase of the color signal and thus its hue. The total number of high bits will set the luminance level.

There's one problem with this technique. Since each cell clocks out its bit stream three and a half times, the start of the next cell will be off by one-half color cycle. This could be compensated for in software by shifting the data in every other byte of memory for a solid background but that would be messy. Instead, the H0 signal, which alternates during every other cell, is used to select either the Q0 or Q2 output from the shift registers, depending upon screen position. This latter output is 180 degrees out of phase and thus provides the one-half-cycle compensation as far as the color circuits are concerned.

Next month we'll answer questions two and three, look closely at the hi-res-graphics display, and discuss RGB video boards and various monochrome and color monitors. ■

TRADETALK



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☐ *Ultima* author **Richard Garriott,** a.k.a. Lord British, has formed **Origin Systems,** a new software company. Garriott's brother, **Robert,** and father, astronaut **Owen K. Garriott,** are partners in the venture, along with programmers **Charles "Chuckles" Beuche, Keith Zabalaoui,** and **Ken Arnold.** Origin's first release will be *Exodus: Ultima III-D IV-P* (three-dimensional, four-player), which will hit the stores July 1, followed by five more programs throughout the month.

☐ **Mike Livesay,** programmer of *Miner 2049er* for the Apple, has formed **Livesay Computer Games** (Canoga Park, CA) and inked an exclusive five-year contract with **Micro Fun** (Highland Park, IL) to develop entertainment software for the Apple and other machines. Programmer **Mike Mooney,** one of the new company's first employees, will be writing Apple games for LCG under the contract.

☐ **Bill Atkinson** and **Richard Page** have been named "Apple Fellows," the highest award for technical achievement bestowed by **Apple Computer** (Cupertino, CA). Atkinson laid the groundwork for the internal software structure or user interface of the Lisa personal computer and created the graphics routines and the "pull-down menu." Page authored the software development tools used in writing application programs for the Lisa and has refined them for use by independent software companies in developing additional applications. The year-long fellowships allow Page and Atkinson to conduct independent research projects in state-of-the-art technology related to the personal-computer industry. The only other engineers to have received the honor are **Stephen Wozniak,** cofounder of the company and designer of the Apple I and Apple II, and **Rod Holt,** who designed the power supply used in the Apple II and Apple III.

☐ Not to be confused with the previous transportation innovation of the same name, the SST is a customized Ford Econoline van designed to shorten sales, support, and training time for Apple dealers. "The demand for hands-on experience at corporations, schools, hotels, and other out-of-store locations is urgent," says special dealer projects manager **Ron Rohner.** "Until now sales and training demonstrations in the field were at best difficult for our dealers. With the SSTs, our dealers can conveniently create more sales opportunities, conduct revenue-generating training courses, and even service their customers from the mobile unit." The vans are available from Apple for a monthly leasing fee and come with audio-visual screens, workbenches, and lockable steel racks and tables for up to twelve Apple IIe or Apple III computers, monitors, and disk drives.

☐ **BPI** (Austin, TX) has announced that its accounting software will be available for the Lisa computer. Says **Tom McConnell,** Apple's small-business-products manager, "BPI's accounting software complements Lisa's family of integrated business tools, thus positioning Lisa as a revolutionary personal computer for small business as well as the office."

☐ **Michael C. Katz,** former vice president of marketing and corporate communications at Coleco, has been named president and chief executive officer of **Epyx/Automated Simulations** (Sunnyvale, CA). He will be responsible for the marketing and distribution of Epyx computer games, while former president **Jim Connelley,** now chairman of the board, will concentrate on research and development.

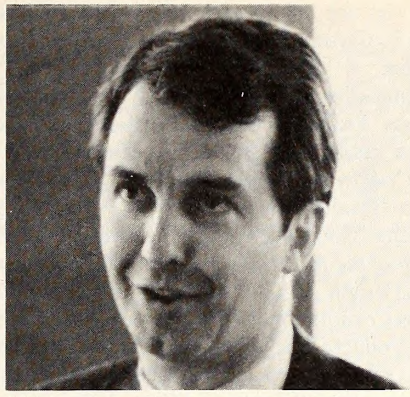
☐ The Munich District Court of Germany has found **Basis Software** and **Basis Microcomputer**—makers of the "Apple-compatible" Basis 108—and two officers of both companies guilty of copying the *VisiCalc* software program on floppy disks and distributing the copies without authorization of **VisiCorp** (San Jose, CA), thus violating West German copyright laws. "The decision is important because it establishes that computer software, such as the *VisiCalc* program, can be copyrighted under West German law," says VisiCorp general counsel **Valarie McInroy.** "The court's decision provides the industry with strong ammunition for fighting software piracy." The West German companies were also enjoined from reproducing the *VisiCalc* manual and other copy-

An Apple SST, loaded for bear and with space for dealer logo and address.

righted reference material. One of the defendants had registered the VisiCalc trademark as its own with the West German Patent Office and was ordered to consent to the cancellation of the registration. The two companies are liable for damages in an amount to be determined by an accounting of their sales and financial records, in which they will be required to reveal the identities of their customers.

☐ **Sierra On-Line** (Coarsegold, CA) has entered the educational software market, acquiring the rights to all the present and future educational software produced by **Sunnyside Soft** (Fresno, CA). **Al** and **Margaret Lowe** and **Mike** and **Rae Lynn MacChesney** of Sunnyside approached them with the proposition, saying they did not wish to give up any more of their time as professional educators to the business of software marketing. All future Sunnyside programs will be released through Sierra On-Line, along with Sierra's own educational products, all overseen by project manager **Nancy Anderton,** former editor for several major textbook-publishing companies.

☐ **Soft-letter** (Cambridge, MA), a newsletter for the software publishing industry, is now available at a biweekly charter subscription price of $135 per year. According to publisher **Jeffrey Tarter,** the newsletter will cover "significant trends and strategies" in software marketing, management, and product development, as well as industry news and an annual ranking of the one hundred largest software publishers. "Software publishing is still a very small industry but it's growing fast," says Tarter. "It's important for publishers to keep up-to-date on innovations and trends, and that's what we're watching."



Axlon executive vice president Fred Heidenthal.

☐ **Axlon** (San Jose, CA), maker of the Ramdisk 320 Memory System, has named **Fred Heidenthal** to the new position of executive vice president. He reports directly to president **John Vurich** and is responsible for all financial, administrative, and manufacturing functions. "With a major expansion ahead of us, we need the talents of an experienced financial expert," says Vurich, "and Fred Heidenthal's track record shows that he has that kind of experience." Heidenthal was most recently executive vice president of finance for Televideo Systems.

☐ **Stan Goldberg,** president of **Micro Lab** (Highland Park, IL), has announced the appointment of **Evelyn Burg** to the position of vice president of sales. As part of the company's expansion of its educational programs, **Myrna Helfand** has been named director of the Micro Lab Learning Center, its new educational division. Interested educators may submit educational programs to Micro Lab, 2310 Skokie Valley Road, Highland Park, IL 60035.

☐ **Softwaire Centres International** (Los Angeles, CA) now has twenty-two franchised computer stores open or under construction, with a projected total of more than one hundred locations by June. One store opened every weekend throughout February and March, and new franchises are being granted each week. President **Glenn Johnson** attributes the franchise program's growth rate both to skyrocketing software sales and a series of free information seminars used to spread news of the company's franchise opportunities.

☐ Meanwhile, **Computerland** (Hayward, CA) is opening a new store somewhere in the world every day, according to president **Ed Faber.** The 400th store—and the first in Hong Kong for the franchise network—opened January 26. The franchise network now has stores in twenty-four countries and plans to open seventy-five new international outlets and three hundred additional domestic ones by the end of the year.

Computerland has appointed former director of accounting **Gary Gapp** vice president of finance and legal. He is responsible for corporate accounting and data processing functions. Former corporate counsel **Deborah Dresser** is

now vice president of administration and planning, responsible for long-range strategic planning. **Mike Walter,** an editor of *Litigation Magazine*, is now Computerland's general counsel.

☐ **Software Distributors** (Culver City, CA) is once again seeking larger quarters. "Our monthly sales surpassed the million-dollar mark in the third quarter of 1982," says executive vice president **Linda Johnson,** citing a current monthly growth rate of 23 percent. "We're accommodating this growth by increasing our sales, technical support, and warehouse staff. A new and larger office/warehouse facility is imminent." The company plans to remain in southern California and is looking for something in the thirty-seven-thousand-square-foot range in Carson, Orange County, or West Los Angeles.

☐ **Spinnaker** (Cambridge, MA) has signed **Thomas Fenimore French Snyder** and **Jock Gill** to create programs for its line of educational software. Snyder, president of Tom Snyder Productions (formerly the Computer Learning Connection), is the author of *In Search of the Most Amazing Thing* and *Snooper Troops I* and *II*. Gill, president of Computer Access Corporation, was a member of the team that produced the company's *Delta Drawing* game, scheduled to be followed this year by other programs in the CAC learning series. Other programmers who have recently signed with the company are **Dale Disharoon,** who is preparing *Hey Diddle Diddle* for release, and **Richard Orban,** author of *Gran Prix* and *Three Mile Island*, who is writing *Close Earth Orbit.*

☐ **Systems Plus** (Palo Alto, CA), international marketer of microcomputer business-applications software, has renewed its contract with **Software Dimensions** (Citrus Heights, CA) to continue selling *Accounting Plus* and all other Software Dimensions products. "We signed a contract that reflects our sales to date and the rise expected for 1983," says Systems Plus president **Rick Mehrlich.** Systems Plus began marketing the five-module *Accounting Plus Super/e* for the Apple IIe in March. "Systems Plus has worked with *Accounting Plus* for nearly three years and has come to understand the marketing of business-applications software that clearly positions it as a leader in the field," says Software Dimensions president **Ron Green.** "They continue to develop new sales aids and support techniques, which have consequently increased the attraction of the product to dealers while diminishing the need for support."

Green maintains that the product became a little too attractive to **Megaware Systems** (Laguna Hills, CA), charging that the company's *Micromate III* is an exact copy of *Accounting Plus*. "They pirated it," says Green. "They copied the entire program and documentation." Software Dimensions is seeking an injunction against further production of *Micromate III*, the impounding of all present copies, $1.5 million in punitive damages, more than $150,000 in statutory damages, and reimbursement to the company of all profits made from the sale of *Micromate III*.

☐ **Joseph S. Edwards,** president of **Eastern Software Distributors** (Baltimore, MD), has announced the appointment of two new management positions. **Thomas A. Jackson,** previously marketing director, is now general manager. He will be responsible for daily management of operations and sales activity. The new company controller is **John W. Livermore III,** coming from a local independent accounting service where he was active in financial management and analysis for corporate clients.

☐ **Ultrasoft** has moved. Its new address is 12503 Bellevue Redmond Road, Suite 200, Bellevue, WA 98005. Telephone: (206) 449-1161.

☐ **Terrapin** has moved. Its new address is 380 Green Street, Cambridge, MA 02139. Telephone: (617) 492-8816.

☐ **High Technology Software Products** has a new address: Box 60406, 1611 N.W. Twenty-third Street, Oklahoma City, OK 73106. Telephone: (405) 524-4359.

☐ **Osborne/McGraw-Hill,** the microcomputer-book-publishing division of McGraw-Hill, has moved. Its new address is 2600 Tenth Street, Berkeley, CA 94710. The company has also named **Mark Haas** technical director, making him responsible for managing the staff of technical editors and providing technical support for the division. Haas was previously managing editor of *Byte*, joining McGraw-Hill in 1976 as an editing supervisor. ■

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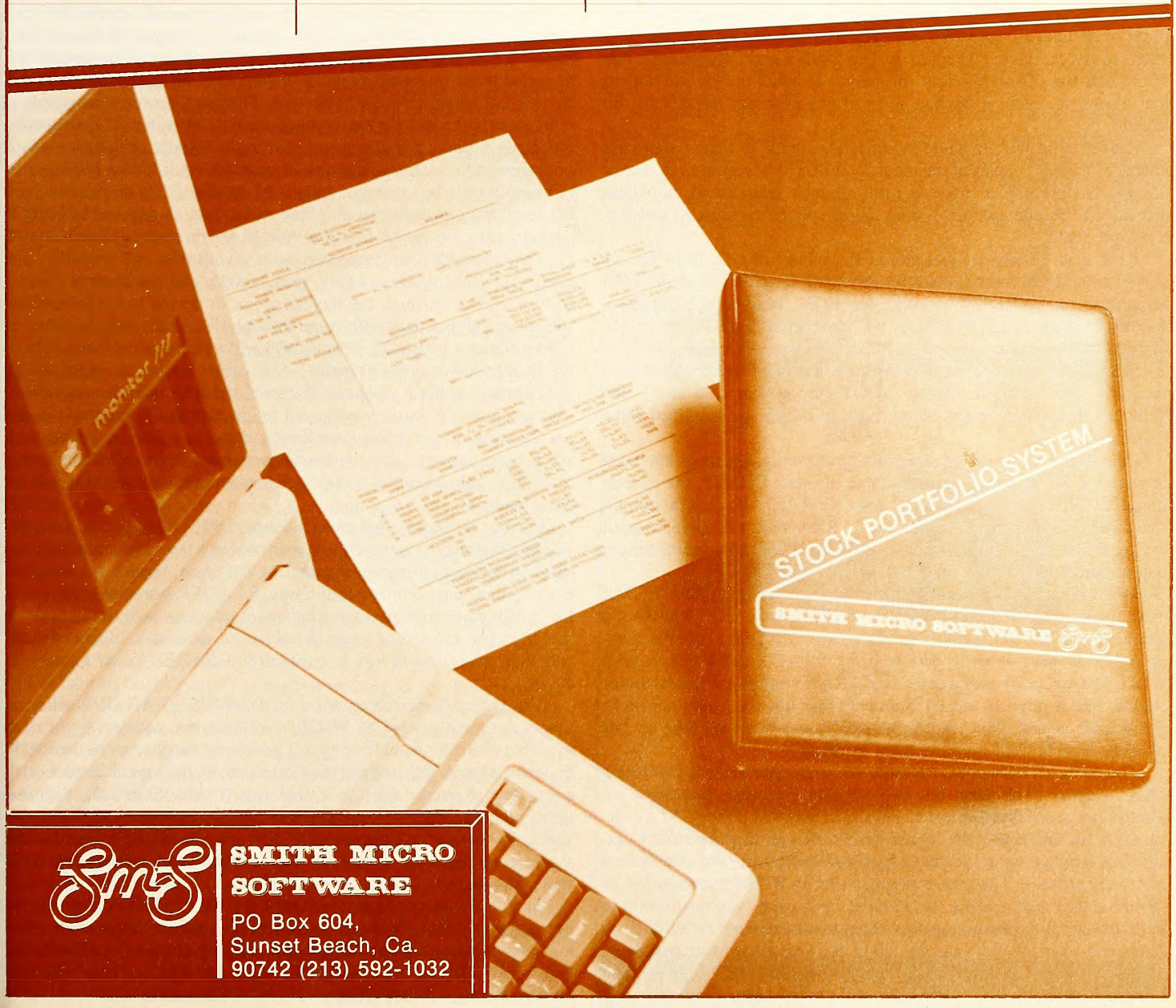

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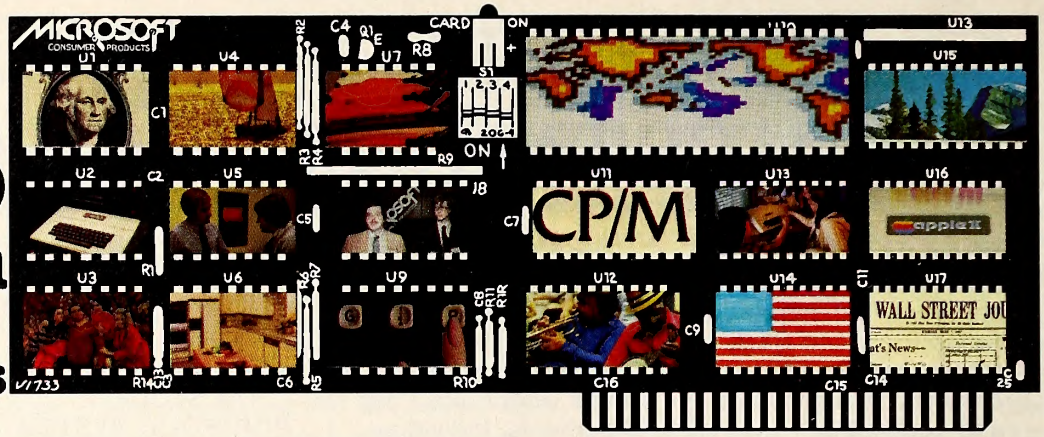
by Greg Tibbetts



When we left off last month's Symposium, we had just finished examining the CONOUT subroutines and had therefore also completed our discussion of the BIOS logical Console device. This month, then, we'll begin our discussion of the logical Reader device, the next of the four devices we've categorized as character I/O.

Once again, we won't be presenting actual source code during this discussion, but since we will be mentioning specific addresses and the purposes of routines at those addresses, you'll be able to start making alterations to the character I/O routines. This kind of experimentation is one of the best ways to learn about the subject at hand, but do use caution and always maintain a backup copy of any disk you modify in this fashion.

Readers who wish to share modifications made to their systems are invited to forward copies of the mods to SoftCard Symposium in care of *Softalk*. No promise is made to print all such submissions, but those printed will include authors' names unless specific requests to the contrary are made.

As a quick review, let's reexamine the subject of I/O. Early on, we said that the BIOS is responsible for providing seventeen functions (corresponding to seventeen routines in the BIOS), which can be accessed, via calls to the routines, by BDOS. We broke these functions down into three categories: system (re)initialization, character I/O, and disk I/O.

System initialization, the first category, has two functions (and consequently two routines): namely BOOT (the system cold start) and WBOOT (the system warm start), both of which we examined some months ago.

Character I/O, which we're examining currently, has seven functions or routines. So far we've discussed three of these: CONST, the console status; CONIN, the console input; and CONOUT, the console output. The other four character I/O routines are READER, the alternate input device; PUNCH, the alternate output device; LIST, the system printer output; and LISTST, the printer status.

Disk I/O, which we'll examine later on, has eight functions: HOME (seek track zero), SELDSK (select a specific drive), SETTRK (seek a specific track), SETSEC (seek a specific sector), SETDMA (select a memory range to read or write data to disk), READ (read a disk sector), WRITE (write a disk sector), and SECTRAN (translate a logical sector number into a physical sector). Some of these functions may not make much sense at this point; they'll become clearer when we take up this category later on and examine them in detail.

The seven character I/O routines are organized around something called a *device*. This term has two possible meanings, depending on whether we're speaking of logical devices or physical devices. As we discussed in an earlier column, logical devices, though they represent a specific function that would require a hardware peripheral, are independent of actual hardware. The term is simply a way for BDOS to categorize the attributes that such a device would have. In this way, you might want to think of logical devices as types or categories of devices, rather than as something physical. For example, all of the actual hardware peripheral devices we discussed during the columns on the CONST, CONIN, and CONOUT routines are in the "Console device" category.

In speaking of the logical Reader device (a category of many physical devices, remember), Digital Research defines it as "the principal tape reading device, such as a simple optical reader or teletype." The fact that few of us use teletypes or other tape or card readers makes little difference; a logical device (or category) of this type can include any actual peripheral device that can send character data as input, one character at a time on request.

This category also can include the input portion of a device that has the capability to do both input and output of such data in that format. Such a peripheral may sound suspiciously like the physical devices we discussed when we talked about the logical console, and indeed there are devices that would serve both purposes. There are, however, some subtle differences in the way the two types of devices are treated. The main such difference is that a peripheral included in the Reader device category is not assumed to be the main source of operator input for the system; that is, its input usually consists of a block of character data that's submitted to the system one character at a time on request, as opposed to being a random series of inputs of indeterminate length (like keyboard input).

The difference just described is definitely a subtle one, and there are cases in which it does not apply, such as when one computer is used to control another through the Reader device or during batch processing, where control and data both come through this device. It is, however, a valid difference to BDOS, since BDOS will not accept such control via the Reader device unless its entire I/O structure is changed, as we saw in the February column when we discussed the BAT: device assignment. This distinction is further reinforced by the fact that there's no way to test the status of the device via a Reader status function, suggesting that it was never expected that the Reader device would be called randomly, but rather, only when the operator or user program expected there to be data available.

For our purposes, then, we can consider READER to be a function wherein characters are passed to a user program from some auxiliary peripheral device as a means of gathering data from outside the computer's "normal" environment. In this way, READER is treated much more like a disk drive interface than a keyboard interface, with the exceptions that the input consists of single characters as opposed to blocks of data, and that, as far as BDOS is concerned, READER is an input-only device.

The Digital Research criterion for the BIOS READER function is that each time it's called by BDOS, it will return in register [A] the next available character from the physical peripheral assigned to be the Reader device (that is, the assigned physical device in the logical Reader category). The character must be a valid ASCII value (0 to 127), with the parity bit reset (zero). All physical peripheral devices to be included in the logical Reader device category for BDOS must be able to do input in the manner just described. This is the only criterion, and, consequently, it is reasonably easy to fulfill.

There's one other concern with regard to the Reader category. This is not really a criterion for the device or for the routine servicing it but more a matter of data structure. This factor also helps to point up the difference between the ways Console device input and Reader device input are treated. Since the Reader device is not really the main system input method, the practice of scanning it continually for random input usually does

not apply. There must, therefore, be some method of telling a program using the Reader device that all characters in this collection have been transmitted, a condition usually called "end-of-file."

When the end-of-file has been reached, a control-Z (1AH) should be returned in register [A] when BDOS makes its next call to the Reader device. This character is the general CP/M end-of-file character and is used in all CP/M text files for that purpose. It must be understood, however, that this is not a function of the device or of the driver routine that operates the device, since neither the device nor the driver routine can tell whether all the data in the collection has been transmitted. The end-of-file character must instead be part of the data that's being input. It is permissible, however, to have a routine always return the end-of-file character if there's no peripheral implemented as the Reader device (as we shall see), since this will at least keep the system from hanging.

Once again, as a means of implementing more than one device, Microsoft chose to use the IOBYTE when creating the logical Reader device. Although up to four devices are allowed by Digital Research, Microsoft decided to limit the possible number of physical devices to three; this was done for the sake of simplicity and because of the limited number of peripheral slots on the Apple. The four physical devices defined by Digital Research are TTY:, PTR:, UR1:, and UR2:. Microsoft treats UR1: and UR2: as the same physical device; consequently, we'll refer to them from now on as URx:.

Of the three devices SoftCard supports, only two are specifically oriented to auxiliary physical devices. As mentioned in previous columns, the physical TTY: device is included as an option for all four of the logical device categories in order to allow a common physical device to be assigned to any form of input or output. Since the TTY: device must therefore be capable of both input and output (to satisfy the requirements of its being assigned to the logical Console device), it is often implemented as the standard form of console I/O—the keyboard and video. This is, in fact, the case with SoftCard, and setting the logical Reader equal to TTY: has the effect of getting Reader input via the current keyboard. Remember that this does not automatically mean the Apple keyboard, since the Console TTY: service routine is altered by BOOT to reflect the presence or absence of a serial card or Apple Communications card (comm card) in slot 3.

The two remaining devices, PTR: and URx:, are, on the other hand, designed solely for auxiliary input, with PTR: being the primary, preinstalled device and URx: being a secondary, user-installed device. When the device structure of auxiliary I/O was devised, Microsoft decided to use slot 2 as the general-purpose I/O interface area, since the loose custom that then existed in the Apple world reserved slot 1 primarily for printers and slot 3 for keyboard/terminal peripherals, leaving slot 2 pretty much untouched. The feeling was that the most common use for Reader input would be for modems or other types of intersystem communication, especially since this kind of communication lends itself to the character I/O type of data transfer. PTR:, then, is primarily designed to use a serial card or comm card in slot 2, interfaced by the user to a modem, another computer, or whatever.

Now let's examine the actual routines involved in the Reader device implementation. As before with the Console input, when BDOS wants a character of Reader input, it calls an entry point in the BIOS jump table, in this case the eighth one. The entry is nothing more than a single instruction, JP READER, where READER is the label of a general routine to handle Reader device input. The READER routine is located at 0DB87H in 56K (0AB87H in 44K).

Like the other routines that use the IOBYTE, READER's first activity is to load the IOBYTE value from its place at 0003H in the system data page. It then strips out the two bits that make up the READER field of the IOBYTE and decodes the value of these two bits by means of a single compare instruction. Since only the values of 0 (for TTY:), 1 (for PTR:), or greater than 1 (for URx:) have any significance, the routine compares the two-bit IOBYTE value to 1. In this way, if the current value is less than the comparitor, the carry flag will be set, and by testing the carry flag the routine knows that the TTY: device is in effect.

If it turned out that the TTY: device was in effect, control would transfer to a routine called TTYIN at 0DB5EH, which is part of CNIN2, the CONIN subroutine we discussed in February. From this point, input would occur the same way whether we entered via CONIN or READER, so you can simply refer back to February's column if you wish to proceed further in the input process.

If, on the other hand, the current value of the two-bit field of the IOBYTE had been 1, the carry flag would be clear but the zero flag would be set, indicating that the current value and the comparitor were equal. In this case, the routine would know that the physical PTR: device was selected and would jump to a routine called RDRIN at 0DB62H. (This routine was mentioned in February also, during our discussion of the BAT: device assignment. RDRIN was the routine jumped to from CONIN if BAT: was in effect and all console input was to come from the Reader device.)

RDRIN is a very simple routine, since its only function is to load a vector address from the I/O vector table in the IOCB and jump to that address. Before we proceed beyond this, however, we should note that, if the current IOBYTE field value had been 2 or 3 instead of 1, neither the carry flag nor the zero flag would have been set, and so neither of the jumps (to TTYIN or to RDRIN) would have taken place. Instead, a different vector address would have been loaded from the vector table and a jump to that address would have been made.

In our earlier discussions of the vector table, we learned that each of the logical devices making up character I/O has two vectors in the table; the exception is the Console device, which has four—two for console input and two for console output. We also learned that each routine corresponds to a physical device, as in the case of console output, where Vector #1 corresponded to TTY:/CRT: and Vector #2 corresponded to UC1:.

With the Reader device, the same basic structure exists, with Reader Input Vector #1 assigned to the PTR: device and Vector #2 assigned to the URx: device. As with the other logical devices, both of the Reader device vectors point to the same routine (that is, contain the same address) when SoftCard is shipped to the customer. Again, this is because Vector #2 is designed for a user-implemented device, so no routine exists for it. The address of the PTR: service routine is placed in it solely to

keep the system from hanging, should a user assign UR1: or UR2: to the Reader device and call for input.

Taking this information back to where we left off in the READER routine, we see that if control had proceeded to RDRIN to service the PTR: device, an address would have been loaded from Reader Input Vector #1, while if the URx: device had been selected, the address would have been loaded from Vector #2. Unless you've altered the #2 vector yourself, both vectors will contain the same address; we'll examine it now.

The address contained in both vectors is ODD45H, and the routine at that location is called RDRIN1. In purpose and appearance, RDRIN1 is very similar to the routine TTYIN1, discussed in February. At that time, we said that general-purpose read routines existed for both serial and comm cards (called RSER and RCOM respectively). These routines are considered general purpose since they do not look for the card in a specific slot every time but rather are designed to get the slot number from whatever routine calls them. The calling routines needing to use RSER or RCOM have only to load the slot number in question into the [DE] register pair and jump to the location of RSER or RCOM, depending on which kind of card you're dealing with. RDRIN1, then, as its first action, loads [DE] with a value of 2, since PTR: is set up to be a slot 2 device.

The next instruction in RDRIN1 is a jump to either RSER or RCOM. Just like TTYIN1, RDRIN1 has this address patched by the BOOT routine during system initialization, as soon as the type of card in slot 2 has been determined. The address starts out originally as 0000. BOOT examines the card-type byte found during the initial booting process. If a serial card is present, BOOT changes the address to 0DD1CH for RSER; if a comm card is present, BOOT changes the address to 0DD12H for RCOM.

Any other card, even if it is recognized by BOOT (as a parallel card would be, for example), is considered unreadable for input. In that case, BOOT replaces the jump instruction and its address with two completely different instructions—a LDA,1AH and a RET. These two instructions fulfill the Digital Research requirements by returning to BDOS with the end-of-file character in register [A], meaning that there is no more input. Consequently, unless the card you're using for the Reader device in slot 2 can perfectly imitate a serial or comm card, SoftCard won't recognize it as valid for input.

If the card in slot 2 looks like a serial card or comm card but doesn't operate the same way, watch out! SoftCard will attempt to treat it in a manner appropriate to its appearance, which may cause some bizarre results. Microsoft has prepared special driver routines for certain other cards in this category, such as the D.C. Hayes Micromodem and the SSM AIO card. A letter to Microsoft's technical support group will get you these patches should you need them.

