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THE INDEPENDENT GUIDE FOR **apple** COMPUTING

APPLES FORECAST FINANCIAL FORTUNES

- SPREADSHEET COMPARISON
- APPLE HOME BANKING
- BUDGETING À LA APPLE
- COMPUTERIZE YOUR CHECKBOOK
- LISACALC
- REVIEWS:
  - ULTRATERM
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- APPLE GAME REVIEWS:
  - CHOPLIFTER!
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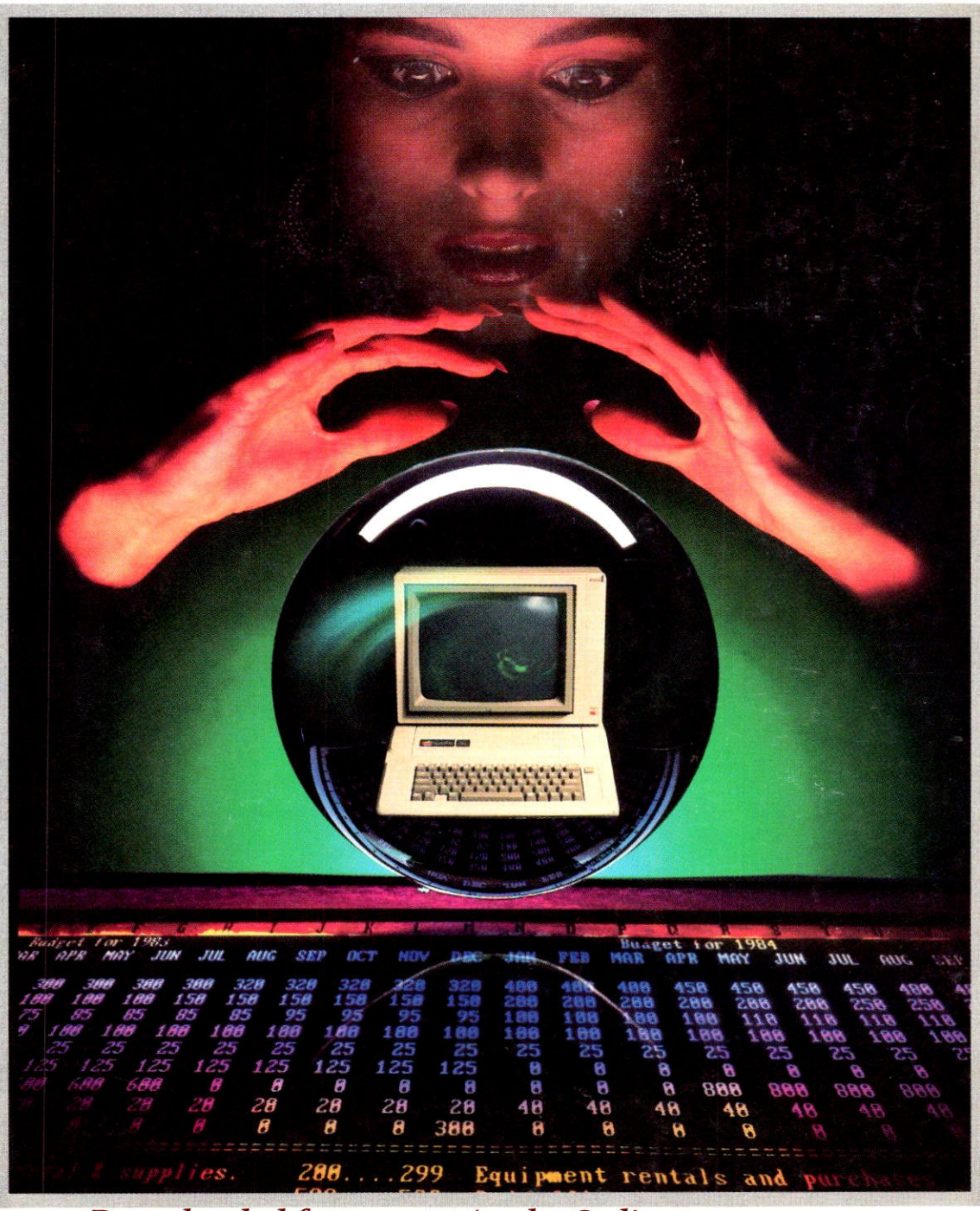

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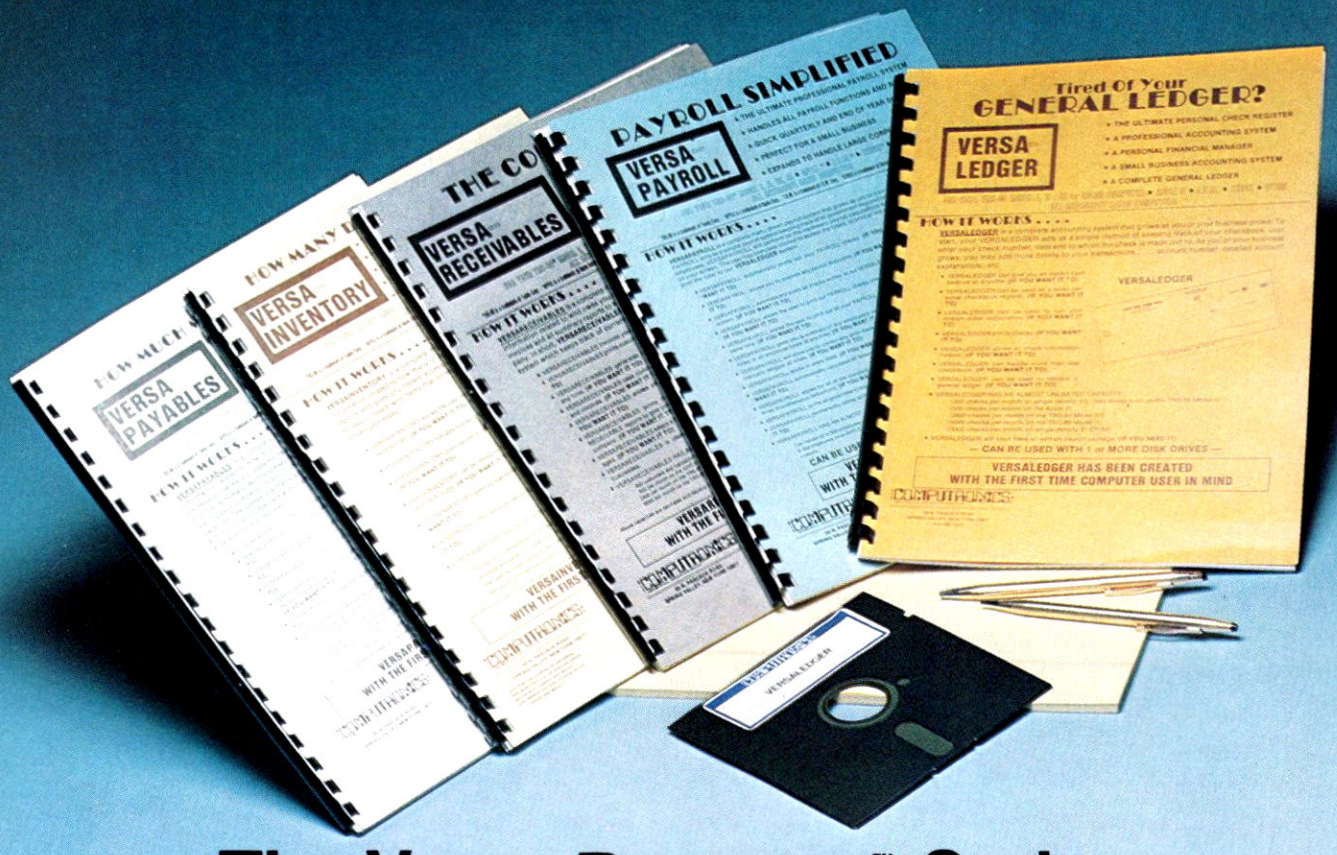

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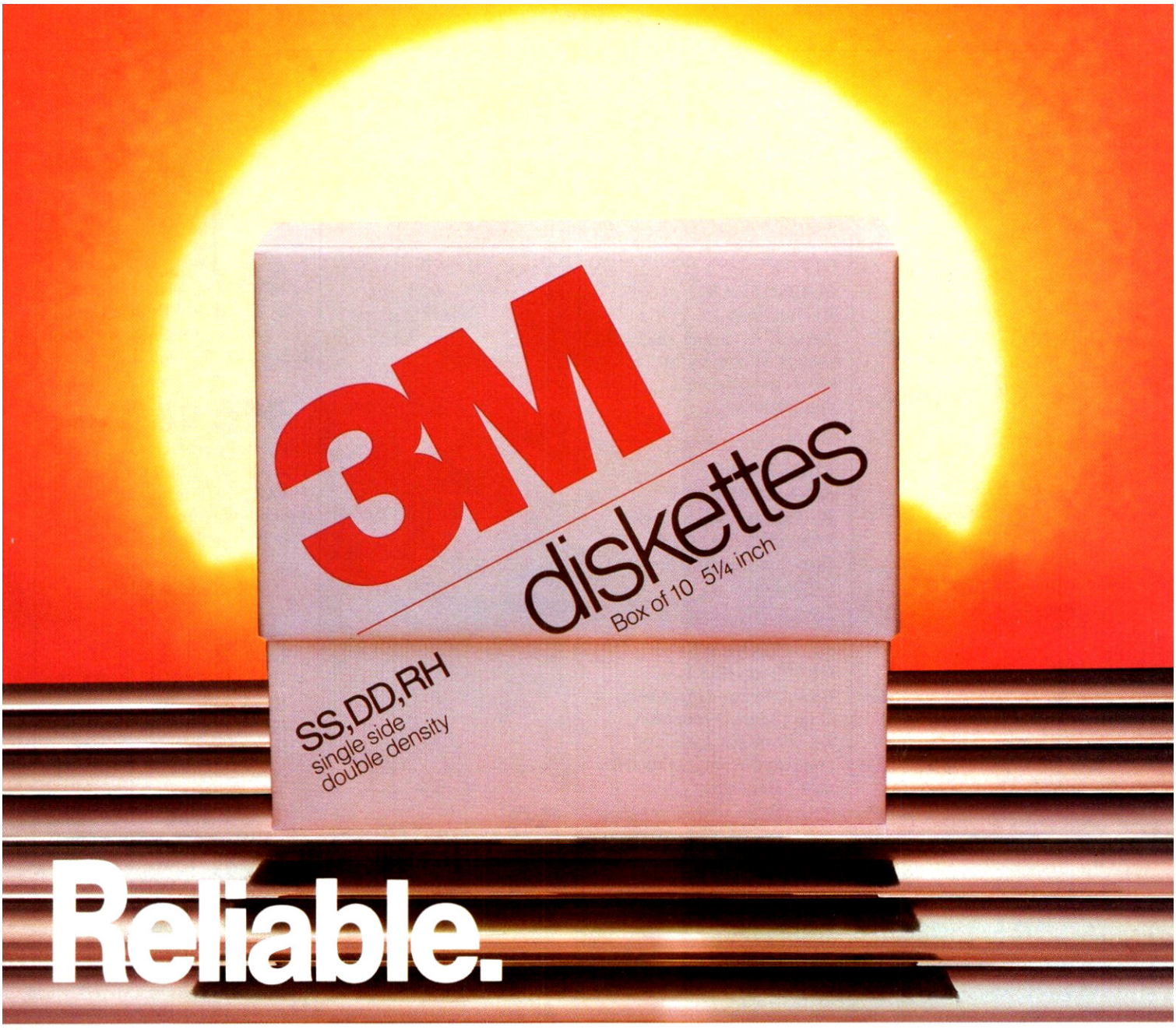

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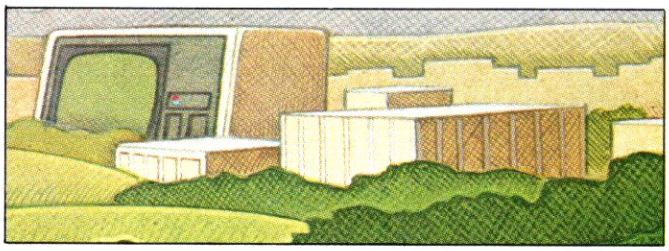

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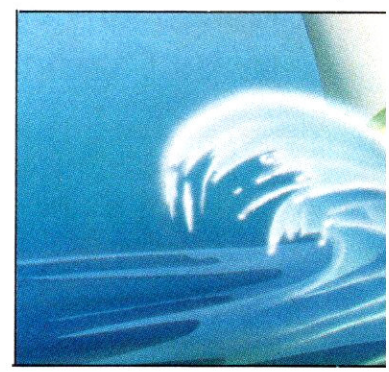

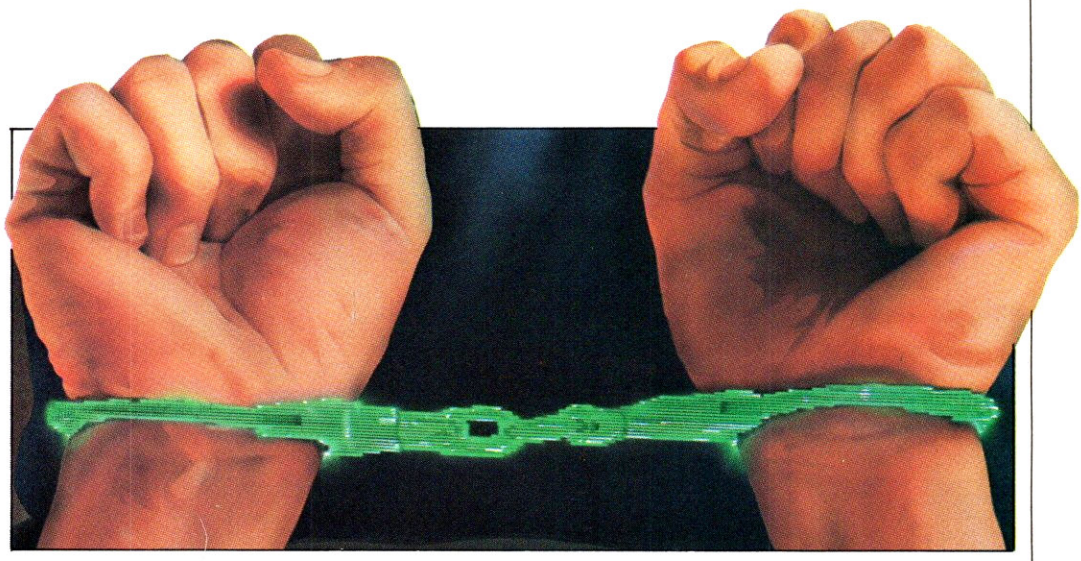

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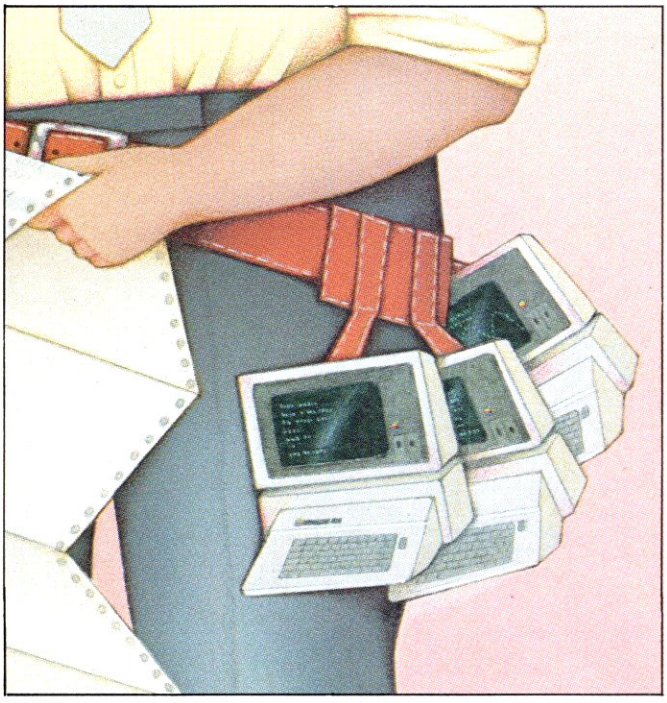

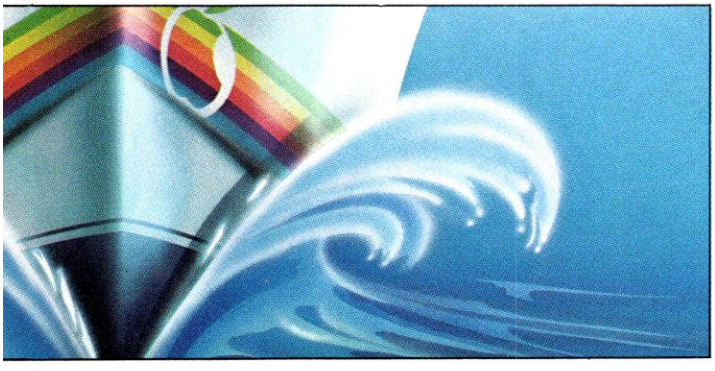

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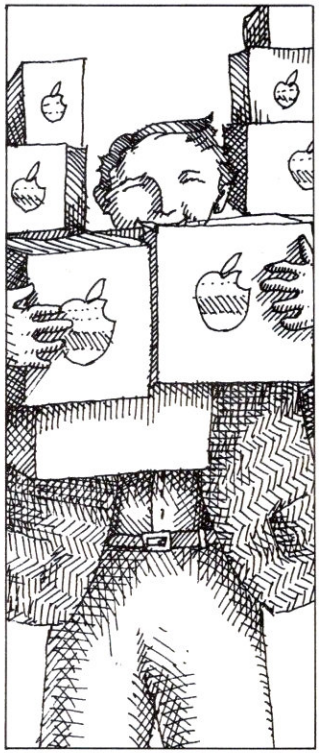

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Inside Apple

Vol. 1, No. 4

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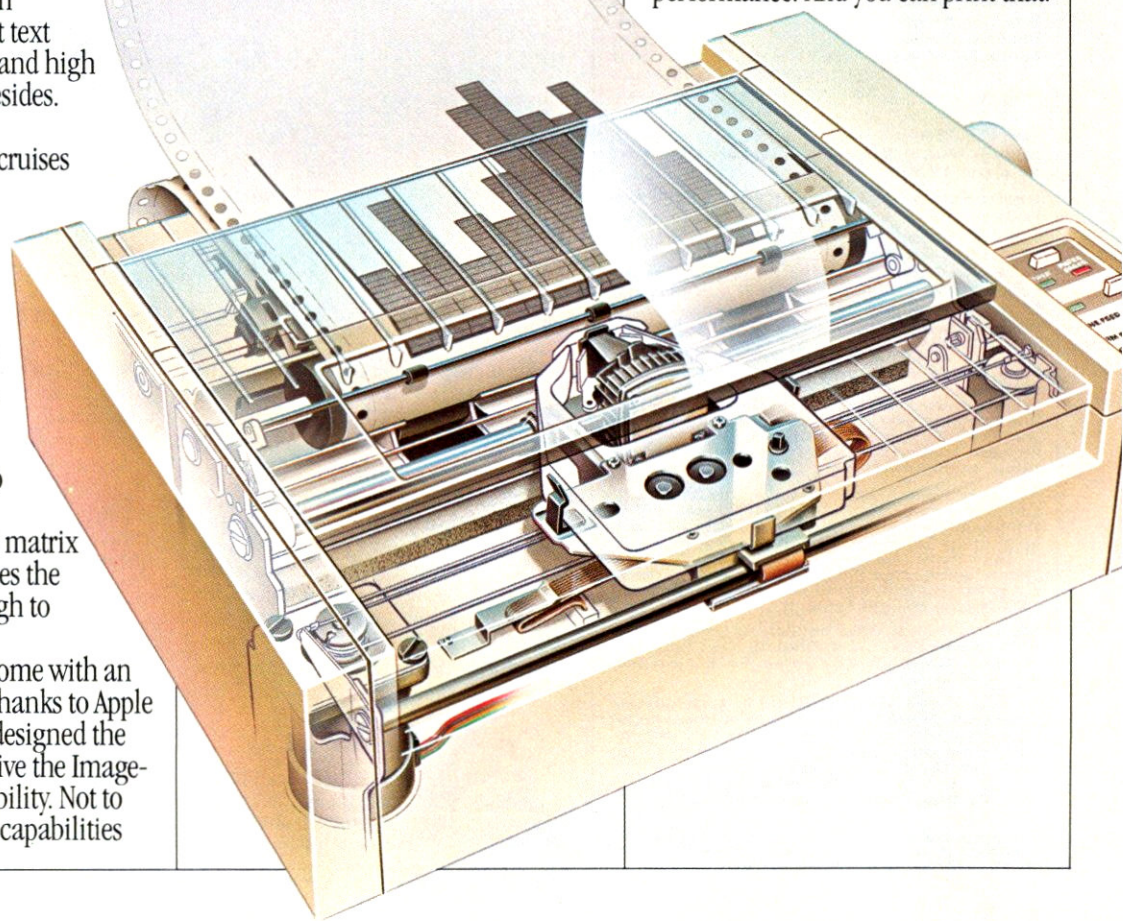

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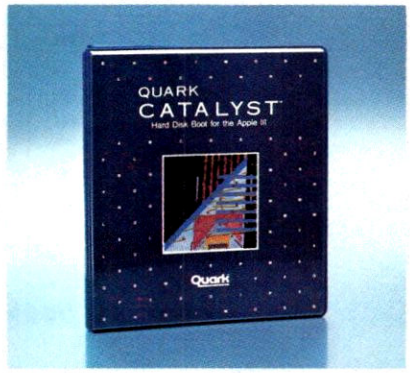

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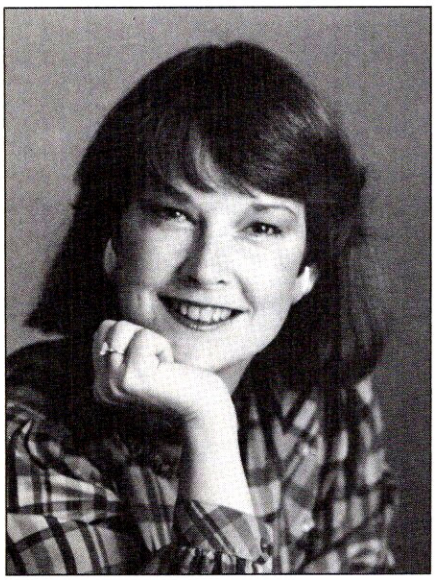
EDITORIAL
A MESSAGE FROM MAGGIE



I overheard a conversation the other day while waiting in line at the checkout counter that disturbed and intrigued me. As I waited to pay for my groceries, a young couple was discussing the case of several computer whiz kids caught accessing classified military material with their computers.

Several FBI agents had climbed in through the windows of the kids' homes the day before and arrested them for computer capers similar to those committed by the young protagonist of the recent film *WarGames*. The young couple launched into a debate about the ethics of the situation.