Since both RCOM and RSER return directly to BDOS, this completes our coverage of the Reader device. Let's move on now to the Punch device.

In speaking of the Punch device, Digital Research says, "The principal tape-punching device, if it exists, is normally a high-speed paper tape punch or teletype." Once again, not many of us have teletypes, paper tape punches, or card punches connected to our systems. However, Punch can be just about any output device capable of accepting character data, one value at a time. The criterion for the Punch device service routine is very similar to that for the Reader device; that is, the routine must accept the character value in register [C], which will be in ASCII with the parity bit reset, and transmit it to the physical device assigned as the current logical Punch device. And that's all there is to it; if no peripheral is implemented as the Punch device, the routine should simply return, having done nothing.

The physical-to-logical Punch device assignment is also very similar to that of the Reader device. The four devices in this case are TTY:, PTP:, UP1:, and UP2:. These correspond to IOBYTE field values of 0, 1, 2, and 3 respectively. In this case as well, Microsoft chose to limit the number of devices to three. They combined UP1: and UP2:; again we'll use a convention (UPx:) to indicate this multiple device.

The TTY: device is implemented by having the TTY:/CRT: portion of the Console output routines perform this function, as we'll see when we discuss the routines themselves. The PTP: device is implemented by means of a routine whose address is stored in the Punch Output Vector #1, and the UPx: device is implemented by means of a routine whose address is stored in Punch Output Vector #2. As with the other routines we've dealt with, both of these vectors point to the same routine originally, for reasons already mentioned.

Physical devices implemented as part of the logical Punch device will probably be the output portion of a corresponding Reader device; that is, PTP: may be the output portion of a modem, the input portion of which is PTR:. This is not always true; for example, Microsoft's technical support group uses a card reader of the type that processes cards on which boxes have been blacked out with pencil marks. This device is incapable of creating cards or of handling any output beyond acknowledgement and other handshake-type signals, and therefore only the PTR: device is implemented. In such a case, PTP: is free to deal with something entirely unrelated—numerically controlled machinery, perhaps.

In most cases, machine communication implies a bidirectional capability, and devices that you may interface will probably affect both the Reader and Punch device assignments. Because of this, PTP:, as the preinstalled device, is designed to communicate with a card in slot 2 so that it can link up with the PTR: device. UPx:, since it's to be a user-installed device, has no such restriction.

BDOS accesses the physical devices in the logical Punch group by calling the seventh entry point in the BIOS jump table, which simply contains the instruction JP PUNCH. The routine with that name is located at 0DB75H. In format it looks very much like the READER routine examined earlier, except it has a minor error, which we'll come to soon.

Initially, PUNCH loads the IOBYTE value and strips its particular two-bit field out. By doing a compare with a value of 1 and checking for the carry flag, PUNCH can jump to the Console output's TTY: service routine if the carry flag is set. This is accomplished through a jump to the routine TTYOUT at 0DB96H, discussed in the March column. If you wish to know more about that routine, please refer to that issue.

At this point, we come to the minor error in PUNCH. If the value of the two-bit IOBYTE field is 1, this indicates that the PTP: device is selected, and this device (as we've said) is implemented by Punch Output Vector #1. A field value of 2 or 3 indicates the UPx: device and Vector #2. In the PUNCH routine, if no jump is made when the carry flag is tested, then Vector #1 is loaded as the default to jump to. At this juncture, if the result of the compare is zero, meaning that the value was 1, a jump to the address just loaded should occur. Instead, however, the jump is made if the result of the compare is nonzero, meaning that the IOBYTE field value is 2 or 3. In such a case, the UPx: device would be the selected one, but the jump would be made to the address in Vector #1. Conversely, if it had been 1, no jump would be made, the contents of Vector #2 would be loaded, and a jump would be made to that address. More simply stated, things are backward here: if PTP: is selected, the UPx: service routine is branched to, and if UPx: is selected, the PTP: service routine is branched to. This error seems more significant than it is. The reason it doesn't cause problems (in two years, we've not heard of any) is that the vectors are identical when the customer receives them, and it is rare that both PTP: and UPx: are implemented in the same system.

Anyone wishing to fix this error can do so after the system is booted by changing the byte at 0DB81H (0AB81H in 44K) from a 20H to a 28H. Changing it on a more permanent basis is somewhat more complicated; if you wish to do this, write in care of the magazine and we'll tell you how to go about it. One word of caution, however: now that SoftCard has been in the field for some years, there's always the chance that software producers have tailored their products to such small variations as this and that correcting the error would affect the operation of such products. Your best bet is to follow the rule that if you haven't had trouble with it, don't change it.

In any case, no matter which vector is used, control now winds up at a routine called PUNOU1, located at 0DD3FH. Like RDRIN1, this routine consists only of loading the register pair [DE] with the value 2 for slot 2 and a jump to an address patched by BOOT. In the case of

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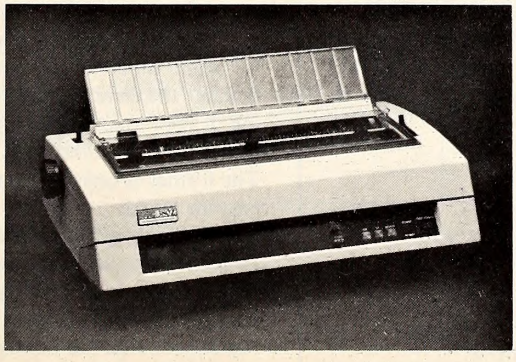

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PUNOU1, however, BOOT can patch in not only the addresses of WSER and WCOM, the general-purpose write routines for serial and comm cards, but also the address of a routine called WPAR.

As you've no doubt guessed, WPAR is a general-purpose write routine for "Apple-standard parallel cards." The reason this phrase is in quotation marks is that, unlike with serial devices, for which there exists a definite and long-standing protocol (the RS-232 standard, to be exact), there is little standardization in the world of parallel devices. Indeed, most of the interfacing questions and problems in the early days of SoftCard support by Microsoft concerned the different ways in which various manufacturers implemented parallel devices.

For that reason, the WPAR routine was designed to implement a basic parallel card of the type issued by Apple itself. No attempt was made to produce a universal parallel-card driver that would handle such diverse peripheral cards as the D.C. Hayes modem card or the parallel portion of the SSM AIO board. It was considered better to interface these with special driver routines as they were encountered.

WPAR, then, located at 0DD31H, uses the value in [DE] and a calculation subroutine to determine the page of memory dedicated to that board—that is, 0E*n*00H, where *n* = the slot number. Using the high-order byte of this address and the low-order byte 0C1H, the address of the status register on the parallel card is determined to be 0E*n*C1H, or in the case of slot 2, 0E2C1H. This location is read repeatedly in a loop until the high-order bit of that location is set (1). When that occurs, the card is ready to accept a byte of data.

The data register location is calculated using the slot value of [DE] also, but calculated to produce 0E0*n*0H; *n* in this case is the slot number plus 8. The data register for parallel cards, therefore, is seen to be in the sixteen-byte scratchpad space for that slot. The data register is in fact the first address of the sixteen available (or for slot 2 it is at 0E0A0H). When the card signals its readiness to accept a data byte, the character being sent to BDOS in register [C] is loaded into the data register, and control returns directly to BDOS.

So, with that explanation, we have now examined both of the general input routines and all three of the general output routines. In the future, we'll refer to them only by name, as we have done when talking about RSER, RCOM, WSER, and WCOM this month.

Let's get back to our discussion of the Punch device. When we left off a moment ago, we were discussing the PUNOU1 routine; more specifically, we were talking about BOOT's alteration of the jump address during initialization. We now know that one of the three output addresses will be placed in the jump address field if a card is found. Unlike the RDRIN1 routine, BOOT does not alter the instructions themselves if no card is found. Rather, it simply leaves the address alone, since a default address of 0DD3EH is already there. As you may have guessed, this is the address of a simple RET instruction that just returns to BDOS without having done anything if no punch device has been installed. This, of course, is done to prevent the system from hanging or (worse yet) from doing indiscriminate memory alterations if no device is implemented.

The final note we need to make on the Punch device routines concerns problems with the comm card write routine, WCOM. In March, when we spoke of comm cards used as terminal interfaces, we said that a patch had been installed in version 2.20B of the SoftCard BIOS CONOUT routine. Called OUTPAT, this correction routine is located in the patch area. Its job is to determine if a comm card is present in slot 3 and, if so, to handle the write to it immediately (using a 6502 subroutine), thereby ignoring the remainder of the CONOUT routine, including WCOM. The reason for this is that the Z-80 processor, unlike the 6502, does a preread of the contents of any memory location before it writes to it.

In most cases this is not a problem. As a result of the communications chip it contains, however, a comm card interprets this read access as the actual write of the data byte, and this causes the comm card to assume that the data register now contains valid data. It therefore proceeds to transmit to the connected peripheral. Since the data has not yet been written into the register, however, the byte sent is whatever value the data register already contained. And now, since the chip is under the impression that it has already accepted a byte of data, it goes into not-ready state until the cycle of transmission is completed, meaning that the Z-80 is never able to write the correct byte into the card's data register.

This error was addressed for Console output during the 2.20B corrections, but not for Punch output. Basically, the feeling was that while no chance could be taken with Console device I/O (since that would be required in order to do anything at all with the system), the fix to deal with a comm card in slot 2 was not mandatory. That being the case, it was decided that further complicating the patch procedure for 2.20B by having two such corrections would be an unnecessary risk.

The same type of patch as OUTPAT can be created for the PTP: device. It must be a filter-type patch, meaning that it checks for a condition (a comm card in slot 2); if the condition is not met, it lets the program flow filter through and continue on its normal route to the Punch routines in the BIOS. If the condition is met, however, the patch must deal with the output itself, using the 6502 to do the actual write. Because of the detail required, not so much to create the patch but to describe the installation of it, space won't be taken to demonstrate it right now.

It's important to put what we've been talking about into perspective. Although there are two errors in the Punch device service routines, they are not terribly significant problems. Only if you are using a comm card (or some other device that can't tolerate a Z-80 preread) will you encounter the error just dealt with. And the previous problem, the switching of the Punch device vectors, will crop up only if you've implemented the UPx: device and have changed Vector #2 to point to your routine. The former problem is somewhat more difficult to fix, but it's also fairly easy to avoid.

In this month's column, we've covered in some detail the Reader and Punch devices and their associated routines. These two devices are probably the ones least used by SoftCard owners; nonetheless, they offer the easiest means by which to implement new peripherals. At some point in the future, after we've covered the BIOS internals to a satisfactory degree, we'll spend some time talking about interfacing to specific peripherals, using these logical devices. Until next month. . . . ■

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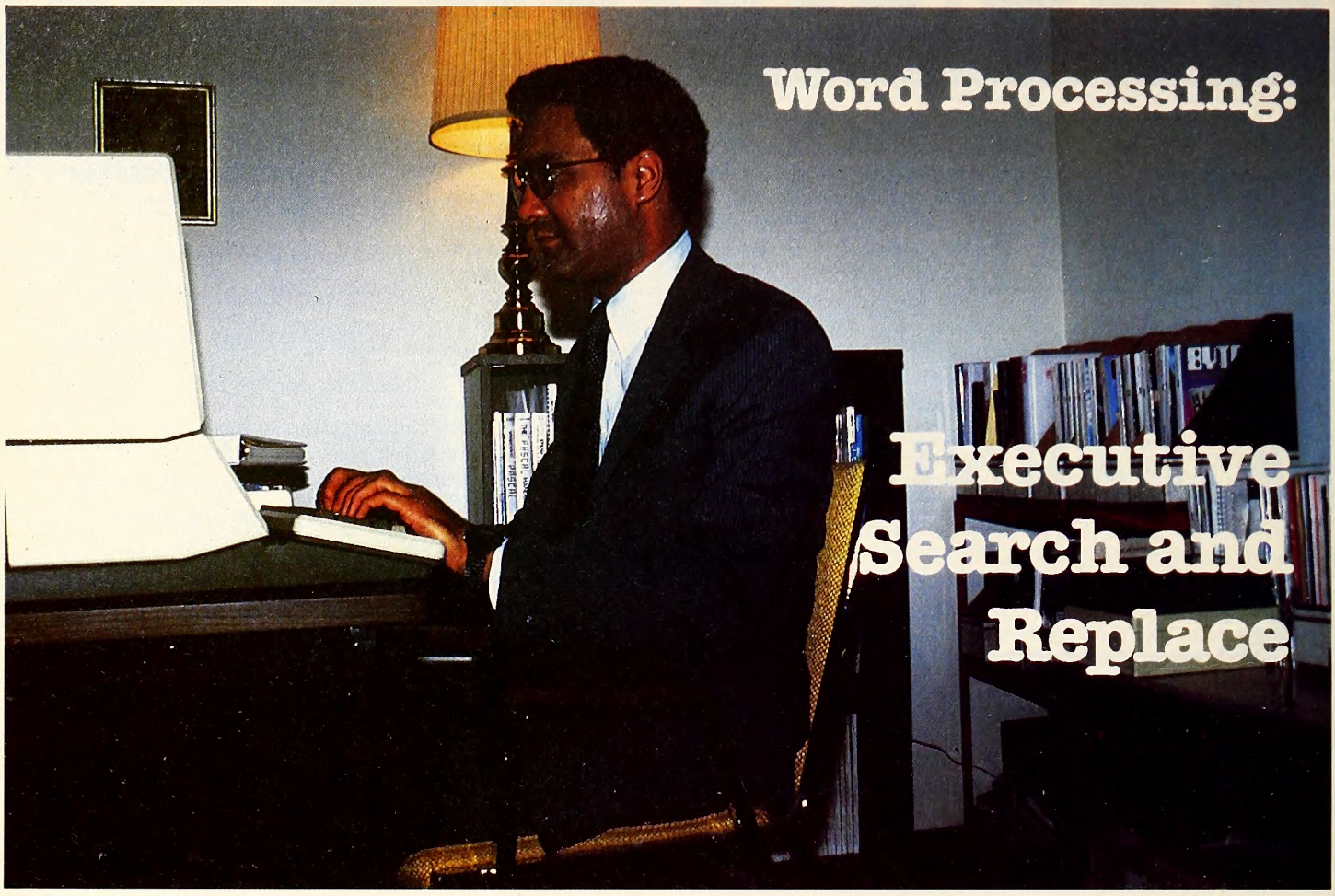

Word Processing: Executive Search and Replace

BY JONATHAN MILLER

The general public has indelicately dubbed them headhunters, but the appropriate handle, the dignified job title, says Ronald Dukes, is executive recruiter.

"We're not body snatchers," says Dukes in tones of injured professional pride. "We don't creep around in the night. I'm helping clients solve a problem. If they get the right person, you're talking bottom-line profits."

The forty-year-old Dukes is a defender of the faith—a member of the Chicago headquarters staff of Heidrick & Struggles, one of the nation's top recruiting companies. Recruiters like Dukes are the employment pros who spot the fast-track up-and-comers, the men and women who fill middle and senior management positions and pull salaries ranging from $60,000 to $350,000-plus. Theirs is a serious and highly competitive business, one that requires cool, confident professionalism. Here, first impressions are often lasting ones.

Enter the VP Xs. Flashback to the late seventies. Dukes is working on one of his biggest projects yet—finding the new top man for a major Midwest company. He's interviewing six-figure executive VPs who've made a career of making things happen.

Candidate "X," one of the stellar prospects, arrives at Dukes's office. A picture of relaxed control, Dukes wants to put the interviewee at ease. He offers his guest a seat and leans back confidently in his own, when suddenly, diabolically, the chair gives way. Head over heels he tumbles, stacks of papers flying. Dukes, the unwitting king of slapstick icebreakers, lands in an undignified heap on the office floor, feet straight up in the air.

Yes, this executive recruiting can be a rough business, but collapsing chairs aren't among its everyday perils. Delayed airline flights, secretaries who insist you "state your business," and candidates who back out at the last moment are the daily devils.

"Either you like recruiting or you hate it," says Dukes. "There are lots of telephone calls, lots of flying, interviewing at airports, working out of telephone booths. Just a helluva lot of hard work."

Whatever its drawbacks, recruiting has its compensations. Top recruiters earn between $75,000 and $150,000 a year, their fees from client corporations representing a percentage (around 30 percent) of an exec's first-year salary and expected bonuses. The work may be hard, but it's a spiritual tonic for nomads like Dukes. "I don't want to be stuck behind a desk," says the former Vietnam infantry captain.

Dukes figures he's on the road roughly a third of the time, but the challenge and involvement of the job help ease the strain of being away from kith and kin back in the Chicago suburb of Buffalo Falls.

Deadeye Dukes. A recruiter is a matchmaker and a troubleshooter. He gets the call when a company finally wakes up to the fact that the problem in the manufacturing division is the person in charge. Not equipment, not systems, but complex, quirky people. Dukes has to understand what clients want—and they don't always know or spell it out—and then size up scores of potential candidates who all tend to look the part—articulate, well-groomed, enthusiastic.

You don't have to have a Ph.D. from Harvard to be a recruiter, but you do have to have a feel for and fascination with people, for the text and subtext of human interaction. Does the client actually want an aggressive, independent individual who'll come in and make changes, or is he really saying he wants someone who'll toe the line?

"Personal styles must mesh," says Dukes. "Some people are hard to work for; they may be browbeaters, and you have to find out. Does the person you're interviewing have the *will* to do the job? You have to distill the essence of what the client wants and what the candidate can contribute."

And then, you have to put it all down on paper, faithfully describing a stranger to the client in a three to four-page narrative. Dukes used to write his candidate reports by hand—he doesn't

like dictating and, at the time, didn't like typing—but that all changed circa 1980. That's when, as Dukes puts it, he kind of fell into computers, into CP/M, and finally into *WordStar*, the so-called Cadillac of word processors.

The Dukes of Missouri. Dukes was never much good at math or science when he was hitting the books in his native Saint Louis, but he's always liked to be on top of things. And three years ago computers were rising to the top.

"For some reason, I just had it in the back of my mind that I wanted to learn more about them." That eventually led him to the friendly folks at Data Domain, his one and only computer store. Like Dukes with his clients, they've made it a point to know their customers well—and for the same reason: the development of a long-term relationship.

When Dukes purchased his Apple II (he has since traded up to a III), *WordStar* was his word processor of choice.

"At the time, there wasn't any word processor that came close to *WordStar*," says Dukes, "and I immediately fell in love with it when I got my eighty-column card."

A complex program written in assembly language, *WordStar*, from MicroPro International, actually consists of four linked programs that together occupy close to 80K of memory. Despite its size, it has been designed to run with a minimum of 32K and one disk drive, a neat trick accomplished through a bit of shuffling known as "program overlays." Only a program core resides in memory at loading. When a user wants to execute a special function, such as underlining or search and replace, the program toggles to disk and overlays the appropriate program segment.

For all intents and purposes, what you see on-screen is what will print with *WordStar*. What the monitor displays is virtually identical to the finished product. Dashed lines indicate page breaks. Left and right margins and line spacing changes—single, double, or triple—are also shown, while a status line at the top of the screen reports file name, page, line, and file number.

WordStar supports various printers (including Diablo, NEC, and Qume), along with serial terminals and memory-mapped video boards. The manual provides the code necessary to customize the system to various terminals and printers.

Double and Triple Shots of Command. *WordStar* operates on two command levels. The primary level consists of double and triple keystroke commands, referenced at the top of the screen in highlighted and modifiable help menus. As users familiarize themselves with the program, they can all but eliminate the menus, thereby increasing the available text display area.

WordStar also features a second tier of dot or embedded printer commands, which are displayed but not printed. They govern a number of printing options, such as line spacing, paper length, top and bottom margins, header and footer locations, conditional page breaks, character width (pitch), page numbers, and the like.

In working with *WordStar*, Dukes has yet to employ an embedded command. Primarily, he uses the program to compose rough drafts of his candidate reports. Like many *WordStar* owners, Dukes employs only a fraction of the program's features, which include deletions in either direction either by character, word, or line; vertical and horizontal scrolling, either line by line or in segments; word-wrap and justification options; relocation of copy blocks with the option of deleting or retaining the block at its original location; backward and forward searches with the option of ignoring distinctions between upper and lower case; underscoring of words, not spaces, along with boldfacing, double-striking, overstriking (printing one character on top of another), subscripting, and superscripting; automatic creation of backup copies; and a print spooler allowing the user to edit one file while printing another.

Manual Override. Complex programs beget complex manuals, and by Dukes's lights *WordStar*'s is horrendous. So complicated, in fact, that he's never read through it. He gets by with a little bit of help from the menus and his copy of the more readable publication, *WordStar Made Easy*. Where he feels assistance is sorely lacking is in the customer support department. MicroPro fields retailer inquiries but not those of end users, and Dukes doesn't regard that as inspired public relations.

Though Dukes doesn't care for MicroPro's support policies, he's very pleased with its product and the CP/M operating system, though he has one reservation about the latter. A year ago, Dukes traded up to an Apple III. It can support 256K, but standard CP/M effectively limits Dukes to 64K. "That's not a drawback of *WordStar*," he emphasizes, "but of CP/M." As it is, though, it's not a critical issue, because Dukes doesn't generate large files.

So overall he's very pleased. A split screen and a larger memory capacity would be nice, he allows, but he doesn't need it. What he did need was something that would enable him to gather his thoughts after an interview, and *WordStar* has more than satisfied that requirement. It's also worked a subtle transformation in his writing, making it a lot easier and more fun. His presentations also seem more creative and structured.

"I just find it a lot easier to sit down at the computer and start typing," he explains. "As I go, even though I'm wordy, I can easily go back and change it, which saves time and helps me compose a lot better."

People who think executive recruiters are high-level employment counselors would probably also believe a recession would boost business. They'd be wrong on both counts.

Unlike employment counselors, executive recruiters like Dukes don't usually work on a contingency basis. They earn their fees by conducting long-term searches even if the client ultimately rejects their candidates. The prolonged recession has flattened business but has not killed it. "People are still moving, particularly at the high level," says Dukes. "The economy is not a big factor with eighty to one-hundred-

thousand-a-year executives."

The Boss Was a Rolling Stone. The big factor for executives is what Dukes calls "a compelling need to move." A difficult boss or a blocked career path are the commonest prods, greater challenge and individual satisfaction the major lures. Money, interestingly enough, is rarely a top priority, says Dukes, adding, "The guy with the super boss, who's paid well and sees opportunity in his present job, is difficult to recruit."

But nearly everybody will hear you out. When Ron Dukes and other recruiters call, executives listen. Whether they're bona fide or would-be prospects, they willingly exchange information, because today's contact could be tomorrow's candidate. "We know the insides of most companies," says Dukes. "We know what their problems are—what their people problems are."

They know, but they keep it in strictest confidence, says Dukes. Discretion is the better part of recruiting, whether dealing with a client, a prospect, or a source, which is why the business traditionally maintains a low profile. When people ask Dukes what he does, he's purposely vague. "Consulting," he'll say. If they knew more, they'd be hustling him for a job, compromising his objectivity and client relationships.

"It's difficult to explain to people that I work for client companies, not individuals, without turning them off. Many of my friends and associates don't understand what I do and that's fine with me."

Nonlinear Recruiters. What makes a top recruiter? Someone who is eclectic, not linear, it would appear. Someone with a feel for industries as a whole, for the functional interrelationships among manufacturing, sales, and marketing divisions, according to Dukes. A client may say he wants a candidate with such and such educational background and sales experience from the hi-tech industry, say, but the right one, in terms of personality, moxie, and ambition, may be champing at the bit in a big oil company. "That's why I tend to be a little concerned when clients appear to be too rigid," says Dukes.

Dukes believes career history determines future performance by and large. When he interviews prospects and composes his *WordStar* candidate reports, he's trying to discern and communicate the essential pattern. Do the career moves, or the lack thereof, indicate a winner, or another guy who's going to drop the ball?

"Many times, candidates swamp you with lots of extraneous information," says Dukes. "I'm only interested in whether the person can do the job. That they got an MBA from Stan-

Olivieri's Outline of Word Processors

by Peter Olivieri

We've looked at quite a few word processing packages over the last few months. Each program so far has had its own special features, advantages, and disadvantages. The ones we'll look at this month are no exception.

PowerText, Beaman Porter, Pleasant Ridge Road, Harrison, NY 10528; (914) 967-3504. Complete Apple II system (no Pascal required) $299; with PowerCase chip (for lower-case capability), $329.95. For Apple II and III owners who already have Apple Pascal, $199.

Equipment required: Apple II, IIe, or III with 64K; monitor; two disk drives; printer. Apple III version requires Apple Pascal.

PowerText is both unique and powerful—unique in that it approaches the word processing task in a somewhat different manner than many of its competitors, and powerful in that it offers a good deal more than the typical word processing package. Let's look first at the way *PowerText* approaches word processing and then consider some of its particular features.

The program documentation describes *PowerText* as a program that "shapes" your text into the form you want. This description is par-

ford or Harvard is fine, but that might not be as relevant as what they've done lately in the R&D area, say, when I'm looking for a manager of engineering."

What ages recruiters prematurely is that finding the right person may not be enough. Dukes can gather all the data, conduct his interviews, and hammer out his *WordStar* summaries, but success is governed by matters beyond his control. Clients who forget to mention that they don't like people who smoke pipes or sport mustaches. Spouses of prospects who decide, at the eleventh hour, that they'd rather stay in Cleveland. And then there's the bolt from the blue.

"Clients will sometimes tell you they want somebody with XYZ background and then find someone on their own who's totally opposite," says Dukes. "It's happened numerous times."

Such surprises frustrate many, but Dukes, a man who describes his military experiences as the best three years of his life, is reassured by them.

"For some reason," he says of clients who go against their own specs, "they liked the individual. He fit. In the final analysis, it turned out to be the person. It's not a matter, if I may say so, of computers or numbers. It's individuals who make the difference." ■

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ticularly appropriate. *PowerText*'s "format-file module" allows you to define formats for the kinds of documents you create fairly often. Once these basic formats have been defined, you can ask *PowerText* to "shape" the text you've just finished working on into whatever format you name.

The *document* format can be used to specify the format of a paper, a market report, or a business proposal; the *letter* format provides a customized style for business letters; the *personal* format is for setting up personal letters; and the *memo* format, as you could probably guess, describes how a company memo might look. The *landscape* format refers to a 132-column-wide page, and the standard format indicates a blank page with no headers or footers. Once you've defined these formats, they can be saved to your system and easily recalled.

The editor module permits you to enter new text; to change, delete, or move text; and to copy text into your document from another disk file. It allows you to search and replace both forward and backward and to scroll by screen or by page. The editor also provides automatic word wrap, a type-ahead buffer, and a "paint mode" that can be used to create diagrams containing vertical and horizontal lines (boxes, for instance).

Most of the editing commands are single-letter commands, and the letters usually relate to the functions being performed. For example, when you're in the editor, B moves you to the beginning of a line, and P moves you to the next page in the document. This editor is disk-based—that is, files are stored on disk and only a portion of the file you're working on resides in memory at any one time.

PowerText's editor always maintains a

backup copy of any file you're editing. This is a nice safety feature, but it also limits file size to one-half of a disk. (Of course, with two disk drives you can create and edit larger files.)

This is one of the most powerful editors we've seen. And, like most editors, it's not always simple to operate. This system is not really "menu-driven" in the user-friendly sense of the word. As you become more familiar with the way the commands work, however, you'll see that a system such as this offers a good deal more than the typical menu-driven system.

Fortunately, the *PowerText* manual is well written and easy to read. Each chapter begins with a description of the objectives for that chapter. The manual's not fast reading, and there are no illustrations to help clarify the various features being described. Yet, by moving along through the manual, you can become a very knowledgeable user of the system.

PowerText has some unique features worth mentioning. To begin with, you never have to set margins with this word processor. Instead you use "style files" to describe the detailed layout of your correspondence and other writing. Addresses can be printed on your envelopes as well as in the texts of your letters.

Subscripting, superscripting, boldface printing, extended printing, and underlining are all supported. Pages are numbered automatically and page breaks are carefully monitored by the system. *PowerText* won't leave a dangling line at the top of a new page or start a new heading as the last line on the current page. And when you create papers and reports, a table of contents can be produced automatically.

There's more. You can "suspend" editing on one file and examine or edit another. You can even extract information from the second file and add it to the list. A utility supplied with *PowerText* gives you the ability to format disks, erase disks, examine disks for bad blocks, and list disk directories.

PowerText also offers the user the ability to prepare reports in columnar format, with up to fourteen columns per 132-character line. Horizontal space can be divided into vertical columns with the relative width proportions you specify, and you can even right-justify, left-justify, or center each column. This provides an unusual amount of flexibility in document preparation.

The ability to create a wide variety of documents quite easily is one of the major strengths of this package. Supplied with the program documentation are some sample documents prepared using *PowerText*. Among these are a table of contents, a page from a screenplay (this is impressive—the formatting requirements for such documents are very particular), a sample page from a movie script, some letters and reports, and a "calendar" printed in the boxed format so typical of many appointment books. These sample documents communicate, more appropriately than any promotional literature could, exactly what this package can do.

Indeed, some users will not like the approach *PowerText* takes with regard to the word processing task. In particular, some users are very uncomfortable with word processors that don't allow them to see on-screen exactly what their final document will look like. *PowerText* won't show it to you; what it will do is shape the document properly so that you have no need to view it. Nevertheless, the inability to see the "final version" on-screen before printing will be considered a drawback to some. In addition, the fact that this is a Pascal-based system may matter to others.

Ultimately, you must weigh your own particular needs (do your homework) before deciding which package is right for you. Some word processors are easier to use than *PowerText*. Some may be learned in a shorter period of time. But it's unlikely that you'll find very many word processors that are as powerful as this one.

A few final notes. *PowerText* is not copy-protected and users are encouraged to make backups. The program comes with a five-year warranty. If it fails to perform as specified, it will be fixed at no charge. Now that is unusual. In addition, you can call Beaman Porter directly if you need assistance. Company personnel are prompt, courteous, and most helpful.

Apple Writer III, Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014; (408) 966-1010.

Equipment required: 128K Apple III, monitor, printer. Suggested: Have your Apple III owner's manual and the *Standard Device Drivers Manual* nearby.

Apple Writer III is an excellent word processing package. Let's look now at its features and discuss its strengths and weaknesses.

Apple Writer III enables the user to create letters, reports, and manuscripts and to print out these documents using a wide variety of formatting options. The program can also be used to design and print form letters in which names and addresses are inserted automatically during printing, and to create one's own programs for carrying out complex word processing tasks.

It's easy to insert, delete, or change characters, words, lines, or whole sections within a document using *Apple Writer III*. In addition, certain keys can be defined to represent words or phrases that would otherwise be time-consuming or difficult to type.

Once the program's up and running, you can load or save a file, erase a file from memory, accept SOS commands, give print program commands, or go to a submenu of additional functions. Simply pressing return gets you a blank screen on which to begin typing your document. Actually, the screen is not quite blank—there's a data line at the top that displays information about what line and character you are at and how much memory for your file remains. This display can be eliminated from the screen (or reinstated) by pressing escape.

Moving the cursor in *Apple Writer III* is done by pressing the arrow keys (remember that the Apple III keyboard has four of them). Holding down the shift key as you depress an arrow key causes the cursor to move more rapidly (by characters, twenty-four at a time, or

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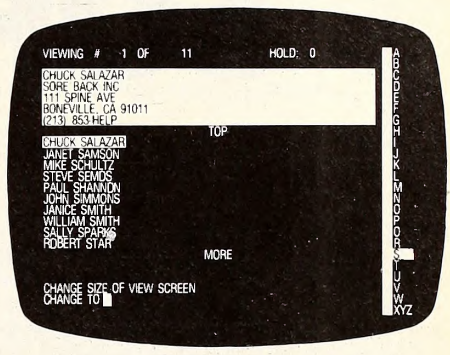

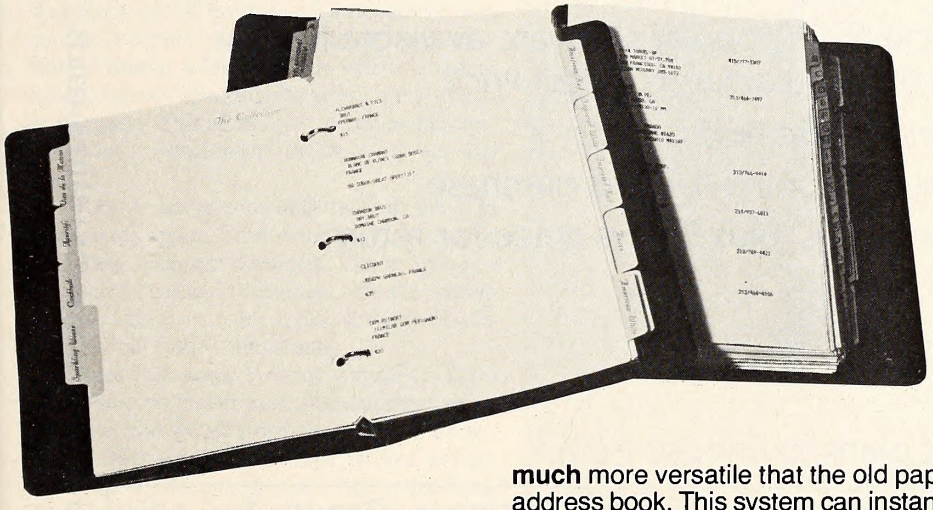

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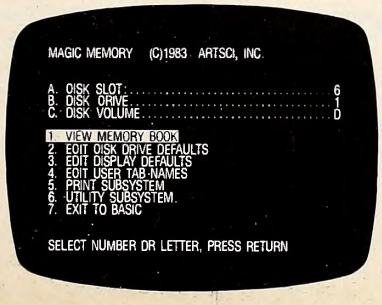

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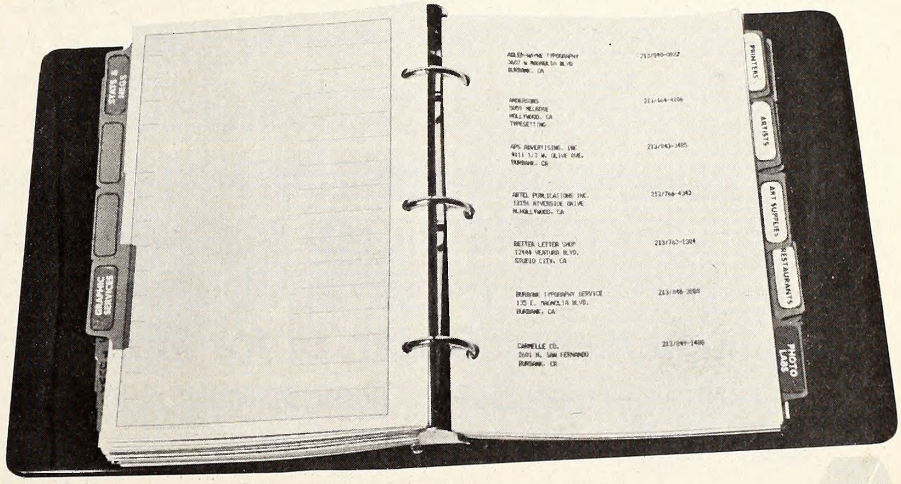

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by lines, twelve at a time). Control-B moves you to the beginning of your document and control-E moves you to the end of it. Using the left arrow and the control key together deletes characters; pressing the right arrow in combination with control reinstates the last 128 characters (a useful feature when you wish to move small amounts of text around within a document).

To insert new text, you simply position the cursor where you want the text to go and begin typing. As you'd expect, word wrap is automatic. It can be turned off, however, by pressing control-Z; that's a useful option, especially handy when you wish to arrange information in columns.

Saving a document is a relatively simple process. Pressing control-S saves the entire contents of memory to disk. It's also possible to save to disk only a portion of what's in memory or to add a text segment to an already existing disk file. The ability to see a catalog listing of your disk files before you name the document you wish to save is a nice feature.

The loading process is just as flexible. You can load an entire document, a segment of a document, or all portions of a document that contain a certain segment of text. It's even possible to display a file on-screen without loading it into memory (and thereby overwriting what's in memory). This allows you to review the contents of a document before you actually load it.

SOS. Pressing control-O calls up the SOS commands menu. From here, you can catalog your disk, rename a document, lock or unlock a document, delete a document, set the system date and time, or name a disk drive as the default for all future commands.

More Functions. Pressing control-Q causes the additional functions menu to appear. From here, you can set tab stops, save a file of tab settings, observe where carriage returns are located in a document, and do underlining. Further editing capacities that facilitate insertion and deletion of material on a word-by-word or paragraph basis are also available.

Apple Writer III's find feature can be used to find text or to find text and replace it with something else automatically or after confirmation. It can also be used to find text and replace it with nothing at all (an unusual but useful feature). In addition, it's possible to use wild-card entries in order to select items of interest more carefully.

Apple Writer III also offers a powerful glossary feature. To create a glossary item, you enter the glossary (control-G) and then type any letter from the keyboard, followed by a string of text. That particular glossary item is now "hidden" behind that particular key. All but two keys on the keyboard can be used in the creation of glossary entries, and upper and lower case letters are counted as different keys. There is a limitation to this feature, however; it concerns the total combined length of all glossary items, which cannot exceed 2,048 characters. Whenever you want to use a glossary item within a word processing document, you just press control-G followed by the letter key under which it's filed. Glossary lists can be saved, retrieved, and displayed.

Some Special Features. *Apple Writer III* offers some particularly unusual word processing features. These include a case command, a jump command, a split-screen command, and a command that allows the entry of control characters in text. The case command (control-C) changes the case of all characters you pass over with the cursor from upper case to lower case or vice versa. The jump command (control-J) jumps quickly to the position of the word you choose. The split-screen command (control-Y) splits the screen into two independent twelve-line displays. The cursor can be placed in either text window and you can then work in all the normal ways on the text contained there. The command for entering control characters in text (control-V) facilitates *Apple Writer III*'s interface with various printers by allowing you to enter the necessary control characters for boldface, compressed print, superscripts, subscripts, and so on.

Apple Writer III also offers alternate type styles; five character sets are available, including gothic and inverse.

Printing a Document. One of the key considerations in evaluating a word processing program concerns how the final printed document will look. Margin settings, paragraph indenta-

tion, top and bottom margins, page-number location, number of lines per page, line spacing, running heads and feet, and justification can all be chosen from the print-control menu. It's also possible to embed text-formatting commands within the text. There's also a query feature within the print procedure. This enables you to specify that printing should be halted at a particular point and that a message should be displayed on-screen; printing resumes when the user takes the appropriate, specified action.

Word Processing Programming. Finally, we come to a truly unique feature of this package—*Apple Writer III* has its own word processing language (WPL), which can be used to write programs that interface with the word processor portion of *Apple Writer III*. For example, instead of entering text editor and print commands from the keyboard, you could write a computer program that would do this for you. In this way, you could automate the form letter printing process and other activities. Unfortunately, the section of the user guide that discusses how to use WPL is not at all clear. Prior programming experience will help you here, but not much. You are provided with lots of examples, both in text and on an accompanying disk.

Program Strengths. *Apple Writer III* is a very thorough program and it is particularly easy to use. Since commands usually begin with a letter that corresponds in some way to the function you're trying to accomplish, they're fairly easy to remember. The special characteristics of the Apple III are also used to advantage in this program. In addition, *Apple Writer II* files can be transferred into this program (and, of course, the *Apple Writer III* files you generate can be transferred in turn into *Apple Writer II*).

Program Weaknesses. As mentioned earlier, the word processing language feature is quite nice but relatively difficult to learn. The portions of the manual devoted to this topic could have been a good deal clearer. In addition, it would have been helpful if the program manual had been indexed; it can be frustrating not to have an index when you want to refer back to something in the manual and you can't remember exactly where you read it.

Apple Writer III's most serious drawback is the fact that you can't see on-screen actual versions of what the pages of your document will look like when printed. And speaking of printing, it's not easy to get a printout of a single page from a multipage document. In addition, some users have had a great deal of trouble sending the proper characters to their printers for underlining, subscripts, and superscripts. (Some reader-supplied solutions to these problems will appear in an upcoming Mind Your Business installment; if you're an Apple III user, or a potential user, keep an eye out for that column.)

All in all, the *Apple Writer III* owners we've heard from indicate a very high level of satisfaction with this product. If you're an Apple III owner and you're looking for a word processor, you'll probably want to give this one careful consideration.

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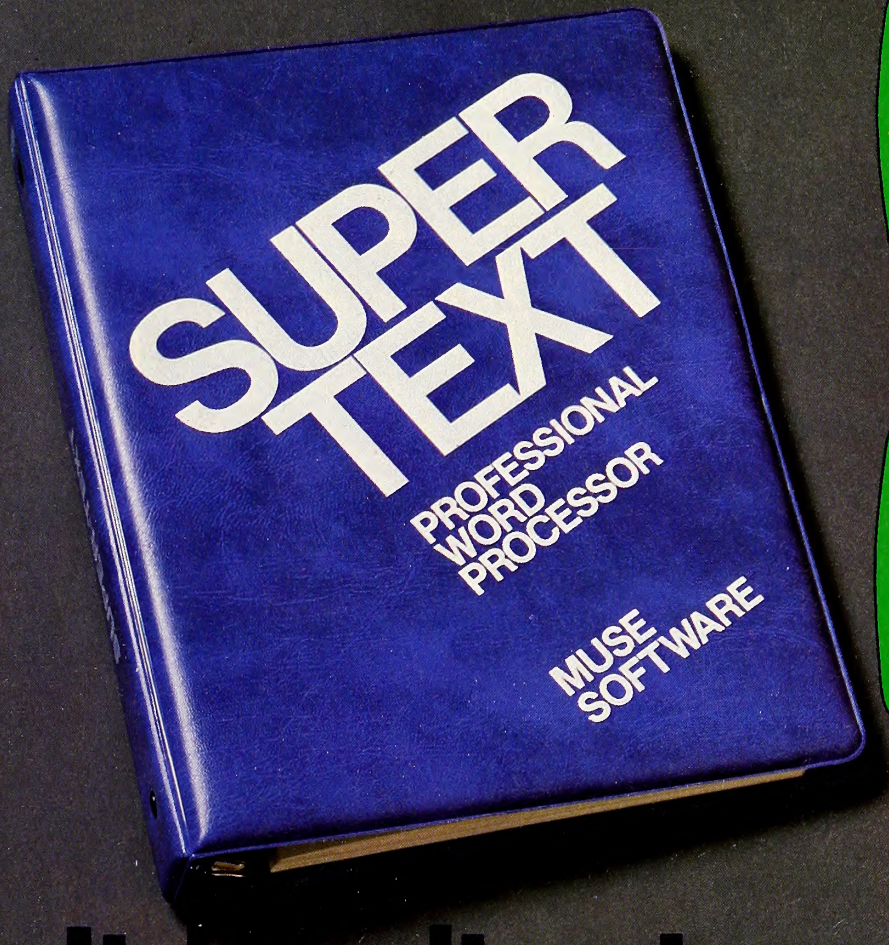

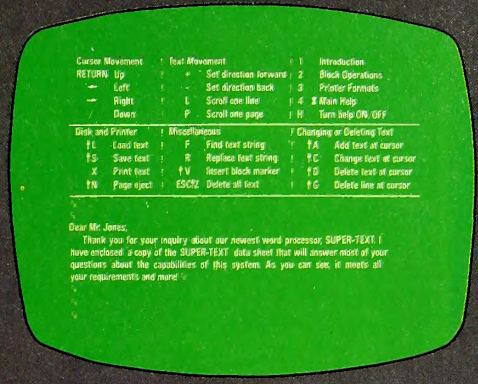

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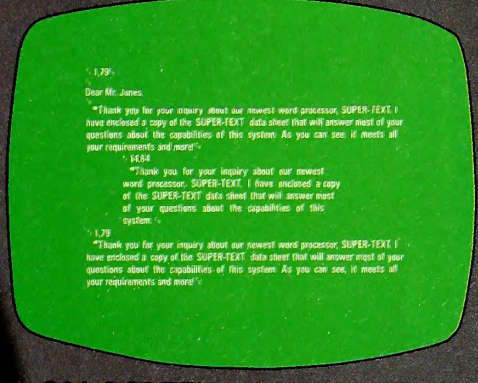

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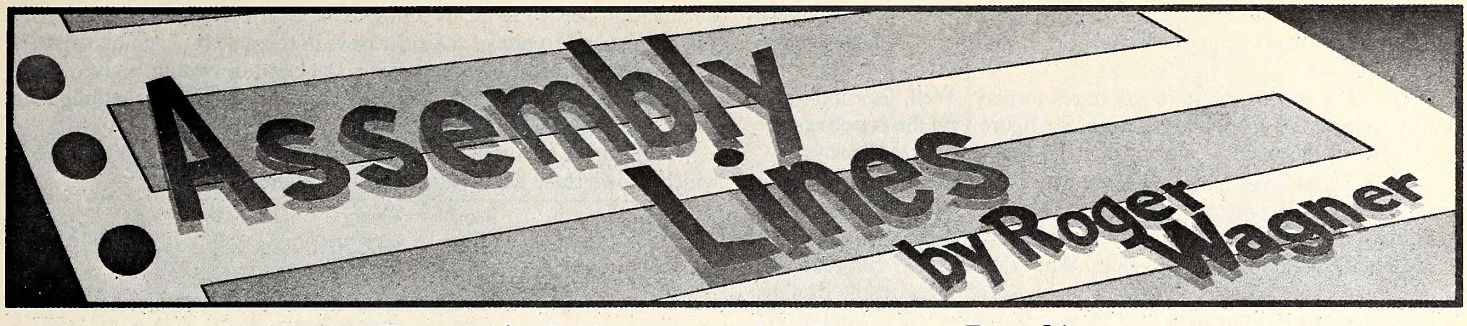

Everyone's Guide to Assembly Language, Part 31

This month's article starts a discussion on how to write your own hi-res character generator, and thus how to use text on the hi-res screen in your own machine language programs.

The discussion will cover a number of points. First, we'll look at the memory mapping of the hi-res screen to see what considerations must be made to put the data for the appropriate characters on the screen.

Next, we'll look at the code needed to intercept the characters being output to the normal text screen, and how this information can be used to actually implement the hi-res character generator.

Last of all, a listing for a character editor will be presented, so you can make up your own character sets, or even produce special characters for unusual graphics effects.

Hi-Res Screen Mapping. The first consideration in creating our character generator is the topic of what actually will be required to put a character on the hi-res screen. In previous issues we have seen how each dot on the graphics screen is related to an individual bit within a byte of memory assigned to the hi-res display. In earlier routines we created graphics by plotting dots using the routines built into Applesoft Basic. This time the approach will be somewhat different.

To create a character on the screen, an entire array of dots will have to be turned on. Although the hplot routines of Applesoft could be used, it turns out there is a much simpler way to achieve the desired result. This method is based on similarities between the normal text display page and the hi-res graphics display page. To fully understand this technique, though, a brief overview of the screen memory mapping will be required.

The Text Display Screen. On the Apple, text display is normally confined to what is called text display page 1. This display corresponds to a block of memory in the address range $400 to $7FF (1024 to 2047 decimal). A character is printed on the screen by storing a single byte in this memory range. The computer hardware then takes care of converting this stored character into a video image on your monitor or television set.

The memory for the screen display is not mapped in a simple, continuous pattern. That is to say, if you were to fill memory sequentially with a certain value, the screen image would not be changed in a line-by-line, character-by-character pattern. Instead, a rather unusual pattern would be followed. Table 1 gives the address of the first character on each line on the normal text display page. You may also wish to look at page 16 of the *Apple II Reference Manual* for a more complete chart.

You may recall from earlier issues that it was not necessary to calculate the beginning address (sometimes called the *base address*) of each line ourselves. Instead, we can use a routine that already exists in the Monitor at $FC22 called VTAB.

When this routine is called, it takes the value stored in location $24 (called CV for cursor vertical position) and calculates the base address of the line corresponding to that vertical position. CV is assumed to be in the range of $0 to $17 (0 to 23 decimal) when VTAB is called.

This is what COUT ($FDED) does whenever the cursor moves to a new line, such as when return is pressed, or when a vtab command in Basic is done. The base address is returned in a zero-page pointer called BASL,BASH ($28,29 = base address low byte and high byte).

The hi-res screen map is broken down to correspond to the layout of the text screen map. Note that the hi-res screen line numbers (on the left in figure 1) are equal to the equivalent text screen line numbers (table 1) plus $1000.

Line #	Address (hex)	Address (decimal)
0	$400	1024
1	$480	1152
2	$500	1280
3	$580	1408
4	$600	1536
5	$680	1664
6	$700	1792
7	$780	1920
8	$428	1064
9	$4A8	1192
10	$528	1320
11	$5A8	1448
12	$628	1576
13	$6A8	1704
14	$728	1832
15	$7A8	1960
16	$450	1104
17	$4D0	1232
18	$550	1360
19	$5D0	1488
20	$650	1616
21	$6D0	1744
22	$750	1872
23	$7D0	2000

Table 1. Text screen line addresses.

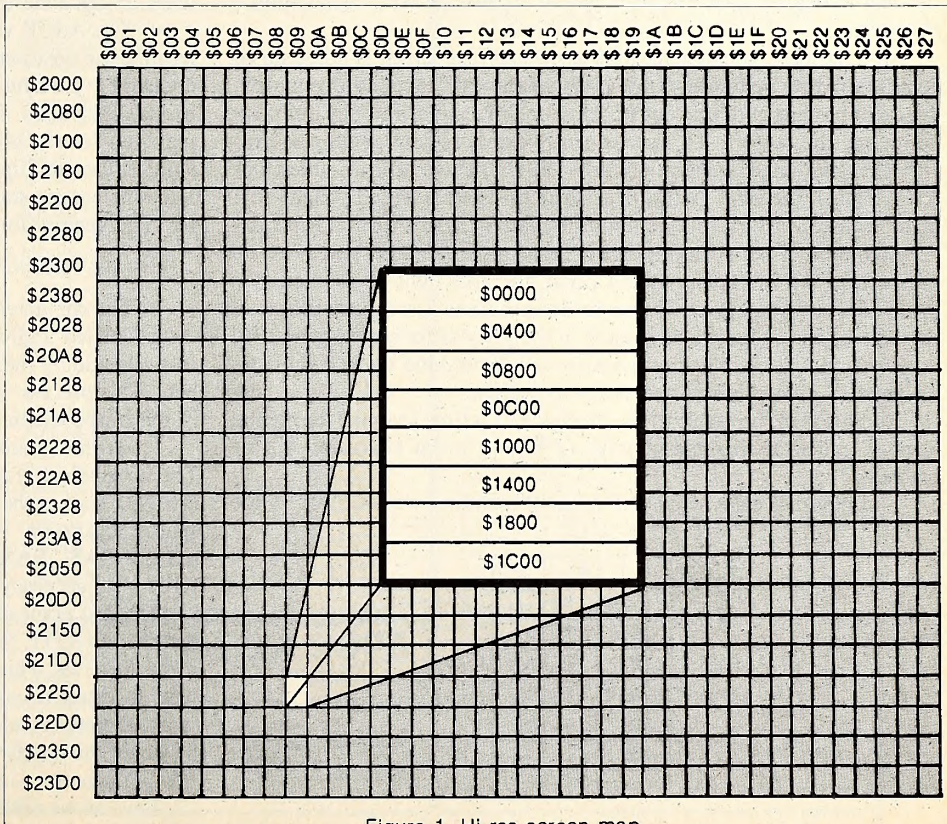

Figure 1. Hi-res screen map.

To determine the final address to print to, the value in CH (cursor horizontal position) is put in the Y register, and an STA (BASL),Y is done.

How does all this relate to the hi-res display? Well, let's look at a similar memory list for the hi-res page. See figure 1 on the previous page for a map of the memory layout of page 1 of the hi-res display.

At first glance, there may seem to be too few horizontal rows to represent all 192 lines. However, if you look at the right-hand side of the chart, you'll see a blow-up of one box of the map. Each of eight lines within the box is labeled with one of eight values. What this means is that each box on the main chart actually represents eight screen lines on the display. Twenty-four boxes times eight lines in each box gives us the total of 192 screen lines. To find the base address of the third screen line, for instance, you would add the correction for the third line within a box ($800) to the base address for the primary box ($2000) to get the actual base address ($2800).

Looking at the horizontal columns, you'll notice that there are forty bytes that make up the 280 horizontal dot positions. Seven bits in each byte are used to map the screen dots (7 × 40 = 280).

At this point you may be getting discouraged thinking that a lot of complicated calculations are going to be required to even begin to know where to start drawing our character on-screen. Take heart, though! If you give it a little thought, you should be able to see a remarkable similarity between the hi-res page and the text page in regards to their memory mapping.

The first similarity is in the number of bytes used for each horizontal line on the screen. In each case, forty bytes are used for an entire line. Could there be even more similarity? Read on!

If you look at the first four lines of the text page, the base addresses are the values $400, $480, $500, and $580. If you examine the first four blocks of eight lines each on the hi-res screen, the base addresses are $2000, $2080, $2100, and $2180.

You'll notice that if you add the value $1C00 to each of the text screen values, you'll get the corresponding base address for the hi-res screen. This pattern continues throughout all twenty-four text screen lines.

What about the eight lines for each block? Each successive line within a block can be calculated by adding the value $400 to the address for the line above it. This will turn out to be just perfect for creating a character.

As it happens, a character on the normal text screen is made up of dots in a matrix seven dots high by five dots wide. Around this matrix, there is a boundary of one dot position on either side, and one dot position along the bottom. This permanently empty region is set up to provide the guaranteed separation between characters when printed on-screen. Thus, the final matrix is actually seven dots wide by eight dots high. Figure 2, for example, shows the matrix pattern for the letter A.

A column of dot positions on each side of the character and a row on the bottom are left open. At this point, the little light in your mind is probably starting to glow. The seven dot positions across each character can correspond to seven bits in each of the forty hi-res screen bytes used on each line. The eight horizontal rows will correspond to the eight bytes assigned to each primary box described earlier.

All this, then, brings us to the precipice. It is time to make the mental leap to understanding the concept of how a hi-res character will be created.

In a block of eight sequential bytes of memory, we can store all the information needed to create a single character on the screen. Each byte will correspond to one of the eight rows in the matrix. Each bit within a byte will correspond to one possible dot position within a given row.

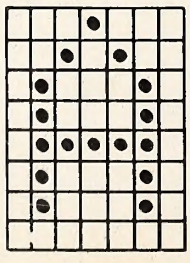

Figure 2. Dot matrix for A.

For example, to encode the letter A, we might store the following bytes: $08,$14,$22,$22,$3C,$22,$22,$00.

To illustrate how this really forms the letter A, take a look at table 2, which shows these same numbers in a different way:

Hex	Binary
$08	%00001000
$14	%00010100
$22	%00100010
$22	%00100010
$3C	%00111110
$22	%00100010
$22	%00100010
$00	%00000000

Table 2.

In the right-hand column is the binary form of each number. You can see which bits are on and which are off. This relates directly to how the character is displayed on-screen. The bits are plotted in reverse order—that is, with bit 0 in the leftmost position. Bit 7 (the high bit) is never displayed on-screen. At most, bit 7 can be used only to shift the other dots one half position. See the earlier articles on hi-res plotting if you need a little refresher in this area.

The Character Generator. Now to actually describe the character generator that will be used to put the appropriate ASCII character on the hi-res screen.

The process it will use will be as follows:

1. A routine will be hooked up to the output vector to intercept each character to be printed to the normal text screen.

2. If the character is a control character, no special processing will be done and the character will be passed on to COUT1 ($FDF0).

3. If the character is not a control character, an examination of the vertical cursor position (CV = $23) and the current text page address will be made. A value of $1C00 will be added to BASL,BASH ($28,29) to calculate the base address of the primary hi-res screen line. The contents of CH ($22 = cursor horizontal position) will then be added to this base address to calculate the actual byte on the hi-res screen to be modified.

4. The ASCII value of the character to be printed will be used to determine the position in a character data table from which the eight bytes containing the data for the character will be retrieved. The position can be determined by first subtracting thirty-two from the ASCII value (to make up for the missing control characters in the table). The resulting value is then multiplied by eight (for eight bytes per character) to determine the correct starting position of the data for that particular character. The general formula, then, is:

```
Position = (ASCII value - 32) * 8
```

5. The character will actually be produced by storing the first byte in the calculated address. The next seven bytes will then be stored by successively adding the value $400 to the base address and storing the next byte. This process will be repeated until all eight bytes have been stored in the hi-res screen memory.

6. At that point the printing to the hi-res screen will be complete. The original character to be printed will then be sent to COUT1 ($FDF0) so that the Monitor routines can handle carriage returns, backspaces, and so on. This action by the Monitor will automatically ensure that the BASL,BASH pair is maintained properly so that we can always rely on its accuracy in positioning the text output on the screen.

This last point may need a bit of explanation. If we never sent a character to COUT1, we would have to handle the entire screen management ourselves. This means when we got to the end of the line, we would have to detect it, and advance CV and recalculate BASL,BASH accordingly. By passing each character to COUT1 (even though technically we never see the text screen), the Monitor will keep BASL, BASH, CH, and CV all maintained in a way consistent with the data printed to the screen.

Thus all we need to do is look at BASL,BASH, CH, and CV for each character printed to have the hi-res screen properly mimic what is going

on with the text display page.