The crux of their discussion was the question of whether or not the kids were in fact guilty of a crime or guilty of natural curiosity. Who was ultimately responsible for preventing such actions? The man took the stance that the military and any other owners of sensitive material should adequately protect such information. He did not consider it a crime that the computer aces had succeeded in cracking military databases. His companion argued that it was a crime to try to break into the computer system, just as it was a crime to break into a store. It did not matter, she said, whether or not the store was adequately locked or whether the kids were just trying to break in out of natural curiosity. He felt it was the government's responsibility to ensure the safety of the classified information and that the system should be inviolable. She felt it was society's responsibility to teach people that accessing other people's data without paying for it or having permission was a crime.

I never did find out how the couple resolved their moral and philosophical differences, but their discussion did start me thinking. I found myself sympathizing with both sides of the issue, because each side had valid points to make.

First, as much as I enjoyed *WarGames,* the movie did not make it clear that accessing classified military information is not only illegal but is also punishable by prison sentences. So it comes as no surprise that some kids might try to pull a similar stunt—people often imitate what they see on television or in a movie.

As personal computers become more widespread, we will all have a responsibility to define what computer crime is and let everyone know the rules.

As personal computers become more widespread, we will all have a responsibility to define what computer crime is and let everyone know the rules and consequences of the game. To determine what computer crime is, we must decide that information can be solely owned and thus protected. Given that decision, we can determine ownership and therefore that it is a crime to take what is owned by another. We do have laws that govern computer activities, but these laws are still in raw form and must be refined to be effective.

I am not at all convinced that parents and teachers are instilling "computer ethics" in children. How many of you have sat down and told your sons or daughters that certain uses of computers are illegal? How many schools and universities are offering courses in computer ethics? (I do know of some schools that offer such classes.) In order to ensure some form of law and order in the world of computers, we are responsible for educating both young and old about the legal and illegal use of computers.

On the other hand, even when they are instructed in the rules and regulations of computing, some people will still try to "crack the code," if only for the pure intellectual fun of it. So, I also agree with the young man that the owners of classified or valuable information must protect that information from electronic intruders. Protecting the data lines that transmit sensitive information is possible, but expensive and time-consuming. Considering the stakes, the investment is well worth it, however.

Thus, I find myself straddling the fence. Yes, it is the responsibility of the owners of information to protect it. And, yes, it is a crime to break into a computer system, just as it is a crime to break into a store. But it is our duty to ensure that everyone is informed of the laws concerning computers. As we begin the new year, I hope that 1984 will bring more attention to the problem of protecting electronic information without the ominous overtones of George Orwell's *1984*. ✚

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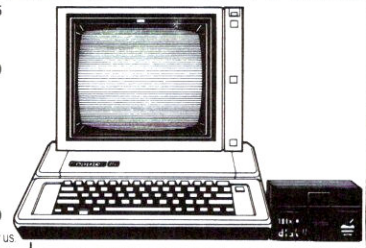

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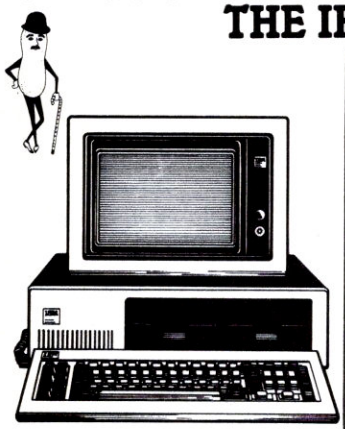

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Quadcolor II, board, use with Quadcolor I	$ 275	$ 209
Quadchrome, 12" RGB Monitor	$ 795	$ 499
Quadscreen, 17", 968 x 512 Monitor	$1995	$1595
Microfazer, w/ Copy, P/P, 8K, #MP8 w/ P.S.	$ 189	$ 129
Microfazer, w/ Copy, P/P, 64K, #MP64 w/ P.S.	$ 319	$ 219
Microfazer, w/ Copy, P/P, 128K, #MP128 w/ P.S.	$ 465	$ 295
Microfazer, Snap-on, 8K, P/P, Epson, #ME8, w/ P.S.	$ 179	$ 145
Microfazer, Snap-on, 64K, P/P, Epson, #ME64, w/ P.S.	$ 319	$ 235

All Microfazers are expandable. (w/copy to 512K) (Snap-on to 64K)

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	LIST PRICE	OUR PRICE
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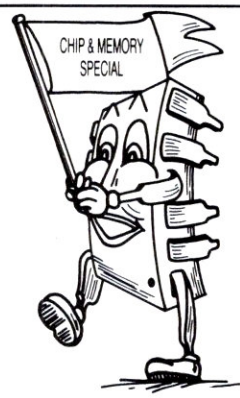
1st MATE, 256K	$ 589	$ 439
Graphics Master		Call

TG PRODUCTS, Joystick — $ 65 — $ 49
WICO, IBM-PC Mouse — $ 100 — $ 69



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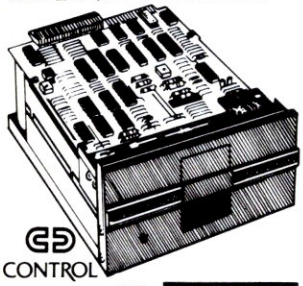

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12 Meg, Fixed	$2250	$1750
20 Meg, Fixed	$2650	$2050
27 Meg, Fixed	$2895	$2295
72 Meg, Fixed	$6500	$4950
VISTA, IBM-PC XT 6MB Backup for Hard Disk, V1200	$1549	$1049

SOFTWARE for the IBM-PC or XT

BUSINESS

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★ dBase II, requires PC-DOS & 128K		$ 700	$ 385
dBase II User's Guide		$ 30	$ 20
Everyman's DB Primer (Book)		$ 15	$ 12
The Financial Planner		$ 700	$ 395
Friday		$ 295	$ 199
APPLIED SOFT. TECH., Versaform		$ 389	$ 265
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FCM (Filing, Cataloging, Mailing)		$ 125	$ 89
Property Management		$ 495	$ 329
DATAMOST, Write-On (Word Processor)		$ 130	$ 89
DOW JONES, Market Analyzer		$ 350	$ 279
Market Manager		$ 300	$ 239
Market Microscope		$ 700	$ 525
EAGLE SOFTWARE, Money Decisions		$ 150	$ 129
★ **EINSTEIN**, Writer	NEW!	$ 300	$ 199
Memory Trainer	NEW!	$ 80	$ 55
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Letter Scenes	NEW!	$ 300	$ 195
FOX & GELLER, Quickcode (MSDOS)		$ 295	$ 179
dGraph (MSDOS)		$ 295	$ 179
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Pie: Speller		$ 100	$ 69
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INFOR. UNLIMITED, EasyWriter II (WP)		$ 350	$ 259
EasySpeller II		$ 225	$ 149
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Data Base Made Easy (Book)		$ 17	$ 12
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MICRO LAB, Miner 2049		$ 40	$ 29
MICROPRO, WordStar™		$ 495	$ 239
Mail Merge™		$ 250	$ 129
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★ WordStar Professional, 4 Pak		$ 895	$ 429
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Report Star™		$ 350	$ 199
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NORTH AMERICAN BUS., The Answer		$ 250	$ 169
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Some Common Basic Prog. (70 each)		$ 100	$ 69
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1983 CL SOFTWARE AWARD:
"Copy II PC by Central Point Software is still the best software buy of 1983 and 1984. It will copy more copy protected software and faster than any other backup system. Unlike other copiers it makes an exact duplicate of your original and it does 100% verification of copy. Documentation is excellent."

★ **CENTRAL POINT**, Copy II PC, Backup		$ 40	$ 35
★ **COMX**, Fastrak™, RAM Disk emulator and printer spooler program. Works on any PC DOS version or RAM Card. Menu Driven.	NEW!	$ 100	$ 59

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Access Manager (MSDOS)	$ 400	$ 179
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Speed Prog. Pkg. (CP/M-86)	$ 200	$ 135
CIS COBOL-86	$ 850	$ 525
DR LOGO-86	$ 150	$ 90
CBASIC Compiler (86 or MSDOS, each)	$ 600	$ 365
HAYES, Smartcom II (Data Comm.)	$ 119	$ 89
MICROCOM, Microterminal (Data Comm.)	$ 100	$ 65
MICROSTUF, Crosstalk XVI (Hayes & IBM)	$ 195	$ 129
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Business BASIC Compiler	$ 600	$ 450
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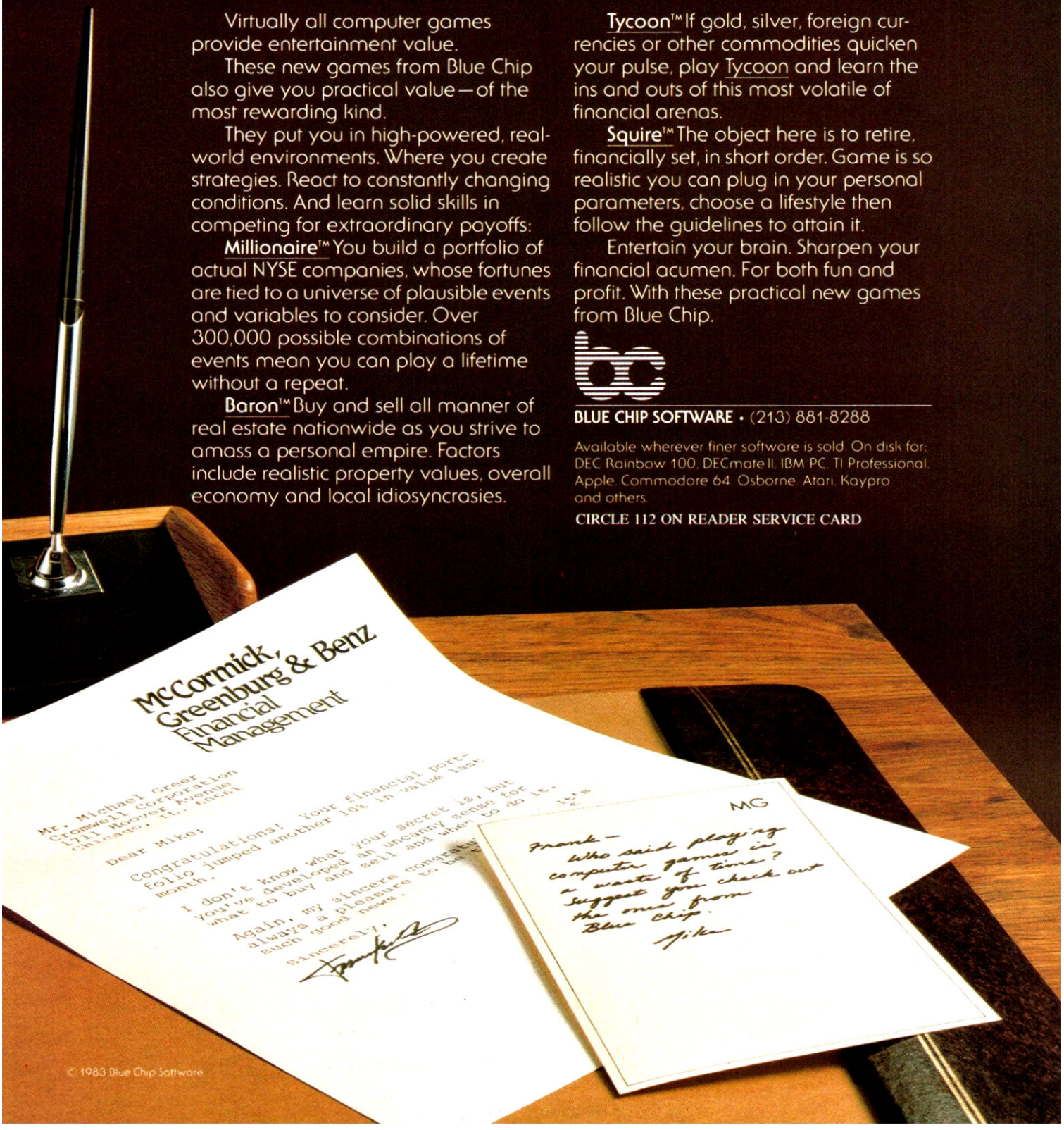

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This newsletter, which goes to approximately 11,000 subscribers, offers the advantages of an electronic bulletin board, which can upload or download investment-related programs, software and message exchanges for subscribers, and a disk packed with 15 public-domain Apple-compatible investment enhancers (this last one costs $10 extra).

Editor Norm Nicholson said that as of the publication's latest membership survey in December 1982, 33% of its readers used Apple equipment; the next nearest was the IBM PC at 6%.

For further information on *Computerized Investing*, contact the newsletter offices at Suite 317, 612 North Michigan Avenue, Chicago, IL 60611. The access number for the electronic bulletin board is (312) 280-8764.

PASSWORD: JOSHUA

Teenagers no longer have to hunt through lists of computer-access lines to link with the Department of Defense's military-strategy computer, as did the hero of the movie *WarGames*. Now the missile bases, numbers of survivors, and lists of possible scenarios are all cataloged in a new game called Strategic Nuclear War.

Dr. William Martel, a defense analyst at Abt Associates in Cambridge, Massachusetts, and Dr. Paul Savage, chair of the political-science department at St. Anselm's College in Manchester, New Hampshire, codeveloped the "game" to help people clearly understand the effects of a nuclear attack.

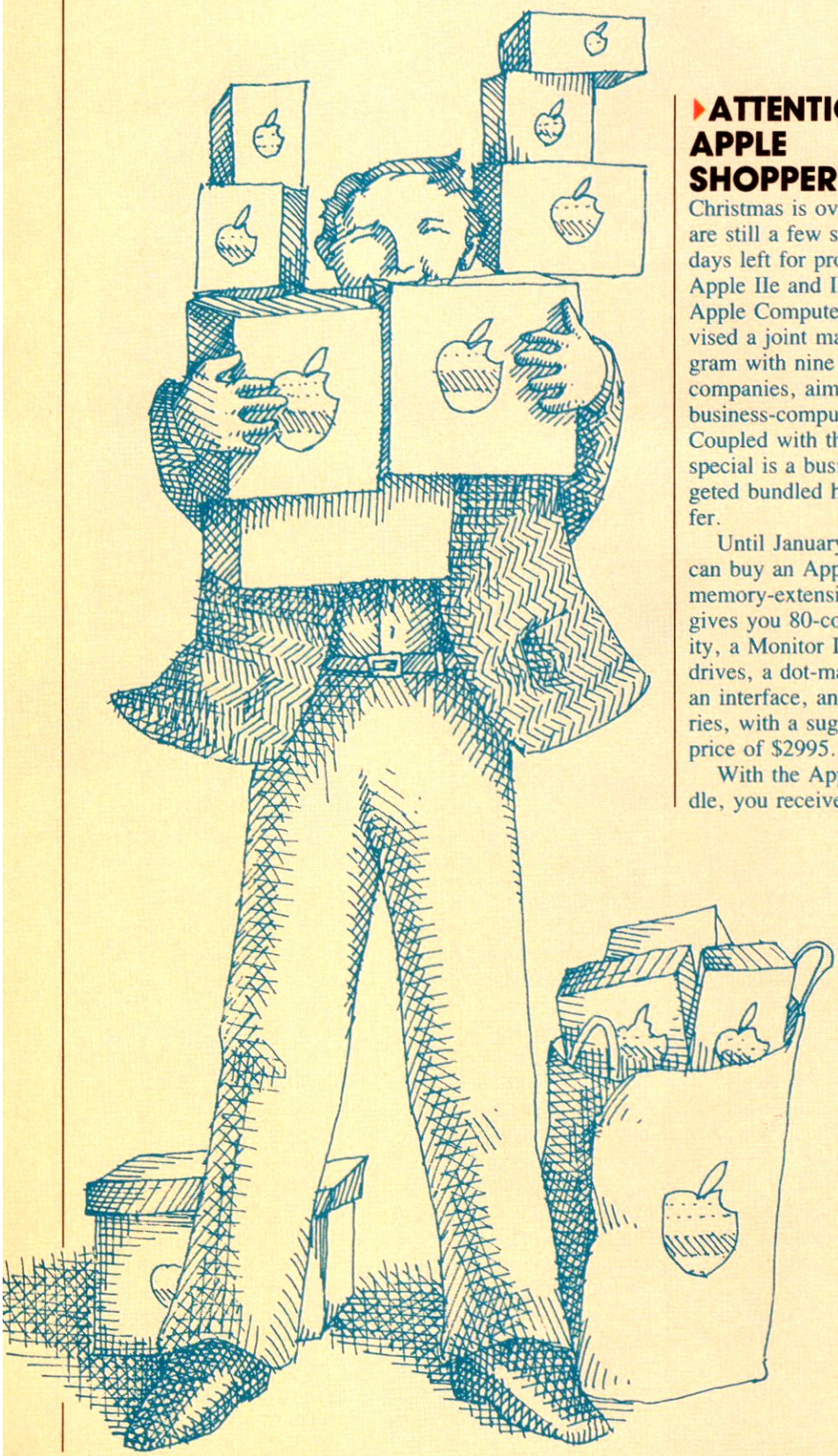
Data for the game was laboriously compiled from unclassified technical journals, manuals, books, and the authors' own knowledge. The software, written in BASIC, lets users update and edit the database to fit current geopolitical moves.

With Strategic Nuclear War, users can assess the destruction if their city is at ground zero or tot up the number of dead if they launch a retaliatory strike at all cities with oil fields or nuclear power plants.

The authors of the program emphasize they are *not* taking an ideological position on nuclear war, but are simply presenting the facts for everyone—not just Department of Defense strategists—to be able to comprehend.

"Much of the debate has been on an intuitive level," said developer Martel, "but this will give people the big picture. They'll be much more informed."

The game, slated to cost $50, runs on an Apple II Plus or IIe with Apple DOS Version 3.3. Tic-tac-toe programs are not bundled with the software.



ATTENTION, APPLE SHOPPERS!

Christmas is over, but there are still a few shopping days left for prospective Apple IIe and III buyers. Apple Computer has devised a joint marketing program with nine software companies, aiming at small-business-computer users. Coupled with the software special is a business-targeted bundled hardware offer.

Until January 15, you can buy an Apple IIe with a memory-extension card that gives you 80-column capacity, a Monitor II, two disk drives, a dot-matrix printer, an interface, and accessories, with a suggested retail price of $2995.

With the Apple III bundle, you receive a Monitor III, a ProFile hard-disk drive with Catalyst 2.0 (a new version of Quark's Selectra software), and a tutorial for the Apple III system utilities, all for $5330. Unlike the IIe bundle, the Apple III deal is a permanent offering on the price list.

COMPUTER COLLECTIBLES

If someone can make it, someone can collect it, and computers are no exception. Yes, a market is burgeoning for computer collectibles—we can't say antiques yet, since antiques are defined as being at least 100 years old. But computer nostalgia is just around the corner.

Meanwhile, rummage through the attic of a nearby computer buff and see if he or she tucked away a few of the following:

- The 1888 Burroughs calculator. This 99-day wonder, the forerunner of today's computers, was the first to print out entries and results on paper. Twenty dollars from a junk shop, hundreds of dollars from a collector.
- The first floppy disk. Invented by IBM for loading programs into computers, a genuine 1972 floppy would have the IBM label, name, and serial number. These probably cost only a few dollars, for now.
- The 1976 Apple I. These gray-bearded machines are few and far between, because of Apple's generous trade-in offers when the Apple II burst onto the scene. Prices could range from $50 to $500 or more.

COMPUTE FOR HEALTH

How long will you live? How healthy are you? A doctor's visit, complete with concomitant parking problems and half-hour penance in the waiting room, is no longer necessary to help you gauge your general fitness level.

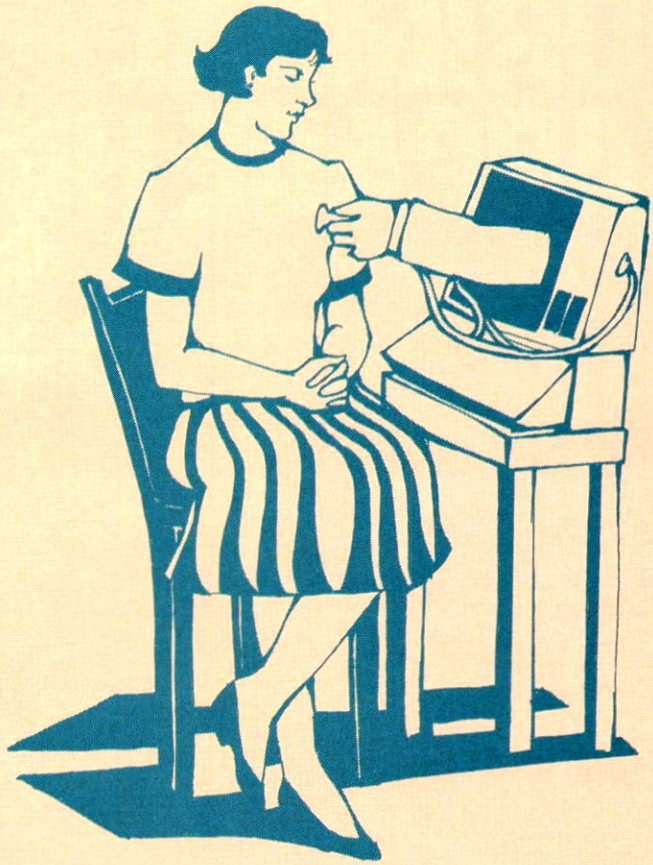
A battery of programs from HRM Software, a division of Human Relations Media in Pleasantville, New York, can help you foster good health practices as well as many clinics can—in fact, these programs have found their way into many clinics.

The Health Awareness Games disk runs on the Apple I, II Plus, and IIe with DOS 3.3 and sells for $99 retail.

Its five programs include Coronary Risk, Why Do You Smoke?, Exercise/Weight, Life Expectancy, and Lifestyle. (Remember that these programs can't substitute for a doctor's care, but are merely health guides.)

In return for your embarrassingly honest answers to its appropriately nosy questions, The Health Awareness programs will give you sound, common-sense advice on better eating habits, exercise, stress, and the results of your current excesses.

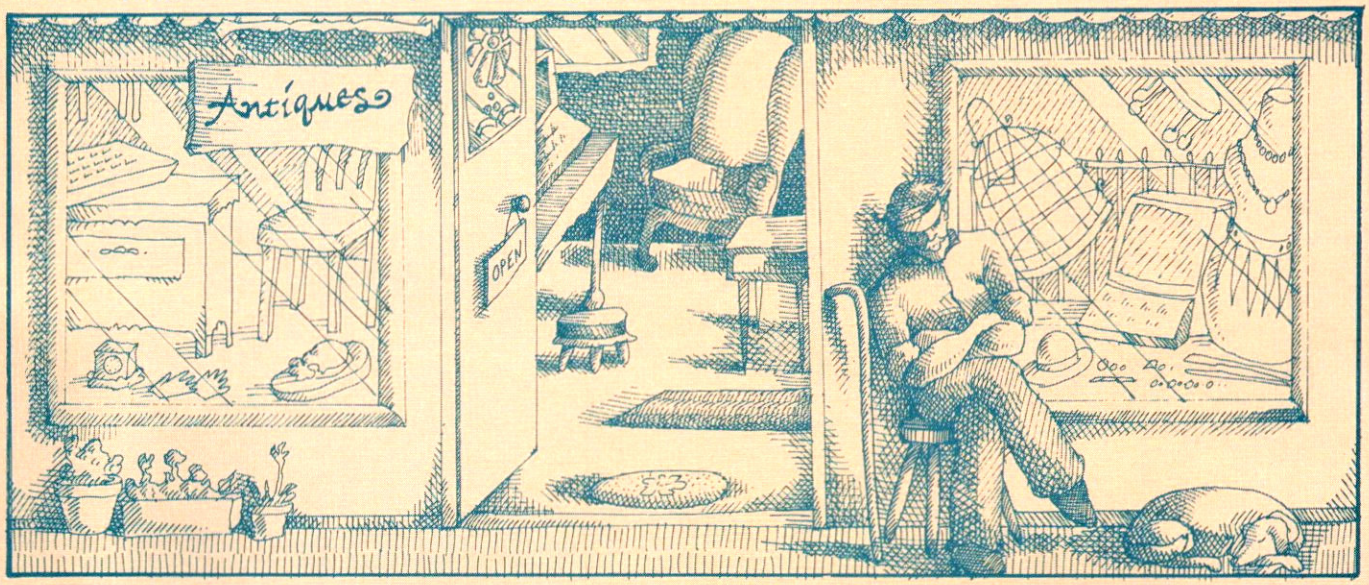
Tell the truth, now, or HRM will sick [sic] its Experiments in Human Physiology hardware/software package on you. This combo for Apple II computers measures your body's response time, skin temperature, and respiration; in other words, it can act as a polygraph.