Here, then, is the listing for the hi-res character generator:

```
                        1  ********************************************
                        2  *        CHARACTER GENERATOR               *
                        3  ********************************************
                        4  *
                        5          OBJ  $300
                        6          ORG  $300
                        7  *
                        8  CSW     EQU  $36
                        9  BASL    EQU  $28
                       10  CH      EQU  $24
                       11  TABLE   EQU  $9000
                       12  POSN    EQU  $3C      ; (BAS2)
                       13  SCRN    EQU  $3E      ; (A4)
                       14  VECT    EQU  $3EA
                       15  COUT1   EQU  $FDF0
                       16  *
0300: A9 0B            17  HOOK    LDA  #ENTRY
0302: 85 36            18          STA  CSW
0304: A9 03            19          LDA  #>ENTRY
0306: 85 37            20          STA  CSW+1
0308: 4C EA 03         21          JMP  VECT
                       22  *
030B: C9 A0            23  ENTRY   CMP  #$A0
030D: 90 51            24          BCC  OUT      ; CTRL CHAR
030F: 48               25          PHA           ; STORE CHAR
0310: 29 7F            26          AND  #$7F     ; CLR HI BIT
0312: 85 3C            27          STA  POSN
0314: A9 00            28          LDA  #$00
0316: 85 3D            29          STA  POSN+1
0318: 98               30          TYA
0319: 48               31          PHA           ; SAVE Y
                       32  *
031A: 38               33  CALC1   SEC
031B: A5 3C            34          LDA  POSN
031D: E9 20            35          SBC  #$20
031F: 85 3C            36          STA  POSN     ; CHR<96
0321: 06 3C            37          ASL  POSN     ; *2 = CHR<192
0323: 06 3C            38          ASL  POSN     ; *4 < 384
0325: 26 3D            39          ROL  POSN+1
0327: 06 3C            40          ASL  POSN     ; *8 < 768
0329: 26 3D            41          ROL  POSN+1
                       42  *
                       43  * POSN=(ASC-$20) *8 BYTES PER CHAR
                       44  *
032B: 18               45          CLC
032C: A9 00            46          LDA  #TABLE
032E: 65 3C            47          ADC  POSN
0330: 85 3C            48          STA  POSN
0332: A9 90            49          LDA  #>TABLE
0334: 65 3D            50          ADC  POSN+1
0336: 85 3D            51          STA  POSN+1   ; POSN=POSN
                                                   +TABLE ADDR
                       52  *
0338: 18               53  CALC2   CLC
0339: A5 28            54          LDA  BASL
033B: 65 24            55          ADC  CH
033D: 85 3E            56          STA  SCRN
033F: A5 29            57          LDA  BASL+1
0341: 69 1C            58          ADC  #$1C
0343: 85 3F            59          STA  SCRN+1   ; SCRN=BASL
                                                   +CH+$1C00
                       60  *
0345: A0 00            61  GETBYTE LDY  #$00
0347: B1 3C            62  G1      LDA  (POSN),Y
0349: 91 3E            63          STA  (SCRN),Y
034B: C8               64  INC     INY
034C: 18               65          CLC
034D: A5 3E            66          LDA  SCRN
034F: 69 FF            67          ADC  #$FF
0351: 85 3E            68          STA  SCRN
0353: A5 3F            69          LDA  SCRN+1
0355: 69 03            70          ADC  #$03
0357: 85 3F            71          STA  SCRN+1   ; SCRN=SCRN
                                                   +$3FF
                       72  * $3FF TO MAKE UP FOR GROWING VAL
                       73  * OF 'Y'
                       74  *
```

```
0359:  C0 08     75  DONE?   CPY   #$08
035B:  90 EA     76          BCC   G1
                 77  *
035D:  68        78  YES     PLA
035E:  A8        79          TAY          ; RESTORE Y
035F:  68        80          PLA          ; RESTORE CHAR
0360:  4C F0 FD  81  OUT     JMP   COUT1
```

The routine is relatively short and is placed at location $300 (768 decimal). When a call to $300 is done by either a 300G from the Monitor or a call 768 from Basic, the routine will set the output vectors to point to ENTRY and then call the DOS hookup routine described in earlier issues. At this point, all future character output will pass through this routine, until it is disconnected either by a PR#0 or by pressing reset.

At ENTRY, the first thing that is checked for is to see if the character being output is a control character. Remember that at this point the high bit will be set on all text going to the screen. Therefore, even though $20 is the more normal ASCII value for a space character, with the high bit set, it will be sent through COUT as an $A0.

If a control character is detected here, the CMP and BCC will pass control to the exit point of the routine, OUT. Remember that BBC is used to detect all values in the accumulator *less than* the value used in the CMP instruction. All control characters will have an ASCII value less than that of the space character.

If the character is a noncontrol character, it's then pushed onto the stack in line 25. This is to save the character to be printed so that it can eventually be passed on to COUT1. The next line, 26, then clears the high bit of the character and stores the resulting value in POSN.

This resulting true ASCII value will shortly be used to calculate the needed position in our character table, so lines 28 and 29 store a zero in the high-order-byte position of POSN. Because 96 characters times 8 bytes each will require a table 768 ($300) bytes long, POSN will have to be able to include a two-byte value. Thus lines 28 and 29 now take this opportunity to set the high byte of POSN to zero now in anticipation of future calculations.

Another bit of programming technique appears on lines 30 and 31. Because the Apple assumes all output routines will leave all the registers (X,Y and A) unaltered, we must save the Y register so as to be able to restore it to its original condition later on exit. To avoid having to use another zero-page location for this, we've delayed saving the Y register until now so that its value can be put in the accumulator and then pushed onto the stack. Prior to saving the character value in POSN, any attempt to put Y in the accumulator would have erased the value for the character we wanted to print.

Now for the calculation phase of all this. The first step is to subtract 32 from the ASCII value in preparation for calculating the table position. Lines 33 through 36 do this. The next step is to multiply by 8 to get the relative position in the table. Fortunately, 8 is an easy number to multiply by. You may remember from earlier issues that a left-shift operation is equivalent to multiplying by 2. Therefore, all we need do is shift left three times to get the effect of multiplying by 8 ($2 \times 2 \times 2 = 8$).

Normally, because POSN is a two-byte value, each shift would have to be a set of ASL and ROLs. However, because we know we're starting with a value less than 96, we know the first shift cannot possibly give a result greater than 256. In looking at lines 37 through 41, you can see that line 37 does the first multiply by two. It is then lines 38 through 41 that do the two-byte shifts to get the final result. Remember also that an ASL puts the bit pushed out the end into the carry flag. That allows ROL to pick up the carry when shifting the high-order byte.

Consider the example in table 3 to see how the shifts work. The letter A has an ASCII value of $41. After subtracting $20 (32 decimal) we'll have a result of $21 (33 decimal). After multiplying by 8, we should get a result of $108 (264 decimal).

Once the multiplication by 8 has been done, the only thing remaining is to take the relative offset position determined and add that to the base address of the table. In this case, we will assume that the table has been loaded at $9000 (and presumably protected by setting himem: 36864).

Once the table position is calculated, the screen byte to be modified must be calculated also. This is done by CALC2. Lines 53 through 59 take the contents of BASL,BASH and add $1Cxx to that, where xx is the value of CH at that point. Adding $1C00 gives the base address of the hi-res screen line corresponding to the current text page line. We could have used the Y register for CH, but that would have prevented us from easily using the Y register to index the character table data. Therefore, we add CH to make BASL,BASH the address of the first hi-res screen byte to be modified. Note that an added advantage of this approach is that HTAB and VTAB commands will continue to work on the hi-res page. Scrolling, however, will not be available.

GETBYTE (line 61) is the section responsible for putting the character on the hi-res screen. This is done in a number of stages. The first step is to set the Y register to #$00 to prepare to retrieve the data bytes from the table. G1 then starts the retrieval loop by getting the first byte of the character from the table and storing it on the hi-res screen.

Now here's where it gets interesting. Normally, the next steps would be to increment Y to get the next character from the table, and to also add $400 to the POSN value to access the next horizontal line on the screen. The problem is, if Y changes, we won't access the line directly below the one we just modified, but rather one byte to the right of where we want to be.

The solution is to add $3FF, rather than $400, to POSN. That way the value of POSN will grow in a way compatible with the increasing value of the Y register. This part of the listing is worth studying until you have the concept. It saves a lot of needless saving of the Y register and hence needless extra time and memory usage. The technique can be applied to many other situations as well.

Once the entire eight bytes have been put on the hi-res screen, lines 78 through 81 restore the accumulator to the value of the original character to be printed and the Y register to its original value. The jump to COUT1 ($FDF0) is then done to complete the printing to the normal text screen. The advantages of this were discussed earlier (maintenance of BASL,BASH, CV, and so on).

A Hi-Res Character Set. The way to use the character generator is to load the assembled binary routine at $300 (768 decimal). In an Applesoft program, you would then execute an hgr command, followed by a call 768 to activate the routine.

If you were to use the routine entirely from machine language, you would have to call it directly. See the articles on internal hi-res for more information on these.

There is, however, one minor detail still missing. That is the table that we assumed existed at $9000. Since you don't yet have a means of easily creating your own character set, you'll need a table to use.

This data, although lengthy, will provide you with a complete character set to be loaded at $9000. Although it will take a while to enter the

		POSN+1 (Hex)	POSN (Hex)	POSN+1 (Binary)		Carry Flag	POSN (Binary)	
START:		$00	$21	%0000	0000	<0>	%0010	0001
ASL	POSN:	$00	$42	%0000	0000	<0>	%0100	0010
ASL	POSN:	$00	$84	%0000	0000	<0>	%1000	0100
ROL	POSN+1:	$00	$84	%0000	0000	<0>	%1000	0100
ASL	POSN:	$00	$08	%0000	0000	<0>	%0000	1000
ROL	POSN+1:	$01	$08	%0000	0001	<0>	%0000	1000

Table 3.

What would you call a world of renegade drivers? A place filled with the most dangerous and reckless pilots ever to punch metal over asphalt... The highway outlaws of society, banished to a planet with 50,000 miles of empty roadway... and each other.
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data, it will probably be a little easier than creating each character with an editor, although you will have that opportunity next month.

```
                                1  ********************************
                                2  *    ASCII CHARACTER SET       *
                                3  ********************************
                                4
                                5  ORG $9000
                                6
9000: 00 00 00                  7  HEX 0000000000000000  ; SPC
9003: 00 00 00 00 00
9008: 08 08 08                  8  HEX 0808080808000800  ; !
900B: 08 08 00 08 00
9010: 14 14 14                  9  HEX 1414140000000000  ; "
9013: 00 00 00 00 00
9018: 14 14 3E                 10  HEX 14143E143E141400  ; #
901B: 14 3E 14 14 00
9020: 08 3C 0A                 11  HEX 083C0A1C281E0800  ; $
9023: 1C 28 1E 08 00
9028: 06 26 10                 12  HEX 0626100804323000  ; %
902B: 08 04 32 30 00
9030: 04 0A 0A                 13  HEX 040A0A042A122C00  ; &
9033: 04 2A 12 2C 00
9038: 08 08 08                 14  HEX 0808080000000000  ; '
903B: 00 00 00 00 00
9040: 08 04 02                 15  HEX 0804020202040800  ; (
9043: 02 02 04 08 00
9048: 08 10 20                 16  HEX 0810202020100800  ; )
904B: 20 20 10 08 00
9050: 08 2A 1C                 17  HEX 082A1C081C2A0800  ; *
9053: 08 1C 2A 08 00
9058: 00 08 08                 18  HEX 0008083E08080000  ; +
905B: 3E 08 08 00 00
9060: 00 00 00                 19  HEX 0000000000080804  ; ,
9063: 00 00 08 08 04
9068: 00 00 00                 20  HEX 0000003E00000000  ; -
906B: 3E 00 00 00 00
9070: 00 00 00                 21  HEX 0000000000000800  ; .
9073: 00 00 00 08 00
9078: 00 20 10                 22  HEX 0020100804020000  ; /
907B: 08 04 02 00 00
9080: 1C 22 32                 23  HEX 1C22322A26221C00  ; 0
9083: 2A 26 22 1C 00
9088: 08 0C 08                 24  HEX 080C080808081C00  ; 1
908B: 08 08 08 1C 00
9090: 1C 22 20                 25  HEX 1C22201804023E00  ; 2
9093: 18 04 02 3E 00
9098: 3E 20 10                 26  HEX 3E20101820221C00  ; 3
909B: 18 20 22 1C 00
90A0: 10 18 14                 27  HEX 101814123E101000  ; 4
90A3: 12 3E 10 10 00
90A8: 3E 02 1E                 28  HEX 3E021E2020221C00  ; 5
90AB: 20 20 22 1C 00
90B0: 18 04 02                 29  HEX 1804021E22221C00  ; 6
90B3: 1E 22 22 1C 00
90B8: 3E 20 10                 30  HEX 3E20100804040400  ; 7
90BB: 08 04 04 04 00
90C0: 1C 22 22                 31  HEX 1C22221C22221C00  ; 8
90C3: 1C 22 22 1C 00
90C8: 1C 22 22                 32  HEX 1C22223C20100C00  ; 9
90CB: 3C 20 10 0C 00
90D0: 00 00 08                 33  HEX 0000080008000000  ; :
90D3: 00 08 00 00 00
90D8: 00 00 08                 34  HEX 0000080008080400  ; ;
90DB: 00 08 08 04 00
90E0: 10 08 04                 35  HEX 1008040204081000  ; <
90E3: 02 04 08 10 00
90E8: 00 00 3E                 36  HEX 00003E003E000000  ; =
90EB: 00 3E 00 00 00
90F0: 04 08 10                 37  HEX 0408102010080400  ; >
90F3: 20 10 08 04 00
90F8: 1C 22 10                 38  HEX 1C22100808000800  ; ?
90FB: 08 08 00 08 00
9100: 1C 22 2A                 39  HEX 1C222A3A1A023C00  ; @
9103: 3A 1A 02 3C 00
9108: 08 14 22                 40  HEX 081422223E222200  ; A
910B: 22 3E 22 22 00
9110: 1E 22 22                 41  HEX 1E22221E22221E00  ; B
9113: 1E 22 22 1E 00
9118: 1C 22 02                 42  HEX 1C22020202221C00  ; C
```

Announcing
The best 6502 Assembler in the World

ORCA/M™

Now. The kind of high-level support you'd only expect to find on a main frame. ORCA/M (*Hayden's Object Relocatable Code Assembler for Micros*) lets you develop sophisticated applications with the speed and ease of a high-level language, yet retain the control and efficiency that only assembly language can give.

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- Parameter subscripting
- Global communication between macros
- Macro expansion loop control
- Count, length and type parameter-attribute functions

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- Character
- Four-byte Integer
- Hexadecimal
- Floating Point

Relocatable object module generation

Fast assembly directly to disk

Program segmentation:
- Selectively assemble individual subroutines
- Global and local scope of symbols

The Linker

Produce executable binary files from relocatable object modules

Link routines from library files

Link subroutine re-assemblies

Define a new origin for previously assembled code

Invoke at assembly time or by command

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- Floating point and double-precision routines
- Transcendental functions
- Hi- and lo-res graphics
- Multiple-precision integer math
- Input and output

The Editor

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- Block move
- Entry of non-keyboard characters

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- File undelete
- Catalog sort
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Disk ZAP: Built-in disk sector editor

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ORCA/M: 21609
Apple II disk, 48k, DOS 3.3
Two drives and 64k recommended

Introductory Price: $99.95

HAYDEN SOFTWARE

```
911B: 02 02 22 1C 00
9120: 1E 22 22          43  HEX 1E22222222221E00  ;D
9123: 22 22 22 1E 00
9128: 3E 02 02          44  HEX 3E02021E02023E00  ;E
912B: 1E 02 02 3E 00
9130: 3E 02 02          45  HEX 3E02021E02020200  ;F
9133: 1E 02 02 02 00
9138: 3C 02 02          46  HEX 3C02020232223C00  ;G
913B: 02 32 22 3C 00
9140: 22 22 22          47  HEX 2222223E22222200  ;H
9143: 3E 22 22 22 00
9148: 1C 08 08          48  HEX 1C08080808081C00  ;I
914B: 08 08 08 1C 00
9150: 20 20 20          49  HEX 2020202020221C00  ;J
9153: 20 20 22 1C 00
9158: 22 12 0A          50  HEX 22120A060A122200  ;K
915B: 06 0A 12 22 00
9160: 02 02 02          51  HEX 0202020202023E00  ;L
9163: 02 02 02 3E 00
9168: 22 36 2A          52  HEX 22362A2A22222200  ;M
916B: 2A 22 22 22 00
9170: 22 22 26          53  HEX 2222262A32222200  ;N
9173: 2A 32 22 22 00
9178: 1C 22 22          54  HEX 1C22222222221C00  ;O
917B: 22 22 22 1C 00
9180: 1E 22 22          55  HEX 1E22221E02020200  ;P
9183: 1E 02 02 02 00
9188: 1C 22 22          56  HEX 1C2222222A122C00  ;Q
918B: 22 2A 12 2C 00
9190: 1E 22 22          57  HEX 1E22221E0A122200  ;R
9193: 1E 0A 12 22 00
9198: 1C 22 02          58  HEX 1C22021C20221C00  ;S
919B: 1C 20 22 1C 00
91A0: 3E 08 08          59  HEX 3E08080808080800  ;T
91A3: 08 08 08 08 00
91A8: 22 22 22          60  HEX 2222222222221C00  ;U
91AB: 22 22 22 1C 00
91B0: 22 22 22          61  HEX 2222222222140800  ;V
91B3: 22 22 14 08 00
91B8: 22 22 22          62  HEX 2222222A2A362200  ;W
91BB: 2A 2A 36 22 00
91C0: 22 22 14          63  HEX 2222140814222200  ;X
91C3: 08 14 22 22 00
91C8: 22 22 22          64  HEX 2222221408080800  ;Y
91CB: 14 08 08 08 00
91D0: 3E 20 10          65  HEX 3E20100804023E00  ;Z
91D3: 08 04 02 3E 00
91D8: 3E 06 06          66  HEX 3E06060606063E00  ;[
91DB: 06 06 06 3E 00
91E0: 00 02 04          67  HEX 0002040810200000  ;\
91E3: 08 10 20 00 00
91E8: 3E 30 30          68  HEX 3E30303030303E00  ;]
91EB: 30 30 30 3E 00
91F0: 00 00 08          69  HEX 0000081422000000  ;^
91F3: 14 22 00 00 00
91F8: 00 00 00          70  HEX 000000000000007F  ;
91FB: 00 00 00 00 7F
9200: 04 08 10          71  HEX 0408100000000000  ;`
9203: 00 00 00 00 00
9208: 00 00 1C          72  HEX 00001C203C223C00  ;a
920B: 20 3C 22 3C 00
9210: 02 02 1E          73  HEX 02021E2222221E00  ;b
9213: 22 22 22 1E 00
9218: 00 00 3C          74  HEX 00003C0202023C00  ;c
921B: 02 02 02 3C 00
9220: 20 20 3C          75  HEX 20203C2222223C00  ;d
9223: 22 22 22 3C 00
9228: 00 00 1C          76  HEX 00001C223E023C00  ;e
922B: 22 3E 02 3C 00
9230: 18 24 04          77  HEX 1824041E04040400  ;f
9233: 1E 04 04 04 00
9238: 00 00 1C          78  HEX 00001C22223C201C  ;g
923B: 22 22 3C 20 1C
9240: 02 02 1E          79  HEX 02021E2222222200  ;h
9243: 22 22 22 22 00
9248: 08 00 0C          80  HEX 08000C0808081C00  ;i
924B: 08 08 08 1C 00
9250: 10 00 18          81  HEX 100018101010120C  ;j
9253: 10 10 10 12 0C
9258: 02 02 22          82  HEX 020222120E122200  ;k
925B: 12 0E 12 22 00
9260: 0C 08 08          83  HEX 0C08080808081C00  ;l
9263: 08 08 08 1C 00
9268: 00 00 36          84  HEX 0000362A2A2A2200  ;m
926B: 2A 2A 2A 22 00
9270: 00 00 1E          85  HEX 00001E2222222200  ;n
9273: 22 22 22 22 00
9278: 00 00 1C          86  HEX 00001C2222221C00  ;o
927B: 22 22 22 1C 00
9280: 00 00 1E          87  HEX 00001E22221E0202  ;p
9283: 22 22 1E 02 02
9288: 00 00 3C          88  HEX 00003C22223C2020  ;q
928B: 22 22 3C 20 20
9290: 00 00 3A          89  HEX 00003A0602020200  ;r
9293: 06 02 02 02 00
9298: 00 00 3C          90  HEX 00003C021C201E00  ;s
929B: 02 1C 20 1E 00
92A0: 04 04 1E          91  HEX 04041E0404241800  ;t
92A3: 04 04 24 18 00
92A8: 00 00 22          92  HEX 0000222222322C00  ;u
92AB: 22 22 32 2C 00
92B0: 00 00 22          93  HEX 0000222222140800  ;v
92B3: 22 22 14 08 00
92B8: 00 00 22          94  HEX 000022222A2A3600  ;w
92BB: 22 2A 2A 36 00
92C0: 00 00 22          95  HEX 0000221408142200  ;x
92C3: 14 08 14 22 00
92C8: 00 00 22          96  HEX 0000222214080806  ;y
92CB: 22 14 08 08 06
92D0: 00 00 3E          97  HEX 00003E1008043E00  ;z
92D3: 10 08 04 3E 00
92D8: 38 0C 0C          98  HEX 380C0C060C0C3800  ;{
92DB: 06 0C 0C 38 00
92E0: 08 08 08          99  HEX 0808080808080808  ;|
92E3: 08 08 08 08 08
92E8: 0E 18 18          100 HEX 0E18183018180E00  ;}
92EB: 30 18 18 0E 00
92F0: 2C 1A 00          101 HEX 2C1A000000000000  ;~
92F3: 00 00 00 00 00
92F8: 7F 7F 7F          102 HEX 7F7F7F7F7F7F7F7F  ;■
92FB: 7F 7F 7F 7F 7F
```

As a side note, this is an odd program in that it doesn't actually do anything. It just creates a data table. Assemble it anyway and save the object code under the name ASCII SET.

To test all this out, you can use this simple Applesoft program. You probably should verify that you can at least get this much to work before diving in and trying to use the routines from within your own machine language programs.

```
 0  PRINT CHR$(4);"BLOAD ASCII SET,A$9000"
 10  PRINT CHR$(4);"BLOAD CHR GEN,A$300"
 20  HGR: HCOLOR=3
 30  HPLOT 0,0 TO 279,0
 40  HPLOT TO 279,159
 50  HPLOT TO 0,159
 60  HPLOT TO 0,0 : REM DRAW FRAME
 100  CALL 768: REM ACTIVATE ROUTINE
 110  VTAB 1: HTAB 10
 120  PRINT "HI-RES CHARACTER GENERATOR"
 130  END
 140  REM USE RESET OR PR#0 TO TURN OFF
```

Summary. At this point you should feel fairly comfortable with the idea of how a hi-res character generator works. The ideas presented here rely heavily on a general degree of familiarity with a variety of techniques discussed in earlier issues, specifically, output vector use and interception, memory mapping of the hi-res and text screens, and of course general techniques of machine language programming. If you are having difficulty in any of these areas, you may wish to review previous issues.

All in all, you should find the approach shown here to be much easier than you first thought. The similarities between the text and hi-res screens greatly reduce the amount of difficulty in creating a character generator.

Next month, we'll do a character editor to create your own hi-res character fonts (the term used for the character design), and also take a brief look at how hi-res graphics in arcade-style games can take advantage of these same techniques to create a wide variety of effects. ■

NEW Unlocked Apple Utilities®

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NEW! Frame-Up

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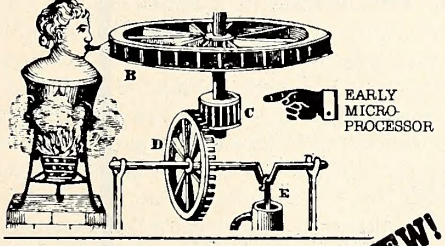
26 NEW FONTS for Apple Mechanic's Xtyper and Hi-Writer programs. Most are full 96-character fonts, large & small, of fully-editable characters. (Apple Mechanic required)

BEAGLE MENU: Use with your disks. Display only the filenames you want (e.g. only Applesoft files or only Locked files) for one-key cursor selection/execution. Space-on-disk, catalog scan, optional sector-number elimination.

TYPEFACES for Apple Mechanic: $20.00
(Includes Peeks/Pokes Chart & Beagle Menu Utility)



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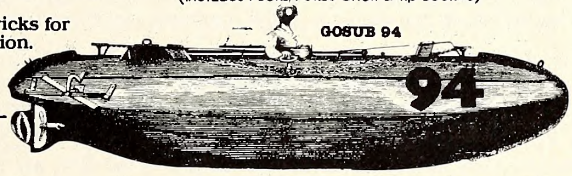


```
10  FOR A = 1 TO 22: PRINT CHR$(ASC (MID$(
    "IJ—!IPX(T!ZPVS!TJTUFS@", A, 1))—A/A);
20  FOR B = 1 TO 4: C = PEEK(49200): NEXT B, A
```

DOS Boss

DISK COMMAND EDITOR
BY BERT KERSEY & JACK CASSIDY

RENAME COMMANDS & ERROR MESSAGES: "Catalog" can be "C"; "Syntax Error" can be "Oops" or anything you want. Protect your programs; unauthorized save-attempt can produce "Not Copyable" message. Also LIST-prevention and one-key program-run from catalog.

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BY TOM WEISHAAR

HIGH-SPEED DOS! Take a look—

Function	Normal	Pronto
BLOAD HI-RES IMAGE	10 sec.	3 sec.
BSAVE HI-RES IMAGE	12 sec.	6 sec.
LOAD 60-SECTOR PROGRAM	16 sec.	4 sec.
SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
BLOAD LANGUAGE CARD	13 sec.	4 sec.
TEXT FILES		(no change)

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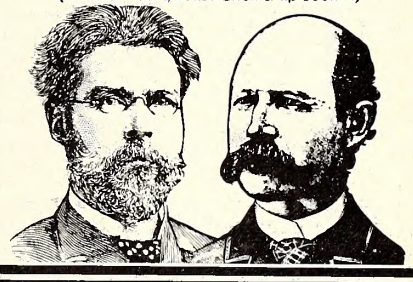

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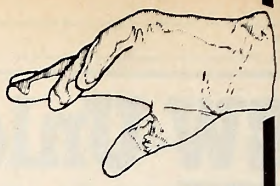

VOLUME TWO!

&Amper~Magic™

by Bob Nacon

The success of the original Amper-Magic™ program package and the introduction of its technique for attaching new commands to Applesoft programs has stimulated the production of Command Library™ packages designed around a 'theme' such as information display or output, input, memory management, etc., which will enhance your Applesoft programs. They will give your program a professional operation and appearance by increasing speed, reducing size, and giving you features you never could have before, while still allowing you to program with the ease of BASIC.

Amper-Magic Command Library No. 2 is dedicated to information display and output capabilities. Read on and enjoy the new programming power Amper-Magic Command Library No. 2 will give you.

This disk contains 27 machine language routines ready to be inserted quickly and painlessly into your own Applesoft programs. Included among them is the most powerful PRINT USING routine yet created for Applesoft, as well as some small but very handy routines for controlling the appearance and activity on the display screen.

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** Access the most powerful PRINT USING command EVER for the Apple. It sure does more than just line up decimal points! It works with strings of characters as well as numbers, and lets the program decide whether to make them Flash or Inverse or Normal depending on conditions you specify. With numbers, you can have fixed or floating dollar sign and/or optional commas and a variety of fill characters. You can embed standard phrases within your format design. You can even print to the screen WHILE outputting to the printer! And generate NO GARBAGE to collect! All in all, the most powerful PRINT USING yet!

** Print to the screen while a peripheral is active

** Save and restore instantly any text screen, no matter how complex with flashing, inverse, and any window settings...

** Make your program WAIT a length of time specified in ordinary seconds (to the tenth of a second); the time may be a variable or expression which can be controlled by the program...

** Print anywhere on the screen under program control, either with absolute movements or with relative movements...

** Print string arrays to any device, with or without an appended special character, and WITHOUT A LOOP...

** Set, clear, or toggle ANY bit or bits anywhere in RAM memory...

** Check the keyboard when called, pause if SPACEBAR is pressed, then continue if SPACE is pressed again or GOTO a location if RETURN is pressed...

** Print the current text screen on command or from the program...

** Send ASCII characters to peripheral devices and POKE peripheral card memory to set or clear bits for control purposes...

** AND MORE....

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DOSTALK

BY TOM WEISHAAR

Bert Kersey, the fellow who used to write this column, says to say hello. He's the one whose picture used to appear at the top—remember the guy, obviously from California, with a disk drive to his ear? Folks say his dog Sophie really wrote the column. It's not true, though. Sophie is a lot funnier than Bert. . . .

Decrying Disk-Drive Decibels. Apple disk drives make a lot of noise. In fact, I've never met one that you had to hold up to your ear. Most of them are leather-lunged little devils that will moan and groan your head off if you let them. There's a guy here in Kansas who says that he has four disk drives and that they all sound different. Each of the little whelps seems to have its own personality.

Those of you who've been at this for a while probably understand a bit of this clatter. If DOS is new to you, stay tuned; you'll find some explanation of it here. Readers of this column can expect to find unabashed enthusiasm for the Apple II; cynical remarks about CP/M and the Pascal Operating System; and tips, tricks, and kind words for plain old Apple DOS.

In the Beginning Was Init. What would be a more suitable place to begin than with *init*? Even those of you who first sat down at an Apple last week have used this DOS command by now. And those of you who are old pros may be surprised at what you don't know about it. After this initial discussion, we'll talk about the changes Apple made to DOS 3.3 in January when it released the Apple IIe.

We all know init is the command you use to make a brand-new disk work. If you really want to hear your disk-drive holler, slip in a brand-new disk and do a few catalogs, loads, or saves. Its plea will be "I/O error." Always keep a brand-new disk around in case one of your drives gets recalcitrant. When it finally sends back the message "uncle" you'll know it's had enough.

Init's younger brother is named *boot,* the friendliest of the DOS commands. This is because you usually don't have to type anything to execute it. (At least 80 percent of computer literacy is knowing how to type.) At any rate, init and boot are brethren. They share a couple of subroutines inside DOS. When you do an init, DOS replicates itself onto a disk. When you boot that disk, DOS brings itself back to life.

Greetings. In addition, when you boot a disk, it automatically runs one of the programs stored on it, the *hello program.* When you initialize the disk, the program you want to be the hello program must be present in your computer's memory so it can be saved on the new disk.

What often confuses people is that every disk you want to use must be initialized, but probably only 10 percent of these will ever be booted. Nine out of every ten disks you meet are used to store word processing, financial modeling, or other types of data files.

"Why do I have to put a hello program on a disk I'm just going to use for data storage?" people ask. The answer is that there's no good reason for it. It's just the way things are normally done. But in a moment we'll teach the old DOS a new trick.

The init command does three things to your disk: it *formats* the disk, puts a copy of DOS itself on the disk, and saves the hello program. You must use the init command on new disks before they will work with your Apple. You can also reinitialize your old disks, *but whatever is on those disks will be erased.*

Now the Syntax. *Syntax* is a word apparently invented to churn the stomachs of kids flunking French in college. One of the many things Apple teaches is that *syntax* can be a useful word. Presumably, however, there are those flunking computer-science classes right now who cringe at the cheerful greeting, "syntax error."

The init command requires that a file name follow it. This name is the name that will be given to the hello program. Incidentally, if you don't have a Basic program loaded when you enter the init command, your new disk will still end up with a hello file on it; it will be empty (usually).

After "init file name" you may include a volume, slot, or drive number. One of the great beauties of Apple DOS is that these things are optional. With many other disk operating systems, you have to type in the volume, the slot/drive, or what color pajamas your disk wears every time you turn around. This, as you may notice, is user-hostile.

A Volume on Volumes. If you don't supply a volume number, your disk will automatically be given the improbable volume number 254. This is the highest possible volume number—they stretch on down to 1. If you specify a volume number less than 0, you'll get a syntax error; if you specify 0, you'll surprisingly get 254; if you specify any number over 254, you'll get a range error.

(If for some reason you need to know the volume number of a specific disk, just catalog it. The only way to change a disk's volume number is to reinitialize the disk.)

After all this data on volume numbers, those of you who are new around here may get the idea that volume numbers are pretty important. In fact, unless you have a hard disk drive or a program that needs to be very compulsive about where it stores its data, volume numbers are close to useless, and you can forget about them.

About Those Noises. When you type in the init command and press return, the first thing you'll hear out of your disk drive is a terrible groan or clatter. This is because DOS has just told your disk drive it is reading track 40 and it should move to track 0. Now we all know that Apple drives only have thirty-five tracks. So when Uncle DOS says this he knows your drive is going to slam into the stopper just beyond track 0 at least five times and probably more. This dirty trick assures everyone that we start on track 0. Your disk controller card pulls the same trick every time you boot a disk.

After your drive quiets down from this merciless treatment, listen very carefully and count very quickly. You will hear exactly thirty-four small "bips" as the magnetic recording head inside your drive moves from track to track and pounds spikes into your disk that mark the beginning and end of each track's sixteen sectors. At the same time it fills every sector with 256 zeros.

After this you will hear a sliding sound as the head moves to track 17 (in hexadecimal that's $11). This is the track DOS uses to write down what is stored where on the disk. The stop here is to fill in some initial information.

Then you will hear another sliding sound as the head moves to track 0. Here Uncle DOS procreates. An exact image of the DOS in memory is written on the disk in tracks 0 and 1 and part of track 2. Whenever this disk you are initializing is booted, this image of DOS will be brought back into your Apple and given life. If your active DOS has any mutations or bugs (whether good or evil), they will be passed down through the generations.

Next comes another sliding sound as the head moves back to track 17 ($11). Uncle DOS is checking to find out where he can save the hello program. Brand-new disks always indicate that the next file should be stored in track 18 ($12). You may hear a few shuffling noises as the program is saved. After that, the init command is finished. The whole proc-

ess takes about thirty seconds.

Genetic Engineering. The init command can be used to make permanent the changes you intentionally put into DOS. Later in the year you'll read here, for example, how to give yourself a new DOS command that will display text files on your screen or printer. After the routines for this command are poked into DOS, you'll do an init. Whenever that disk is booted, you'll have a version of Uncle DOS that contains the new command.

We can demonstrate this now in an area a little more germane to init. Normally the hello program on your disk must be in either Applesoft or Integer Basic. By changing just one byte, however, you can get Uncle DOS to brun an assembly language program or exec a text file for his boot greeting.

```
For      RUN:  C=6
        BRUN:  C=52
        EXEC:  C=20
POKE -25022,C   (normally 6)
```

After making this poke, enter *new* to erase any program in memory and initialize a disk, using the file name you want for your hello program. After the disk has been initialized, delete the empty Basic file you will find on it. Then use the FID program on your System Master disk to put your binary or text file on the newly initialized disk. When you boot that disk, it will brun or exec the file with the hello file name.

This poke only affects the run command DOS uses at the end of a boot. It does not change the type of file that is saved as part of the init command.

Mysterious Problems. This knack Uncle DOS has for saving an exact image of himself during an init can occasionally be a source of frustration. Somewhere along the line, a program gone wild or a careless poke may have introduced an unobtrusive error into DOS. Every disk you initialize from that DOS and any of its progeny will contain the error.

It may seem crazy that changing the value of a single byte inside DOS could do much damage, but look what we were just able to do with only one poke. Here's one more just to prove the point. The following poke should be used only on other people's computers. If anyone asks, you don't remember where you read this:

```
POKE -22397,0
```

Since DOS (or any other software) is so sensitive to small changes, it's a good idea, when you initialize a disk you plan to use for booting, to start with a clean version of DOS. Start by booting your System Master disk. Then immediately do your initializing. *Do not run any programs first.*

In particular, don't run any programs that insert themselves between DOS and its buffers (don't worry if you don't know what that means; we'll get to it in a month or two). *Global Program Line Editor,* for example, is a wonderful program. But any disks you initialize after running *GPLE* will save space for it whenever they are booted.

Yes, Master. A disk you initialize yourself is a "slave" disk. This means that, when the disk is booted, DOS loads itself into whatever memory area it was in when the disk was initialized. Back in the early days of personal computing (twenty-four months ago) this was of some concern. Various Apples had various amounts of memory in them. A slave disk initialized on a 48K Apple, for example, would not boot on a 32K Apple.

If you have an Apple with less than 48K of memory, take it and run, don't walk, to the nearest computer store and buy it a handful of chips. These are much cheaper now than they were the last time you checked. Now that we have the Apple IIe and its 64K minimum memory, upgrading memory will be a lost art within six months. Have it done now.

Then you can forget the program called *Master Create* on your DOS System Master disk. It is used to change "slave" disks into "master" disks (disks that will boot on any size Apple). Since we just talked the owner of the last remaining Apple with less than 48K into upgrading, we don't need master disks anymore. And the slaves are freed.

Look Ma, No DOS. The DOS manual, under one of those little stop sighs, insists that the init command should not be used from inside programs, but only in immediate-execution mode. It doesn't say why. Probably it's because the program with the init in it would become the hello program. If you booted the new disk, its hello program would promptly proceed to init its disk—and erase itself.

But come on, Uncle DOS. We are user-friendly people, right? And we all know human users never realize they don't have any initialized disks left until their Apples are full of an evening's worth of data that needs to be saved. Professional-quality programs should allow you to initialize disks without leaving the program and losing your data.

One trick is to poke old Uncle DOS in a few magical places so that he won't save a hello file. We can also make him forget to save himself—this will leave tracks 1 and 2 empty and give us more disk space for files. (Track 0 will also be empty, but getting Uncle DOS to use it would require major surgery.)

In the February DOStalk, Kersey told you how to free up these tracks on your existing disks. Now you find out how simple it is to initialize your disks that way:

```
POKE -23192,76    (normally 32)
POKE -20743,11    (normally  5)
POKE -20813, 4    (normally 12)
POKE -22263,65    (normally 33)
```

Note that these are negative numbers. The first poke makes Uncle DOS forget to save a hello program. The second poke makes him forget to replicate himself. The third poke makes him mark tracks 1 and 2 as "free" rather than "in use."

You may or may not want to use the fourth poke. It changes the syntax of the init command. After this poke, "init file name" will give you a syntax error. Just enter "init" without a file name to avoid the error. This is handy for reminding you that neither a hello program nor DOS will be saved. However, it also causes programs that use the standard init syntax to fail. One, for instance, is *CopyA* on the DOS System Master disk.

These pokes can be typed in by hand very carefully or can be included in a program. Unfortunately, you can't use init itself to save a version of DOS with these pokes intact. Your homework for this month is to figure out why.

If you include these pokes in the hello program on the disk you usually boot from, any disks you initialize will be data disks. Use them to store graphics, word processing files, or other files. DOS isn't on them and they won't boot; but so what?

(Note to assembly language programmers: after you've made the above changes in a DOS that has already been booted, the following memory areas become free space: $B600–$B65C, $B700–$B7B4, $B7C2–$B7D5.)

DOS 3.3e. When the Apple IIe was released in January, a few fairly minor changes were made to DOS 3.3.

A routine used to calculate random access file position was changed slightly. It's now about 10 percent easier to understand but comes up with the same answers it always did, it seems. This routine lives at 45873 ($B331) Memory Lane.

The DOS boot routine was changed slightly to store the value 255 ($FF) in one of the bytes of the slot 3 scratch space (1275; $4FB) and to throw two new switches, one at 49164 ($C00C) and the other at 49166 ($C00E). The IIe reference manuals hadn't made their way to Kansas City when this article was written, so we can't tell you what these switches do exactly, but at least one of them seems to turn off the IIe's eighty-column card if it is on during a boot.

Booting is somewhat simplified on the IIe, by the way. By pressing the open-apple key (located just to the left of the space bar), control, and reset all at the same time, you can force a reboot even if your system is hopelessly locked up. These keys are separated widely enough so that you won't hit them by accident. (It takes practice to do it on purpose.)

Ever Had Appendicitis? Uncle DOS has always had a very obscure bug in his append command. That's the one you use to add data to the end of a sequential text file. In the old DOS 3.3 this command doesn't work if it is preceded by an exec or an "end of data" error on a file that ends on a sector boundary. Since, on the average, only 1 in every 256 files ends exactly at the end of a sector, and since the exec or error has to precede the append command with no other intervening DOS errors, and since the error has to occur on a different file than the one being appended to, this bug is quite obscure indeed. It is difficult to replicate on purpose. Nonetheless, when the stars are right, it can ruin your day.

That bug has been fixed in DOS 3.3e. Unfortunately, as often happens, the fix caused another bug. Now append fails to work on any file that ends one byte short of a full sector. Before, append failed maybe once in every 10,000 tries. Now it fails once in every 256 tries. This means append still works right 99.6 percent of the time.

If you'd like append to work right 100 percent of the time, use the pre-IIe version of DOS and, before every append, *poke −18851,0.* This exterminates even the obscure bug.

Probably the most important factor in the 3.3e changes is their location. Changes have to be put someplace, and Apple put these in a formerly empty space inside DOS at 47721 ($BA69). This territory has been claimed over the years by many different programs. Beware, programmers—you can't use it anymore. Pencil this into your copies of *Beneath Apple DOS* now.

The use of this space also means that most programs that move DOS to a language card do not work correctly with DOS 3.3e. Using append while DOS is on the card brings your system down in flames.

Speaking of Language Cards. In the February *Softalk* Open Discussion, Chris Riley asked about putting DOS on a language card. This is no trivial exercise, but it can be done. The trick is in handling all the switching back and forth between DOS on the card and Basic on the motherboard. I've spent a couple of weeks trying to do it and my program is all finished—except that it doesn't work.

Meanwhile, Riley and anybody else who's interested might take a look at "Loading DOS 3.3 on the Language Card" in the July/August 1981 *Call −A.P.P.L.E.* and "Notes about DOS Mover" in the November/December 1981 issue. Both articles are by Cornelis Bongers. The program as published works just fine with the pre-3.3e version of Apple DOS. What's beyond my capacity to understand is that the folks at *Nibble* own the rights to this program. The manager of data processing always did say programming was too complex for me.

See you next month.

All About Applesoft

by Doug Carlston

Many programs would benefit if it were possible to mix hi-res graphics and text on the Apple screen. Although there is a four-line text window available at the bottom of the hi-res screen, that won't cut the mustard if, for example, we want to design a graph with two scaled and labeled axes.

There are several ways around this limitation. Some of the best involve convincing your Apple to print on the hi-res screen rather than on the text page. Unfortunately, this kind of convincing requires talking to the Apple in its own native machine language—Applesoft won't do.

Several years ago Apple published and distributed to its dealers a booklet and a set of disks called *Apple Software Bank Contributed Programs Volumes 3–5*. Volume 3 contained a hi-res character generator and character table.

If you can get your hands on that disk, your life will be much simpler. If you can't, you're going to have to type in two long and very boring programs to create those routines.

This column is not dedicated to boring anyone, and if this were not such an incredibly useful tool, we'd never ask you to do anything so tedious. But, just this once, do it. It's worth it.

Once the dirty work is done, we'll use the hi-res character generator to create a program that will track your weight over an eleven-week period and plot the results on a graph. If tracking your weight has no appeal, you can easily change the labels to track your height, IQ, or shoe size.

We'll also learn how to scale graphs, and we'll practice moving programs around into different areas of the Apple's memory—a trick that becomes increasingly important when you start filling up your Apple's memory and need to start searching around for a few free bytes.

This discussion is written for disk drive owners—if you have a cassette, you can still use the hi-res routines but you'll have to renumber the programs that poke the routines into memory so that they and your main program can all be saved to cassette simultaneously.

Let's get the hard work done first. There are two programs that poke data into memory. The first one pokes in a machine language program that generates characters on the hi-res screen. The second (and longer) program pokes in a table that describes those characters in excruciating detail. Make sure that you boot a disk before you start typing either program—you'd hate to type in something this long and then discover that you had no way to save it:

```
20  FOR X = 5120 TO 5361
40  READ A: POKE X,A: NEXT
50  PRINT CHR$(4);"BSAVE CHARACTER
    GENERATOR,A5120,L242"
380  DATA 72,32,88,255,134,78,186,189,0,1,133,55,169,60,133,
    54,166,78,141,87
390  DATA 192,141,82,192,141,85,192,165,230,201,64,240,5,169,
    32,141,84,192,141,206
400  DATA 3,141,80,192,169,0,141,205,3,169,127,141,207,3,169,
    104,141,204,3,104
410  DATA 72,132,78,201,141,240,45,201,140,208,43,160,0,132,
    42,173,206,3,133,43
420  DATA 173,205,3,201,255,240,1,152,145,42,200,208,251,230,
    43,165,43,56,237,206
430  DATA 3,201,32,208,231,132,36,132,37,24,144,108,240,108,
    165,37,74,41,3,13
440  DATA 206,3,133,43,165,37,106,8,10,41,24,133,42,10,10,5,42,
    10,40,106
450  DATA 24,101,36,133,42,104,45,207,3,72,173,204,3,74,74,74,
    133,39,104,72
460  DATA 42,38,39,42,38,39,42,38,39,41,248,133,38,160,0,177,
    38,132,79,160
470  DATA 0,72,173,205,3,240,6,201,255,240,2,177,42,145,42,
    104,81,42,145,42
480  DATA 164,79,165,43,24,105,4,133,43,200,192,8,208,217,230,
    36,165,36,197,33
490  DATA 144,16,165,32,133,36,230,37,165,37,197,35,144,4,165,
    34,133,37,164,78
500  DATA 104,96
```

When you have finished typing that in, run it, and a machine language program called *Character Generator* will be saved to disk. You may also want to type *save Character Generator Maker* in order to save your Applesoft program, just on the off chance that you made an error and will need to fix the machine language program later.

Here is the program that pokes in the character table:

```
20  FOR X = 4470 TO 4826
30  READ A: POKE X,A: NEXT
40  FOR X = 4352 TO 4359: POKE X,0: NEXT
50  PRINT CHR$ (4);"BSAVE CHARACTER TABLE,A4352,L474"
220  DATA 24,0,0,64,32,16,8,4,2,0,60,66,98,90,70,66,60,0,16,24,
    20,16,16,16,124,0,60,66,64,48
230  DATA 12,2,126,0,60,66,64,56,64,66,60,0,32,48,40,36,126,32,
    32,0,126,2,30,32,64,34,28,0,56,4
240  DATA 2,62,66,66,60,0,126,66,32,16,8,8,8,0,60,66,66,60,66,
    66,60,0,60,66,66,124,64,32,28,0
250  DATA 0,0,24,24,0,24,24,0,0,0,24,24,0,24,24,12,32,16,8,4,8,
    16,32,0,0,0,62,0,62,0
260  DATA 0,0,4,8,16,32,16,8,4,0,60,66,64,48,8,0,8,0,56,68,82,
    106,50,4,120,0,24,36,66,126
270  DATA 66,66,66,0,62,68,68,60,68,68,62,0,60,66,2,2,2,66,60,0,
    62,68,68,68,68,68,62,0,126,2
280  DATA 2,30,2,2,126,0,126,2,2,30,2,2,2,0,60,66,2,114,66,66,60,
    0,66,66,66,126,66,66,66,0
290  DATA 56,16,16,16,16,16,56,0,112,32,32,32,32,34,28,0,66,34,
    18,14,18,34,66,0,2,2,2,2,2,2
300  DATA 126,0,66,102,90,90,66,66,66,0,66,70,74,82,98,66,66,0,
    60,66,66,66,66,66,60,0,62,66,66,62
310  DATA 2,2,2,0,60,66,66,66,82,34,92,0,62,66,66,62,18,34,66,0,
    60,66,2,60,64,66,60,0,124,16
320  DATA 16,16,16,16,16,0,66,66,66,66,66,66,60,0,66,66,66,36,
    36,24,24,0,66,66,66,90,90,102,66,0
330  DATA 66,66,36,24,36,66,66,0,68,68,68,56,16,16,16,0,126,64,
    32,24,4,2,126,0,60,4,4,4,4,4,60,0
```

Run it and then type *save Table Maker*. If you were able to find the contributed programs disk, you'll note that this table is only a portion of the one on the disk. For the time being, we've omitted lower-case and control characters. Including them would have about tripled the typing job.

If you looked closely at the addresses where these programs poked, you may have noted that they are right in the middle of that area of memory between the text page and the hi-res page where most Applesoft programs reside (look at the memory map on page 141 of your DOS 3.3 manual if you want a refresher). If you ate your Wheaties this morning you might even have been wondering if this wasn't going to cause something of a conflict once we got around to writing our Applesoft graphing program.

If you were actually wondering that, go to the head of the class. If we'd tried to write an Applesoft program of any length, it would even-

tually have overwritten the two machine language routines, and we would have had no hi-res character set.

Applesoft programs usually load starting at location 2048. However, it is possible to force them to load at other locations. There's a pointer in locations 103 and 104 that indicates the starting address for an Applesoft program. Try peeking those locations now:

```
PRINT PEEK(103), PEEK(104)
```

You should get:

```
1               8
```

Location 103 stores the low two digits of the hex address, and location 104 stores the high two digits of the address, so if you translate the numbers to hex and arrange them in the order we are usually accustomed to seeing them in, you get 0801. Naturally, your Apple is thinking in hex, not in decimal. However, your lightning-quick mind has already recognized that 801 in hex is the same as 2049 in decimal (8 * 16 * 16 + 0 * 16 + 1).

But wait. You thought we said 2048 was the starting address, not 2049. Indeed it is. However, for various obscure reasons, the pointer actually points to the byte after the starting address. In fact, there is another rule: the starting address itself must always contain a zero. Try this:

```
PRINT PEEK (2048)
```

So let's write a routine that will force all subsequent Applesoft programs to load somewhere up in high memory. As we'll only be using hi-res page one, the memory associated with page two is a good place. Checking the map, we see that page two begins at 4000 hex, usually written as $4000, or 16384 decimal. The first thing to do, then, is to change the pointer so that it points at $4001.

The high byte of $4001 is $40; the low byte is $01. In order to poke these values into the Apple we have to convert them to decimal (Applesoft uses decimal; the Monitor uses hex). The number 1 is 1 in hex or in decimal. Forty hex is the same as 4 times 16, or 64. So here's our line of code:

```
POKE 103,1: POKE 104,64
```

One last thing to do—ensure that the first byte is zero:

```
POKE 16384,0
```

Once we've typed in these three pokes, any Applesoft program we load will load up in the hi-res page two area. Here's a quick test. After you've keyed in the three pokes, load in any Applesoft program. List it to make sure it's there. Then type *hgr2:text.* This will clear page two and then put you back in text mode. Now try to list your program. All gone.

Remember, you have to change the low memory pointer *before* you load your Applesoft program—you can't do it from within the program. So let's write a little introductory program that turns on the graphics and moves the start of program address:

```
10  HGR
20  XX = PEEK ( - 16302)
30  POKE 103,1: POKE 104,64: POKE 16384,0
```

Save this program under the title *Diet Hello.* We'll run it to change the program starting address before we load our main graphics program.

Now type *new* and let's start work on the graphing program:

```
10  DIM A%(200): GOSUB 1000: GOSUB 3000: GOTO 100
```

The first thing we do is reserve space via the dimension statement for all of the data we expect to be entering. Then we jump to our two setup routines. Subroutine 1000 sets up the graph on the hi-res page and subroutine 3000 sets up the menu on the text page:

```
1000  REM *** PRINT GRAPH ***
1005  GOSUB 2000: HCOLOR= 3: PRINT CHR$(12): VTAB 1: HTAB
      1: PRINT "LBS"
1010  FOR X = 0 TO 9: VTAB 22 - (X * 2 + 1): HTAB 1: PRINT 100 +
      (10 * X): HPLOT 23,X * 16 + 20 TO 27,X * 16 + 20: NEXT
1020  VTAB 23: HTAB 7: FOR X = 1 TO 11: PRINT X" ";: HPLOT 28
      + 21 * X,168 TO 28 + 21 * X,172: NEXT : VTAB 24: HTAB
      19: PRINT "WEEK";
1030  HPLOT 25,0 TO 25,170 TO 270,170: GOSUB 2010: RETURN
2000  REM TURN ON HI-RES CHARACTER SET
2005  PR# 0: IN# 0: POKE 54,0: POKE 55,20: VTAB 24: HTAB 1:
      PRINT " ";: POKE 972,16: POKE 974,32: HTAB 1: PRINT " ";:
      CALL 43089: RETURN
2010  REM TURN OFF HI-RES CHARACTER SET
2015  VTAB 24: HTAB 1: PRINT " ": PR# 0: CALL 43089: RETURN
```

Let's walk through this together. The first thing the graphics routine does is jump to a subroutine at line 2000 that turns on the hi-res character set. Probably the best way to handle line 2005 is to treat it as one of the natural mysteries of the world and not to worry about it too much. It sets things up so that the print command calls our machine language routine and writes on the hi-res screen instead of the text screen. If your curiosity is insatiable, try to get your hands on the booklet that goes along with volumes 3 through 5 and read up on it there.

The rest of line 1005 sets the drawing color to white1 (color 3) and then clears the screen—we could have used hgr, but printing CHR$(12), or control-L, works just as well with our routine active. It then prints the label for our vertical axis in the upper left-hand corner of the screen.

Line 1010 does a lot. This is the line that prints the numbers from 100 to 190 up the left-hand side of the screen and then makes little hash marks next to them. Let's see how it works.

The variable X is going to run from 0 to 9 in value. The first thing we do with X is set our vertical tab. Then we calculate a weight based on X. Finally, we choose the horizontal line on which to print our hash mark. Look at the three formulas in that line and at their values as X changes. Table 1 shows the results of these formulas.

X	0	1	2	3	4	5 9
22-(X*2+1) (Vtab)	21	19	17	15	13	11 3
100+(10*X) (Weight)	100	110	120	130	140	150 190
X*16+20 (Y hplot)	20	36	52	68	84	100 164

Table 1.

These formulas are not all that difficult to figure out. Keep in mind that the hi-res screen is 280 pixels wide and 192 pixels high (and that pixel is just a good Scrabble word meaning dot). Since the Apple screen is also 40 characters wide and 24 characters high, a little quick division reveals that each character must be 8 pixels (192/24) high and 7 (280/40) wide. So if you're going to vertically tab down 2 characters, you are moving the equivalent of 16 pixels toward the bottom of the screen.

Line 1020 draws the scale and hash marks for the X axis of the graph. Line 1030 actually plots the two axes and then jumps to a subroutine at line 2010 that turns off the hi-res character set, so that print statements will go back to their old habit of printing on the text page.

Using the two subroutines at 2000 and 2010, you can alternate between printing text on the hi-res screen and on the text page. This feature is useful in our program because we can set up a menu of functions on the text page without disturbing our graph:

```
3000  REM ** SET UP TEXT PAGE **
3005  GOSUB 2010
3010  HOME : HTAB 10: INVERSE : PRINT "WEIGHT TRACKING
      CHART": NORMAL
3020  VTAB 5: PRINT TAB( 5)"L(OAD DATA FROM DISK"
3030  PRINT : PRINT TAB( 5)"E(NTER NEW DATA FROM
      KEYBOARD"
3040  PRINT : PRINT TAB( 5)"S(AVE DATA TO DISK"
3100  RETURN
```

Inverse is a clever command that prints your characters in black on white instead of the other way around. It works well for highlighting important text. Normal rectifies the situation. Another command, called flash, works the same way as inverse does. Flash is particularly useful if you want to create painfully annoying text displays. Use it sparingly.

Now we need to design an input routine. We would like one that not only collects keyboard input generally but that also allows us to bounce quickly back and forth at any time between the graph and the menu on the text page.

```
19  REM ** KEYBOARD STROBE **
20  POKE - 16368,0
21  X = PEEK ( - 16384): IF X < 128 THEN 21
22  IF X = 155 THEN FLAG = NOT FLAG: IF FLAG THEN POKE -
    16303,0
23  IF NOT FLAG THEN POKE - 16304,0
24  A$ = CHR$ (X - 128): POKE - 16368,0: RETURN
```

The escape key toggles between the input display and the graphics display.

When we press escape, which is the same as CHR$(27), X will be equal to 128 + 27, or 155. Whenever that happens, the routine checks the variable named FLAG, which tells it whether we are currently looking at the text page or the graph. Poking - 16304 (or peeking it) puts us in graphics mode; poking - 16303 puts us back in text mode. Both, as you remember, make the switch without erasing anything on either screen.

Next we need to design the main program, which will check to see if we want to go to any of the functions on the menu and will send us there when we ask:

```
100  REM ** MAIN PROGRAM **
110  GOSUB 20: IF A$ = "L" THEN 150
120  IF A$ = "E" THEN 300
130  IF A$ = "S" THEN 500
140  GOTO 110
```

There were three major program parts listed in the menu on the text page: enter data, load data from disk, and save data. Let's start with enter data.