A GOOD STORY IS HARD TO FIND

Which is why *A+* is willing to pay up to $50 for every morsel of news, hot gossip, or intriguing computer stories we can use in these pages. You must include your name, address, and telephone number with each tidbit.

All submissions become the property of *A+* magazine and are subject to editing. Please direct your data to Dispatches, c/o *A+* magazine, 1 Davis Drive, Belmont, CA 94002.



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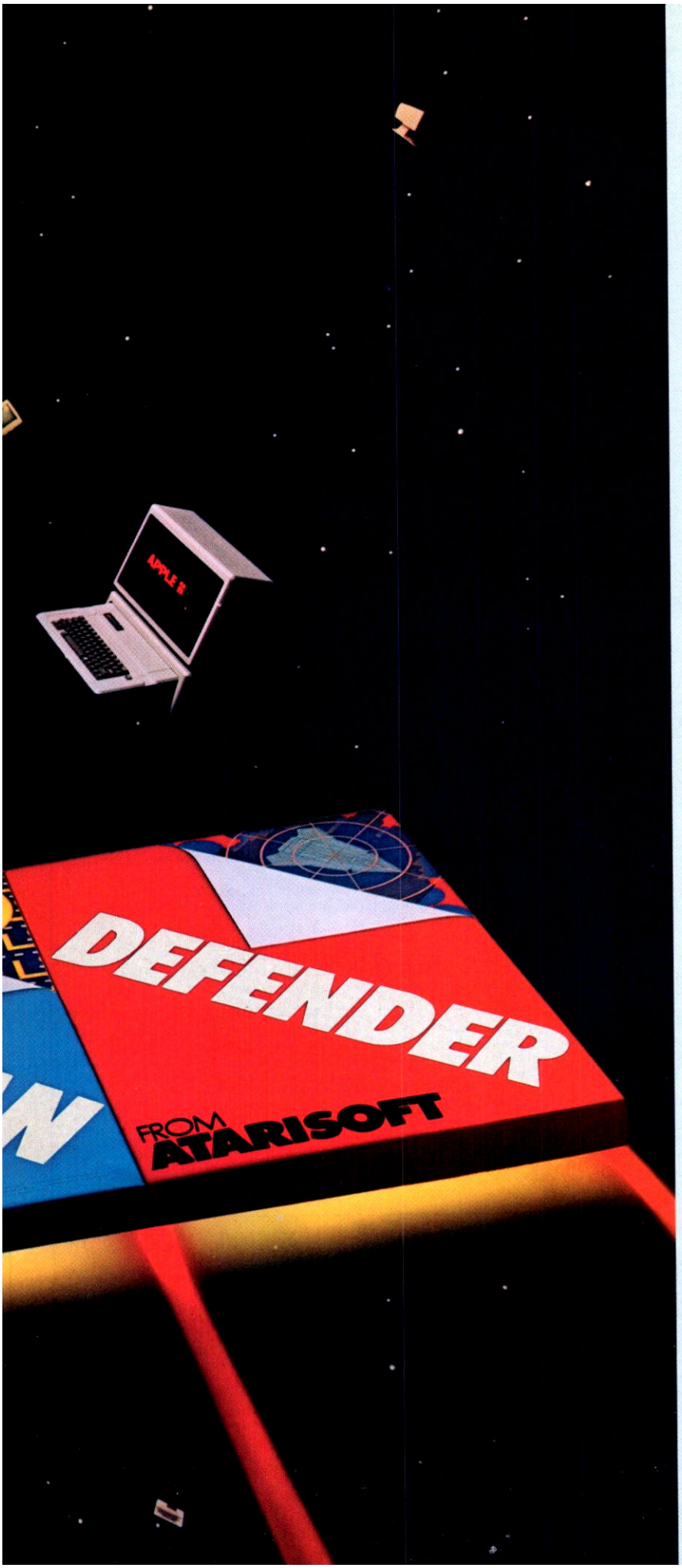

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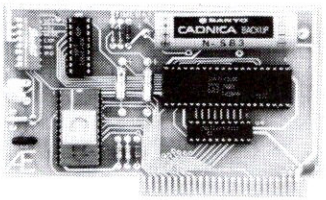

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- Just plug it in and your programs can read the year, month, date, day, and time to 1 millisecond! The only clock with both year and ms.
- A rechargeable NiCad battery will keep the TIMEMASTER running for over ten years.
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- Basic, Machine Code, CP/M and Pascal software on 2 disks!
- Eight software controlled interrupts so you can execute two programs at the same time (many examples are included).
- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond.

The TIMEMASTER includes 2 disks with some really fantastic time oriented programs (over 25) plus DOS dater so it will automatically add the date when disk files are created or modified. The disk is over a $200.00 value alone — we give the software others sell. All software packages for business, data base management and communications are made to read the TIMEMASTER.

If you want the most powerful and the easiest to use clock for your Apple, you want a TIMEMASTER.

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Super Music Synthesizer
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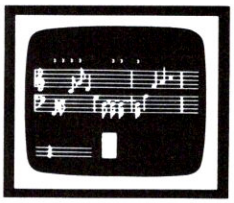

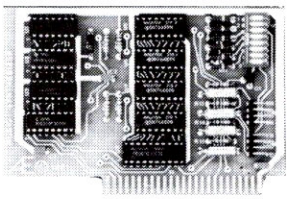

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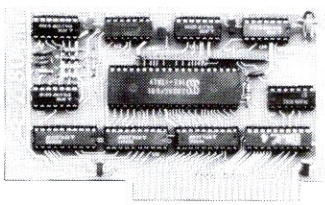

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SUP'RTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
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The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

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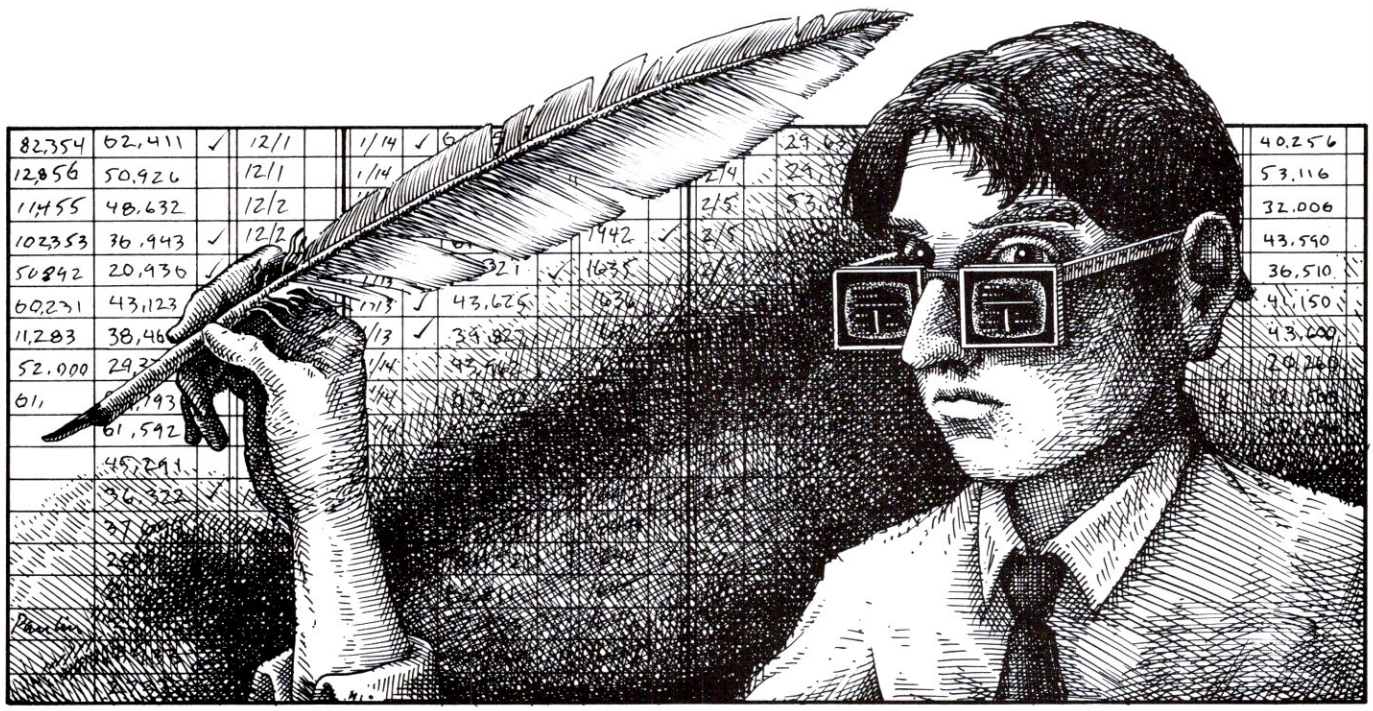
THOUGHTWARE/BY STEVE ROSENTHAL

Now that personal computers are within economic reach, you may be much better off if you turn over the bookkeeping work to an electronic assistant.



THE BASICS OF FINANCE

It's hard to run even a lemonade stand today if you do your counting on fingers and toes. Numbers have a way of quickly getting out of hand, and you can spend hours trying to get a few columns of them into line. Now that personal computers are within the economic reach of most businesses and many households, you may be much better off if you turn over the bookkeeping work to an electronic assistant.

One of the tasks that computers do best is the normal accounting and record keeping of any line of financial activity. But with the right personal computer and software, you can also make predictions, plan alternatives, analyze trends, produce reports, and even graph the results. In fact, most computer users find that they would no more think of doing their finances without a computer than their paperwork with a quill pen.

At some level, all financial matters involve money—after all, that's what makes them financial. As economists are constantly pointing out, however, once you get beyond the change in your pocket, money isn't so simple. Depending on the context, money can represent movement, accumulation, information, or obligation. Money reaches into the past, underlies the present, and helps shape the future.

One of the tasks that computers do best is the normal accounting and record keeping.

Similarly, financial information can represent any combination of history, current position, or future expectation. Having that information clearly organized and readily at hand can help you see where you are, how you got there, and where you're going.

When decisions depend on financial results, up-to-date information is necessary. A business that knows its costs and sales for the past month is almost always better able to make the most of opportunities than one that knows only what was happening six months or a year ago. Accurate dollar figures should not and cannot replace the total perspective businesses need for important decisions, but where numbers are significant, better numbers often lead to better results.

Planning for the future involves more than compiling budgets and monetary forecasts. But any human enterprise rests at least in part on its financial via-

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CIRCLE 125 ON READER SERVICE CARD

bility, and the ability to make more educated guesses about the future allows you to select the best possible actions to shape the outcome.

Balancing the Books

Help with everyday accounting is the first financial activity that most people turn to a computer for. Because normal bookkeeping involves so much repetitive sorting and addition, it is ideal work for a computer and tedious and difficult for a person.

Five basic steps make up this type of accounting, whether it's on a computer or being done manually. In order, these are entering the transactions, assigning each item to the proper account, drawing up the balances, checking that there are no discrepancies, and producing reports. In each step, a computer's help can be enormous.

Entering transactions is the most time-consuming regular activity in any accounting system. Before you can file, sort or total individual items, you have to extract sufficient information about the transaction from the real world and transfer it to the phantom world of financial records.

Before computers, entering individual items took a lot of ledger paper (that nice, sturdy lined paper); a lot of carbon paper sets; and a clear, readable hand. Since each transaction had to be entered separately, the temptation was to shorten each entry by abbreviating repetitive terms, and the result was often so cryptic that even the people who had produced the page couldn't decode it.

With a computerized accounting system, the process can be much easier. Most financial packages let you create a data-entry "screen"—a blank, fill-in form for each transaction. Depending on the system, you either enter each transaction in response to separate prompts or type in the entire entry as if you were editing data with a word processor.

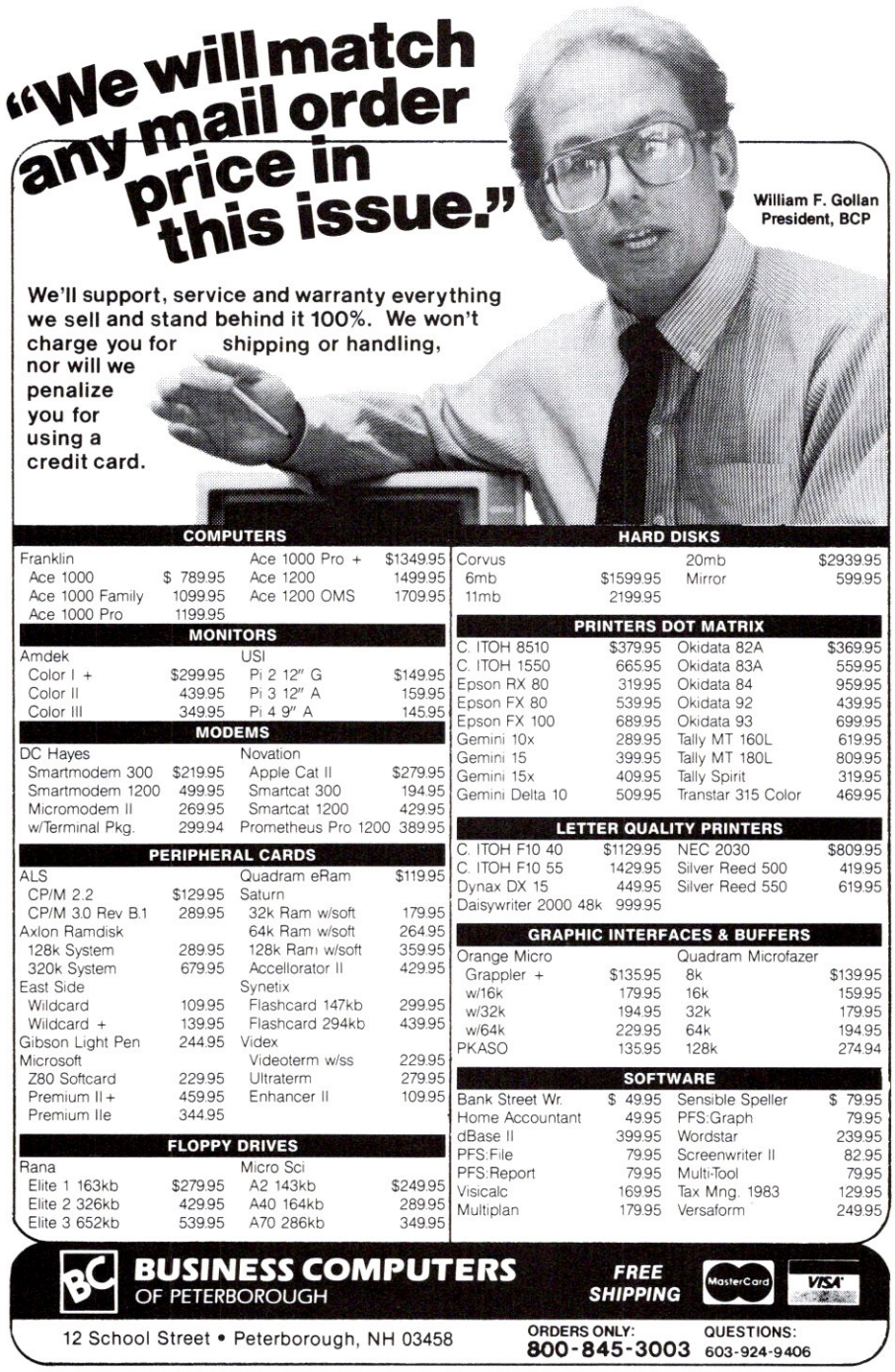
Even the most elementary systems make sure that numerical fields are filled with numbers and that you have at least had an opportunity to enter a description. More advanced packages check that numbers are within specified ranges (you can set them to refuse million-dollar entries if your annual gross is $30,000), copy repetitive parts of the listing (such as bringing forward the date), fill out the complete customer or supplier name from a code or partial entry, and so on.

If you are using a simple checkbook register, the date, description and amount are all you need, but normally you turn to a computer because you want to know precisely how much of the money is owed or owing, comes from various bank accounts, goes for different purposes, and ends up in different places.

So for business or home budgeting use, you also have to enter some kind of classification with each transaction. Then, when it comes time to add up the entries and do the balances, you'll also get the totals by class.

What's more, in most cases each entry will need two class specifications. To keep complete accounts, you need to sort each entry both by where it came from and by where it is going (which financial people call "double-entry bookkeeping"). That way, you'll not only know whether you spent your money on postage or printers, but also if your checks will bounce or your savings account is empty.

With a standard financial package, the way you specify the transaction source and destination is with an account number—a range such as 100-199 is typical for income, 200-299 for bank accounts, 300-399 for expense categories, and so on. Unfortunately, such a



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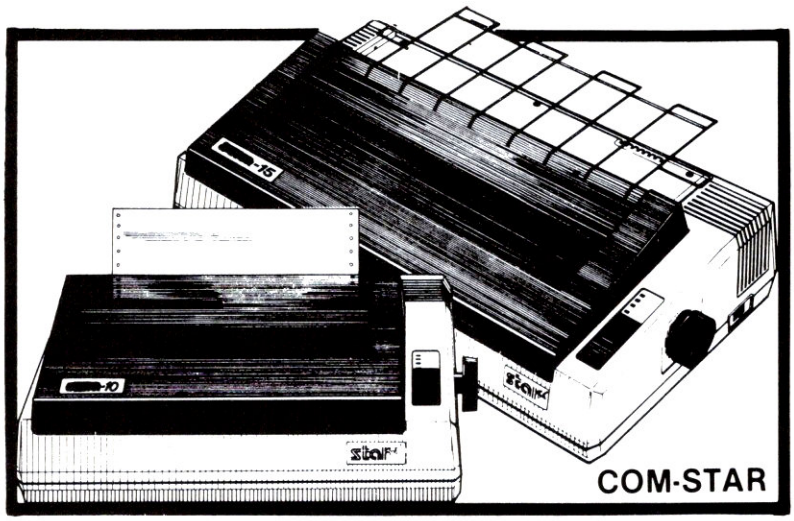

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setup requires you to memorize this chart of accounts or refer to it constantly. Some more convenient packages let you define your own names for accounts and accept them or specified abbreviations.

A few specialized systems even let you bypass much of this stage of data entry for certain transactions. You can buy systems that connect a cash register to an Apple, so that as you ring up each transaction, it also goes into the day's records. Similarly, semicustomized systems combine the generation of receiving-room and shipping-room records, order processing, and other parts of the normal business paperwork system with the capture of accounting data.

Updating the Accounts

Once you've put your data into the computer, it's time to do something with it. Most accounting systems run in the "batch update mode," meaning that you enter all the new transactions you have collected and then have the computer proceed to add or subtract them from the proper accounts. The result is somewhat like a daily bank statement—you know what has happened yesterday, but until the end of the day you just have to keep up with a pencil.

A few systems now offer "on-line updating," which means, of course, that each transaction updates the total as you enter it. Unfortunately, this feature requires a combination of large memory and fast disks, so most Apple packages don't have it yet. Most traditional accountants prefer the batch mode anyway—it's long been a principle of accounting to write the individual transactions down and keep that original record as inviolate as possible, both to be able to track down errors and to prevent fraud.

A few specialized systems can let you bypass much of this stage of data entry.

Accountants call distributing each item to the proper account "posting," supposedly from when transactions for each category were placed on a separate peg. The collections of daily entries are the "journals," and the destinations they are posted to are the "ledgers."

In double-entry bookkeeping, each transaction must be reflected in at least two ledger entries. For each "credit" where an item is added, there must be a corresponding "debit" where it is subtracted (or a series of credits or debits). In single-entry books (such as a simple checkbook), each entry is entered just once into a single ledger.

Distributing the items to the ledgers is usually what takes the computer itself the most time, and it spends most of that time reading and writing information out to the disk. Posting is a sorting process, so unless the number of transactions and accounts is small enough to keep everything in memory, a lot of disk grinding is inevitable.

Eventually, the buzzing noises stop, and the items are all in place. With a home-checkbook package, once the entries are sorted, you may not need your original input file anymore. After all, your purpose is to see the checks in date or payment order, not in the order you happened to type them in.

Accounting packages for business use are not so easily satisfied. One of the rules of any business system is that you must be able to follow every transaction from original input to final total—in accounting terminology, a complete "audit trail." As a result, most business packages save their journals even after they sort the entries to ledgers.

CIRCLE 222 ON READER SERVICE CARD

Most accounting systems have one main ledger (the "general ledger") and as many subsidiary ones as you need to keep the detail manageable in the main ledger. You wouldn't, for example, want to write down every purchase of paper in the main ledger of a billion-dollar corporation; instead, you'd have the computer post all office supplies to a subsidiary ledger, and the total for supplies would go, in turn, to the general ledger.

If you are scrupulous in your record keeping, accurate in your data entry, and entirely correct in setting up your system, then your books will always come out exactly in balance at this stage. In the real world, it rarely turns out that way, though. Once you make postings you usually find that one or more totals don't come out, or that some entries are apparently in error.

Taking human nature into account, most accounting packages let you strike trial balances and make needed changes before you accept the final result. Programs that reflect a pen-and-ink philosophy only let you add correction entries; those that emulate pencils and erasers allow you to change your entries and try again. Sometimes it takes several iterations of correction and trial balance before all the numbers are right.

Time to Report

If you have the slightest affinity for accounting, simply getting your books to balance will give you a definite feeling of satisfaction, but unless you consider financial record keeping merely a performance art form, you'll want to get those results back out of the computer so you can use them.

The three main outputs that you ordinarily want from a financial package are checks, statements (bills), and reports. The checks go to the people you owe money to, the statements go to the people who owe money to you, and the reports tell you how the enterprise is faring.

Writing checks is simple in theory, but not all accounting packages actually print out checks directly. Because of the differences in printers, check styles, and sizes, and the difficulty of feeding individual checks into a printer, it's not so easy to get the print lined up correctly. Consequently, many packages merely show the information in a report or on the screen and let you actually write out the checks on your own.

On the other hand, almost all packages can print statements. Depending on the system, they include at least the customer's name, the date, an amount, and a general description of what the charge is for. In case you don't have preprinted forms, most include your own name, address, and phone as well. Many systems also let you specify a detailed format giving each item included, service charges, and any tax.