There are two times when we will want to enter data. The first is when we are just beginning to enter information about a person and therefore know that we can start storing it at the beginning of our array. The second, more complicated situation occurs when we want to append new data to an existing file. In that case we'll have to load in existing information, check to see how many days have been entered, and then start entering keyboard information from that point. Let's let K be the variable representing our day counter, and use a flag, FG, to keep track of whether this is a new file or an appendage to an existing file:

```
300  REM ** ENTER DATA **
301  VTAB 5: CALL - 958: PRINT : PRINT TAB( 5)"N(EW PERSON":
     PRINT : PRINT TAB( 5)"A(PPEND DATA": GOSUB 20: IF A$ =
     "N" THEN K = 0:FG = 1
305  PRINT : PRINT "ENTER 0 TO QUIT": PRINT
310  PRINT "ENTER WEIGHT FOR DAY ";K + 1;: INPUT ":";WEIGHT:
     IF WEIGHT = 0 THEN A%(K) = 0: GOSUB 3000: GOTO 100
315  WEIGHT = WEIGHT + (100 - WEIGHT) * (WEIGHT < 100) -
     (WEIGHT - 190) * (WEIGHT > 190)
320  A%(K) = 20 + (190 - WEIGHT) * 1.6:K = K + 1
```

```
330  IF K = 1 OR FG = 0 THEN FG = 1: HPLOT 28 + 3 * K,A%(K -
     1): GOTO 340
335  HPLOT  TO 28 + 3 * K,A%(K - 1)
340  GOTO 310
```

We'll assume that no sane soul will ever permit his or her weight to plummet to zero and therefore will use zero as a signal that the user is finished entering data. Lines 310 through 340 form a loop that continues until a zero is entered.

Line 310 prompts you for your next entry, telling you what day you're on and using a normal input statement to accept your answer, which it stores in the variable WEIGHT. If your entry is 0, line 310 puts the menu back on the text page (subroutine 3000) and then goes back to the main program.

Line 315 tests your answer and makes sure that your response falls within the acceptable limits of 100 and 190. This line uses logical operators, which we discussed a few months ago. For example, the phrase (WEIGHT < 100) has a numerical value of 0 unless WEIGHT is less than 100, in which case it has a value of 1. To see how it works, try testing this line in your head with several values.

Line 320 is a different kettle of fish. What this line does is convert WEIGHT (which can range in value from 100 to 190) into a variable, A%(K), which represents the Y coordinate of the dot to be plotted. This gets a little complicated. The value of Y closest to the top of the screen is 0; at the bottom the value is 191. The number 190 appears 20 lines from the top of the screen; the number 100 appears 164 lines from the top.

Here's how to come up with the formula on line 320:

1. The label 190 is on the third row from the top (see the formula for vtab in line 1010 and table 1). Each line is eight pixels high. Halfway down the third row is 8 + 8 + 4 = 20 pixels from the top.

2. Every 10 pounds of weight is two rows, or sixteen pixels, lower on the screen. Therefore, for every pound less than 190 we must plot 1.6 pixels further down the screen.

3. In other words, for any given weight (WEIGHT), the Y coordinate (also known as the number of lines from the top) is 20 plus the difference between 190 and WEIGHT, or (190 − WEIGHT), multiplied by 1.6.

That's all there is to it. We add 1 to K, the day counter, to get ready for the next day's data.

Lines 330 and 335 handle all of the actual plotting. Line 330 uses the hplot command, which plots a single dot, and line 335 uses hplot to, which draws a line from the last plot position to the new one.

Hplot to is a nice command because it connects all the dots we want to plot. However, we can't use it until we've plotted at least one point using hplot. Therefore, line 330 checks for that, and if we're entering the first day's data or if we're beginning to append data (first point), it keeps control and hplots the dot, then jumps to line 340. Otherwise, control bounces down to line 335, where the hplot to command is used.

If you are wondering where the 28 + 3 * K came from, take a close look at line 1020. As you can see, the X coordinate of the first hash mark is 28 + 21 * 1, or 49. This marks the end of the first week, or the seventh day. The hash mark indicating the end of every week is twenty-one pixels farther to the right. Since there are seven days in a week, each day should be 21 / 7, or three pixels farther to the right. That's how we got 28 + 3 * K.

Finally, let's make sure we understand why the Y coordinate is A%(K − 1). A%(K) keeps the data for each day. However, line 320 changes that data from WEIGHT, which was what we input, to a number indicating the Y coordinate of the pixel. We use K − 1 instead of K because we already advanced the counter to the next day at line 320.

The program is far enough along now that you can test it. Save it under the file name Diet.

To run the program, you'll have to *bload Character Generator* and *bload Character Table, run Diet Hello*, and finally *run Diet*. Your graph should appear on-screen. Press escape to see the menu. Try entering some data (ending by entering a zero), and then press escape to see how well it graphed.

Try writing the load and save routines yourself. These should be pretty simple for you by now. Next month we will propose one solution and then turn the mess into a turnkey program using a text file and the exec command. Until then, stay slim! ◨

NEWSPEAK

Bits and Bytes takes a humorous but educational look at the computer age. In this scene, three *Pac-Man* characters are singing and dancing about the joys of computer games.

INDUSTRY MAKES MOVES TO EASE CRISIS IN COMPUTER EDUCATION

In the seventies, educators cried that "Johnny can't read." Today, they're concerned that "Johnny can't compute," but the problem isn't necessarily with Johnny.

Despite overall declining enrollments, colleges and universities can't accommodate thousands of students who want a computer education, and the story's little better at the grade-school level. The problem is not enough teachers and inadequate facilities.

Fewer qualified graduates augurs badly for the beleaguered U.S. computer industry. It now confronts the Japanese challenge knowing that last year there were only fifty thousand engineering and computer-science graduates to fill one hundred fifteen thousand industry slots.

"We've looked at the whole problem and it's pervasive," says Patricia Hill Hubbard, president of the Education Foundation of the two-thousand-member AEA (American Electronics Association). "If we don't expand the basic university plant through increased teaching capacity, it's going to be a moot point how literate our high school graduates are."

Fortunately, the AEA, Hewlett-Packard, Apple, IBM, and other industry leaders are doing something about the problem. With a big assist from Hewlett-Packard, the AEA has launched a fellowship program designed to increase the number of engineering and computer-science doctoral candidates by two hundred and to encourage them to pursue teaching careers after graduation.

Hewlett-Packard has pledged $6 million from 1982 to 1987 for the three-part program involving twenty-two selected universities. It provides tuition support for four-year doctoral work, a stipend for living expenses, and a grant of new equipment if the graduate joins the science faculty of an accredited university, not necessarily one of the twenty-two.

Total benefits of the program to individuals range from $48,000 to $72,000, depending on whether the candidate attends a public or private school. All fellowship loan money is forgiven if the candidate holds an accredited teaching position for three years after graduation—proportionally less is forgiven if the

GOTO page 271, column 2

A MUSICAL PLAY ALL ABOUT KIDS AND COMPUTERS

There's a wonderfully ironic twist at the end of the musical play *Bits and Bytes*. Morton B. Norton, supersalesman of Computerama, gives up. He finally realizes that his potential customer can't possibly afford to buy what he's selling. He tells the young girl, Happy, that public libraries, workshops, clubs, and magazines are ways to learn about and use computers without buying one.

This final-act resolution contrasts well with the opening song of *Bits and Bytes*. The South Coast Repertory touring production, playing mainly in southern California elementary schools for children from kindergarten to eighth grade, begins with a musical number praising the computer revolution and imploring the audience to "get your computer right away."

The entire cast of *Bits and Bytes* consists of five performers, with three actors playing multiple roles. The setting is a funky, make-believe computer store. The set is dominated by an overgrown, multicolored checkerboard that is supposed to be a computer monitor. The disk drive is a box with a slot big enough for a twenty-four-inch floppy disk. Disks are made of flimsy foam-packing material and provide some of the play's more slapstick moments.

With a running time of about forty minutes, *Bits and Bytes* is a very enjoyable kids' view of computers. Morton B. Norton (James LeGros) "can outsell everybody," but he doesn't know that much about computers. His two helpers are Bits (Deborah Nishimura) and Bytes (Sam Hamann). Early on they inform the audience that real bits and bytes are what computers use to remember things.

Hungrily searching for a customer, Norton finds Happy (Laura Leyva), a decidedly *unhappy* little girl. Fast-talking and pushy—a typical salesman—Norton closes in for the kill: "Sales are our game. So let's talk hi-tech. For remembering things a computer is better than an elephant, and a lot cleaner, if you know what I mean."

Bits, Bytes, and Norton break into a song

GOTO page 268, column 1

Pagination Predicted To Spark Another Revolution in the Publishing Industry

An amazing thing has happened at the *Pasadena Star-News*. Over a year's time, the daily southern California newspaper has reduced the number of employees in its composing room by more than half, from twenty-two to nine. At the same time, it has nearly doubled its output. In addition to the *Star-News*, Knight-Ridder Newspapers publishes the daily *All-Sports* newspaper and several local weeklies.

Currently the *Star-News* is the most technically advanced newspaper in the world. It took lots of money, but the owners are like pioneers in a wild new frontier. They'll be called loco at first, and then other publications will recognize the rich, untouched territory opening up.

Utilizing a complicated machine that can do the work faster, more accurately, and, in the long run, cheaper, the eventual goal of the *Star-News* is zero employees in the composing room.

The Newspaper Pagination System (NPS), specially developed for the *Star-News* by Information International Incorporated of Culver City, California, is an expanded and adapted version of its "electronic scissors" computer systems used by several national weekly newsmagazines, including *Time*, *Newsweek*, and *U.S. News and World Report*. The *Star-News* is currently the only newspaper in the world using the complete pagination system for newspaper production.

Above, manipulating the elements of a newspaper page is accomplished easily with a mouselike device. Below, the scanner digitizing artwork for input into the pagination system.

Pagination is the process of actually designing a page on a terminal screen, using a customized graphics tablet and a mouselike device for input. Preedited and coded components (pictures, headlines, text), stored in a computer's memory, are called up onto a grid and keyed into blocks that equal the number of inches and columns on the actual page. All the scaled-down elements on the screen are manipulated to the operator's satisfaction, allowing freedom to try different layouts and arrangements expeditiously. When a page is finished, a complete, camera-ready Velox is printed out through a separate phototypesetting process.

Before the electronic make-up portion of the process, elements of the newspaper page—ads, headlines, stories, bylines, screened photographs, and so on—have been entered into the main computer separately, using a "front-end" computer system, with terminals in each of the major departments. All the front-end terminals are linked to the main computer, where the information is stored for retrieval by the make-up editors who work at the pagination terminals.

The NPS is made up of four subsystems, all working in conjunction with one another. The first is a scanner for digitizing artwork, photographs, and line drawings. The second is a graphic merge and storage subsystem, comprised of two file managers and a pair of 200 megabyte disk drives that receive and store text and formatted illustration files, interfacing with the SDC Text-II host computer system. The third subsystem consists of the page-make-up stations where the pages are format-

GOTO page 269, column 1

Profitable Texas Minimill Bucks Trend

AILING STEEL INDUSTRY RETOOLS

The country's largest steelmaker and "Big 8" chief negotiator, U.S. Steel Corporation, is currently bargaining with labor leaders in hopes of curing the "ailing steel industry." Competition from Japan and Western Europe, the recession, and the loss of the international market have seriously injured big steel companies in this country.

The result is the closing down of large steel mills all over the United States, particularly along the "rust belt" from New Jersey to the Great Lakes. Bethlehem Steel recently closed its Los Angeles plant permanently, laying off more than one thousand workers, and the company is facing the greatest single-year loss in history. Only twenty-five years ago, Bethlehem's L.A. plant had been considered the most modern and efficient steel mill ever built. Nowadays, its West German and Japanese competitors are utilizing the latest technology and management techniques to outproduce and outprofit once-indomitable Bethlehem.

Large steel mills like Bethlehem Steel's permanently closed Los Angeles plant have fallen on disastrous times.

No one can say for sure what could save the ailing steel industry, but examples do exist that point to a different approach to the job of making steel. Not unlike independent filmmakers that flourish away from Hollywood and its aging studios, smaller steel companies are trimming their operations and adapting some of the techniques that have made foreign steel producers so successful in recent years.

For instance, in 1982 Chaparral Steel Company in Midlothian, Texas, reported earnings of $11 million on sales of $160 million. A small operation in comparison to the Big 8, to be sure, but the key word here is profits. In the midst of the worst steel-industry slump since the Great Depression, this thriving Texas "minimill" has its head well above water.

Chaparral, with only seven hundred fifty employees, puts out an average of one hundred tons of steel per hour. They can produce a ton of steel in less than two man-hours, one of the most efficient ratios in the industry. Among the more automated of steel mills, Chaparral has used computers since it opened in 1976. The mill began with "an old Xerox computer," says Michael Redmon of the data processing department, referring to a Xerox 530 that worked in the melt shop.

The Xerox was unable to keep up with the progress of the company, which soon outgrew its capacity. The Xerox, which Chaparral donated to a local high school, was replaced about two years ago with a Hewlett-Packard minicomputer.

The system's primary function is monitoring the casting process in the melt shop—maintaining the proper temperature and logging the number of hours the process is being used. The computer controls the furnace, leaving the operator the ability, of course, to override it. In addition to the monitoring, the Hewlett-Packard provides chemical analysis for all of the metallurgical testing done at Chaparral's lab. The desired chemistry is entered into the system, and it in turn lists the required alloys.

The forty-acre site also includes a medium-section mill where a complete Japanese computer system by Fuji, with a powerful assembly-language-type program, is being used. Five microprocessors control different sections of the mill, while constantly monitoring each other. Position and speed control, sequence timing, and safety interlocking are all maintained by the Fuji system.

Most of the programming had already been done by the Japanese. However, Fuji trained some of Chaparral's employees, including a group of electricians who were sent to Japan to learn trouble-shooting techniques.

Chaparral has gotten more than computers from Japan. They have also adopted some of the Japanese management techniques and business practices, such as uniting the worker and the front office, retraining, and sharing profits. Ironically, while many of their counterparts from the major steel mills are running out of employment benefits, Chaparral workers are collecting overtime.

The seven-year-old minimill is proud of its on-site instructional offerings. Two permanent employee instructors teach electrical and mechanical courses on various aspects of both disciplines. Voluntary classes are held for an average of eight hours per week for six to eight week periods. All hourly employees who attend classes in addition to putting in their regular workweek receive overtime pay.

The classes are limited to those working in the specified fields. However, the company does not limit the educational opportunities to what is offered on-site.

Michael Cseay, an electrical technician in the medium-section mill, has been with Chaparral a year and a half and has been sent to four different training programs in various

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MUSICAL

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for Happy's benefit that proclaims, "Use a computer and you'll have it made. It'll do your homework and raise your grades. Buy a computer and solve your problems for real."

Happy wants to make sure the machine will work before she buys it. ("A wise consumer, a quick chick," says Norton.) He shows her how it can help with homework. ("Oooh, homework. Grody to the max," says Happy.) Then, in one of the play's most madcap scenes, Norton shows her some educational programs—*Pirates of Pronouns, Star Words, Star Words II: The Adverbs Strike Back*, and finally *Spelling*. ("Oooh, gag me, my worst subject," winces Happy.)

The next number is real cute. Norton explains how computers are making old office machines useless. Three of the actors come out dressed as a calculator, a typewriter, and a file cabinet singing a mournful song. "We're obsolete, we can't compete. Last year's smash is this year's crash. We had our day and that's the way it is with technology."

Happy decides that she would like a program that would help her find the right boy. Bits writes the program while, to the delight of the crowd, Happy picks out several young bachelors from the audience and lines them up. ("He must be taller than me and a surfer. He must have hair and not be into disco or slam dancing.") But the program has a bug and doesn't pick any of them for Happy. A computer hacker's worst fears are realized when two four-armed bugs emerge from the computer and dance around gleefully singing a nasty bug song.

Left to right: Morton B. Norton (James LeGros), Happy (Laura Leyva), Bytes (Sam Hamann), and Bits (Deborah Nishimura).

But writing custom programs is not exactly what Happy had in mind. ("It sounds too much like work. I want to have fun.") The games number ensues, with three giant *Pac-Man* characters dancing, singing, and chasing each other. It's great fun and the kids love it.

Finally Norton pushes Happy to sign on the dotted line. ("All you have to do is sign here and we will automatically get your weekly allowance of two dollars and ten cents for the next fifty-seven years, twenty-seven months, and three days.") But Happy wants to make sure that the computer will make her truly happy. She asks the crucial question that causes the machine to blow up.

Happy is definitely not happy after "it's dead." ("Who's going to love me when the power blows?") Trying to calm her down, Bytes says that "when you're sad or distressed, people are best." An appearance by Mr. Chips (Robert Crow) further convinces her that she didn't destroy the computer, but she asked it a question it couldn't answer.

Bits and Bytes, written by Michael Dixon and Jerry Patch, takes a refreshingly innocent approach to computers and manages to say something. Not all the jokes are readily accessible to the children and some of the lyrics get buried with all the dancing and fooling around. Still, the overall reaction at the Glenoaks School in Glendale, California, on February 22 (one of more than two hundred planned performances of the show) was spectacularly good. The basics of computer technology have rarely been presented in such an entertaining and palatable fashion. One teacher, referring to the attitude of the performers, commented: "If teachers could be that uninhibited, the kids would learn a lot more."

Bits and Bytes will be touring throughout the southern California area until June this year. South Coast Repertory is also distributing a brief study guide on computers for teachers who don't have access to computers in the classroom.

STEEL

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parts of the country. He is leaving soon for yet another program in Houston.

"One thing I like about this mill," Cseay comments, "is they want everyone to learn." Cseay, a former Tandy employee, emphasizes the company's desire to "keep up in a hi-tech world." He also adds that employees in all areas of Chaparral get the opportunity to attend classes in their fields.

A nonunionized mill (all employees are on salary), Chaparral does not believe in layoffs, company cars or planes, time clocks, executive secretaries, or executive parking places. In seven short years the company has become one of the top twenty steel producers in the United States. Workers seem happy and they're making a little money.

Bethlehem Steel would love to make "a little money."

PAGINATION

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ted. Typesetting output is produced by the fourth subsystem, made up of two InfoSet 400 Pagesetters. These are devices that set fully made-up, illustrated, broadsheet pages, which are then put in front of a camera and shot into negatives for press plates.

The computerized production of the morning paper occupies parts of three floors of the five-story *Star-News* building. On the first floor, classified ads, taken over the phone, are entered directly into the front-end system's data banks, called directories. A dictionary is built in, and the order of the classifieds can be determined by terminal operators who assemble the pages each day. Classified display ads are also created at make-up terminals on the same floor.

Front-end editorial work and pagination is done on the third floor. On the fourth floor, wire-service information, via satellite, comes straight into the computer system. The chattering Teletypes of the traditional newsroom are now an on-line process.

Production director for the *Star-News* Les Wiltse: "Pagination is here to stay."

Also on the fourth floor, in the air-conditioned and glass-walled computer center, is the scanner doing the scanning once done in the camera room of the composing department. The mechanical paste-up operations that the computer has yet to take over are also done on this floor.

Production director for the *Star-News*, Les Wiltse, oversees the whole computer operation from his office on the fifth floor, as well as fielding calls from other papers interested in how the system is shaking down and consulting with debuggers and production specialists working on the system's gradual expansion.

The most frequently asked question, Wiltse says, is how much did all this cost? The system has a $1.9-million price tag. "Certainly no small change for an operation with our revenue," says Wiltse. "But it's cost-effective. We expect to meet our original estimate of a four-year payback."

The pagination process is still expensive for large newspapers, like the *Los Angeles Times*, which has a front-end system in use but is holding off on pagination. Advancements in disk-storage technology will soon make the system more readily available. The *Los Angeles Times* makes in a week what the *Pasadena Star-News* makes in a year ($15 million). The *Times* also prints about fifteen hundred pages a week to the *Star-News*'s three hundred to three hundred fifty pages.

Still, the benefits of the pagination system in a medium-sized newspaper environment are many, according to Wiltse. "Revisions and corrections can be made very quickly; layout editors never have to rebuild anything from scratch. The display of line art on the screen is a tremendous advantage, especially when the art is irregularly shaped. The layout is automatic. New material is entered and simply flowed into position.

"Make-up editors can take the time they need to get the quality they want. They're not looking over the shoulder of a paste-up person at a drawing board in a bustling composing room anymore."

One of pagination's biggest advantages is in the area of aesthetics. "Cold type [photocomposition] has never been able to achieve the precise make-up of hot metal," Wiltse explains. "Now we have the best of both worlds, the flexibility of cold type and a precision inherent in a modern digital computer to keep gutters and margins even, headlines straight, and all graphic-arts elements under electronic control that cannot be equaled by any mere mortal. Nothing's going to be crooked, and the spacing won't be bad, and nobody's going to drop a line."

"Hot metal" is a reference to the Linotype machine, introduced into the publishing industry in the 1880s. It was a huge contraption of belts and moving arms that rivaled the best work of Rube Goldberg. A skilled operator would retype a story and the machine would cast it into metal lines of type at a speed of about sixty words per minute. Linotype machines were used at the *Star-News* until 1973.

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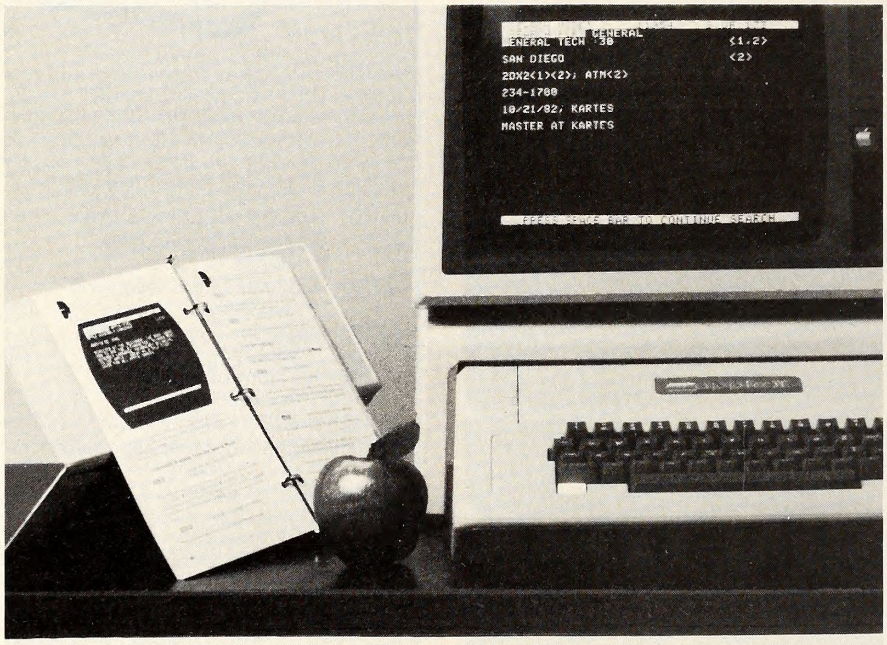
School of Management and Strategic Studies

Two-Year Program Equips Execs for the Future

In the "information age," keeping one's job often requires keeping up with change. Blue-collar and white-collar workers alike may have to adapt to new technologies in our fast-changing, fast-paced society. Even high-level management will be forced into retooling and reorganizing as computer technology provides the necessary implements of change.

According to Western Behavioral Sciences Institute president Richard Farson, the assumptions and styles of traditional management are no longer sufficient in modern businesses. Managers and executives must adapt to the changing times.

The WBSI is helping executives learn to adapt through its School of Management and Strategic Studies, based in La Jolla, California. The school was established to provide an intensive two-year educational program for a limited number of key executives from business, government, and nonprofit organizations.



The School of Management has enlisted the services of some of the nation's leading scholars and scientists. The objective of the two-year ongoing program is to get executives to learn from the faculty and from each other about the changing requirements of leadership in the coming decades.

Participants come from the leadership ranks of the private and public sectors. They are nominated by their sponsoring organizations and are evaluated by WBSI to make sure all class members are compatible.

The six-month course currently being taught is entitled "The Management of Scarcity and Abundance" and follows the school's first two, "The Private Sector and the State" and "Technological Progress and People," which were taught last year. Beginning in July of this year, the course will be "Globalism and Interdependence." Because each of the courses will be repeated at two-year intervals, participants may enter the program any time a new segment is beginning.

When they begin the program, students meet the faculty in La Jolla for a seminar where they are taught the basics of computer teleconferencing and are given hands-on experience with microcomputers. At the end of the session, each participant takes home a computer and a printer, which serves as a link to fellow students and WBSI faculty.

By virtue of its crucial role in the School of Management's style of instruction, teleconferencing is one sophisticated application that participants are introduced to right from the start of the program.

During the six months between meetings, participants and faculty "meet" and converse with each other via modem. Faculty members call up the central computer and, after inputting their passwords, present questions and information drawn from their fields of expertise. Participants read this material at their leisure and can store it for printing hard copy later. They can also challenge the ideas given, offer suggestions and comments, or leave related information based on experience for the rest of the group to read.

Computer teleconferencing allows more than one person on the system at a time. When students call up, they can check to see who else is logged on and exchange live messages with that person. Although participants can communicate via electronic mail on the system, allowing several users on-line at once lets their debate or exchange of ideas happen instantaneously.

Through its courses, the School of Management and Strategic Studies wants the stu-

dents to develop strategic thinking. Courses are divided into modules, each lasting three or four weeks and taught by an expert in the subject. The four themes of "fundamental values," "context of decisions," "human systems," and understanding "the past as prologue," are included in all the courses, acting as the center for discussion. The faculty member responsible for each topic stimulates discussion with questions, case-history problems, simulations, and exercises.

Apple Computer, Anadex, and Hayes Microcomputer donated computers, printers, and modems respectively for students who began their studies at the program's inception in January 1982. New students now pay for their equipment, which includes a Non-Linear Systems Kay Pro II computer and a Gemini dot-matrix printer. The entire $12,000 tab, which includes tuition and equipment fees, is picked up by the participants' employers.

PAGINATION

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Photocomposition revolutionized the composing room in the sixties. The rate at which the new photographic method could generate type in justified form was seventy-six hundred words a minute. Galleys of type are developed chemically and pasted onto boards. Metal press plates are made from the negatives of these page boards. This cold-type process is what the majority of magazines and newspapers use today.

Now the photocomposition process is clearly threatened by the computerized composing room. "The composing room is no longer the beehive of activity that it was just a few years ago," says Wiltse. "Once, one hundred people worked in composing at the *Star-News*. With a tough stance on union negotiations, some generous offers, attrition, and other factors, the composing room now has only nine people."

The only stumbling block to total computerization at the *Star-News* is a union restriction involving the make-up of display ads, a point that is still in negotiation.

Unions across the country are understandably opposing automation of the newspaper business—across the board, from front-end editorial to the composing room. There was an uproar from the same sectors at the introduction of the Linotype and the photocomposition processes as well. Nobody likes losing their job, and no one knows how difficult and expensive retraining will be until it is tried.

Training new editorial and classified people to work on the pagination system is an in-house activity at the *Star-News* and is simpler than might be imagined. Trainees are surprised at how easy the system is to learn and operate. "New employees are given a course on the front-end system as soon as they are hired. Three days of on-the-job training followed by a couple of weeks of hands-on experience at a page-make-up station is usually enough," says Wiltse.

All the union tumult, retraining, and expense aside, "Pagination is here to stay," says Wiltse. And that means it's time to start hawking all those grease pencils, pica rulers, and X-acto knives.

INDUSTRY

continued from page 265

teaching is for a shorter duration.

Thus far, says Hubbard, hi-tech companies have agreed to sponsor eighty of the two hundred fellowships, but their efforts will be undercut in the long run if teacher salaries continue to average 30 percent less than those offered by industry. For that reason, the AEA is also looking into short-term add-on grants to boost faculty salaries, while lobbying Congress and state houses to enlarge their commitment to computer education for salaries and equipment.

Apple will be making some ten thousand computers available to public and private grade schools in California this spring under the tax-write-off provisions of a state bill passed last year. The legislation, similar to a measure defeated at the federal level and recently reintroduced, allows the company to write off the donation at twice cost or cost plus one-half of the unrealized profit, whichever is smaller. Steve Scheier, project director for Apple's Kids Can't Wait program, hopes local Apple clubs will chip in as volunteer teaching aides to turn their neighborhood schools into Apple corps.

According to Hubbard, Apple's donation comes none too soon. "The whole of undergraduate education is in trouble," she says. In California, the annual capital replacement rate of educational equipment runs about 2 percent. If that trend continues, the equipment life cycle will soon be fifty-nine years. "That's the base," she sighs, "and it's absolutely antiquated."

Hubbard is pleased that remedial steps are being taken, but she's concerned that the computer industry will permanently lose the services of many gifted students for whom there is inadequate teaching space today. The gap is too great to fill quickly, she says, and time may be working against us. Demographic trends indicate that the manpower pool that industry must draw on is steadily shrinking.

"If these students today can't get into higher education," she warns, "there won't be engineers to design the products and we'll lose our competitive edge."

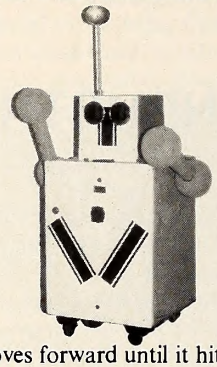
NEWSBITS

☐ **Eat Your Heart Out, Woz.** Get ready for the ME Festival. California State College, San Bernardino, is hosting a computer workshop and technology exhibit April 22–24. Seminars will feature hands-on encounters with microcomputers, including a special series on the handicapped. At least fifty industry exhibitors will display their latest wares. The ten-dollar workshop registration fee includes admission to the exhibit area. ME stands for "microtechnology for everybody."

☐ **Meanwhile, Back at the Ranch.** Unuson is planning to hold the second and third Us Festivals May 28–30 and June 4–5. Both festivals will be at the Glen Helen Regional Park in San Bernardino, California, the site of last year's well-attended extravaganza.

☐ **MudWare on the Move.** The rains pelting California this winter have paid off for N. Urban Shocker. First tons of mud slid into Shocker's swimming pool. Then lightning hit the pool and the resultant chemical reactions formed a superconducting mud puddle with more computing power than a Cray 1. Shocker copyrighted the unusual computer architecture and plans to sell personal mud pies with Dirt, a unique programming language. April Fool.

☐ **Do DROID-BUGS Dream of Electric People?** Two of the cheaper (in cost and performance) hobby robots come from Robot Shack, a division of Dynamic Development, based in El Toro, California. PR-1 has two arms that rotate ninety degrees, two faces (one female and one male), limited hearing, a digital clock, an optional water gun for squirting unfriendly people, a computer control panel, and a belly-button balloon inflator. Controlled by radio waves or computer programs, PR-1 costs $499. The DROID-BUG from Robot Shack is a self-contained, dome-



shaped toy that moves forward until it hits an obstacle, then changes direction and repeats the process indefinitely. DROID-BUG costs $100. Both robots are expensive toys more than anything else, and they should appeal to children but not to many hard-core robotics hobbyists.

☐ **And Now for the Computer Movie News.** Columbia Pictures has acquired the rights to Tracy Kidder's Pulitzer Prize-winning book, *Soul of a New Machine*. The studio has not announced any plans for the material yet. Riding high on the success of *Tootsie* and *Gandhi*, Columbia is on a roll. In these days of steamy Richard Gere and tantalizing Sandahl Bergman, it's difficult to imagine Kidder's retelling of Data General's Eagle minicomputer project making much of an impact on the big screen. But Columbia just may be the studio to pull it off.

☐ **And on the Computer-Music Scene.** Oh, for the days of "Heartbreak Hotel" and "The Twist," when rock 'n' roll was uncomplicated and not striving for relevance. Styx has brought beer-and-broads technorock to the eighties with a decidedly banal offering in its new album *Kilroy Was Here*. Voice-synthesized drivel about "Mr. Roboto" and rock 'n' roll's ability to save mankind from technototalitarianism makes this album a real earsore. Much more interesting is Neil Young's cowboy-lament to the computer age—*Trans*—released on Geffen Records, a Warner label. Most of the songs on the album feature synthesized sounds, including vocoderized singing. With several keyboards, a drum machine, and assorted digital and analog equipment, Young has fashioned a sometimes bleak but always interesting look at a dystopian future. Songs like "Computer Age," "We R in Control," and "Computer Cowboy" are eerie electronic echoes of Orwell's *1984*—decrying the loss of love, individuality, and livelihood.

"Transformer Man" is an especially effective tune about future hero worship of a sort. This is one of the strongest commitments yet to the new digital technology by a serious rock artist. Young's fans have had to survive as many directions in his music as albums he's released. Not ready to abandon his roots, Young will begin each show in his upcoming *Trans* tour with a solo acoustic set and then break out the hi-tech jingles—the same concert format he used in the immensely popular *Rust Never Sleeps* tour a few years back. You'll probably hear Styx's bombastic crud on the radio much more than Young's grand experiment, but don't be put off. Computers are drastically changing the composition and presentation of modern music and Young proves the new direction is accessible to more than just adolescent space cadets.

☐ **No Loud Typing, Please.** Interstate Computing Company has opened the Computer Library in Metairie, Louisiana. The Computer Library is an ambitious project, created to increase the public's knowledge and awareness of computer technology and how it's changing the world. For a yearly fee, library members have use of a variety of personal computers and a large collection of software. Public and member-only seminars are on the docket.

☐ **Architects, Take Note.** *The Computer*, a new annual publication for architects and engineers launched by *Architectural Record*, is scheduled for a mid-May premiere. The publication will include articles on computers for architects, a directory of computer hardware and software service organizations, and a buyer's guide. It will be distributed to some twelve thousand architectural firms identified as "million-dollar-plus companies." ◨

NEWSPEAK STAFF

Editor David Hunter

Contributors Michael Ferris, Jonathan Miller, Marsha Stewart, and Matthew Yuen

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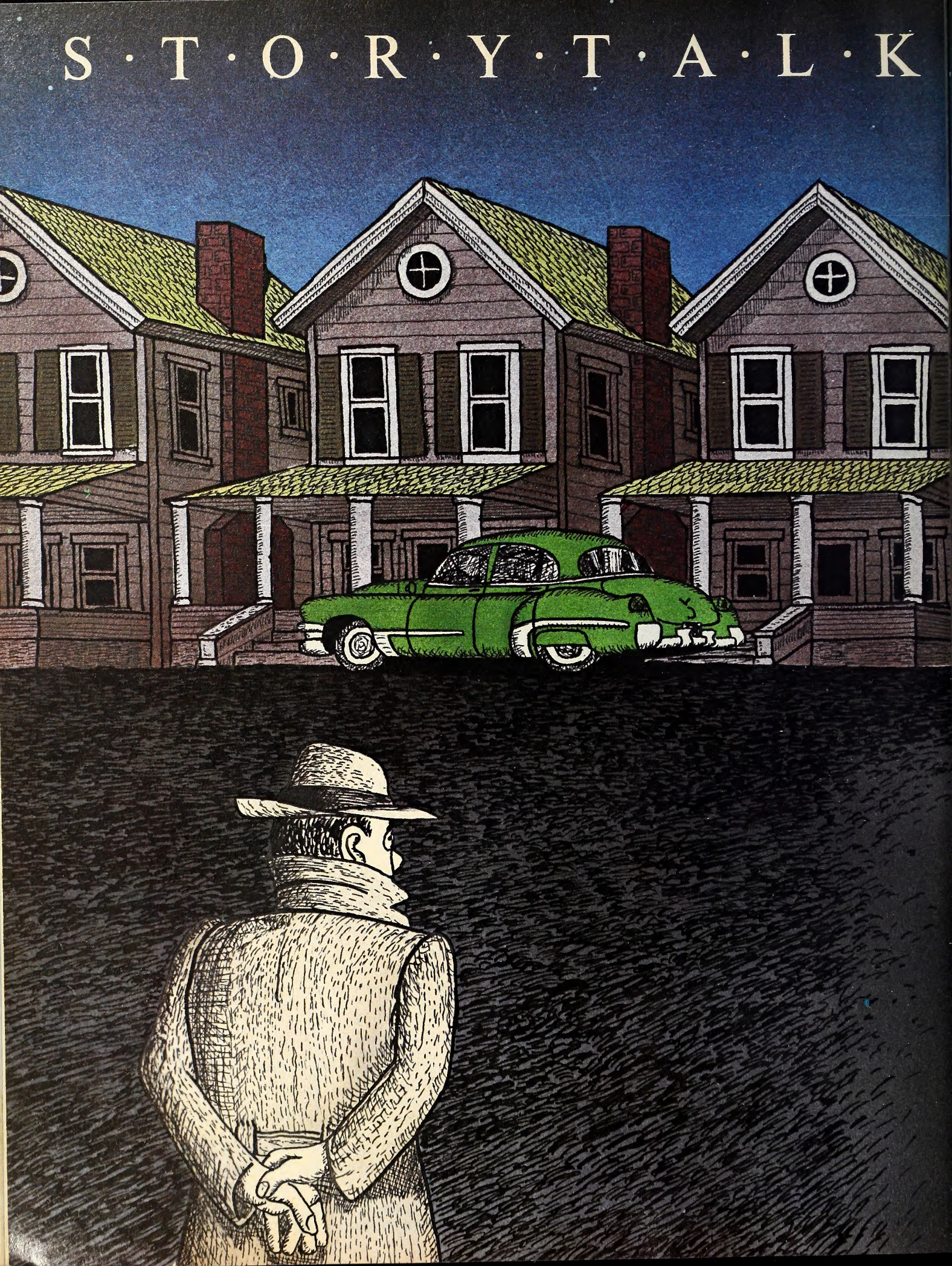


F·I·C·T·I·O·N

APRIL FOOL

BY VIVIAN VANDE VELDE

The back door slammed.

"Is that you, George?" Eloise called.

The door slam made him jump, but the voice made him wince.

"No, dear, it's Jack the Ripper," George whispered.

In all the years they'd lived here, he'd always gotten home at the same time. Yet every day Eloise would come in from fondling those miserable plants that made the veranda look like a tropical rain forest, slam the door, and ask that same pointless question.

George's answer was also part of the ritual, although this time he waited a bit too long before saying it. He was struggling to get his key out of the door while balancing a large, heavy carton, and he hadn't noticed that Eloise was already entering the room behind him.

"What did you say, George?" she shouted into his ear. She insisted she was not hard of hearing but merely surrounded by people who wouldn't speak up. Eloise made a point of always speaking up.

George abandoned the key in frustration and turned to face his wife. "Nothing, dear. Yes, it's me."

"Don't be facetious, George. Of course I can see it's you. What's in the box?"

George sighed—mentally. He'd never dare try Eloise's patience by vocalizing it. "I told you I was going to stop at lunch today to pick up the computer."

Disappointed, Eloise stood in his way tapping her foot.

"Eloise, this box is heavy."

Eloise remained unfazed in the doorway. "And where do you think you're putting that... that computer thing?"

George drew himself a decidedly nasty mental picture, but merely nodded with his head toward the living room.

"Oh no you don't," his wife said. "I don't want all those stupid wires and things all over the place."

"There aren't a lot of wires. Eloise, please, my arms are breaking."

"In the basement."

"Eloise—"

"The basement, George. Or you can stand here holding it till your arms fall off."

Fearing that just such an occurrence was imminent, George nodded. "Yes, dear."

Eloise stepped out of his way. "I'll get the door for you," she offered graciously.

"Thank you, dear," George said.

George gingerly made his way down the basement stairs to his workbench. Eloise followed but looked in no mood to help. George got the light switch with his shoulder.

"Dearest," he murmured, inclining his head toward a philodendron she had been repotting.

She glowered, but pushed her equipment slightly to one side. He eased the box down.

"Do I have time before dinner?" he asked, knowing that she never started before he got home.

Eloise glared some more.

"Ah, good," George said; "then I can set this up."

Again the glare.

"Thank you very much," George said, and he began to struggle the computer out of its carton.

He was surprised that she remained as he hooked everything up; he decided she must be intrigued in spite of herself.

He had bought the computer with the money she had given him for birthdays and Christmases over the years, but she had been furious.

"Computer?" she had said. "What would anybody want a computer for?"

He had given several useful, albeit unlikely, possibilities. Eloise had stared at him blankly and he had begun to describe some of the wondrous things he had seen on the TV special about microcomputers.

"Games," she had said. "You want to play games with it."

"Well, yes, dear, I suppose I do."

Eloise had been bitterly disappointed. She had hoped he would spend the money on something worthwhile, like taking her to Bermuda, but she could only blame herself for trusting him with the money in the first place.

"Wouldn't a pocket calculator do just as well?" she had asked.

And yet here she was watching him with a steady—even impatient—concentration as he set up the computer and put one of the demonstration cartridges into his cassette recorder. She sighed loudly and frequently as they waited for the information to be loaded.

"Which would you prefer—infinite spiral or random squares?"

"Oh, really, George. Get on with it."

"Right. Infinite spiral, then," George decided and keyed in the appropriate command.

"That's it?" Eloise asked in total disgust.

George was so intent on the clear, beautiful image, it took several seconds for him to realize that she had spoken and then several more before what she had said registered.

George looked up in surprise, amazed that anybody, even Eloise, could fail to be charmed.

She shook her head and turned toward the stairs. "Stupid thing," she muttered. But whether she meant her husband or the computer she didn't say.

In the following weeks George retreated more and more to his basement room. He spent hours adapting existing games to be more challenging or devising his own programs.

Drab at work, unmemorable around the neighborhood, submissive with his wife, he turned his computer sanctuary into an exotic world where heavily armed starships and ravenous dragons lurked.

Although Eloise spent her evenings watching television or tending her plants, she resented the time he spent with the computer and nagged at him to keep her company. When he did, he'd fidget, his mind awhirl with complex chess moves to boggle the computer or strategies to navigate a lunar rocket to a safe landing.

"Oh, go on, get out of here!" Eloise would finally scream. "Your twitching is making me crazy!"

"Yes, dear. Thank you very much." And George would scramble to recheck listings and debug programs until all hours of the night.

This had been going on for almost three months when Eloise stopped him as he got up from the dinner table. He was still chewing on his last mouthful of liver—Eloise was the only person George knew who actually liked the stuff—and he had his hand on the basement doorknob.

Eloise had already dismissed him, but now she said, "My sister's having a garage sale."

"That's nice," George said, opening the door.

"I'm giving her that damned computer."

George smiled feebly. Eloise had a vicious sense of humor.

"I mean it, George."

George's arms and neck tingled. "Eloise," he said, trying to chuckle.

"So enjoy it, because the sale is next Saturday."

"Eloise!" he cried.

"It's not open to debate," she warned. "I can't take any more of it. You've become obsessed."

George wished that she would give him an "It's the computer or me" choice, but she didn't. She simply said the computer was on its way out. He tried whining and pleading—he knew it wouldn't do any good to attempt firmness—but Eloise had decided and, as always, George finally found himself admitting that, yes, he was wrong, and, no, he couldn't expect Eloise to put up with that sort of behavior, and, of course, Eloise knew best how to handle such things.

Devastated, he half-stumbled down the stairs and numbly turned on the computer. He caressed the smooth frame and ran his fingers ever so lightly over the keys that would respond instantly and silently to his touch. Damn her, anyway, he thought; she had no right to take away his only friend.

The idea came to him while he was playing a game of *Star Invaders*. He was wishing he could crack the programmer's code so that he could change the advancing rows from alien shapes to the initial "E" for Eloise, because what he wanted more than anything else was to zap his wife. He suddenly surprised himself by saying—out loud—"Why not?"

George quickly glanced over his shoulder to make sure Eloise wasn't within earshot—Eloise didn't approve of people talking to themselves—then gleefully exclaimed, "Why not, indeed!

"This time she's gone too far," he muttered as he flipped through all the literature the computer store had given him with his purchase, "too far." He and his friendly computer were going to get rid of that meddling woman together.

George had gotten to the bottom of a formidable pile of manuals, pamphlets, and clippings without finding anything.

"Help," he typed on the keyboard.

"Syntax error," the computer's screen responded.

"A lot of help you are." George sighed and leafed through the advertising section of a magazine aimed at home computer operators.

Audio recognition capability couldn't help, he decided. Neither could a printer. The trouble was that Eloise rarely even went into the basement. Of course, there were the days she did the laundry and George would find her underwear folded on top of his disk drive; and on several occasions he had noticed potting soil on his work papers. But she never actually used the computer, and George reluctantly admitted to himself that he wasn't likely to cajole, trick, or force her into doing so. Too bad. He had really set his heart on somehow killing her with the computer—poetic justice, he considered it. Even if it were something as mundane as electrocuting her with it.

He glanced at the washing machine only a few feet away, but couldn't come up with anything that wouldn't destroy the computer along with his wife. He patted the computer reassuringly on its CRT screen to let it know he wouldn't do anything to endanger it.

If he hadn't had his mind on electrocution, the ad wouldn't have grabbed his attention; but he had, and it did, and there was the solution to his problem.

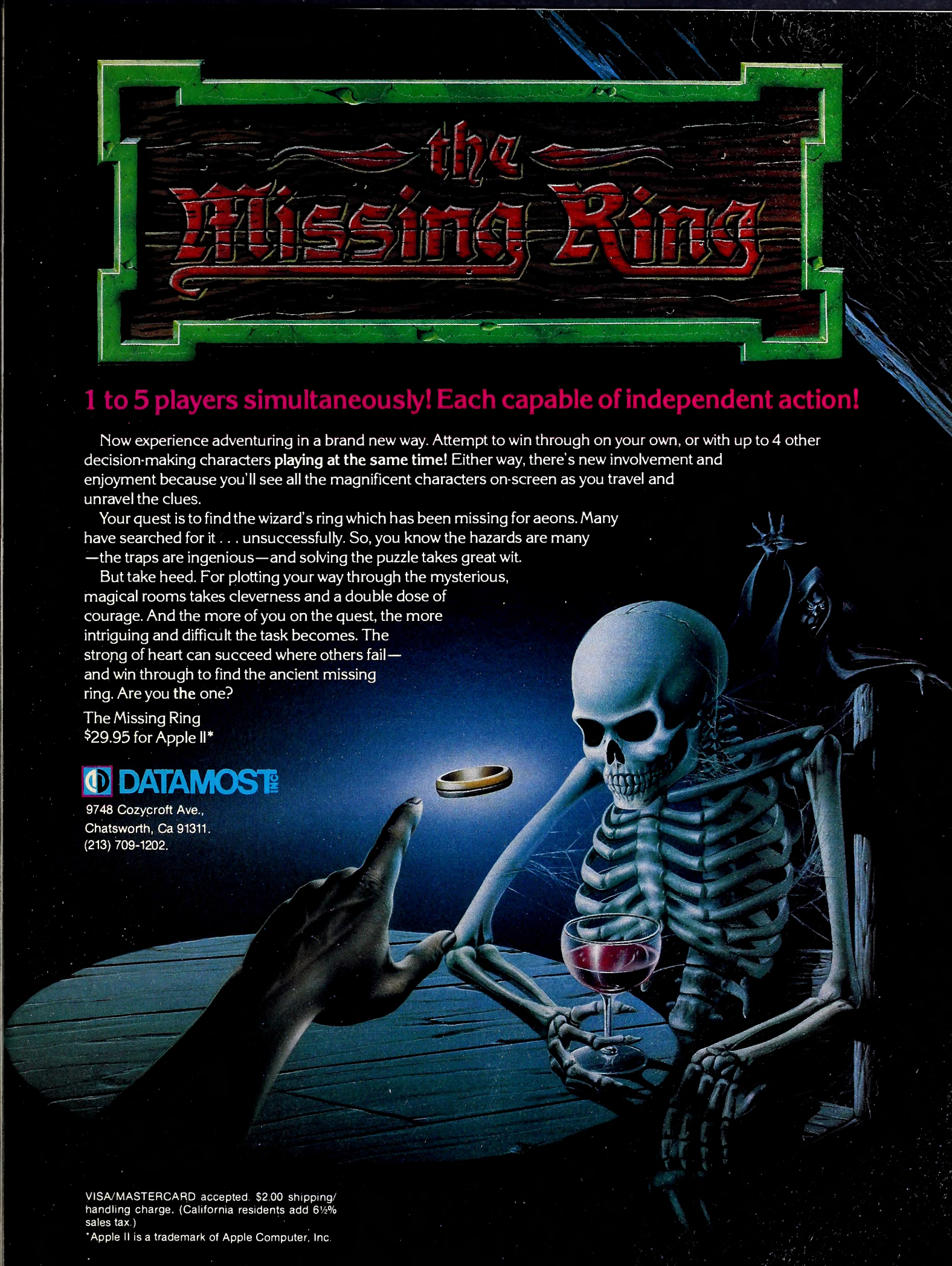
"The Home of the Future," the ad said. "Interface Your House with Your Home Computer."

"Hmm," George said. He read on.

There was a way, he discovered, to hook the computer into the electrical system. Actually, the headline was a bit hyperbolic. The system was actually a sophisticated timer, George realized. Program the computer and at preordained times it would do what you had keyed in.

The ad talked about starting the furnace and water heater half an hour before it was time to get up, turning the lights on dim and increasing their brilliance gently, perking the coffee and toasting the bread, heating the electric rollers—all to help people get to work on time while sleeping in later.

George tapped his finger on this line several times: "And you don't



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even have to be there."

"Preset your computer to do your work for you," the ad suggested. "Sprinkle the lawn. . . . Start your dinner cooking. . . ."

"Kill your wife," George whispered. Again he looked over his shoulder. He really had to stop that.

He sat back and gnawed at a pencil. On TV they always had such complex ways of doing such things. But how? How?

George's imagination had never been fertile, and years of living with Eloise had dried it out even more. By 3:30 he had only come up with one practicable possibility. It wasn't as flashy as he would have liked; but it would do.

One of the things about Eloise that had always grated on his nerves was that she was so predictable. There was never any room for variance in her life. Now that very trait would work to his benefit.

George knew that whenever Eloise was upset she would take a long, hot bubble bath. He could call her from work (the alibi) and say something totally unexpected and rude that would disturb her. She would get in the tub (the scene of the crime) for one of her hour-long soaks. There was a shelf over the tub where she kept her paraphernalia—including the blowdryer (the weapon!) which he would have already computer-set to turn on at a certain time (the *modus operandi*). The vibration would cause the dryer to drop into the water, and that, he was pleased to visualize, would be that.

If the computer store hadn't had the equipment in stock, George would have been lost. As it was, he had withdrawn all the money from their savings account and even cashed a couple of savings bonds. If Eloise had known, George thought with grim satisfaction, she would have killed him.

George spent the next two days installing the system and checking the program for any bugs. He didn't have time to play any of his usual computer games, but he consoled himself by planning all the wonderfully rude things he could say to Eloise in that phone conversation on the big day. He thought of this as a new game, his magnum opus, and he had to have a routine for every contingency.

Finally, on Thursday, all was ready. That morning George could barely keep from whistling as he shaved. Leaving the bathroom, he noted that the hair dryer was in place exactly where he wanted it.

Next, he skipped breakfast. (Eloise believed in breakfast, but she never got up early enough to check on him. Still, he had never tried crossing her before.)

When he went into the basement, he found a Swedish ivy plant on top of his computer.

"Why does she always have to do that?" he hissed. He picked up the pot by the plant itself and smashed it on the edge of his workbench. Then he loaded in the program that would make the dryer start blowing at exactly 3:17.

"It's just you and me, kid," he said in his best Bogart, which wasn't very like Bogart at all. He patted the computer affectionately.

George called Eloise at 3:00.

"About my computer," he started without even saying hello.

"Yes?"

"You're not selling it."

"I beg your pardon?" Eloise said in the tone that always made him lose at least three inches from his already meager height.

"That's *my* computer, which *I* bought with *my* money, and from now on I plan to do what I want and you will kindly keep your nasty little nose and your fat, ugly sister out of my business."

George noticed that everyone in the office had suddenly become very busy.

"George!" Eloise gasped.

"And you know what else?" George added. "I broke your goddamn Swedish ivy." He slammed the phone down, then picked it up instantly. Without even checking to see if they had been disconnected, he screamed, "On purpose!" and slammed down the phone again.

George glanced around the office. Everyone was pretending to be unaware of what had happened, although those who sat farthest away had maneuvered themselves within better hearing range.

That argument had served two purposes. He was counting on it sending Eloise into a frenzy, and it had also made people aware of his presence at the office at the time of her death. George sometimes suspected that he could miss a week or two of work without anyone noticing that he wasn't around. But they all noticed him today. He tried to stifle a smile as he bent over a lengthy report. "George?" he imagined everyone saying. "Oh, yes, he was here at 3:00. I remember because he had a fight with his wife and now he's heartbroken about it."

George worked on thinking heartbroken but kept breaking into chuckles that he'd disguise by clearing his throat. By quitting time he sounded like a man on the edge of pneumonic collapse.

"Feel like a beer on the way home?" George asked a co-worker. He and the colleague always walked in the same direction, but they had always done so separately before. "I had a bit of a tiff with the missis and I sort of need a bracer. We could stop in at the Windmill."

The man looked desperate to find a suitable excuse. "No," he finally said. "Sorry, I can't." He scurried out ahead of George and went home a different way.

George stopped for a beer anyway. Eloise hated the smell of the stuff and wouldn't allow him to have any. He had once had one glass at a wedding and Eloise had complained for a week. George smiled and ordered a second.

A middle-aged woman who looked as if she had been there for some time already was sitting on a stool next to where he stood.

"Nice place," he observed.

The woman glanced at him disinterestedly. "Hmmph."

"Come here often?"

Her look was somewhat suspicious this time but her answer was the same. "Hmmph."

"Real nice place."

"Drop dead," she said and moved down a stool.

George decided it was time to go home.

He entered by the basement door. Not a sound could be heard from upstairs, but there was a pungent, burnt-out smell throughout the house. He glanced at his watch. It was almost an hour past his usual time. What would Eloise have said? He couldn't guess, for in all these years he had never been late before. Eloise wanted him to be punctual.

"But from now on, we can do whatever we want!" he shouted to his computer.

Then he switched on the light.

He gave a wordless cry. The computer was still smoking, its power supply impenetrable in metal housing. The keys were half melted into each other and the whole right side of the console had oozed in on itself.

"What did she do to you?" he screamed. He put his hand out to the charred plastic and burned his fingers.

He jumped back and landed in a puddle. The plastic couldn't have melted that much, he knew. He bent down. It was ordinary water.

The phone call must have been too much, he decided. Instead of simply heading for the bathtub, Eloise must have thrown a bucket of water on his beloved computer.

He dropped to his knees and raised his eyes to heaven. It was then that he realized what had really happened.

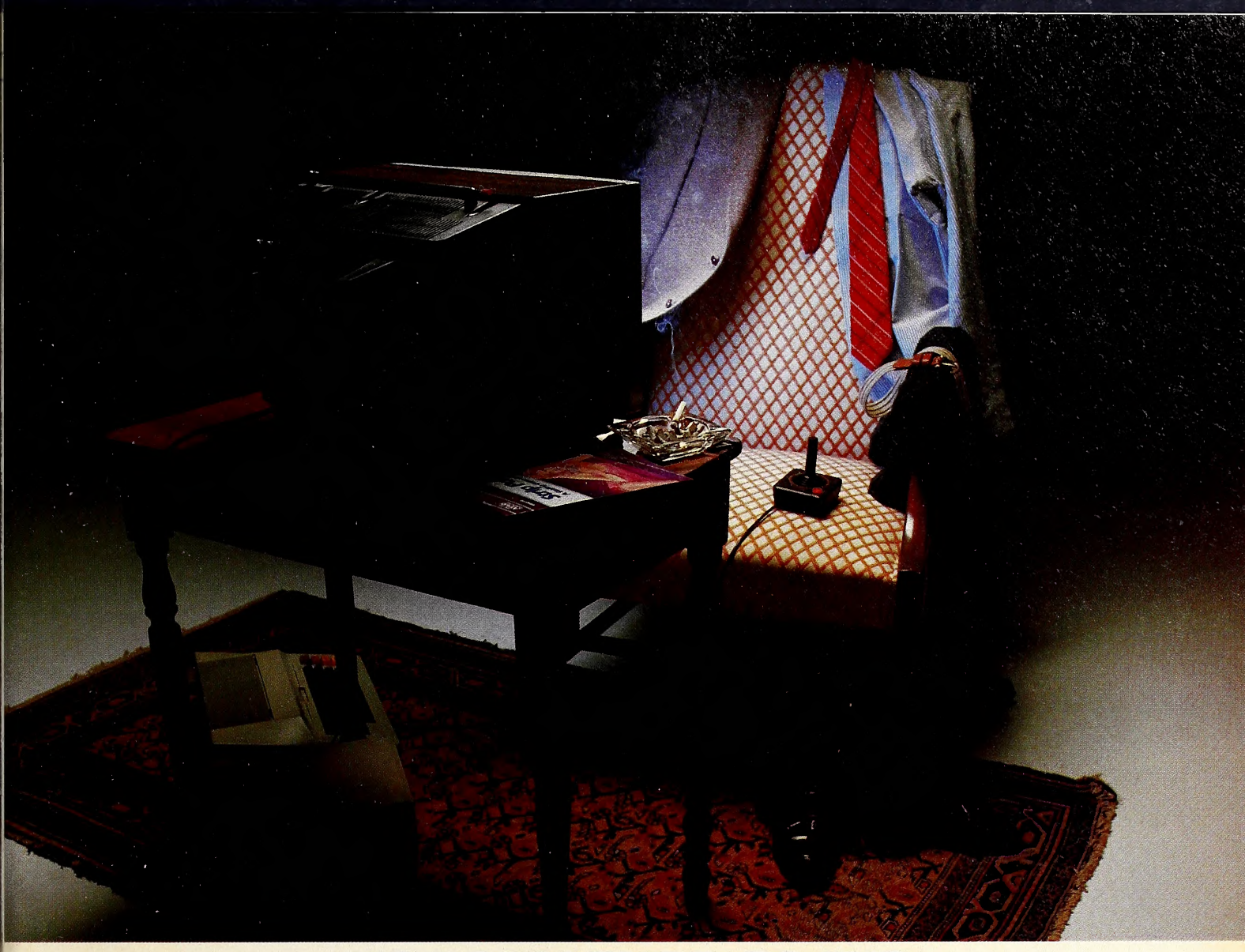
His wife's Swedish ivy—the one he had smashed—had been picked up off the floor. It had been tenderly—George knew how gentle she could be with her plants—placed in a new clay pot and replanted. And then, without maliciousness but simply to help it overcome the trauma its violent unrooting had caused, Eloise had saturated the soil and hung the pot by the one basement window that offered good light—the one directly above his computer.