As for reports, many accounting packages are preconfigured to produce certain standard reports, but most allow you to design your own as well. You can have complete transactions by customer, totals by categories, expenses by department, and so on. Unfortunately, at this stage of computer-software development, flexibility often goes hand in hand with complexity, so you may have to spend a few hours setting up your more complex reports.

One report most people want to see is a listing of overdue bills. A computer has no trouble looking through all receivables (bills) and seeing which ones have been outstanding more than a specified length of time. Accountants call this "aging" the accounts. You can then send reminders (or threats, if that's your style) to customers who are behind in their payments.

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Softerm 1
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Softerm 1 is a powerful and flexible terminal emulation program that operates on an Apple® II, II Plus, or IIe to provide basic terminal communications to a variety of host computers, timesharing services, and information services such as *The Source*℠ *CompuServe*® *and the Dow Jones News/Retrieval*® It operates full or half-duplex at speeds up to 9600 bps using either a direct connection or any standard manual or auto-dial modem. Features include user-defined keyboard macros, built-in phone book for automatic dialing, terminal mode line capture simultaneously to print or disk, copy screen to print or disk, and terminal status display.

DOS, CP/M, and PASCAL File Compatibility Combined In a Single Program

Softerm 1 incorporates an advanced file manager which provides compatibility with DOS 3.3, CP/M, and Pascal disk formats for all file operations including file transfers. And at speeds up to 5 times faster than standard Apple DOS! Built-in disk utilities provide *INIT, CATALOG, RENAME,* and *DELETE* commands for all disk formats. Wildcard match characters can be used whenever filenames are entered.

Local file transfers allow DOS, CP/M, or Pascal files to be displayed, printed, or even copied to another disk. For example, a file on a CP/M formatted disk in Drive 1 could be copied to a Pascal formatted disk in Drive 2 providing a complete format conversion capability. Numerous editing options such as tab expansion and removing unwanted characters allow easy reformatting of data to accommodate the variations in data formats used by host computers.

Multi-Protocol File Transfer Capability

Softerm 1 offers file transfer methods flexible enough to match any host computer requirement. These include the *character* protocol with user-definable characteristics to provide maximum flexibility for text file transfers to any computer. The CP/M User's Group standard *XMODEM* protocol may be used for binary file transfers with systems using the CP/M operating system. The intelligent *Softrans* protocol can be used to transfer *any* type file and provides automatic binary encoding and decoding, error detection and automatic retransmission, and data compression to enhance line utilization. A FORTRAN 77 source program is supplied with Softerm 1 which is easily adaptable to any host computer to allow communications with Softerm using the Softrans protocol. Specific host computer versions of the Softrans FORTRAN program are available on request.

Softerm file transfer utilizes an easy to use *command language* which may be executed interactively or from a *macro* command file which has been previously entered and saved on disk. Twenty-three high-level commands include *DIAL, CATALOG, SEND, RECEIVE, ONERR, MONITOR, HANGUP,* and others. A *SCHEDULE* command even allows file transfers at a specific date and time.

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CIRCLE 163 ON READER SERVICE CARD

complex web of entries, flows, and balances. Even before computers, many people handling money found that it was easier to envisage the whole process as a rectangular array. In two dimensions, each item could be used twice but written down only once.

On a standard spreadsheet, each line represents a single item or class of items, and the various columns across the page represent the constituent parts. For example, if you had an entry for the cost of office space as one line, the various columns might be rent, heat, and electricity. Or if your horizontal line were sales, the vertical columns could denote sales in each month and then the annual total.

On a simple rectangular spreadsheet, the sum of all the individual columns for an item adds up to the total for that item. The sum of the items in a column is the total for that category of expense. The total of all items, if everything is done correctly, equals the total by category.

Because of this simple relationship between constituent parts and final sums, one of the standard applications for this kind of accounting is the budgeting and reporting process in a large organization. Using rows to represent the organization's units and the columns to represent general budget categories or purposes, you can use a spreadsheet to get a good overview of where the money is going and why.

Even manual methods did not limit rectangular ledgers to simple summation across rows and columns. Using the same basic format, you might have set up a sheet in which one column was quantity sold, the next one price, and the third one total sale amount. Every complication added greatly to the chance of error, and it was not unusual to spend hours or days trying to find the reason why a large spreadsheet did not come to consistent totals.

With a computer's help, you can design spreadsheets of any complexity and not worry about doing the actual arithmetic.

Spreadsheets Go Electronic

Interactive computing changed all that. With a computer's help, you can design spreadsheets of any complexity and not worry about doing the actual arithmetic. You can make one column the result of a calculation involving several others and make particular rows dependent on values you entered above them.

For example, if your rent was a base amount plus a percentage of your gross sales minus a promotional allowance plus a city tax, the computer has no problem with that—once you describe the correct formula, every time you need to calculate the rent, your spreadsheet will crank out the figure.

On microcomputers, the original popular spreadsheet program was, of course, VisiCalc, written for the Apple II. Since then, the number of these "Calcs" has increased faster than compound interest, and there are perhaps dozens for various Apple computers alone (see "Get Ready, Get Set, Calculate!" in this issue.)

On a "Calc" spreadsheet, you start with a rectangular grid (the size depends on the brand and your computer's memory size), with the intersection of each row and column known as a "cell." In each cell, you can place a constant value or a formula for calculating the value based on the contents of other cells.

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CIRCLE 126 ON READER SERVICE CARD

For example, suppose you had a lemonade stand. If you were to use a spreadsheet, you might make each column the monthly results. You'd use one row for sales, one for each major cost item, and one for income. If your rent stayed the same, you could enter it as a constant in each of the twelve active columns in a row dedicated to rent. Your sugar costs, however, would depend on sales. So for the entry on the line for cost of sugar, you might enter a function such as 0.03 times the sales for that column. Similarly, income could be a function of sales, and profits the difference between income and expenses.

Early spreadsheets, such as the original VisiCalc, allowed you to enter only short formulas and named each cell according to its row and column coordinates. So instead of being able to refer to a cell as "cost per cup" or even "CUPCOST," you had to keep track of it as "N12" or whatever. The principal difference in more recent products is a greater attention to making the process easier to use and more humanized. Most products now allow you to choose your own labels, expand the width of certain columns for longer values or formulas, and format reports in more flexible ways.

Predictions and "What Ifs"

You can run a spreadsheet that calculates the result of actual figures just as easily with numbers based on guesses, wishes, and dreams. Instead of just being a backward-looking record of what has already taken place, a spreadsheet can be a modeling and predictive tool. Given stated assumptions about how figures interact and a set of initial values, a spreadsheet goes on to calculate what the outcome should be.

On a computerized spreadsheet, recalculating even a large model takes a few minutes at worst.

If you have a budget, for example, that is made up of expenses by department and item, you might want to check what will happen if labor costs rise 13% next year. Or suppose production expenses are made up of a fixed starting figure plus a declining incremental cost. Sales, in turn, are governed in part by price. What would the effect be on profit if prices were cut 10%?

With manual spreadsheets, the effort needed to test these "what if" scenarios made this an almost unused technique. Recalculating was slow, tedious, and error-prone. On a computerized spreadsheet, recalculating even a large model takes a few minutes at worst.

Many a business has found that it could cut weeks from its budget cycle by using computerized spreadsheets. In fact, many businesses originally bought Apple IIs merely to be able to use VisiCalc for a few weeks per year. For others, the ability to take sales projections and vary assumptions easily justified the price. And still others wrote complete accounting systems based on spreadsheet models.

In hindsight, the result should have been obvious. Once the tools were provided, people with the need and curiosity to explore and create started producing a flood of new products and methods. Now, from almost the smallest enterprises to the largest, few are not using or planning to use small computers for their financial planning and record keeping. Victory, it seems, is at hand, and those uncontrollable columns of uncooperative numbers need never terrorize us again. ✚

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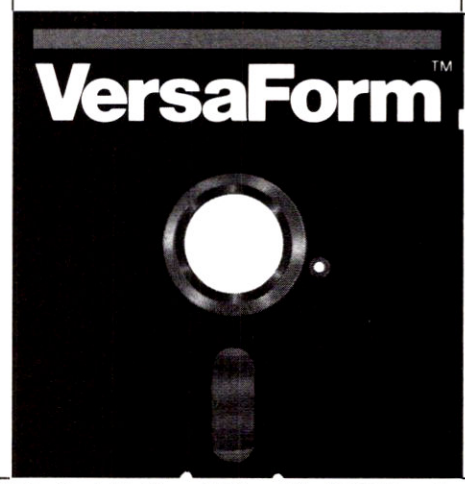

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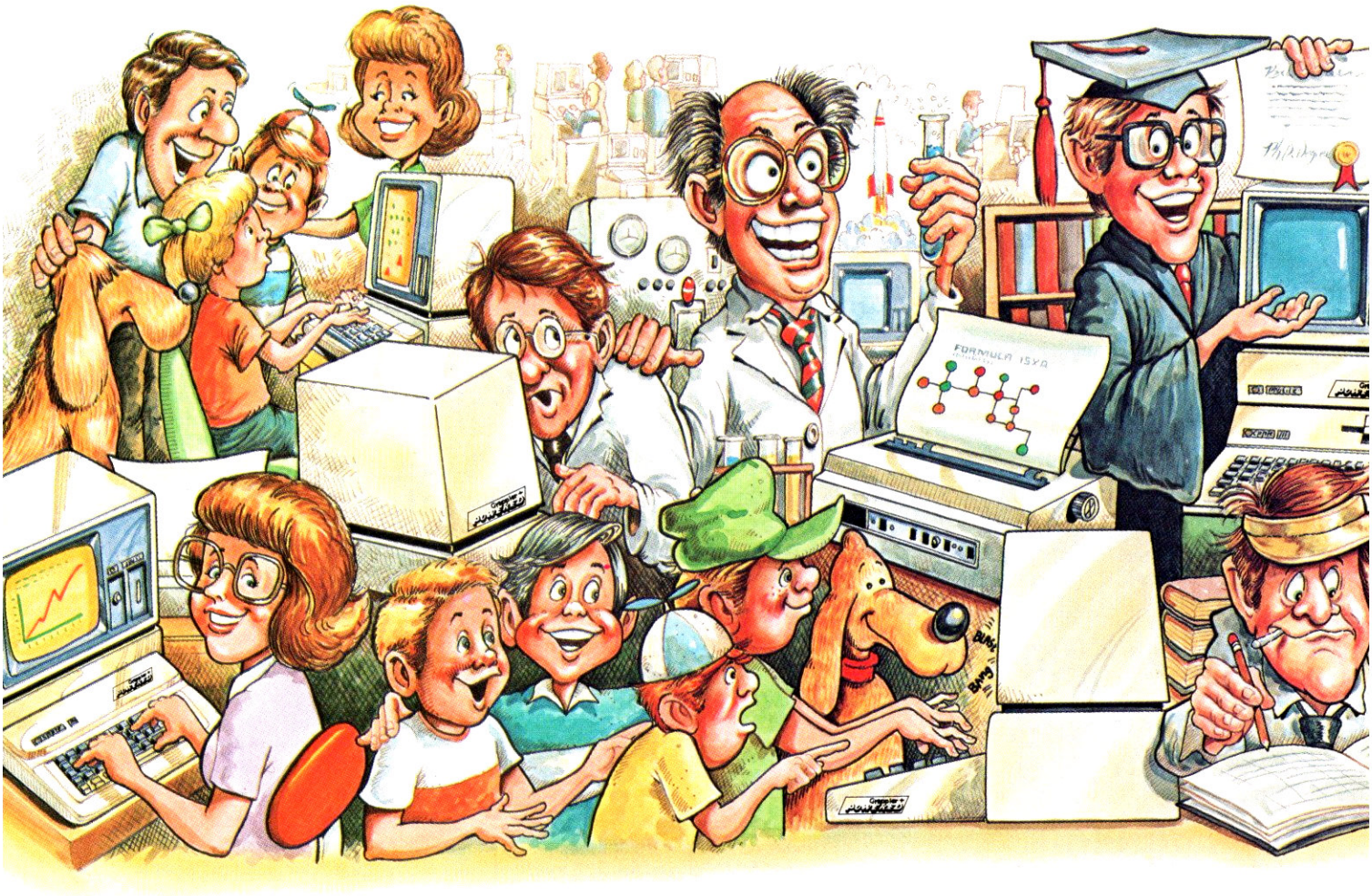

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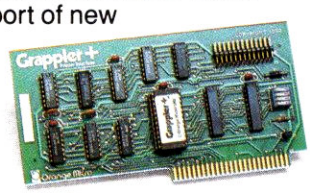

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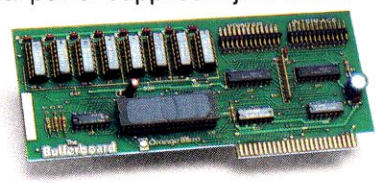

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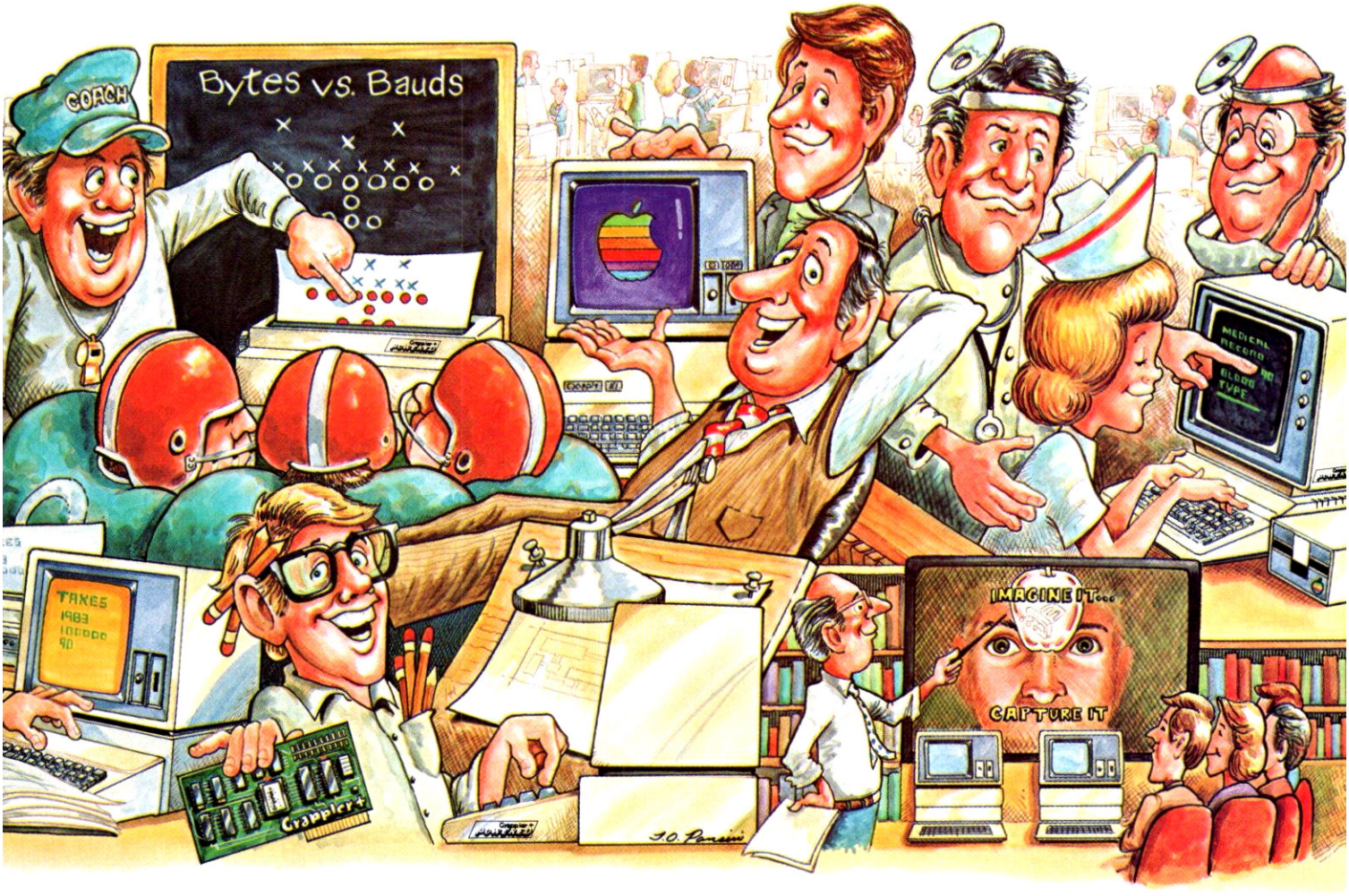

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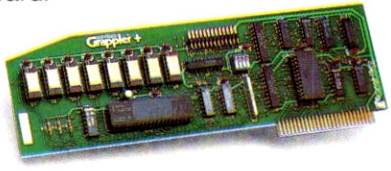

With this much interface power, you'll never need anything else. And the price will surprise you, too.

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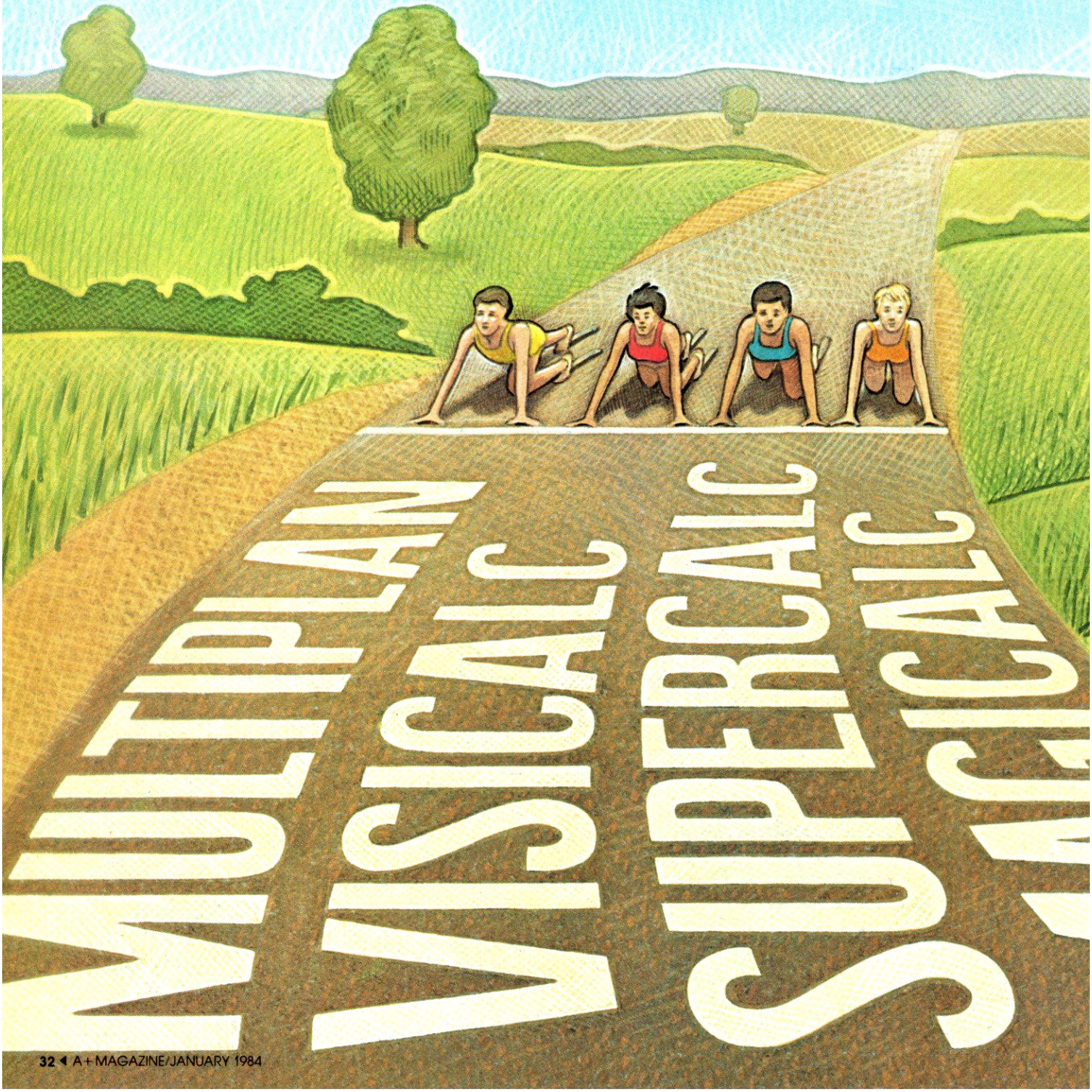


The Apple II computer came to market in 1977. The machine, with 4K or perhaps 16K of RAM and a "fast" cassette offline storage system, convinced thousands of computer hobbyists that this new competition to the Commodore Personal Electronic Transactor (PET) was capable of doing honest-to-goodness work. To computer professionals and to businessmen who felt they needed a computer but didn't want to spend tens of thousands of dollars on a minicomputer, however, the Apple II was but a toy. Since little software was available, these "experts" were more or less correct.

A year passed, and Apple Computer brought out the Disk II, complete with a disk-operating system with mimeographed instructions. Well, DOS 3.0 was quickly succeeded by DOS 3.1, and then 3.2—and the mimeographed instructions were replaced by the *Dos and Don'ts of DOS*. Steve Wozniak's Integer BASIC was replaced by the Applesoft version of Microsoft BASIC, complete with floating-point calculations and high-resolution graphics. More advanced games, a word processor or two, and even a couple of file-manager programs began to appear.

In 1979 Daniel Bricklin and Robert Frankston, who had been trying to stir up some interest in a computer program that converted the Apple II to a visible calculator, teamed up with Dan Fylstra. He was a Harvard Business School acquaintance of theirs who had been marketing a chess program and some educational software for the Apple under the name Personal Software, Inc. Subsequently, a $79 program called VisiCalc hit the market. VisiCalc gave the Apple computer

an electronic simulation of an accountant's worksheet.

Accountants took a look at VisiCalc, saw its 63-column-by-254-row electronic simulation of their normal working papers, and began to put Apple computers on their desks. If you wanted VisiCalc, you had to buy an Apple. These professionals began to recommend VisiCalc (and therefore Apples) to their clients, and the Apple boom—and, in reality, the entire microcomputer industry—took off. Soon the old 13-sector DOS 3.2 version (which didn't have features such as the Boolean IF, AND, and OR, and Data Interchange Format, but did have the ability to save a template to cassette tape) was replaced by the current DOS 3.3 version of standard VisiCalc. The $79 price tag gave way to $250; Personal Software, Inc., became VisiCorp; and even the computer "experts" began to allow that the Apple computer, and other microcomputers, might be a little more than toys, after all.

Success, as always, bred competition. Although VisiCalc was now produced for Atari, Radio Shack, Hewlett-Packard, and other machines, little was available for the 8080- and Z80-based computers running Digital Research's CP/M operating system. Sorcim Corporation of San Jose, California (which is also VisiCorp's home town) released SuperCalc, and with the introduction of Microsoft's Z80 coprocessor SoftCard, it became usable on the Apple II. SuperCalc was similar to VisiCalc, but it introduced a couple of improvements. Apple CP/M required an 80-column card, so SuperCalc made the entire 80-column screen, as well as lowercase letters, available to Apple users. Two other features VisiCalc users envied were SuperCalc's variable column width and text "spillover."