The damage wouldn't have been so bad if George hadn't left the power on to run his program. Instead of simply being water-damaged, all the chips had shorted out. As George watched, another drop of water gathered at one of the holes in the bottom of the pot. The drop elongated for an unbearably long moment, then fell, sizzling as it hit his computer.

He thought the sound would make him weep; but then he heard something worse.

The back door slammed.

"Is that you, George?" Eloise called. ◨



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Softalk Presents The Bestsellers

It's time for a quiz to find out how many of you have been paying attention in class and doing your homework. Your score won't count against your final grade, so don't panic and don't look at your neighbors' papers. They probably don't know either.

1. What was the main thrust behind simplifying the architecture of the Apple IIe?

2. What well-known microcomputer hardware company has never been able to produce applications software that would lead its own market in sales?

3. Other than spreadsheets—read that *VisiCalc*—what one category of software is always found among the top four positions in the Top Thirty?

See, that wasn't so hard, was it? Now let's check your answers.

1. The streamlined motherboard was intended to facilitate mass manufacturing. A simple test can be conducted to observe the effectiveness of this strategy. Walk into any Apple dealer and try to buy an Apple IIe. Hear your dealer's response and then figure out whether you want to wait that long before taking delivery.

Yes, dear hearts. For all that the good folks at Apple strove mightily to design you a makable machine, they can't make them fast enough. They're selling forty thousand a month of the newfangled version; even streamlined manufacturing processes can't keep up with the demand.

So much for industrial design.

2. You could answer Osborne or KayPro and get half-credit for this one. But this is an Apple text, which should have been hint enough to dredge that hallowed name from some dark recess of your mind. Since time immemorial—or at least since early 1980—Apple has been unable to write software with the best of the independent software vendors. Those gloaters who got this one right will have to relearn their history, however, because Apple is no longer the correct answer.

Remember those forty thousand machines a month mentioned in answer 1? What do you think is happening to them? A hint: They aren't playing *Little Brick Out*. Many of them are busily engaged in word processing, using *Apple Writer II*. So many new machines are so occupied that *Apple Writer IIe* walked away from the rest of the pack in February, thus becoming the first Apple software product to head the Top Thirty.

That might be a more impressive statistic if Apple hadn't had the home-court advantage in developing specific software for the IIe. Nevertheless, *AWII* dethroned *Choplifter* to reign supreme in the first full month of IIe sales.

3. If you answered this with a specific genre of games, you could lose. But if you just answered entertainment software, you get full credit and another chance to relearn history.

Referring back to those aforementioned forty thousand new Apples in February, another thing they aren't doing besides playing *Little Brick Out* is playing anything in great numbers. What we're looking at is the silicon-implanting of the small-business set.

Not only was *AWII* first; *VisiCalc* was second, *PFS: File* was third, and *Home Accountant* was fourth. Nary a game in the bunch unless you

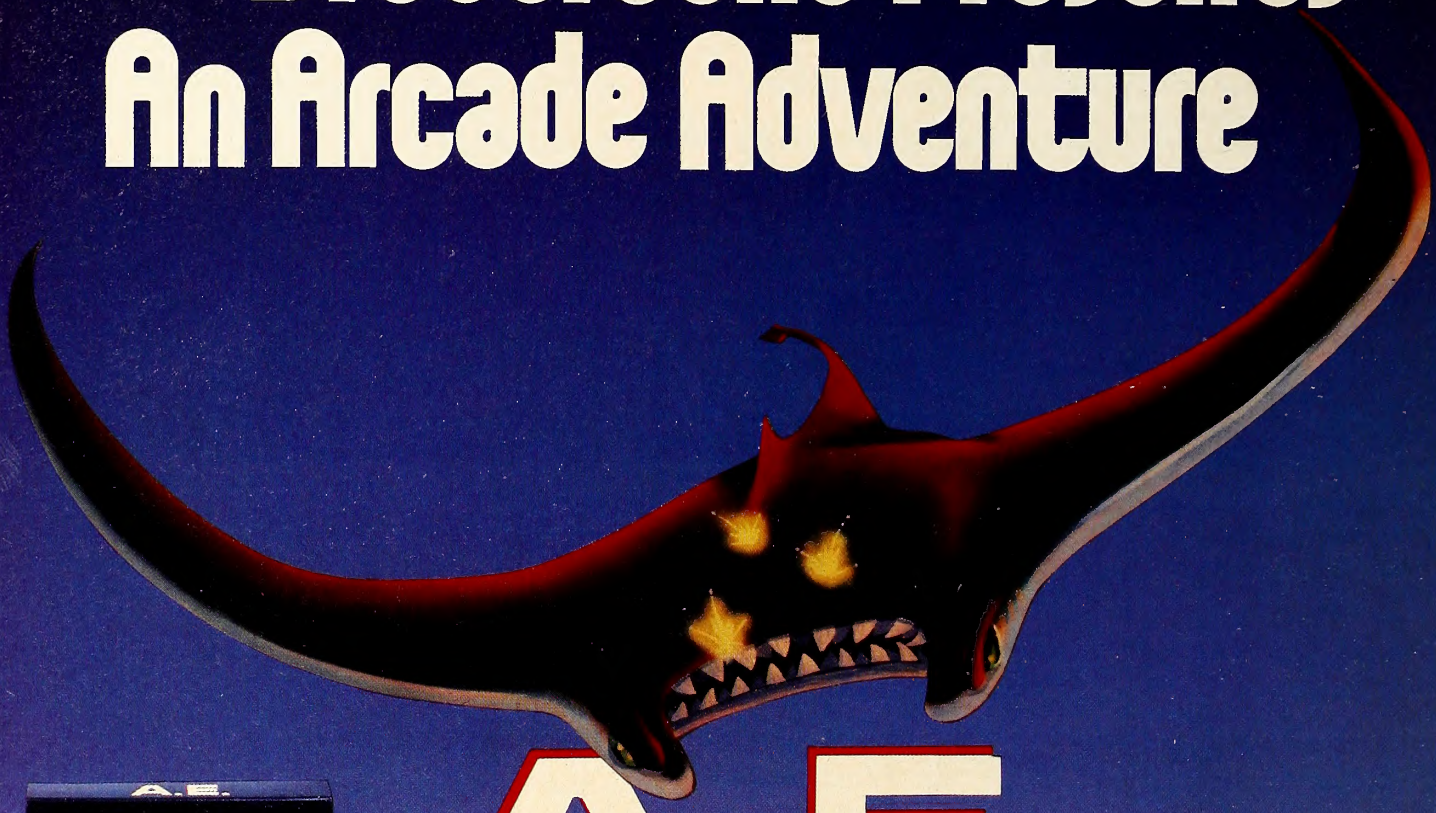
Apple III

This Month	Last Month	
1.	1.	**VisiCalc: Advanced Version,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
2.	4.	**Apple Writer III,** Paul Lutus, Apple Computer
3.	3.	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
4.	5.	**Quick File III,** Rupert Lissner, Apple Computer
5.	2.	**Word Juggler,** Tim Gill, Quark Engineering
6.	8.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
7.	6.	**The Catalyst,** Tim Gill, Quark Engineering
	—	**PFS: Report,** John Page, Software Publishing Corporation
9.	8.	**VersaForm,** Joseph Landau, Applied Software Technology
10.	—	**Apple III Business Graphics,** Apple Computer
	—	**Great Plains Hardisk Accounting Series,** Great Plains Software
	—	**General Ledger,** George Shackelford, State of the Art

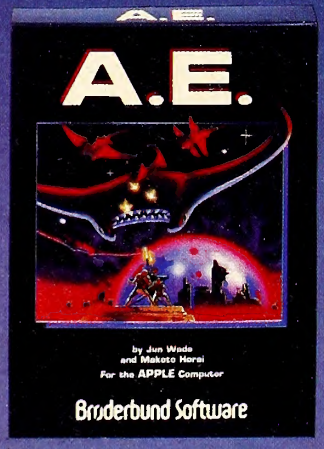
Arcade 10

This Month	Last Month	
1.	1.	**Choplifter,** Dan Gorlin, Broderbund Software
2.	2.	**Miner 2049er,** Mike Livesay and Bill Hogue, Micro Fun
3.	3.	**Frogger,** Olaf Lubeck, Sierra On-Line
4.	4.	**Aztec,** Paul Stephenson, DataMost
5.	6.	**Pinball Construction Set,** Bill Budge, BudgeCo
6.	5.	**The Arcade Machine,** Chris Jochumson and Doug Carlston, Broderbund Software
7.	8.	**Snack Attack,** Dan Illowsky, DataMost
8.	7.	**Crisis Mountain,** David H. Schroeder, Synergistic Software
9.	—	**Seafox,** Ed Hobbs, Broderbund Software
10.	—	**Super Taxman 2,** Brian Fitzgerald, H.A.L. Labs

Broderbund Presents An Arcade Adventure



A.E.



A.E.'s, produced by an industrial giant to control pollution on Earth have slipped quality control. They attack relentlessly in waves from the sky. Your mission: to drive them farther and farther into space. With each successful defense, you are transported to another, then another more distant 3-D environment. With these progressively difficult scenes, A.E. delivers the ultimate challenge.

Never has a computer game required such precision, such timing. You'll be hooked from the very start. A.E. (it means sting ray in Japanese) provides such enduring satisfaction on every level that it will become your personal standard of excellence in computer gaming.

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Broderbund Software

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take it upon yourself to try to make the four leaders interchange data. That'd be more challenging than *Repton* and more frustrating than playing *Strip Poker* in a nudist colony.

Slowness in entertainment software was a central theme among dealers, with each offering a different analysis. A southern dealer put forth inventiveness—more specifically, the lack thereof—as the reason for the sales slowdown. In his thinking, there's been little exciting and different software to spark a buying spree. His diagnosis: galactic gobs of enervating ennui.

A midwestern dealer felt price was the key factor. He's noted considerably greater resistance to the high price of entertainment software lately and believes Penguin's ten-dollar price reduction is a start in the right direction. Another way of phrasing his comment is that programming artistry is no longer sufficient unto itself to ensure snappy sales—the game should be priced competitively with other entertainments of a fleeting nature.

Whatever the reason, entertainment software took it on the chin in February. Nine of the Business 10 programs made the Top Thirty, the largest such penetration ever, as new owners embraced the revamped Apple as a worthy business machine.

That doesn't necessarily imply that publishers of applications software were getting rich while the entertainment publishers lined up at the poorhouse. Nobody will retire off the February earnings. Valentine's month may be great for Hallmark, but it's traditionally a bummer for software, and this year was no different. One of the burning questions is what those forty thousand new owners are running other than a IIe product demo disk.

Word Processors 10

This Month	Last Month	
1.	2.	**Apple Writer II,** Paul Lutus, Apple Computer
2.	5.	**Word Handler,** Leonard Elekman, Silicon Valley Systems
3.	1.	**Screen Writer II,** David Kidwell, Sierra On-Line
4.	4.	**WordStar,** MicroPro
5.	8.	**Sensible Speller,** Sensible Software
6.	10.	**Bank Street Writer,** Gene Kusmiak and the Bank Street College of Education, Broderbund Software
7.	7.	**Magic Window II,** Bill Depew, Artsci
8.	9.	**Super-Text Pro,** Ed Zaron, Muse
9.	6.	**Apple Writer II Pre-Boot Disk,** Kevin Armstrong and Mark Borgerson, Videx
	—	**PIE Writer,** Softwest, Hayden
	—	**Executive Secretary,** John Risken, Sof/Sys

Home Education 10

This Month	Last Month	
1.	1.	**MasterType,** Bruce Zweig, Lightning Software
2.	3.	**Early Games for Young Children,** John Paulson, Learning Tools
3.	5.	**Snooper Troops I,** Tom Snyder, Spinnaker Software
	6.	**Facemaker,** DesignWare, Spinnaker Software
5.	4.	**Story Machine,** DesignWare, Spinnaker Software
6.	9.	**Typing Tutor,** Image Producers, Microsoft
7.	6.	**Ernie's Quiz,** Children's Television Workshop, Apple Computer
8.	—	**Delta Drawing,** Computer Access Corporation, Spinnaker Software
9.	—	**SAT English I,** Eileen Shapiro, Micro Lab
10.	—	**Algebra I,** Edu-Ware Services

1985 WAS NOT A VERY GOOD YEAR. THE RUSSIANS INVADED GERMANY, STORMED THE PERSIAN GULF, ATTACKED NORWAY, AND OVERRAN THE BALTIC.

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Designed by Roger Keating, creator of SSI's highly-acclaimed SOUTHERN COMMAND,™ these strategy simulations boast the same successful look and play as his previous masterpiece: beautiful color graphic displays, easy-to-use movement system and realistic combat rules.

In GERMANY 1985, battalions of Soviet infantry, tanks, artillery units, and paratroopers have breached the southern center of West Germany through the Fulda Gap. NATO forces must contain and repel the Red invasion.

We've introduced several innovative rules to this game: Speed of movement is inversely proportional to the number of enemy units that can see you; smoke screens can be called upon to help cover an attack or retreat; and the concepts of HQ units, divisional integrity, and air superiority are fully incorporated.

For improved playability, the computer can actually move and fire for you. For example, if you wish to move from point A to B, simply order the computer and it will move the designated units along the most efficient path — stopping whenever enemy units are encountered. Or you can have the computer direct your artillery fire for you. In the solitaire mode, the computer can play either the Soviet or U.S. side.

GERMANY 1985 (at $59.95) is more than the standard bearer for our new series. Its rulebook contains all the rules for the rest of the line....which are priced at just $34.95 each! What you've got are four great modern wargames at unbeatable prices!

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**48K disc for the Apple II with Applesoft ROM card.*

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There were some interesting developments, however, that bear watching.

Definitely the most-impacted list by the introduction of the IIe was the Word Processing 10. Even though other publishers got some lead time in getting their packages ready for the switchover, they weren't at all prepared to compete with Apple's marketing and distribution push.

Screen Writer II was impacted the most. It's been bouncing around the top ten for several months, but trailed off to fourteenth in February.

The fates were even crueler to *Word Handler*. It's been making steady progress through the ranks until, in December, it looked ready to make a real run at *Screen Writer II* for top dog. In February, it edged past *Screen Writer II*, only to see *Apple Writer II* farther ahead than *Screen Writer II* had ever been.

WordStar, because of the presence of 64K standard, and *Bank Street Writer*, because it was ready for the change in systems, also benefited in February.

Another Apple product also made waves after the intro of the IIe. *Quick File*, which resembles a mature *File Cabinet* more than any other program, burst on the scene and supplanted *Multiplan* as the third-ranked business title. *Multiplan* was unable to gain further ground on *VisiCalc* as VisiCorp unveiled a special IIe edition of that program to entice buyers.

Home Accountant maintained a dominant position among Home 10 programs, but it hasn't been able to shake two dogged competitors—*The Accountant* and *Chequemate*. The annual invasion of privacy by the IRS

Adventure 5

This Month	Last Month	
1.	2.	**The Mask of the Sun,** Chris Anson, Alan Clark, Larry Franks, and Margaret Anson, Ultrasoft
2.	1.	**Zork I,** Infocom
3.	3.	**Zork II,** Infocom
4.	4.	**Deadline,** Infocom
5.	—	**Sherwood Forest,** Dav Holle and Dale Johnson, Phoenix Software

Fantasy 5

This Month	Last Month	
1.	1.	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
2.	2.	**Ultima II,** Lord British, Sierra On-Line
3.	3.	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
4.	—	**Apventure to Atlantis,** Bob Clardy, Synergistic Software
5.	—	**Beneath Apple Manor,** Don Worth, Quality Software

Strategy 5

This Month	Last Month	
1.	1.	**Castle Wolfenstein,** Silas Warner, Muse
2.	2.	**Flight Simulator,** Bruce Artwick, SubLogic
3.	4.	**Chess 7.0,** Larry Atkin, Odesta
4.	—	**Galactic Adventures,** Tom Reamy, Strategic Simulations
5.	—	**Bomb Alley,** Gary Grigsby and Joel Billings, Strategic Simulations
	3.	**Sargon II,** Dan and Kathe Spracklen, Hayden

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

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affected this category most, as three tax packages popped onto the list, headed by Micro Lab's *Tax Manager*.

That old war-horse, *DOS Boss*, went to the top of the Hobby 10 list, which seemed particularly down in comparison to other categories. *Merlin*, *Apple Pascal*, and *Utility City* joined that list.

MasterType still heads the Home Education 10, but it's *Early Games for Young Children*, the runner-up, that's getting the kudos. A Washing-

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.	—	**Quick File,** Rupert Lissner, Apple Computer
4.	3.	**Multiplan,** Microsoft
5.	7.	**PFS: Report,** John Page, Software Publishing Corporation
6.	8.	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
7.	6.	**General Ledger,** George Shackelford, State of the Art
8.	5.	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
9.	9.	**PFS: Graph,** Bessie Chin and Stephen Hill, Software Publishing Corporation
10.	4.	**VisiFile,** Creative Computer Applications/Colin Jameson and Ben Herman, VisiCorp

Hobby 10

This Month	Last Month	
1.	8.	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
2.	1.	**DOS Tool Kit,** Apple Computer
3.	3.	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
	8.	**Pronto DOS,** Tom Weishaar, Beagle Bros
5.	—	**Apple Pascal,** Apple Computer
6.	2.	**Apple Mechanic,** Bert Kersey, Beagle Bros
	4.	**Zoom Grafix,** Dav Holle, Phoenix Software
	5.	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
	—	**Utility City,** Bert Kersey, Beagle Bros
10.	—	**Merlin,** Glen Bredon, Southwestern Data Systems

Home 10

This Month	Last Month	
1.	1.	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	3.	**ASCII Express: The Professional,** Bill Blue and Mark Robbins, Southwestern Data Systems
3.	—	**Tax Manager,** TASO, Micro Lab
4.	6.	**The Accountant,** Ernest Forman, Decision Support Systems
5.	5.	**Chequemate,** Masterworks
6.	—	**Tax Preparer,** James Howard, HowardSoft
7.	3.	**Transend 1,** Tim Dygert and Bob Kniskern, SSM
	—	**Hayes Terminal Program,** Hayes Microcomputer Products
9.	—	**Tax Advantage,** Continental Software
10.	10.	**VisiTerm,** Tom Keith, VisiCorp

Softalk Presents The Bestsellers

ton dealer is using the program to sell systems. That's the highest praise a dealer can give a piece of software.

Apple Writer III got a boost from the attention paid to its little brother and moved past *Word Juggler* in the most significant change on the Apple III list. *VisiCalc: Advanced Version* continues to dominate.

Among arcade games, *Choplifter* narrowly held off *Miner 2049er* for top spot. *Seafox* and *Super Taxman 2* joined an otherwise little-changing list. *Snack Attack* failed to make the Top Thirty for the first time in fifteen months.

The top three Fantasy 5 games retained their positions, but *Knight of Diamonds* fell out of the Top Thirty for the first time since its introduction. Don Worth's remake of *Beneath Apple Manor* scored the bottom rung of the list.

The Mask of the Sun ousted *Zork I* for first in the adventure category, but Infocom still had three of the top five programs. Rounding out the top five is *Sherwood Forest* from Phoenix Software.

Castle Wolfenstein maintained the lead in the Strategy 5 division, but the big change was lower down, where *Chess 7.0* from Odesta overtook *Sargon II* by a narrow margin.

One last quiz question: What's the difference between *VisiCalc* and *VisiCalc IIe*?

If you answered, "Nothing," you agree with *Softalk*'s pretentious sage, who decreed that the programs should be tracked together. Likewise with *Apple Writer*, *PFS: File*, and other software with split personalities. But don't believe that when you go into a store to buy. ■

Apple-franchised retail stores representing approximately 7.6 percent of all sales of Apple and Apple-related products volunteered to participate in the poll.

Respondents were contacted early in March to ascertain their sales for the month of February.

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 March represented every geographical area of the continental United States.

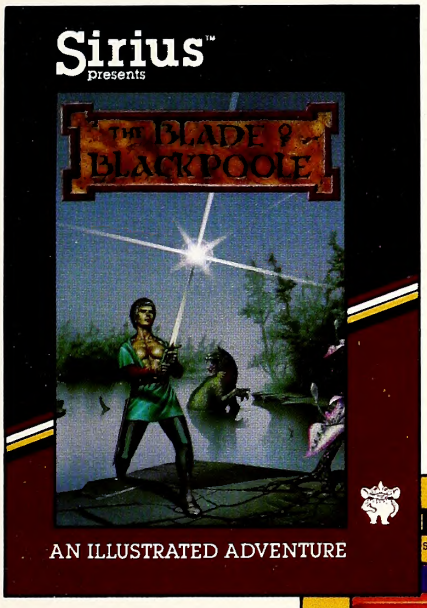
Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only for the month in which they are 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 3.67 percent, which translates roughly into the theoretical possibility of a change of 4.11 points, plus or minus, in any index number.

The Top Thirty

This Month	Last Month	Index	
1.	11.	199.87	**Apple Writer II,** Paul Lutus, Apple Computer
2.	2.	130.06	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	6.	92.67	**PFS: File,** John Page and D. D. Roberts, Software Publishing Corporation
4.	4.	81.86	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
5.	1.	72.30	**Choplifter,** Dan Gorlin, Broderbund Software
6.	3.	71.47	**Miner 2049er,** Mike Livesay and Bill Hogue, Micro Fun
7.	7.	48.20	**Frogger,** Olaf Lubeck, Sierra On-Line
8.	5.	45.71	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
9.	—	42.39	**Quick File,** Rupert Lissner, Apple Computer
10.	13.	36.98	**Multiplan,** Microsoft
11.	—	27.84	**PFS: Report,** John Page, Software Publishing Corporation
12.	8.	26.59	**Ultima II,** Lord British, Sierra On-Line
13.	—	25.76	**Word Handler,** Leonard Elekman, Silicon Valley Systems
14.	10.	24.52	**Screen Writer II,** David Kidwell, Sierra On-Line
	9.	24.52	**Aztec,** Paul Stephenson, DataMost
16.	17.	24.10	**Castle Wolfenstein,** Silas Warner, Muse
17.	15.	23.69	**MasterType,** Bruce Zweig, Lightning Software
18.	18.	22.85	**Pinball Construction Set,** Bill Budge, BudgeCo
19.	27.	22.02	**The Mask of the Sun,** Chris Anson, Alan Clark, Larry Franks, and Margaret Anson, Ultrasoft
20.	—	21.19	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
21.	21.	20.78	**Zork I,** Infocom
22.	26.	19.53	**Early Games for Young Children,** John Paulson, Learning Tools
23.	29.	18.70	**General Ledger,** George Shackelford, State of the Art
24.	23.	17.04	**WordStar,** MicroPro
25.	—	16.21	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
26.	28.	14.13	**DB Master,** Alpine Software/Stanley Crane and Jerry Macon; and Barney Stone, Stoneware
27.	—	13.71	**Zork II,** Infocom
	—	13.71	**Flight Simulator,** Bruce Artwick, SubLogic
29.	—	13.30	**PFS: Graph,** Bessie Chin and Stephen Hill, Software Publishing Corporation
30.	—	12.88	**Deadline,** Infocom

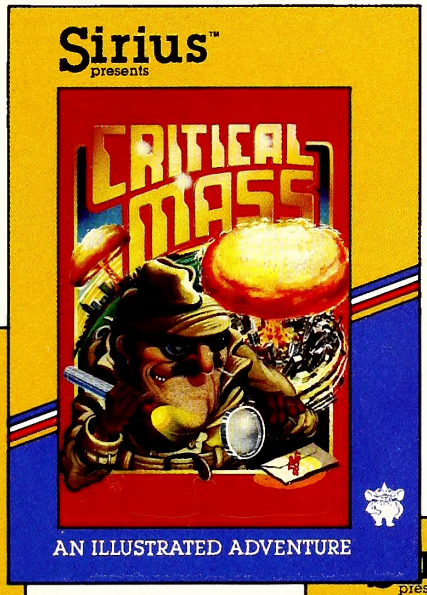
For Heroes Only!



Blade of Blackpoole

Step back in time and join the search for the magical sword of Myraglym. Travel cautiously on your journey for you will encounter dangerous serpents, spine-chilling evils and carnivorous plants that crave human flesh!

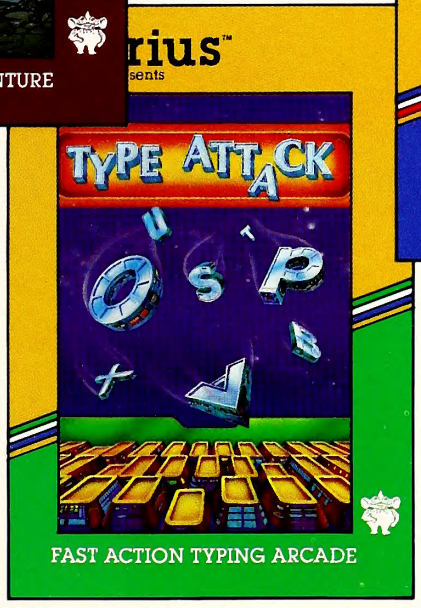
Avail. on disk for the Apple II, II+ or IIe and Atari 800 or 1200 and Commodore 64.



Critical Mass

On Jan. 1st at 10:00 am, the U.N. received this message: "Good Morning, in exactly 9 days, the world's 5 largest cities will be destroyed by thermal nuclear weapons." At 10:03 am, you received this assignment: STOP . . . THIS . . . LUNATIC!

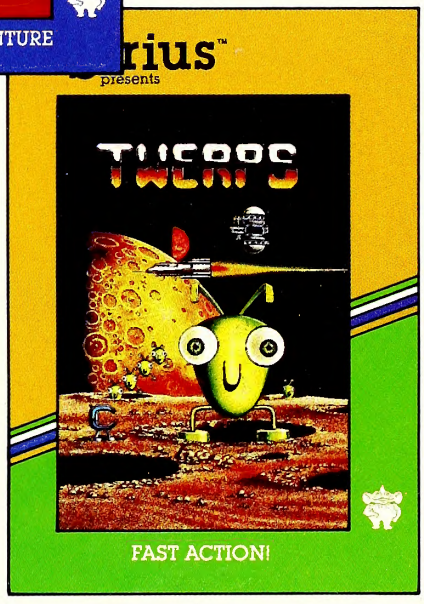
Avail. on disk for the Apple II, II+ or IIe and Atari 800 or 1200 and Commodore 64.



Type Attack

The planet Lexicon is under attack! Letters of the alphabet are falling from the sky. To repel them, you must be able to type the letters faster than they can fall. Be quick! An entire civilization is depending on your skill.

Avail. on disk for the Apple II, II+ or IIe and Atari 800 or 1200, IBM-PC and Commodore 64 and on cartridge for the VIC-20.



Twerps

The boldest space rescue ever! Defenseless Twerps are stranded on an asteroid. You, Captain Twerp, are to board a Twerp-craft, blast through the Orbiters, land safely and rescue your comrades. Beware of the Glingas and Twerp-eating Gleepnites!

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Pure Video Excitement!

For Your Atari 800 or 1200, Apple II, II+ or IIe, Commodore 64, VIC-20 and IBM-PC

LUNAR LEEPER

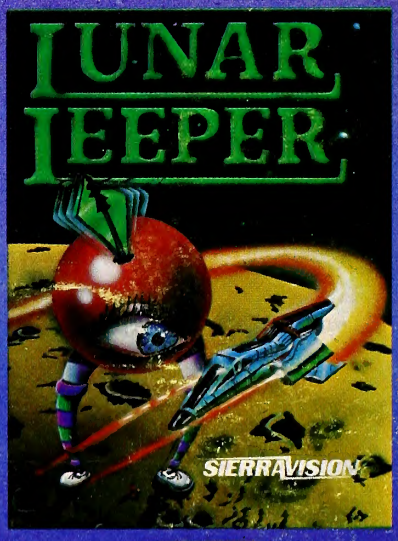
"Lunar Leeper is very addictive, and you'll probably lose hours of sleep over it."

Softline, January 1983

"It's a lot of fun... Lunar Leeper is eminently playable. The spacecraft control is both frustrating and challenging. The Leepers are swift and unpredictable. The game is both silly and enjoyable... A very good game."

Softalk, January 1983

Some games are "silly;" others are "challenging." It's the rare few that are both. That's what makes Lunar Leeper "eminently playable" and "very addictive." They said it; we believe it. So will you.



Lunar Leeper is available for the Apple II/II + (48K) and Atari 400/800 (40K) for $29.95. Order from your local dealer or directly from Sierra On-Line, Inc., Sierra On-Line Building, Coarsegold, CA 93614, (209) 683-6858.

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