In the autumn of 1982, VisiCorp introduced Advanced Version VisiCalc (VCAV hereafter). VCAV had variable column widths; 80 columns; lowercase letters; a host of new features called "attributes" (which could format, protect, hide, and the like); new financial functions; built-in date arithmetic; keystroke macros; customized printing output; and lots more. Unfortunately, the program was available only for the Apple III, and not the II or II Plus, which left room for a new entry from ARTSCI, publisher of a word-processing program called Magic Window, which came on the scene with Magicalc.

Magicalc will seem familiar to any Apple VisiCalc user, except that it does not have VisiCalc's trigonometric func-

SPREADSHEET COMPARISON CHART

Feature	VisiCalc	VCAV	Super-Calc	Super-Calc²	Magi-calc	Multi-plan
COMMANDS:						
Attributes	N	Y	N	N	Y	N
Blank						
A Cell	Y	Y	Y	Y	Y	Y
A Column or Row	N	N	Y	Y	N	Y
A Block	N	N	Y	Y	N	Y
Clear Template	Y	Y	Y	Y	Y	Y
Delete a Row or Column	Y	Y	Y	Y	Y	Y
Edit a Cell	Y	Y	Y	Y	Y	Y
Format:						
Global	Y	Y	Y	Y	Y	Y
A Row or Column	N	N	Y	Y	N	Y
A Range	N	N	Y	Y	N	Y
A Cell	Y	Y	Y	Y	Y	Y
Integer	Y	Y	Y	Y	Y	Y
Left-Justified	Y	Y	Y	Y	Y	Y
Right-Justified	Y	Y	Y	Y	Y	Y
Center-Justified	N	N	N	N	N	Y
Fixed Decimals						
2 ($)	Y	Y	Y	Y	Y	Y
variable	N	Y	N	Y	N	Y
Commas	N	Y	N	Y	N	Y
Dollar Signs	N	Y	N	Y	N	Y
(Negatives)	N	Y	N	Y	N	Y
Percentages	N	Y	N	Y	N	Y
Scientific	N	Y	Y	Y	N	Y
User Definable	N	Y	N	Y	N	N
Bar Graph	Y	Y	Y	Y	Y	Y
Global Parameters						
Column Width	Y	Y	Y	Y	Y	Y
Order of Calculation						
Row or Column	Y	Y	Y	Y	Y	Y
Natural	N	N	N	N	N	Y
Auto or Manual Recalc	Y	Y	Y	Y	Y	Y
Keystroke Macros	N	Y	N	N	N	N
Insert Row or Column						
One at a Time	Y	Y	Y	Y	Y	Y
Multiple	N	Y	N	N	N	Y
Local Column Widths	N	Y	Y	Y	Y	Y
Move a Row or Column	Y	Y	Y	Y	Y	Y
Name Cell or Range	N	N	N	N	N	Y
Print						
Formulas	Y	Y	Y	Y	Y	Y
To Printer	Y	Y	Y	Y	Y	Y
To Disk	Y	Y	Y	Y	Y	Y
Sends Printer Control Codes	Y	Y	Y	Y	Y	Y
Borders	N	N	Y	Y	N	N
Page Breaks	N	Y	Y	Y	Y	Y
Titles	N	Y	N	N	N	N
Headers	N	Y	N	N	N	N
Footers	N	Y	N	N	N	Y
Margins	N	N	Y	Y	Y	N
Page Numbers	N	Y	N	N	N	N
Protect Cells	N	Y	Y	Y	Y	Y
Replicate						
Prompts Absolute/Relat						
For Each Reference	Y	Y	Y	Y	Y	N
Multiple	N	Y	Y	Y	Y	N
Built into Formula	N	N	N	N	N	Y
Attributes Only	N	Y	N	N	Y	N
Contents Only	N	Y	N	N	Y	N
Formats Only	N	Y	N	N	Y	N
Values Only	N	N	Y	N	Y	N
Sorting	N	N	N	Y	N	Y
Storage						
Consolidate File	N	N	N	Y	N	N
Delete File	Y	Y	Y	Y	Y	Y
DIF (or similar)	Y	Y	Y	Y	Y	Y
Initialize Disk	Y	Y	N	N	Y	N
Load from Disk	Y	Y	Y	Y	Y	Y
Rename	N	N	N	N	Y	Y
Save Entire File	Y	Y	Y	Y	Y	Y
Save Partial File	N	N	Y	Y	N	N
Full Screen Catalog	N	N	Y	Y	Y	Y
Titles						
Vertical	Y	Y	Y	Y	Y	Y
Horizontal	Y	Y	Y	Y	Y	Y
Both	Y	Y	Y	Y	Y	Y
Windows						
Number Possible	2	2	2	2	2	8
Horizontal	Y	Y	Y	Y	Y	Y

Feature	VisiCalc	VCAV	Super Calc	Super Calc^2	Magic Calc	Multi-Plan
Vertical	Y	Y	Y	Y	Y	Y
Synchronous	Y	Y	Y	Y	Y	Y
Asynchronous	Y	Y	Y	Y	Y	Y
Repeating Label	Y	Y	Y	Y	Y	Y
BUILT-IN FUNCTIONS						
Mathematical Functions:						
Absolute Value	Y	Y	Y	Y	Y	Y
Arccosine	Y	Y	Y	Y	N	N
Arcsine	Y	Y	Y	Y	N	N
Arctangent	Y	Y	Y	Y	N	Y
Average	Y	Y	Y	Y	Y	Y
Column	N	N	N	N	Y	Y
Count	Y	Y	Y	Y	Y	Y
Cosine	Y	Y	N	Y	N	Y
Sum of Extensions	N	Y	N	N	N	N
Exponent, Base "e"	Y	Y	Y	Y	Y	Y
Integer	Y	Y	Y	Y	Y	Y
Logarithm, Base 10	Y	Y	Y	Y	Y	Y
Logarithm, Base "e"	Y	Y	Y	Y	Y	Y
Modulus	N	Y	N	Y	N	Y
Pi	Y	Y	Y	Y	Y	Y
Round	N	Y	N	Y	Y	Y
Row	N	N	N	N	Y	Y
Sine	Y	Y	Y	Y	N	Y
Sign	N	N	N	N	N	Y
Square Root	Y	Y	Y	Y	Y	Y
Standard Deviation	N	N	N	N	N	Y
Sum	Y	Y	Y	Y	Y	Y
Tangent	Y	Y	Y	Y	N	Y
Logical and Similar Functions:						
And	Y	Y	Y	Y	Y	Y
Choose	Y	Y	N	N	Y	N
False	Y	Y	Y	Y	Y	Y
Error	Y	Y	Y	Y	Y	N
If	Y	Y	Y	Y	Y	Y
Iserror	Y	Y	N	Y	Y	Y
IsNot Available	Y	Y	N	Y	Y	Y
Lookup						
Two-Line	Y	Y	Y	Y	Y	Y
Block	N	N	Y	Y	N	Y
Maximum	Y	Y	Y	Y	Y	Y
Minimum	Y	Y	Y	Y	Y	Y
Not Available	Y	Y	Y	Y	Y	Y
NOT	Y	Y	Y	Y	Y	Y
OR	Y	Y	Y	Y	Y	Y
TRUE	Y	Y	N	N	Y	Y
Value	N	Y	N	N	N	Y
Financial Functions:						
Future Value	N	Y	N	N	N	N
Internal Rate of Return	N	Y	N	N	N	N
Net Present Value	Y	Y	Y	Y	Y	Y
Number of Payments	N	Y	N	N	N	N
Payment	N	Y	N	N	N	N
Rate	N	Y	N	N	N	N
Calendar Functions:						
Date	N	Y	N	Y	Y	N
Day	N	Y	N	Y	N	N
Day of Week	N	N	N	Y	N	N
Hour	N	Y	N	N	N	N
Minute	N	Y	N	N	N	N
Month	N	Y	N	N	N	N
Seconds	N	Y	N	N	N	N
Year	N	Y	N	Y	N	N
Arithmetic Operators:						
+	Y	Y	Y	Y	Y	Y
−	Y	Y	Y	Y	Y	Y
*	Y	Y	Y	Y	Y	Y
/	Y	Y	Y	Y	Y	Y
^	Y	Y	Y	Y	Y	Y
%	N	Y	Y	Y	N	Y
Comparison Operators:						
=	Y	Y	Y	Y	Y	Y
<	Y	Y	Y	Y	Y	Y
>	Y	Y	Y	Y	Y	Y
<>	Y	Y	Y	Y	Y	Y
<=	Y	Y	Y	Y	Y	Y
>=	Y	Y	Y	Y	Y	Y

(continued next page)

tions (@SIN, @ASIN, @COS, @ACOS, @TAN, and @ATAN). It does have almost everything else that ordinary Apple VisiCalc has, and more. Magicalc uses your 80-column board (from almost any manufacturer) to give you an 80-column screen. Magicalc can use your 128K or 16K memory-expansion card (and probably anything in between) to create and use template files that are larger than those you can save on your Apple disk. It offers lowercase, the useful @ROUND function, "local" column widths, and even a few attributes. At $150 suggested retail—it's often much cheaper labeled privately by an Apple-"compatible" manufacturer or an Apple users' group—Magicalc compares well to the original Apple II VisiCalc, as long as you don't need the trig functions.

Then there was the spreadsheet entry from Microsoft. (You remember that company—it wrote Applesoft!) Multiplan, clearly an electronic spreadsheet simulator, is not at all a "calc-alike."

Magicalc compares well to the original Apple II VisiCalc, as long as you don't need the trig functions.

The left- and right-arrow keys are for moving around a menu at the bottom of the screen, rather than for moving a cursor in the template. The / language, established by VisiCalc and copied by most of the other spreadsheets, is nonexistent. The upper-left-hand cell is R1C1 rather than A1, and you "copy" rather than "replicate." The most important new MultiPlan feature is the ability to "link" templates. You can consolidate sales reports from several branches into a master sales report and post the bottom-line total of detailed manufacturing-cost information to the Cost of Goods Sold cell on the corporate balance sheet. No longer does the amount of memory available in the computer limit the spreadsheet.

Sorcim (that's *Micros* spelled backwards, by the way) wasn't to be left behind. The company has recently introduced SuperCalc^2 for the Apple CP/M environment. The program has many advanced features, as well as the oft-requested ability to sort.

In early October 1983, VisiCorp began shipping the long-awaited VCAV

for the Apple IIe. VCAV for the IIe is just like the Apple III version and is a welcome addition, even if it doesn't sort. (VisiCorp has recently started shipping VisiCalc IV for the IBM Personal Computer, which includes an integrated graphing, sorting, and keystroke macro "patch" to regular VisiCalc. At present this "patch" is not available for Apples, but we can hope.)

Now that we've gone through a quick history of each of the five spreadsheet programs, let's take a look at them one by one. Because VisiCalc was the first, and is the best known, we'll assume that you have had some acquaintance with that product and will understand if we compare the other programs to it. If you have never seen VisiCalc, go down to your local computer store and ask for a demonstration, or purchase one of the multitude of books written on the subject.

SuperCalc

SuperCalc is, in effect, standard VisiCalc for computers that run CP/M. Although it does not work exactly like VisiCalc does, it respects the / convention and has most of the VisiCalc commands and functions. One insignificant difference is hard to get used to: SuperCalc's functions do not begin with VisiCalc's @ sign. As with many CP/M programs, SuperCalc is published for a variety of different computers, and the documentation tends to be a bit general.

As with other CP/M software, you must "install" the operating system on your program disk and must sometimes customize it to suit your particular computer. This process can be quite a trial, especially when the manual doesn't help you overcome your particular problem and when the Install software supplied with the system differs from that described in the special "Read Me First" installation manual. Also as with most CP/M software, SuperCalc is not copy-protected, and you are encouraged to make up to three copies for backup and to use (obviously not to sell or give away). The ability to make copies is welcome, particularly as the program disk must remain in the drive for overlay and help purposes. I assume that anyone with CP/M experience will have little difficulty with installation.

SuperCalc's major contributions to the spreadsheet derby are lowercase, 80 columns, "local column widths," and "text spillover." Local column widths permit you to set the width of each column, independently. Text Spillover lets you enter text into one cell, without worrying about cell boundaries. As long as adjacent cells to the right of the entry cell are empty, the text of the entry cell will "spill" over to the empty cells to the right. This feature is convenient for headings, cell identification (*Sales* is easy, but *Cost of Goods Sold* usually requires more than one cell's space), and the like. Before Magicalc and VCAV were available, many a frustrated VisiCalc user was driven to CP/M and SuperCalc merely for such features.

Multiplan, clearly an electronic spreadsheet simulator, is not at all a 'calc-alike.'

My version of SuperCalc runs under "CP/M 2.X" (presumably 2.2 and presumably not under 3.0 or CP/M Plus). Thus, the program cannot take advantage of more than 64K of RAM in the computer, and that work space is quite limited.

Then there is the cursor. The non-CP/M calc programs all use inverse video. The 80-column versions each have some provision for inverse video, as long as your 80-column card can do the job. Sorcim, however, makes no provision for a decent cursor for SuperCalc, using, instead, a < > format. These symbols are often difficult to see as they move around the screen. Worse, the first and last space in the current cursor cell are covered. A single-digit number in the cursor cell looks blank. (Yes, you can look down at the prompt display, but you can't just scan the screen and see what's there.) My Videx Card (with the inverse-video chip) can generate an appropriate cursor—it does it with Magicalc, for example. Why can't SuperCalc tell the card what to do? I don't use SuperCalc much, finding VisiCalc or Magicalc more convenient, but if you must have a CP/M calc program, SuperCalc should satisfy your needs . . . until, of course, you take a look at SuperCalc^2.

SuperCalc^2

SuperCalc^2 is a next-generation spreadsheet that can run with the same equipment you need for SuperCalc. SuperCalc files seem to be "upward compatible" with SuperCalc^2 (that is, you can use SuperCalc files with SuperCalc^2, but not necessarily the other way around), and any SuperCalc user will instantly be at home with SuperCalc^2.

To SuperCalc's features SuperCalc^2 adds sorting, date arithmetic, enhanced page formatting for printing, some other enhancements, and a bit clearer documentation, both in the manual and on the Help screens. Installing the program is as confusing as with SuperCalc (the documentation still doesn't agree with the program prompts), but even a CP/M novice can do the job with a little careful work. Unfortunately, the same < > cursor makes it impossible to read all of the numbers in the cursor cell, but if you like SuperCalc, SuperCalc^2 will work on the same machine, and the extra $100 is undoubtedly worth it.

Magicalc

Magicalc is second-generation VisiCalc, with enough advanced features to make it the program of choice if you're considering a plain spreadsheet but are unhappy with some of the limitations of ordinary VisiCalc. (Once again, engineers beware! Bill Graves, the program's author, decided not to implement

SPREADSHEET COMPARISON CHART (continued)

Feature	VisiCalc	VCAV	Super-Calc	Super-Calc^2	Magi-calc	Multi-plan
GENERAL:						
Operating System	DOS	DOS	CP/M	CP/M	DOS	DOS
Calculation Precedence	L to R	L to R	ALGEBRA	ALGEBRA	L to R	ALGEBRA
Can Return a Label	N	Y	N	Y	N	Y
Help Screens	N	Y	Y	Y	N	Y
Text Spillover	N	N	Y	Y	N	Y
Default Recalculation	Col	Col	Row	Row	Col	Natural
Number of Rows	254	254	254	254	254	255
Number of Columns	63	63	63	63	63	63
Lowercase	N	Y	Y	Y	Y	Y
40-Column Display	Y	N	N	N	Y	Y
80-Column Display (with Hardware)	N	Y	Y	Y	Y	Y
70-Column Display (without Hardware)	N	N	N	N	Y	N
Uses Memory > 64K	N	Y	N	N	Y	N
Copy-Protected	Y	Y	N	N	Y	Y
Uses Overlays	N	Y	Y	Y	N	Y
Number of Disks in Package	1	2	1	2	1	2

VisiCalc's trigonometric functions. If you use arcsines in your everyday work, Magicalc will not do the job.) The program is also inexpensive, with a list price of $149.95.

For years I've been hearing (from Software Arts and VisiCorp, among others), "We can't do [this, that, or the other] because 64K of memory doesn't leave enough room, and there is no standard large memory-expansion board."

Sometimes, the same argument comes up to explain a failure to offer an 80-column display. Well, Magicalc utilizes your memory cards and also your 80-column card to give you the largest work area of any of the programs discussed in this article. It also supports several different 80-column cards. If you don't have an 80-column card and don't want to purchase one, ARTSCI provides a high-resolution 70-character screen. I don't care much for the font, and you really need a video monitor, rather than an RF modulator and a TV set to read it well, but it does work and it is cheap.

I asked Bill Graves if he would disclose the secret that had allowed him to accomplish these feats. He laughed and said, "A lot of hard work." It appears that when Magicalc boots, it looks around, determines what type of memory expansions are present, and adjusts itself to use them all. The various types of 80-column cards are taken care of by leaving space for a "printer driver" that can be customized for any card. Printer drivers for Videx, STB, Westrex, SuperTerm, and Smarterm come with the program. (Hint to programmers: Graves' approach works well and gives a big boost to the program.)

In addition to a larger work space and an 80-column display, Magicalc adds the @ROUND function; @COL and @ROW, which return the "value" of the current column letter (e.g., A=1, BK=63) and the number of the row, respectively; the ability to protect and unprotect cells (and to tab to unprotected cells); local column widths; and a couple of fancy additions to replication (*Reproduce,* Magicalc calls it) for a very nice package. Magicalc can read standard VisiCalc files (except for trig functions) and, if you don't use any of Magicalc's new functions or features, VisiCalc can read Magicalc files. The Data Interchange Format is supported, as is limited page formatting on your printer.

Magicalc is considerably faster than VisiCalc (see benchmark chart, this page). Except for Magicalc's insistence that a Control-C means "go to lower right cell of file" rather than "Cancel," as in VisiCalc, any experienced VisiCalc user will have no trouble with Magicalc. Because of its extra features and lower price, I also recommend Magicalc over VisiCalc to beginning users in search of a spreadsheet program. At the moment, I tend to grab for Magicalc rather than VisiCalc when I need an Apple II spreadsheet, and I guess that's the best recommendation I can give.

Multiplan

Some of my best friends (even a couple who are experienced VisiCalc users) love MultiPlan, but don't expect to switch from VisiCalc to MultiPlan without a little pain and suffering. Although it is an excellent full-featured spreadsheet, it is not a "calc-alike" and does take more than a little getting used to.

Microsoft manufactures two versions for the Apple II: one for CP/M and another written in native 6502 code. My comments are based on the 6502 version, although I understand the CP/M version is virtually identical.

Multiplan's Ready mode is for menu selection. (With VisiCalc, you press the / key to get into this mode. The program interprets any entry at this point as a menu selection. If your single-letter entry happens to be something that Multiplan recognizes, the program executes your command; otherwise, Multiplan indicates an error condition. (With VisiCalc, any entry in the Ready mode other than the / is taken to be the beginning of a number or label entry.) The approach, then, is to select the appropriate name from the menu, which lists full names rather than first letters only, either by moving the cursor to the desired option or by pressing the first letter of the option. (There's a lot of controversy about single-letter menus vs. full-command-name menus, the latter supposedly being more "user friendly." Multiplan gives you the best of both approaches, but I suspect that the majority of users will start entering letters for most things after a short while. The full names seem to be more a learning device than anything else.)

A look at the feature chart (pages 34–36) shows that Multiplan has all of the standard spreadsheet features, as well as LEN and MID, the only real text-manipulation commands (which look suspiciously similar to Microsoft BASIC

CLOCKING THE CALCS

In evaluating the calc programs, I developed a couple of benchmark templates that can give you some idea of speed and maximum and minimum numbers the various programs use. The first template places the number 1 in cell A1 (or cell R1C1, if you are using Multiplan) and puts the cell reference (1+A1) into cell A2. Cell A2 is then replicated in cell A100. (Multiplan uses different cell names.) Column B, from row 1 to row 100, consists of the formula (2*3)^(A1) replicated down the page. In the benchmark box, test point 1 is the length of time it takes to replicate (1+A1) all the way down the page. Test point 2 is the length of time it takes to replicate cell B1. Test point 3 is the lowest cell in column 2 that does not show an error condition. Test point 4 is the contents of that cell, and it shows the largest number in the series that the program is able to handle. Test point 5 is the length of time the program takes to recalculate the template when a 2 is substituted for a 1 in cell A1.

The second benchmark template has 1 in A1, (1+A1) in B1, and so forth, down to column J. It gives us the numbers from 1 to 10 on the top row of the first ten columns of the sheet. Rows 2 through 100 consist of references to the first cell in each column, which produces a 1000-cell matrix. Test point 1 with this matrix is the size of the file, in memory. (Subtract the starting memory remaining shown by the program and subtract the memory remaining after the template is complete.)

Test point 2 is the time it takes to load the file from disk, including recalculation time, if the program recalculates. Test point 3 is the length of time it takes the program to recalculate.

Do not accept or reject a calc program based solely upon these benchmarks. Program selection involves more than speed. Still, the variations among programs are interesting, and if speed of calculation is important in your particular application, these benchmarks show you what happens at the extreme.

PROGRAM:	BENCHMARK 1 TP1	TP2	TP3	TP4	TP5	BENCHMARK 2 TP1	TP2
VisiCalc	2.7	117	79	2.978E61	61	18K	96
SuperCalc	2.46	103	80	1.787E62	97	26K	45
Magicalc	1.2	17.1	80	1.8E62	18.8	18K	41.5
Multiplan	10.02	19.6	63	1.056E49	22.5	88%	30.5

commands), and is the only program with the ability to "link" spreadsheets. Multiplan's ability to sort is also appealing. A look at the benchmarks shows a reasonable speed, although the largest usable number is considerably smaller than those of the other programs.

Because Multiplan shows the remaining work space in terms of percentage rather than absolute size, we can only say that the Multiplan work space *seems* bigger than SuperCalc but smaller than VisiCalc or Magicalc. Spreadsheet linkage is supposed to make up for any inadequacy in work space, though, and to some extent it does. You do have to do a lot of planning and be very careful in reloading and recalculating supporting templates and creating and destroying links properly. Although it never hurts to plan your spreadsheet *before* turning on the computer, even with VisiCalc, advanced planning and written documentation are a must when you link spreadsheets with Multiplan.

Multiplan's loading time is fast because it doesn't use ASCII text files, as do VisiCalc and Magicalc. (Multiplan can read them, should the occasion arise, however.) The decreased loading time is offset by Multiplan's inability to read files with an ordinary text editor or word processor, however.

Several features of Multiplan enable you to state answers to problems in English, rather than just as numbers. They include a lookup function that can use various target ranges for a single lookup range, and a unique index function, coupled with the program's ability to have a function give you text.

The 6502 version can use 40- or 80-column displays, but the 80-column display requires a video card. You use two diskettes, first a boot disk (which, unfortunately, is labeled Disk 2 of 2) and then the program disk (Disk 1 of 2). The program disk is copyable; the boot disk is not. Since you have to keep the program disk in the drive because of the need for extensive overlays and help screens, this compromise approach to copy protection seems almost reasonable.

Multiplan is a good, solid product that apparently is selling well, but I don't find it as easy to use as VisiCalc.

VCAV

I first used Advanced Version VisiCalc in its Apple III format more than a year ago and found it a vast improvement on ordinary VisiCalc. Now available also on the Apple IIe, VCAV, except for its lack of sorting ability, is a full-fledged next-generation spreadsheet program with a whole range of advanced financial formulas, date arithmetic, formatting, and all sorts of other things to make life easier. Because the program is so new on the IIe, I haven't had sufficient time to really put it through its paces. Because the IIe version is so similar to the III version, I can recommend the product based on my experiences with the latter.

The financial functions (@PERIODS, @PMT, @PV [present value] and @FV [future value]) add automatic amortization calculations, and @IRR automatically calculates the internal rate of return of a given cash flow. (Having spent a lot of time puzzling over what IRR really is and how best to use it, I'm not sure that @IRR is all that valuable. It does, however, seem to be an "in" financial yardstick, so the ability to use VCAV to calculate it is welcome.) @ROUND solves the accountant's problem of what to do when your accounts don't "crossfoot," and attributes and print formatting help you develop a nice-looking screen and print-formatted display. I know what @MOD and @DOTPROD do, but I've never quite figured out a way to use them to any advantage.

Small touches, such as the ability to insert or delete more than one row or column at a time, and big advances such as "keystroke memory" add up to a very usable program that is definitely worth the extra money.

IIe VCAV requires two disk drives and an 80-column card with extended 64K of memory. The program comes with a copy-protected loader disk that you have to boot and a copyable program disk that must remain in the drive. Even with the extra 64K of memory, VCAV is too big to cram into the IIe (or the III, for that matter) all at once. Delays caused by loading overlays and help screens can slow things down considerably at times. The preferred way to run the program on the III is definitely with the program disk installed on a ProFile hard-disk drive, to speed up overlay loadings.

If you bought your original Apple II to run VisiCalc, you might well upgrade to a IIe to run VCAV. Certainly, if you already have a IIe (especially with an extended-memory 80-column card) and Version 208 or 218 VisiCalc, you should contact VisiCorp, pay the upgrade charge ($150), and get VCAV. If you need a spreadsheet program with advanced features, have never used VisiCalc—particularly if you have a II or II Plus—and money is a problem, you may wish to look at Multiplan, instead.

The Bottom Line

Each of these programs can enable you to produce reports and projections or balance your checkbook with ease. It is hard to go wrong with any of them. If you use CP/M, SuperCalc^2 is clearly the winner, but I wouldn't purchase a CP/M card just for SuperCalc^2. If you have an Apple II, I recommend that you buy an 80-column card if you don't have one and get Magicalc, on the low end, or Multiplan, for more advanced features. My preference for IIe owners is definitely VCAV, unless you require built-in sorting. In that case, the Microsoft entry is the way to go. Do get one of these programs, in any case. You'll soon wonder how you ever got along without it. ✚

PRODUCT INFORMATION

VisiCalc
VisiCorp
2895 Zanker Road
San Jose, CA 95134
(408) 946-9000
List Price: $250
Advanced version: $400
Upgrade (from your dealer): $150
Requires: 48K RAM with Apple II Plus, 64K with Apple IIe; at least one disk drive; printer recommended.

SuperCalc
Sorcim, Inc.
2310 Lundy Avenue
San Jose, CA 95133
(408) 942-1727
List Price: $195
SuperCalc^2: $295
Upgrade (from Sorcim): $125
Requires: 48K RAM with CP/M 2.2, 64K RAM with CP/M-86; Apple II, II Plus, IIe, or Apple III with CP/M; one disk drive.

Magicalc
ARTSCI
5547 Satsuma Avenue
North Hollywood, CA 91601
(213) 985-2922
List Price: $149.95
Requires: 64K RAM; Apple II, II Plus, or IIe; one disk drive; an 80-column card if 80 columns are desired; printer recommended; DOS 3.3.

Multiplan
Microsoft
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080
List Price: $375
Requires: 64K RAM; Apple II, II Plus, or IIe; one disk drive.

HOME BANKING

APPLES ARE REACHING FROM YOUR LIVING ROOM INTO YOUR BANK

If you have owned an Apple—or other microcomputer—for any length of time, you probably already know that some chores are easier to do the old-fashioned way. For instance, it's a lot less work to look up a telephone number in a little black book or card file than to go through the ritual of boot-up and data retrieval, and I have yet to find a calendar program that makes life any easier than the disposable wall calendar my bank used to give me.

If you are about to buy your first computer, don't be discouraged by this observation. The list of useful applications is virtually endless, and you can be sure that several will fit your particular needs. Since I make my living as a writer, the most practical task I put my Apple (or Apple-compatible Basis 108 computer) to is word processing, but if I were to list its nonrecreational uses in order of importance, banking would rank a close second.

Home banking began before computers found their way to our end of the telephone line, but—although it does not require any special hardware—banking by phone has not significantly shortened the lines at the teller's window. Home banking by computer is a viable option, though, and, based on my experience with two New York banks, it is definitely here to stay. So far, most banks offering this service are still testing the waters, which means that they accept only a limited number of customers. "We haven't set any definite timetable for ourselves," says Susan Weeks of Citibank's public-affairs department. "We have found, through past experience, that it's better to do one's homework first." Homework here entails getting feedback from the experimental customers and adding refinements to make the systems as convenient and "user friendly" as possible. As part of this process, pioneer home bankers such as myself are frequently asked for evaluations based on their experiences. Besides answering endless questionnaires over the telephone, I have been to more than my share of testing sessions in rooms bugged with hidden microphones and walled with two-way mirrors.

BANKING BY PHONE HAS NOT SIGNIFICANTLY SHORTENED THE LINES AT THE TELLER'S WINDOW.

Of course, the marketing researchers don't want you to know you are being observed by their client bank; in fact, they are always careful not to mention who the bank is. I must add that I am speaking of Citibank only, because Chase Manhattan Bank conducted its sessions without the ludicrous veil of secrecy. Chase also served tasty sandwiches, and the reward was more generous. Reward? Oh yes, following each session, some effusive lady always hands you an envelope containing a cash payment. "We have many clients, and we always need people for these sessions," one particularly talkative researcher told me, "so we could keep you busy every night." At $35 a throw, I decided to stick to writing.

One problem facing the banks is that all home computers are not created equal, so a bank must first decide which systems to go with. When Chase introduced Chase Home Banking in the summer of 1981, the service was aimed at Apple II users; Citibank, on the other hand, chose to launch its HomeBase with the Atari, in late 1982, and expanded to include Apple II service four months later. Both banks have told me that their system will not run on an Apple III, but I have my doubts about that, since their software will work with a serial card as well as with the Micromodem II. I could have experimented with my Apple III, but my Basis does the job well, so why risk impairing the perfect health of my Apple? Both banks also serve IBM PC users now, and more systems are scheduled for inclusion in the near future.

ALL HOME COMPUTERS ARE NOT CREATED EQUAL, SO A BANK MUST FIRST DECIDE WHICH SYSTEMS TO GO WITH.

There are probably as many different approaches to home banking as there are banks offering the service. For instance, the systems Chase and Citibank employ are quite diverse, not only in the way they operate, but also in the services they offer. Accessing Chase Home Banking involves two diskettes (supplied by the bank) and requires all transactions to be entered off-line; Citibank's HomeBase uses only one diskette to put you on-line with its computer. Both software pro-

grams take advantage of the Hayes Micromodem II's auto-dial feature. For some odd reason, the Chase boot diskette is copy-protected, which makes life tough when it crashes; I had two such crashes, both forcing me back to the teller lines while I waited for replacements. Citibank's software reproduces very well with the good old Copy A command. Each bank also furnishes an additional diskette: Citibank's lets you configure the boot disk to your system; Chase's is for archiving the checkbook register, but more about that later.

With Chase Home Banking, once you have entered all your transactions, the main menu's Call Chase option dials the bank, logs on to the system, extracts your latest balances, and proceeds to perform a two-way transmission of data. Once it has sent all your entries to the bank's computer and received data, such as any mail or bulletins you might have had waiting, the program logs off. Your screen will now tell you if the diskette contains any new mail or bulletins, and a couple of keystrokes will gain you access to them. Citibank's HomeBase program, on the other hand, puts you in direct touch with a bank computer. After you make contact, you no longer need the diskette, and all your transactions are performed on-line.

Let's compare how the two systems handle a few important functions:

Obtaining Balances

Chase writes your balances to the diskette each time you access the system, but it can take many hours before the figures reflect your most recent transactions. Citibank gives you a truer balance, complete with interest accrued, where applicable. If you transfer money between accounts or pay a bill, the balance is immediately updated on Citibank's system, but not so on Chase's. Chase does, however, list the time and date reflected by the balances, but the delay makes little sense considering the technology involved.

Paying Bills

One of the most convenient features of home-computer banking is the ability to pay bills without having to write out a check and pray that the postal service will not lose it. Here, Citibank's approach is considerably better than Chase's. Both systems require that you enter a name, address, and account number for each payee in advance, and both make the payment with a bank check bearing your name and account number, but here is where the similarity ends. With Chase Home Banking, you have to make requests to add new creditors to

HOME BASE

BILL PAYMENT BUDGET REPORT

HOMEBASE
P.O. BOX 703
OLD CHELSEA STATION
NEW YORK, N.Y. 10113

CUSTOMER IDENTIFICATION NUMBER:
62183355775374

STATEMENT PERIOD FROM
01-01-83 TO 08-31-83

MR. CHRISTIERN ALBERTSON
444 CENTRAL PARK WEST APT. 16C
NEW YORK, NY 10025

PAGE 1

MERCHANT NAME	STATUS	ACCOUNT NUMBER	TOTAL PAID YTD
ROXANN MANAGEMENT	ACTIVE	3- 60 42924-060183	1,287.72
NEW YORK TELEPHONE	ACTIVE	212 662 6046 132 3G	236.42
ITT U.S. TRANSMISSION SYSTEMS, INC.	ACTIVE	Z11510935	64.39
COMPUSERVE INFORMATION SYSTEM	ACTIVE	086-528-229	50.32
CON EDISON	ACTIVE	471029149500042	419.41
GROUP W CABLE	ACTIVE	20935-065625-02-0	129.75
WILLOUGHBY-PEERLESS BUS.MACHINE INC	ACTIVE	01195	93.14
CHGE CARD COMM CORP - MHT MASTERCRD	DELETED	5217 0011 0790 3508	154.00
CREATIVE COMPUTING	ACTIVE	40019978	19.97
BOOT-UP, INC.	ACTIVE	357	40.58
MHTCO -- MASTERCARD	ACTIVE	5217001107903508	50.00
		TOTAL	2,545.70

CITIBANK

HOME BASE

BILL PAYMENT STATEMENT

HOMEBASE
P.O. BOX 703
OLD CHELSEA STATION
NEW YORK, N.Y. 10113

CUSTOMER IDENTIFICATION NUMBER:
62183355775374

STATEMENT PERIOD FROM
08-01-83 TO 08-31-83

MR. CHRISTIERN ALBERTSON
444 CENTRAL PARK WEST APT. 16C
NEW YORK, NY 10025

PAGE 1

PAYMENT DATE	PAYMENT REFERENCE	PAYEE	SOURCE ACCOUNT	PAYMENT AMOUNT
08/01/83	000026	MHTCO -- MASTERCARD 5217001107903508	CHECKING - BAL. 0057227812	50.00
08/10/83	000027	ITT U.S. TRANSMISSION SYSTEMS, INC. Z11510935	CHECKING - BAL. 0057227812	5.76
08/10/83	000028	COMPUSERVE INFORMATION SYSTEM 086-528-229	CHECKING - BAL. 0057227812	10.39
08/17/83	000031	NEW YORK TELEPHONE 212 662 6046 132 3G	CHECKING - BAL. 0057227812	62.22
08/17/83	000029	CON EDISON 471029149500042	CHECKING - BAL. 0057227812	125.52
08/17/83	000030	GROUP W CABLE 20935-065625-02-0	CHECKING - BAL. 0057227812	43.25
08/19/83	000032	ROXANN MANAGEMENT 3- 60 42924-060183	CHECKING - BAL. 0057227812	416.28
08/19/83	000033	ROXANN MANAGEMENT 3- 60 42924-060183	CHECKING - BAL. 0057227812	12.96
			TOTAL	726.38

Samples show two of the statement options available with HomeBase.

CITIBANK

your list of payees via the system's mail option, and about three weeks must pass before you can make any payment. Citibank allows you to enter a new payee and payment simultaneously and cuts the waiting period down to a maximum of ten days. The Chase system is obviously designed for payments to business accounts, utilities, bank loans, and the like, but Citibank seems more flexible, as my test of the system bore out: I added a friend as a payee, giving his bank's address, his checking-account number, and an amount to be paid—his account was appropriately enriched within ten days. Citibank also allows you to enter regular monthly, quarterly, or yearly payments in advance, and you can even stipulate an amount beyond which no more payments are to be made. Chase lets you enter payments up to a year in advance, but you have to enter each payment separately. Since you don't get any cancelled checks, you must rely on the bank's monthly statement for proof of payment. Citibank goes a step further by mailing its customers a monthly "Bill Payment Statement and Budget Report" listing all payments made, the year-to-date total for each account, and the grand totals for both month and year.

Deposits and Withdrawals

Versatile as your Apple is, you can neither deposit cash into it nor retrieve cash from it (alas), but Citibank allows you to order presigned Citicorp travelers checks through the system, in the amount of $300 or more. A laser forges your signature on these checks, and you receive them in the mail a couple of days later. You can also mail in a deposit (using prepaid envelopes the bank supplies), recording the fact that you have done so. Mail service being what it is these days, Citibank will acknowledge receipt of your deposit or, if five days pass without receipt, give you the bad news. Chase has no such services. Citibank also makes it easy to find out if a check has been cleared, in that you can do a search of your statement by check number, amount, or date.

Home-banking customers receive monthly statements, just as everyone else does, but having your bank reach your Apple (or vice versa) gives you more immediate access to the bank's register of your transactions. Here, again, Citibank has the better system—it lets you retrieve all transactions for the past 60 days at any time. Chase gives you only the transactions made since you last logged on to the system, and if you don't have a printer set up to generate hard copy, that information disappears forever from your screen once you move on to other parts of the menu.

Chase is also somewhat stingy when it comes to giving you information on current interest rates, CDs, IRAs, and so on. You request the information electronically and receive it by mail, usually in the form of brochures that, quite naturally, cannot keep you up with fast-changing rates. Citibank gives you all the current Citibank rates plus trend and forecasts, all on-line and up to date.

So, you ask, "Whatever happened to 'the Chase advantage'?" The answer is that Chase Home Banking does do some things better. One very important area in which Chase has the upper hand is customer service. Both systems make it easy for you to contact a real person by either phone or electronic mail, but when you call Citibank, an anonymous person answers, and a beep tells you that your conversation is being recorded (presumably for the same people who were hiding behind the mirrors). My Epson spits out graphics characters whenever I press Control-P while linked to Citibank. "What am I doing wrong?" I asked a voice at customer service. "I don't know," came the reply; "*our* Epson works fine." A big help that was—I still can't get a printout from HomeBase unless I use my NEC Spinwriter, which is connected to my Apple III. Chase actually gives you your very own personal banker, Mr. Wiegert, who seems to be familiar with every customer and goes out of his way to assist. Even now, months after I closed my Chase account, Mr. Wiegert not only knew who I was (when I called him in connection with this article), but he still had my account data in his computer! That might bother some people, but, living in the big city, I found it quaintly small-townish. Of course, as Home Banking grows and goes public, it will inevitably extend beyond Mr. Wiegert's reach, but the personal touch is there now, and it is lacking at Citibank.

EACH TIME A RESEARCHER CALLS YOU AND YOU ANSWER A QUESTIONNAIRE, THE FEE IS MAGICALLY WAIVED.

The Chase system has a few other advantages. The software, for instance, includes a checkbook register that is better than any Apple checkbook program I have seen. It prompts you step by step, automatically puts entries in chronological order, and allows you to code each entry and reconcile checks. The register has a capacity of 251 checks, but archive diskettes are easy to create, so there is no real limit. You can also merge and otherwise manipulate them with the help of an expansion diskette the bank furnishes. Unfortunately, the bank's computer does not automatically enter checks into your register—that would have been the sensible way to do it—but the register is still a good feature, and built-in utilities that let you generate checkbook-register reports in a variety of configurations make it even better. Citibank offers no equivalent feature.

So what does all this cost? Chase, which you can access around the clock, charges no fee as yet—beyond the usual monthly checking-account fee of $6—but you can be sure they are working on it. Citibank's system is open for business from 8 A.M. to midnight and has a monthly charge of $10, but each time a researcher calls you and you answer a questionnaire, the fee is magically waived. Ten dollars is actually a bargain, especially when you consider that Citibank throws in three Dow Jones News/Retrieval services: News (for the past 90 days), Current Quotes, and Historical Quotes.

Finally, we have the question of privacy and possible electronic intrusion. With an ever-growing army of whiz kids (young and old) poking and peeking to see how far their modems will reach, there is always the chance of someone getting closer to your bank account than you would want, but I have not heard of any illegal access in connection with home banking. Chase software requires that you enter a password before it will run; Citibank wants both the number of your Citicard and your personal identification code. To the determined hacker, these are probably mere obstacles, but your money is no less vulnerable if you bank the old-fashioned way.

To sum up my experiences with the two systems, Citibank's HomeBase is clearly my favorite, but both series represent a giant step away from the teller's line—and that, no matter how you slice it, is a giant step in the right direction. Now, if they would just offer an 80-column option and stop using pony express to get my checks cleared. ✚

FINANCE·F
ARTEL
JCPenney
SOLID STATE DRIVE
apple ///

▸FINANCE/BY JAN SHAW

APPLE KEEPS TRACK OF SOUNDTRAX

Small recording studio swears by variety of business-software applications

Horodko Soundtrax is a tiny company with a reach out of proportion to its size. Hundreds of thousands of people throughout California have unknowingly heard what Horodko Soundtrax does in radio and television commercials produced, all or in part, by the five-person company in its recording studio in San Francisco.

All of the financial work and business planning of this going enterprise with an expanding list of advertising clients is done on an Apple III.

Sitting at the III in his home office in nearby Alameda is owner and president Ed Horodko, the 38-year-old former classical-radio disk jockey and engineer who began Soundtrax four years ago. He bought an Apple II for the business three years ago, he says, because he is interested in electronics anyway and wanted to run the office quickly, efficiently, and inexpensively. He switched to an Apple III two years ago.

Horodko explains that he still does a lot of announcing for his recording-studio clients, but at the moment, he seems to be enjoying demonstrating how he does "everything" for the business on the Apple III.

"Everything" includes accounts receivable, including printed invoices; accounts payable, including payroll, financial planning, and forecasting; word processing, including scripts, rate cards, brochures, a handbook, and correspondence; and general business planning, including a "thought-processing" program.

Since he purchased the Apple III with 256K memory, a Monitor III, and an external floppy-disk drive two years ago, Horodko has added more equipment,

He seems to be enjoying demonstrating how he does 'everything' for the business on the Apple III.

piece by piece. It includes a NEC 7710 printer, an Apple ProFile hard-disk drive with a 5-megabyte capacity, a Hayes Smartmodem (a device to send and receive data over telephone lines), a MicroSci drive (a .5-megabyte floppy-disk drive that

uses floppy disks that hold four times as much information as a regular floppy disk does), and a Radio Shack Model 100 lap computer.

The Apple III has room for four cards, but Horodko uses only two. One allows the computer to use the ProFile hard disk, and the other is a game-port card that provides the same game-port function as that of an Apple II.

What appears to fascinate Horodko most are the programs. Horodko relies primarily on five off-the-shelf programs—he describes them as "the best"—and a handful of utility programs for his business.

"My Apple III is running under a system called Catalyst II," he says. "What Catalyst lets you do is take almost all your programs and actually put them on the hard disk. The advantage of having all your programs, as well as the information files that the programs generate, on the hard disk is that you don't have to fiddle around with your floppy disks."

Horodko relies primarily on five off-the-shelf programs and a handful of utility programs for his business.

Without Catalyst, Horodko says, he would have the time-consuming task of finding the correct disk, inserting it, using it, saving the data, putting it away, finding the next one (hoping he'd filed it in the right place), and starting again. The point of using a computer, he says, is to get things done quickly.

"With Catalyst, you just push a couple of keys, and there you are in the other program."

Horodko continues, "This is the main menu. When you turn the computer on with the Catalyst program in the drive, it gives you this menu, which is all my programs."

As he runs the III through its paces, he explains that when he first decided to computerize the business, he didn't know *anything* about computers.

"Of course, at the time, there were only about four comparably priced personal computers on the market," he says. He shopped, asked questions, and ended up choosing his original Apple II, which he still uses to address and print labels in the studio, for two reasons: "A lot of programs were available for the Apple, more than for any other company, and the monitor wasn't built in to the computer."

He had the idea that announcers could use the monitor instead of paper for their scripts. The idea did not take the industry by storm. The industry, in fact, was highly resistant to the idea, he says. It never got off the ground.

Horodko punches in Versaform, a number-crunching database program that he uses for invoicing—among other things—from figuring out the bills to printing them.

To demonstrate, he types in his code for the Ketchum advertising agency in San Francisco. Up comes the address. He adds a purchase-order number and a job number and then fills out the rest of the form by adding the stop and start times of a recording session and the type of session—in this case an eight-track-tape session. (Some recording sessions are more complex than others, which is reflected in the hourly rates.) After entering three pieces of information—start, stop, and type of session—he leans back in his chair and pushes the Enter button.

Onto the monitor comes the number of hours in and the rate of an eight-track recording session ($70). The computer multiplies the hours by the rate, producing the price. At the bottom of the screen is a running total of everything on the page. The program automatically adds sales tax and computes the total.

Then Horodko keys in the price of a different kind of recording service, the cost of a tape in this case, and again sits back as the computer instantly enters it on the invoice, adds it to the total, re-computes the sales tax, and gives him a new grand total. As the Ketchum sessions continue over the course of a month, these few steps keep the Ketchum account current. As Horodko says, the point of a computer is to get things done quickly.

If he pushed a few more keys, the Ketchum invoices or all the rest of the invoices for the month would print out "perfectly," Horodko says.

For accounts payable, Horodko punches up Advanced VisiCalc, a program that acts as a giant spreadsheet. On it he keeps track—individually and by category—of checks, expenses, bills, and payroll. He says, smiling, that VisiCalc "will do virtually anything with numbers."

The point of a computer is to get things done quickly.

Horodko uses a graphics program, Graph 'n' Calc III, to project trends through graphs and charts. His word-processing program is called Word Juggler.

His favorite program is ThinkTank. He uses it in general business planning and describes it as a cross between a database and a thought processor that "forces you to think logically."

He greatly admires the programs he uses—a contrast to his early experi-

ences. Horodko says that at first he spent over a $1000 on "really horrible" programs.

"I bought a lot of the programs because a salesman told me what I needed. It would invariably turn out wrong. Finally I joined a couple of users' groups and talked to a lot of Apple users, and after a while I learned to spot a good program."

Horodko praises the users' group Apple III SIG (Special Interest Group) on The Source. It has what amounts to a big community bulletin board where people hash out computer problems, note good and bad programs, keep up on news, and help each other out, he explains.

Advantages of the III, according to Horodko, include the "fairly big file capacity" in the hard disk—five megabytes. "That's equivalent to about 38 5¼-inch floppy disks," he says. "It's not gigantic, but it's big. You can buy them bigger, but this is enough for me."

Another advantage of the III, he says, is that it has the ability to "emulate the Apple II" with the insertion of an Apple II emulation disk.

When asked about the limitations of the III, Horodko pauses for quite a while. "There aren't any, really, for my needs," he says. Another pause. "Well, maybe there is one. It's not a limitation for me because I don't need it, but I haven't yet seen a database program that's completely compatible with the Catalyst system and that lets me freely move information in and out of itself."

Good database programs are available, he says, but data has to be keyed in rather than shifted automatically for other programs. That could be a serious problem for someone with needs different from his own, he says.

Horodko leans back, having run the Apple III through all its paces, then turns off the computer. The demonstration is over, and it's back to business. The Apple III may print its invoices in "perfect" batches in no time at all, but Horodko still has to staple them together and glue on the stamps just as he did before computers. ✚

▶FINANCE/BY VANESSA SCHNATMEIER

BUDGETING A LA APPLE

From cables to labels, firms use micros to forecast the future.

Medium-size companies that use microcomputers for financial planning, market forecasting, and day-to-day management have their own special needs. Although every company has a unique plan for its micros, the following portraits show how two companies use Apple computers to fill the bill.

ARTEC

The Arlington TeleCommunications Corporation (ARTEC) provides cable television to more than 20,000 subscribers in Arlington County, Virginia, just outside of Washington, D.C. In 1980, ARTEC's chief operating officer, John Evans, decreed that Apple computers would help predict the company's financial future.

ARTEC started out with "one small Apple" with a single external disk drive and an IDS 560 Paper Tiger printer, but Michael Sullivan, director of customer services, says Evans quickly realized what kind of tool he had found and soon expanded the company's stable of computing equipment.

ARTEC now owns two Apple IIIs with a ProFile hard disk, and two IBM PCs; in addition, the firm is about to purchase a Compaq computer. Eventually ARTEC might buy a Corvus hard disk with an Omninet Diskserver, with the aim of networking the Apples, the IBMs, and the Compaq so they can share mass storage.

ARTEC uses the Apple IIIs for all its budgeting.

Sullivan says ARTEC uses the Apple IIIs for all its budgeting, employing the VisiCalc and Advanced VisiCalc spreadsheet programs, which he calls "tremendous programs."

"With an industry as new as the cable business, it's extremely helpful to be able to play the 'what if' game. If you attempted to do it manually, it would be extremely time-consuming and paper-generating," he says. Sullivan praises the spreadsheet programs for their ability to let ARTEC know where it stands financially at any moment.

ARTEC's financial numbers have to jump through an ever-increasing number of hoops, and the franchise's financial managers use the Apple IIIs to perform all capital budgeting

and forecasting. ARTEC segments its overall budgets into departmental budgets and projects the needs of the departments with the Apples. It also produces its balance sheets on them, but the Apples don't construct the company's final corporate statement; a general-ledger service takes care of that job.

Operating statements and performance analyses—revenue per subscriber, subscriber penetration levels, cash flow to revenue, debt per subscriber, cash flow per subscriber, revenue per mile of cable, cash flow per mile, and investment and marketing costs per subscriber—are all on computer now, according to Sullivan. "Nothing is done manually any more," he explains.

ARTEC uses a variety of software besides the ubiquitous VisiCalc to massage its numbers: VisiSchedule, VisiTrend + VisiPlot, Apple Writer III, PFS: File, PFS: Report, and Apple Business Graphics. Fifty percent of the firm's computer use involves VisiCalc, though, says Sullivan.

'Ideally, we would like to use the personal computer for our service history, our billing, and our trouble-call scheduling.'

VisiCalc comes in particularly handy for estimating subscriber penetration levels and construction costs, according to Sullivan. "We do our projections using the Apple by looking at what the current penetration is and what we expect it should be, based on what the government tells us is there. We can detect areas that appear to be low; we can also look at areas that appear to be higher than what we had projected initially. Then, of course, the human interpretation comes in."

ARTEC went with the Apple III because it came standard with 128K RAM, whereas the Apple II held only 48K at the time. The company generates large spreadsheets that require that extra memory, Sullivan points out. Every in-house computer at ARTEC has a minimum of 256K, and some have more, because the firm wants to analyze as much data as it can.

That doesn't mean everybody at ARTEC spends hours a day hunched in front of a terminal. Of the company's 65 employees, 14 work with the micros during an average month. ARTEC houses its computers in a data-processing center, with sign-up schedules for casual users.

"Ideally, we would like to use the personal computer for our service history, our billing, and our trouble-call scheduling, but no single kind of personal computer can handle that kind of task," comments Sullivan.

"If there were some way we could combine our billing functions so that a personal computer could take care of them, it would be a realistic concept [to have a computer on every desk], but now we primarily use the computers as a management tool instead of as a day-to-day information network."

Sullivan is not completely happy with the Apples, although he is fully aware of the benefits they have brought. For one thing, because so little software is available for the Apple III, the financial analysts often have to work with programs in the Apple II Emulation mode. It's no problem, really, if they are running a file that doesn't use up much memory. With larger files, the analysts are restricted to the Apple II's 48K, though.

They have arrived at a solution. Says Sullivan, "The key is that you pinpoint a few items, perhaps a bottom line or a bottom line in a series of 12 or 13 months with an average and a year-to-date total. That amount of information would not prohibit you from using the Apple II to do your printing and plotting."

Sullivan also believes that the Apple disks contain too little storage capacity. He points out that whereas Apple disks can store only 133K on one disk, IBM and Commodore disks can store 320K. On the other hand, Apple disks are easier to use and take less time to format, he noted.

ARTEC isn't planning to purchase any more personal computers; if anything, the company wants to introduce the computers it already owns to each other. In cooperation with a local dealership, Universal Computers in Alexandria, ARTEC has set up communications between the IBM PC and the Apple III, arranging a kind of forced marriage between Apple Access III and IBM PC Talk.

For firms contemplating the purchase of personal computers for financial analysis, or indeed for any part of their business, Sullivan emphasized the importance of a dealership's support.

"You can go into any one of 20 to 25 stores and get the same product. What makes one better than the other? Most people starting out with personal computers have a lot of questions that they don't even know they have to ask, and it's so important to have a dealership that is really attuned to your needs."

Fasson Industrial

"Green-eyeshade people were always pictured as people sitting in front of large pieces of paper, adding columns and cross-checking them and putting little tick marks down when they added properly."

ARTEC isn't planning to purchase any more personal computers; if anything, the company wants to introduce the computers it already owns to each other.

That's the word picture of precomputer financial analysts painted by Hugh Kent, until recently the controller of the Fasson Industrial division of Avery International, the world's largest label-making and -printing company. Fasson Industrial, based in Painesville, Ohio, employs approximately 300 people and contributes a substantial (though unspecified) portion of the $450 million revenue of Avery International's Materials Unit.

Kent currently serves as

the management systems manager for Avery International's entire Materials Group, of which Fasson Industrial is one division. But in June 1980, as controller at Fasson, he oversaw the introduction of personal computers—Apples II Plus, IIe, and III, in particular—into Fasson's increasingly Byzantine financial-planning operation.

"We bought Apples because we saw VisiCalc. We would have purchased any machine in the world that happened to run VisiCalc, if we could have afforded it," Kent says.

Financial analysts and planners were the first microcomputer users at Fasson, and those ex-green-eyeshaders were impressed by the way the Apples transformed once-tedious tasks into a few minutes' work.

Before the Apples, Kent says, "the simplest of what we now think of as spreadsheets used to take hours and hours, and doing 'what ifs' with those same spreadsheets sometimes took days."

At first, Fasson bought two Apple II Pluses, but in short order it became clear that the company would want more. Today, as at ARTEC, five Apples of various models are in "walkup configuration," set up at central locations.

The machines permitted Fasson to create assumption-driven profit-and-loss statements (P&Ls), a long-desired dream for the division's analysts. An assumption-driven P&L differs from the usual type in that it consists of product statements built up product line by product line, rather than department by department. In one stroke this approach minimizes interdepartmental rivalry and clarifies the financial strengths and weaknesses of a group of products.

For instance, Kent explains, analysts "divided the factor called unit-volume increase into subcategories such as industry growth rate and industry-share-penetration change. By the time we were finished, we had a complete picture of the factors affecting any one product. Then we added the product lines together and ended up with a better understanding of the whole business." The entire process took about two months less than Fasson's previous financial-planning efforts ever had.

'We would have purchased any machine in the world that happened to run VisiCalc, if we could have afforded it.'

Financial planners find it useful to allocate indirect or fixed costs to individual product lines. Say an analyst wants to figure out the marketing costs for product lines A and B. If A is 60% of the sales for the group and B is 40%, the simplest method is to multiply the cost of marketing by 60% for product line A.

"Prior to VisiCalc, we knew how to do it, but with the mechanics involved, there were so many numbers going in so many different directions that we couldn't do it on a timely basis. By the time we'd finished it, management probably wouldn't have cared, and we would have been into a subsequent accounting period."

Now assigning allocation factors is simple. "If you take all your indirect costs and assign them to one of your product lines—if you can assign every cost to one or more of the product lines—then you can compute an income statement all the way down from sales to net income after taxes," says Kent.

Computers in general and microcomputers in particular have eased the minds of planners at many corporations, Kent believes. The economic upheavals of the 1970s and the near-depression of the early 1980s focused the attention of many corporations, large and small, on balance sheets and cash flow. Though many companies predict income well, predicting balance sheets is far more difficult. Number-crunching micros cater to the financial planner's nervous need for current and complete figures.

Thanks to the Apples, Fasson Industrial's planners created fresh product-line income statements every month and eventually worked into weekly income forecasts.

"Once we set up the formulas in a VisiCalc model [the largest spreadsheet available on an Apple III], they were very easy to generate every month. We would generate product-line income statements all the way down to the net-income line, within a few hours after we closed the books."

Armed with this information, Fasson's management felt more secure in making investment decisions.

Most financial planning is aimed at ascertaining what happened last week or last month, says Kent. With the microcomputers he has attempted to drive the detail of the forecasts down through the organization and coax other employees to think ahead rather than behind.

Although he's now creating in-house software to run on IBM equipment—Avery International has decided to go with the IBM PC—Kent believes that the initial purchase of the Apples pushed Fasson Industrial's financial planning into the computer age at last.

"The Apples' biggest benefit to us was that they got us started and that they were the only machines that ran VisiCalc. That created a revolution in the office workplace and allowed lots of common people like me, at various levels of accounting and financial planning, to get started on computing." ✚

▸FINANCE/BY LAWRENCE GREENBERG

J.C. PENNEY'S CRYSTAL BALL

How a large corporation, J.C. Penney, uses a little computer, Apple, to plan the next half-century.

At J.C. Penney's Milwaukee distribution center, Ron Burr is cheerful—and he's been cheerful for over two years. As technical manager in the company's catalogue division, he was instrumental in establishing the Catalogue Budget Planning System in June 1981. This Apple-based network reaches from the company headquarters in New York City out to its six nationwide distribution centers. Why is he so cheerful?

To answer that question, Burr first describes how the budget-planning process takes its course at J.C. Penney. Annual raw sales data in the New York office are broken down by distribution center, showing weekly sales figures, and transmitted out to the six locations. The centers then build the balance of their budget plans for the coming year and send a copy of the final plan back to New York. There, financial managers consolidate the data to produce a divisional budget that is the basis for six-month, year-long, and five-year market forecasts.

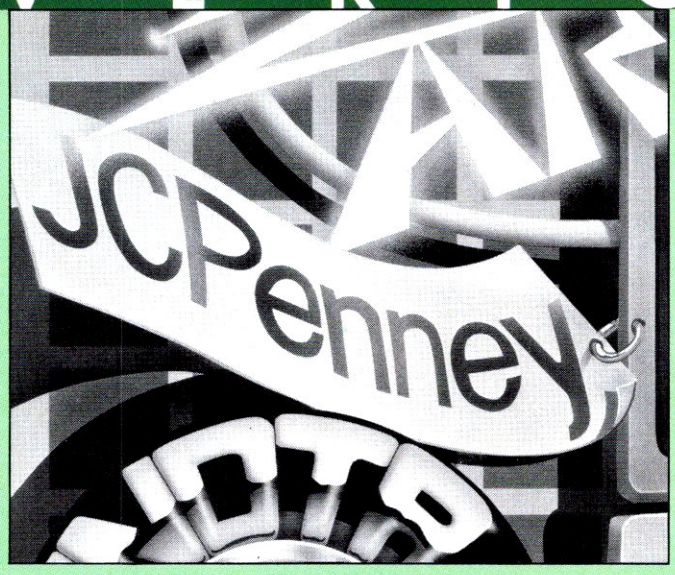
Burr goes on to explain that Milwaukee is really a second data center for the network. The other five centers transmit mark-down (liquidation) data to Milwaukee to be consolidated. The consolidated data go back to New York in the form of a divisional report and back to the distribution centers as a series of comparison reports. "Prior to June of '81," Burr says, "the whole budget-calculation process was only semi-automated, with just a few mainframe programs available. Mostly it was a manual operation and took a lot of time. Also, we had to use telecopier processing to receive and send out sales data to the distribution centers. Managers almost always had to wait until about 11 A.M. the day after the transmission before receiving anything."

Things changed radically when J.C. Penney bought a series of Apple II Plus computers. Every distribution center began with one; now each location has two II Plus computers and one IIe. I asked Burr why the firm had chosen the Apple. "At the time, it was the number 1 personal computer on the market, with the greatest range of software availability. We knew we were going to get a personal-computer system—for reliability, speed, and flexibility. It was primarily the software that did it." Does IBM's recent edging Apple out of first place in the microcomputer market affect the company's satisfaction with its decision? "Not at all," he said. "We're happy with what we have. I don't see any substantial hardware changes for quite a while."

Flexibility is especially crucial; as any financial-operations manager knows, budgeting is always subject to change.

To explain the basis for the company's choice further, Burr says, "All six centers and New York are now interconnected by MicroCourier [a software package that handles network transmissions]. This means we can get information much faster from New York and also send it out faster. We used to have to wait until the next day to get anything; now it's only a matter of hours." Because calculation turnaround time is much faster, "we're in a better position to explain analyses and forecasts." Burr notes that the entire budgeting process since the installation of the Apple network is more reliable and flexible. Flexibility is especially crucial; as any financial-operations manager knows, budgeting is always subject to change. "The Apple handles year-to-year changes much faster. We really speeded up the whole process of producing the budget," Burr said.

The Milwaukee distribution center was the site responsible for the initial development of all system design and in-house software. It currently manages all new program development and existing-software modification and retains backups of both data and software for the New York office. To accomplish these functions, Milwaukee uses a Corvus 20-megabyte Winchester mass-storage system. New York has an identical unit to provide data storage for its three II Plus computers.



In New York, Al Sieczkowski, the catalogue budget analysis and reporting manager, coordinates the flow of financial information for the entire network. He talked about his perspective on the Apple network at company headquarters: "Although 95% of our programs here in New York are on disk, the 5% that are on the Corvus are extremely large number-crunching programs and could in no way be handled by disk storage. Our programs were infants in the beginning; as we grew and learned more, we got into the more sophisticated programs for which we needed the Corvus."

Not long ago, Sieczkowski's office bought Apple IIIs; an interesting development followed. "We were using the III for market forecasting soon after we got it, but because we had used the II longer and were more familiar with it, and because we felt there would be difficulty in transferring software from the II to the III, we now have all market forecasting on one of our II Plus units." The other two II Plus machines are used for financial reporting.

As the hardware for budget planning, market forecasting, and related applications has changed, so has the software. The consolidation of sales data in New York is now managed with MergeCalc software, for which Burr has only good words. The company's catalogue division has developed in-house software for the weekly sales-data distribution-center breakdown. And the six distribution centers use VisiCalc to project the following year's sales demand from the weekly data.

Although neither Burr nor Sieczkowski sees any real problems with the current network system, both are enthusiastic about planned enhancements. Primary among these is the downloading of all required software from Milwaukee's IBM 3081 mainframe to the Apples, both in New York and in the field. Al Sieczkowski explains, "We're still in the process of refining our Financial Information System—our mainframe financial database. We had to delay the downloading project to work on FIS, but at this point, it looks like downloading should be in place within a year or so."

'It will be really interesting to see people who are so much more comfortable with personal computers become managers.'

What are the advantages? Foremost is the availability of up-to-the-minute information. Although current information access is much faster than in pre-Apple days, the age of the information must sometimes be estimated. Storage in the mainframe database would insure the accuracy of all data. Additionally, the availability of all information from a central source means that inputting errors from multiple locations are eliminated and that the same figures don't have to be entered repeatedly for a given report.

J.C. Penney is now in the midst of a study to investigate the use of additional personal computers for its financial operations, including such applications as operating statistics and expanded reporting capability. Ron Burr foresees a time, not too far away, when selected company employees will be working at home with their Apples and when every manager will have one on his desk. "They're too cheap not to be!"

Hardware is not the only reason for this vision of proliferating Apples. "The software is so much better now," he continues. "I think users are feeling much more comfortable because today's software is multifunctional. You don't have to keep changing disks to do a number of different tasks. You load up one disk, and you can do quite a bit with it now."

Burr is also looking forward to seeing what he terms "whiz kids" moving into managerial spots. "It will be really interesting to see people who are so much more comfortable with personal computers become managers. I think they'll take advantage of them much more readily than managers are doing today. They'll really see them as handy tools for all kinds of purposes." The Milwaukee center has a summer internship program to help high-school students become familiar with the Apple. In fact, one student has his own Apple at home and regularly communicates with the catalogue division throughout the year. Burr wants to expand this training program as much as possible.

Does J.C. Penney have any suggestions for setting up a network system like theirs? Ron Burr says, "Start with a good overall design to insure that you produce the results you want. Keep in focus what a personal computer can and cannot do—don't get overconfident. A specific limitation is the speed of printing out reports. Use as many software products as possible to minimize in-house programming. And I'd strongly recommend using MergeCalc for data consolidation, as well as the Corvus for large data-storage requirements."

The foundation of good corporate budget planning is efficient use of time. Ron Burr is cheerful because J.C. Penney's catalogue-budget planning and market forecasting are clearly more efficient than they were just a short two years ago. How important were the Apple computers? Burr looks up and smiles. "What would we do without them?" ✚

PLUMBING
INVOICE
CHECKBOOK

COMPUTERIZING YOUR CHECKBOOK

When you've gone from a single bank account to numerous ones, it's time to turn to your Apple for help.

When Al Coiner was just out of college, he would have laughed if someone had suggested he needed computerized help in balancing his checkbook: "You've got to be kidding. I've got one checkbook and one bank account. I don't even need a calculator!"

But then (the fictional) Al married Vikki Green (equally fictional), who also had one checkbook and one checking account. Over the next few years the Coiner-Greens acquired

- household expenses
- daughter Beth
- a house complete with mortgage and balky plumbing
- a two-flat apartment building, courtesy of Vikki's lamented great-aunt Charlotte, complete with tenants, depreciation, and deductible expenses, and
- an Apple IIe.

By mid-1983 they had a checking account with four separate checkbooks—Al's personal checkbook, Vikki's personal checkbook, a household checkbook, and one for the apartment building. In addition, Al, who worked on commission, had a money-market account that he used to gainfully employ large commissions and then draw on for monthly expenses.

"Help! We're drowning in paperwork," they cried.

Two or three years ago it seemed the woods (or at least the computer stores) were full of Apple software for balancing a checkbook. But to many people, it seemed like using a sledgehammer when a flyswatter would do, and most of these programs disappeared. Today, computerized checkbook balancing still exists, but with a difference. Today's programs are designed for multiple checkbooks or accounts and are as applicable to small businesses or partnerships as to household accounting.

One computer-store owner in San Diego says he offers two possibilities to customers looking for multiple-checkbook-balancing software—either The Home Accountant, a popular program from Continental Software, or one of the database "calc" programs (which require lengthy setup). Does he have any other specific checkbook programs for the Apple? Just one: a single-checkbook freebie that comes on a multiprogram disk he gives to people who buy Apples from him. How about the program, Personal Finance Manager, from Apple? It too handles only one checkbook, along with several credit cards and other items.

An unscientific spot check of other software dealers tells much the same story. There is a newcomer to the field, though, a program called Money Street from Computer Tax Service.

I acquired The Home Accountant and Money Street, both of which were new to me, for review. I applied them to the five-bank-account financial situation of Vikki and Al Coiner-Green. Both programs are designed for similar functions: recording checks, deposits, and other transactions; reconciling bank statements; sorting items by category and providing totals; and printing reports. My evaluation involved these questions:

- Does the program do what it says it will do?
- How easy is it to use?
- How easy is it to learn?
- How useful is the manual?

Money Street

Money Street comes in a cushioned plastic snap-open case. Inside is one program disk (up to two backup copies are available for $10 each); a 48-page manual; a letter from the authors with some suggestions for users, a request for comments, and a 20-cent stamp; a 4-page pamphlet which summarizes the program's features; a circular from Bank of America called "How to Balance Your Checkbook"; a chart of the menus and operations; and a registration card (for assistance, backup disks, and updates).

Money Street works on any Apple II (you have to use Caps Lock key if you have a IIe) and on the Apple III in emulation. You can configure the program for either one or two disk drives; it works perfectly well with one drive, but the lack of a second drive necessitates frequent switching between program and data disks.

Once you've booted the disk, one of the first options is what is described as a demonstration. It appears to be aimed primarily at prospective buyers, since it contains large amounts of advertising copy, along with a few samples of screens and operations.

For the first-time user, the program is designed to move quickly into actual data entry. A brief system-configuration routine involves entering the number of disk drives, the printer card's slot number, and the paper length. You put this information on the program disk for use from then on.

Money Street can handle as many checkbooks or checking accounts as you want, since you keep each account on a separate data disk. For each book/account, you enter the name, such as Household, and a starting balance; then you place a blank disk in the drive, make a menu selection, and wait while Money Street initializes the disk. This procedure is a nice touch, since it minimizes the time and work you'll need before you can actually start entering checkbook-register items. Once you select the appropriate item from the menu, you press Return to move the cursor from field to field—check number or D (for deposit), month, date, payee or source of deposit, category code (such as 03, Al's credit-card interest), and amount. For electronic-teller transactions, check charges, and transfers from one check-

1
COMPUTER OPERATOR
ELLEN THRO

ACCOUNT NAME
HOUSEHOLD

CHECKBOOK HISTORY
12/31/83

ENT#	FILED	CHK #	MO/DA	PAYEE	CODE	DESCRIPTION	AMOUNT	TOTAL
						STARTING BALANCE:	500.00	
0001	UNCLD	3001	12/02	1ST FEDERAL	00/		-50.00	450.00
0002	UNCLD	3001	12/02	1ST FEDERAL	02/		-582.00	-132.00
0003	UNCLD	3002	12/08	JOHNSN'S PLMBG	00/		-92.17	-224.17
0004	UNCLD	3003	12/08	CTY G&E	00/		-55.00	-279.17
0005	UNCLD	3004	12/08	GROCER BASKET	00/		-47.06	-326.23
0006	UNCLD	D	12/15	TRANS FM. RNTL	00/		500.00	173.77
0007	UNCLD	3005	12/15	JOHNSN'S PLMBG	00/		-35.03	138.74
0008	UNCLD	3006	12/15	CTY COLLECTOR	17/		-451.52	-312.78
0009	UNCLD	3007	12/15	TELEPHONE CO.	00/		-27.09	-339.87
0010	UNCLD	3008	12/16	GROCER BASKET	00/		-62.80	-402.67
0011	UNCLD	3009	12/20	GROCER BASKET	00/		-38.19	-440.86
0012	UNCLD	D	12/15	TRANS FM. VIKKI	00/		500.00	59.14
0013	UNCLD	D	12/15	TRANS FM. AL	00/		500.00	559.14

Figure 1: A printout of the Coiner-Green's household checkbook for December

1
COMPUTER OPERATOR
ELLEN THRO

ACCOUNT NAME
VIKKI

SORT BY CODE
12/31/83

ENT#	FILED	CHK #	MO/DA	PAYEE	CODE	DESCRIPTION	AMOUNT	TOTAL
0001	12/31	2001	12/01	GALAXY CR.CD.	04/		-1.20	
0002	12/31	2002	12/01	RUFFUM'S	04/		-2.47	
0005	12/31	2005	12/15	2ND FEDERAL	04/		-16.00	-19.67
								-19.67

Figure 2: Vikki's total credit-card interest

book to another, you can enter *xx* or some other symbol instead of a check number. When the cursor moves to a new line, the next check number automatically appears in reverse color; Return enters this number, and typing over it cancels it. The other entries from the previous line are listed on the new line in reverse color, so if the new item has the same date, category code, or another duplicated field, a simple Return enters it as well. This approach is convenient, but it took a little while to become accustomed to.

Figure 1 is a printout of the Coiner-Greens' household checkbook for December.

Any entry can be split: for instance, Vikki, a salaried employee, split her salary-check entry between gross salary and subtractions for Social Security and withholding tax, and she apportioned a credit-card payment between principal and interest. Each entry receives its own code number (I used 00 for "no category"), so at any point you can obtain a printout of a code or group of codes, such as Vikki's total credit-card interest, code 04 (figure 2).

If, for instance, Al and Vikki realize at some point that Johanson's Plumbing has become a regular part of the family circle, they'll easily be able to keep a running total of payments to the company. Selecting Edit on the menu, they can scroll through household checks since the beginning of the year, assign a separate code to Johanson's Plumbing, and use it from then on.

A fill-in-the-description code directory from 00 to 99 is available for each checkbook. If the code numbers are defined (which Vikki's were not), the definitions will print out under Description. You can fill in all the categories in each directory, a tedious process; fill in only those applying to each checkbook; or fill in one directory completely, print it, and use the printout for further reference. Another convenience: you can print out information on the screen at any time.

Reconciling the bank statement resembles the manual method. When you enter the number of a cleared check, the entire entry appears on the screen. Next, the program automatically lists deposits and other transactions. You can enter check charges and other debits, and the program computes the totals. If there is a discrepancy, you can start over, and the reconciliation can be printed.

Money Street does what it sets out to do, though the advertised half-hour learning time may be a bit optimistic.

Since each checkbook is managed separately, you'll need some extra effort and a bit of ingenuity to consolidate the various totals. The easiest way to perform a consolidated reconciliation is to take the total debits and credits from each checkbook and enter them on another data disk, as if they were checkbook entries; then compare or reconcile the total to the statement total. The same method is possible for totals of credit-card interest or any other category that appears in several checkbooks.

On the other hand, the separate book totals might be handy for budgeting or for determining whether a couple should file separate tax returns or a joint return.

Besides allowing the printing of any screenful of information, Money Street can sort and print a variety of reports, some on paper only and others on either the screen or paper. Paper-only reports include sorting by month, monthly totals, code, and code totals, as well as a listing of the code directory. Reports available on screen or paper include sorting by amount or payee, checkbook history, checkbook registry, and listings of uncleared checks, uncleared items, and reconciliation history. Figure 3 shows Al's and Vikki's personal checks sorted for the month of December. Money Street sorts the checks by code, with a subtotal on each, and by date within each code.

Computer Tax Service also offers a $25 utility disk (which I did not see) that lets you make two copies of the program disk and do some additional types of data sorting.

In general, Money Street does what it sets out to do, though the advertised half-hour learning time may be a bit optimistic. It is forgiving of mechanical errors such as putting the wrong disk in a drive or having the drive empty at the beginning of a new routine. You perform most operations by selecting a menu number, or with Return, and you need only a few control commands. Also, the only way to exit from a screen or routine is to save it on the data disk—a boon for the for-

1
COMPUTER OPERATOR ACCOUNT NAME
ELLEN THRO AL

SORT BY MONTH
12/31/83

ENT#	FILED	CHK #	MO/DA	PAYEE	CODE	DESCRIPTION	AMOUNT	TOTAL
0001	12/31	1001	12/01	UNIVERSE CR. CD.	00/NO	CATEGORY	-150.00	
0003	12/31	D	12/03	SUBURBAN RLTY	00/NO	CATEGORY	8000.00	
0004	12/31	XXXX	12/03	TRANS. TO MMKT	00/NO	CATEGORY	-6000.00	
0007	12/31	1005	12/15	GLOBAL OIL CO.	00/NO	CATEGORY	-25.92	
0008	12/31	XXXX	12/15	TRANS. TO HSEHLD	00/NO	CATEGORY	-500.00	
0006	UNCLD	1004	12/15	HEIRS& HEIRESS	00/NO	CATEGORY	-52.50	1271.50
0002	12/31	1001	12/01	UNIVERSE CR. CD.	03/AL	CR. CD. INT.	-3.02	-3.00
0005	12/31	1002	12/03	1ST NATL BK	13/AL	IRA ACCT.	-700.00	-700.00
								568.50

Figure 3: Al's and Vikki's personal checks sorted for the month of December

getful.

A minor problem was the refusal of Money Street to reconcile the December checks with a statement dated January 6. A moment's reflection and rereading of the manual led me to try the same thing with the statement dated December 31. This time it worked like a charm. It turns out that once a new year begins, you'll need new data disks, and only uncleared items are carried forward. I also had a one-time problem moving the cursor to the top of a check-register screen. After I switched to the category-code directory and then back to the screen, whatever the problem was disappeared and did not recur.

The most frustrating and time-consuming portion of the learning period involved getting the printer and Money Street in sync. The manual gives fair warning that you may have problems. Mine involved a "line feed" command. A section in the manual explains briefly about hexadecimal ASCII code, and the initial system configuration lets you enter various ASCII codes on the first line and the last line. Even though I configured the system to issue the correct line-feed command to the printer, nothing happened—everything overprinted on one line. At this point I decided to activate the line feed by throwing a DIP switch on the printer. This maneuver worked, and printing commenced satisfactorily.

I was also unable to successfully use the Money Street system configuration to issue the ASCII command for "correspondence-quality printing." Entering it in a BASIC program would have necessitated exiting from Money Street, issuing the command, and then reloading Money Street. Moral: try all this before you deal with actual data.

The manual provides the information you'll need, including a list of suggestions from customers and a series of customers' questions and answers. Between the screen information and the manual, you shouldn't have too much trouble becoming proficient in the use of Money Street. The manual's organization leaves a bit to be desired, though. The first pages include a glossary, a list of report options, and summaries of program limits (dollar amounts and number of uncleared items) and operations. But they also include "comments from happy customers" (page 14), and the manual doesn't actually tell you to boot the program disk until page 17. A tutorial that explains operations uses a list of sample data, but the instruction to enter it is on page 22, while the list itself is on page 6. Other information is in a readable question-and-answer format, but in no particular order, making it difficult to locate specific topics. For instance, the procedure for starting a new year is sandwiched between "printing a screen" and "finding cancelled checks." The section on "printing" follows this. Also, the wording in the manual doesn't always match what is on the screen, though the meanings are the same.

To sum up: Money Street does what it says it will do with checkbook information in an easy-to-use fashion, but it requires extra steps to consolidate data from various checkbooks or accounts. It is designed to make errors reversible and loss of data difficult. First-time users can have it in full operation within an hour, *if* they can make the printer connection. Though the manual warns of difficulties, the printer commands did not work for me. The manual contains the basic information you'll need, but it and the other printed material should have been thought out as carefully as the program itself obviously was.

The Home Accountant

The Home Accountant package is a 7 × 9-inch three-ring, hard-cover binder with the program disk in the inside front pocket and a warranty card (for

```
80N
                    CHECKBOOK
                 VIKKI NOV 1983
              RECONCILE 1ST NATIONAL

                                          $AMOUNTS
STATEMENT BALANCE                         1068.91
OUTSTANDING CHECKS                         75.47(-)
OUTSTANDING DEPOSITS                        0.00(+)
NET BALANCE                               993.44
CHECKBOOK BALANCE                        1050.88
YOUR CHECKBOOK:
DOES NOT RECONCILE BY                      -57.44
IN THE BANK'S FAVOR
              (P)PRINT     (R)RETURN
                ENTER SELECTION P

80N
```

Figure 4: A printout of a checkbook reconciliation

```
80N
                ADD BUDGET CATEGORIES
                   CATEGORY# 7
A TYPE 5 (1-5) EXPENSE
B        TITLE        VIKKI        WITHHOLDING        TAX
                                   BEG ACTUAL  DIFFERENCE
     BUDGET   C  2000.00
D JAN
E FEB
F MAR
G APR
H MAY
I JUN
J JUL
K AUG
L SEP
M OCT
N NOV
O DEC     500    0.00  500
TOTALS>  > 500 2000.00 1500-
                LETTER TO EDIT (A-O)
X (CANCEL) P(PRINT) R(RECORD)
                ENTER SELECTION P80N
```

Figure 5: Home Accountant allows you to print out almost every individual screen and transaction

extended warranty period, assistance, and updates); 136 loose-leaf pages of text, including a two-page index; and an order form for checks compatible with the system. It runs on the Apple II, II Plus, and IIe, with one or two disk drives (two are preferred). Some printed reports require an 80-column printer, but others need 132 columns. Each one-disk system can manage up to five checkbooks as well as other accounts, sort entries by category and print reports on them, reconcile bank statements, and print checks. It can also create three different colored graphs per budget category, though you cannot print these without a graphics program.

Starting to use The Home Accountant to manage checking accounts is not for the faint-of-heart, because the program requires lengthy preliminaries. I suffered two major setbacks before achieving any semblance of success:

1. The program disk was defective—a fact that was not immediately apparent.
2. Not until I'd completed the time-consuming task of setting up budget screens and mandatory cash accounts for each checkbook and budget categories to use with them—perhaps half an hour's work—did The Home Accountant inform me that it was impossible to start the year in December if it ended on December 31. Budgeting must start in the month prior to that in which checkbook items are to start. The program doesn't allow any additions, so my only alternative was to begin from scratch.

The first step in using The Home Accountant is to initialize a data disk with the Apple System Master DOS 3.3 disk. Once you do this, you boot the program disk for The Home Accountant. (Booting on an integer Apple with Applesoft on a ROM card must always begin with the System Master disk, followed by the program disk.) The configuration routine includes information on printer-card type (serial or parallel), and the manual even provides a list of ASCII commands for 11 different printer brands.

Budgeting involves naming and assigning starting balances to up to 100 items within five categories: Assets, Credit Cards, Liabilities, Income, and Expenses. For checkbook management, you need only two categories: Checkbook and Cash, both classified as assets. You prepare these on formatted screens, with the beginning amount and estimates for each month. I set up the Coiner-Greens' checkbooks beginning (the second time) in October, making it possible to start entering register items in November. Similarly, you have to enter each budget category completely, first deciding which budget type it is and then setting up monthly balances. The program assigns numbers to the categories.

Transactions is the menu for entering checkbook items. For each entry the categories are: Date, Transaction Number, Payee, Amount, Memo, Budget Category, Tax Deductible or Not, and Cleared or Not. You can handle transactions between checkbooks the same way. You can also split any entry, say a payment containing principal and interest. First record the entire amount and list Split under category. Then enter the same date, transaction number, and payee, but assign the appropriate amount to the desired category.

The program can perform searches throughout the checkbook by any field, date, or combination, and editing is also possible. Since you can't make new entries in a previous month, the manual suggests entering a few $0.00 dummy items each month, to allow for forgotten entries.

The Home Accountant's strength, its categories, is also its greatest deficiency.

Reconciling the checkbook involves entering check charges and other new items from the statement and then selecting Reconcile from the Transactions menu. Next, you enter the statement balance. Then, as The Home Accountant displays each transaction, enter Y for "yes" or N for "no" in the Cleared category. The program calculates the reconciliation, which you can print out. In case of a discrepancy (see figure 4), you can keep redoing the reconciliation until you achieve success.

The Home Accountant can print several reports of assets and liabilities, budgets, income, and expenses. Those related to the checkbook include a list of budget categories and their numbers, the month-by-month totals for each budget category, one month's checkbook balances, and checkbook activity for a given period. In addition, you can print out almost every individual screen and transaction, such as a check entry, before you save it on the data disk (figure 5). The program can also print checks, including the name and address of the recipient.

The manual is extremely thorough and guides you step-by-step through each routine. Numerous pictures of screens enable even beginners to succeed eventually.

The Home Accountant's strength, its categories (called modules), is also its greatest deficiency. The program is so structured and hierarchical that you have to adapt to it, rather than being able to tailor it to your particular needs. You must always complete the Budget module, with a form filled out with monthly estimates for each category, even if you simply want to keep running totals of a few of them in the checkbook. For all practical purposes, the cash account for each checkbook is busywork, even if you're interested in a total household budget. You can put five checking accounts on each data disk, but they are as segregated as if each were on a separate disk.

On the other hand, for a household or small business, the complete documentation not only provides all the information a CPA could want but, by its very structure, can also help the program's users gain more control over their finances. And if those users persevere through the lengthy preliminaries, transaction entering and checkbook reconciliation are speedy processes.

Motivated users will find that The Home Accountant performs adequately for checkbook management, but its overly rigid design makes the program difficult to adapt to less than total budget management. The thorough manual is the life-support system during the lengthy setup process. ✚

PRODUCT INFORMATION

Money Street
By Donald A. Hill, Jr., and Robert A. Payne
Computer Tax Service
Box 7915
Incline Village, NV 89450
(702) 832-1001
List Price: $99.95
Backup disk (max. of 2): $10
Utility disk: $25

The Home Accountant
By Robert Schoenburg, Stephen Pollack, and Larry Grodin
Continental Software Company
11223 South Hindry Ave.
Los Angeles, CA 90045
(213) 410-3977
List Price: $74.95
Backup disk: free during warranty period

In Apple Computer's LisaCalc spreadsheet program, high-resolution graphics, mouse technology, and internal memory of one megabyte team up to produce an intriguing product.

Not that LisaCalc's features and performance as a spreadsheet per se separate it dramatically from the competition (e.g., VisiCalc, SuperCalc, Microplan). The nature of the Lisa itself distinguishes this software product from the others.

For example, LisaCalc eliminates the need to learn a special modeling and editing command language, because it replaces the usual confusing computer commands with simple graphic images.

As with the other six software packages available for Lisa (LisaWrite, LisaGraph, LisaProject, LisaTerm, LisaList, and LisaDraw), high-resolution graphics, ease of learning and use, and ability to port data to other programs have been given priority.

Any review of a Lisa or "Lisa-like" program presents a problem. The Lisa operating system is so unlike CP/M or Apple DOS that most readers need a bit of orientation.

The Lisa's designers were thoughtful enough to create an operating environment that is visual in nature, making it exceptionally easy to master. For example, copying files is just a matter of moving an object around on the screen and pushing a button.

All activities on the Lisa operate conceptually and according to the same two rules: Select and Operate. You select the thing (be it a file, word, letter, number, or shape) you want to do something with; then you select the function you want to perform on it.

To select something, you move a pointer around on the screen using a small device called a "mouse" that you roll around on your desktop. Once you have the pointer positioned on your object, simply pushing a small button on top of the mouse "selects" the object, displaying it in reverse video, which, on the Lisa, is black.

Now you choose which operation to perform on your selection by moving the pointer up to the top of the screen to the "menu bar." The menu bar offers a variety of operational categories, each of which has subheadings. The subheadings do not normally appear on the screen, but they "unfold" when you position the pointer on a menu category and press the mouse button. After the particular menu selection unfolds, you move the pointer down to the desired operation and then let up on the mouse button. Voilà! It's done. That's basically all there is to operating the Lisa.

Any editing on Lisa varies little from program to program. Aside from the indispensable option called Undo Last Change for reversing a normally catastrophic mistake, the Edit menu contains a few other curious words: Cut, Copy, and Paste. When you "cut" or "copy" something, it gets stored on a temporary "clipboard" and waits to be "pasted" somewhere else. The difference between Cut and Copy is that Cut deletes the selection from your document and Copy replicates it.

To create a new spreadsheet, you just "pull off" a fresh piece of LisaCalc "stationery" by selecting a picture (called an "icon") of a pad of paper and clicking the mouse button twice. This action creates a new icon (document) labeled "Untitled," which you can rename later. Clicking twice on the new icon dramatically expands the small icon into a full-

screen grid of empty spreadsheet cells. Also, the menu bar changes and a status area appears (see figure 1).

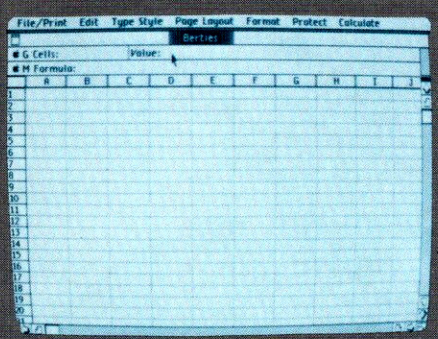


Figure 1: Here is how a blank LisaCalc document appears. Notice the menu bar and status area.

In addition to the usual menu bar and pointer, you can see three areas near the top of the screen: Cells, Value, and Formula. This area is referred to as the "status panel."

The Cells area performs two functions. It reports the location of the currently selected cell(s), or you can choose which cells you want to select by typing their coordinates in here.

The Value area always displays the contents of the selected cell unless you select more than one cell. You can edit the selected cell's contents (value) either at this spot or in the cell itself. In either case, both areas simultaneously reflect any changes or additions.

Let's say you want to fill in cell B1. With most spreadsheets, you either have to use control keys to move the cursor to the desired location, or you can jump directly there by typing a special command. With the Lisa, you generally have several alternatives for selecting any object (in this case a cell). For example, there are three ways to select a cell: (1) Just move the pointer to the correct cell and click the mouse button. You can select a group of any number of contiguous cells this way. You can also select any particular row or column by moving outside the matrix and clicking on the row number or column letter. (2) Use the arrow keys located on the number keypad. (3) Or, press Apple-G (the Apple key and the G key simultaneously), which jumps the cursor up to the Cells area. Now you can enter the name of a cell (e.g., B4) or a range of cells to be selected (e.g., B4:B15, which means B4 to B15).

Now you have two choices. You can enter the *value* of the cell or you can enter its *formula*. To enter the value, you just begin typing on the keyboard. The value appears not only in the cell, but also in the Value area of the status panel. If you choose to enter a formula instead, you have two ways to get your cursor to the formula area for entry: (1) Position the pointer on the Formula area and click the mouse button, or (2) Press Apple-M, thereby jumping cursor to the Formula area, where it waits for input. I found the second method easier, since at this point I was using the keyboard anyway.

After typing in and/or editing either a formula or a value, you actually enter it into the spreadsheet by selecting another call or pressing Return, Enter, or Tab. The keys work as they would in a word processor. Return and Enter drop the cursor down one row and to the left margin; Tab moves you over one cell.

After following both the elementary and detailed tutorials that are part of the LisaCalc manual, I tried experimenting on my own. I created a new spreadsheet, a fictitious annual expense report for a company called Marston's Piano Shop. It's actually a

SIMPLY PUSHING A BUTTON ON TOP OF THE MOUSE 'SELECTS' THE OBJECT, DISPLAYING IT IN REVERSE VIDEO, WHICH, ON THE LISA, IS BLACK.

very simple spreadsheet (see figure 2), but it was a good test of LisaCalc's data-entry and editing abilities.

The first thing I wanted to do was widen column A so that my descrip-

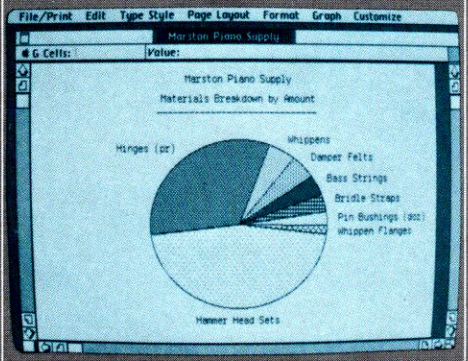


Figure 2: Data from a LisaCalc spreadsheet can be easily copied into other Lisa programs. Here you see statistics from a sample spreadsheet in a graphic printout by LisaGraph.

tions would fit in. This turns out to be simple with LisaCalc. I just positioned the pointer on the dividing line between columns A and B, pressed the mouse button, and moved the mouse until the column was as wide as I wanted. When I released the button, the screen reappeared with the correct column sizes. As a comparison, I tried this change on SuperCalc. The command was /F C A<CR> 20 <CR>. The same command in VisiCalc was equally awkward.

Inserting new rows and columns anywhere in the document is easy too. You just select a line between two rows, for example, move to the Edit menu, and choose Insert Blank Row.

Next, I began entering my titles and descriptions. The grid arrangement on the screen made this part easy; because I was not apt to select the wrong cell accidentally. For example, when using other "Calcs," I sometimes find it difficult to see which row an entry is on, especially if it is on the right side of the screen, furthest from the row marker.

In my example, typing in the formulas was relatively simple. I didn't use any complex equations, and most of the formulas were similar. Since LisaCalc, like most other spreadsheets, allows you to copy one formula into other cells while making adjustments for the change of location, you can eliminate a great deal of typing that you would have to do otherwise. It's even easier on the Lisa.

Let's take an example. My column D7 is entitled Subtotal. Its formula is B7*C7. (The * sign means "multiplied by.") Now, row 8 is going to use the same formula, but the 7's need to be changed to 8's. The formula for D8 should be B8*C8. Just copying the first formula of column D into all the other cells of column D without modifying each one would give erroneous results; a command called Paste Adjusting . . . comes to the rescue.

Paste Adjusting . . . is a variation of the Paste function, and the . . . after it means that you will have to answer a few more questions on a subsequent screen overlay if you select this option. This command enabled me to copy my formulas into other cells without any problem.

First I selected D7 and chose Copy from the menu. Then I selected D8 through D15 and chose Paste Adjusting. . . . LisaCalc analyzed the formula in D7, checked where I was going to copy it to, and concluded that I probably wanted the formula modified for each row. A new overlay appeared on the screen asking for confirmation and/or changes of any variables (see figure 3).

I left both variables relative, then clicked the "OK" square, and it was done. All eight rows I'd selected were now filled with their correct formulas and calculated. This feature is especially helpful with long equations and for creating spreadsheets with replicated formulas. Some other spreadsheets do provide these features, but they are more difficult to use.

In addition to the editing commands discussed above, LisaCalc offers a series of formatting commands (see figure 4). They let you modify both text and numerals in selected cells, or in the entire document.

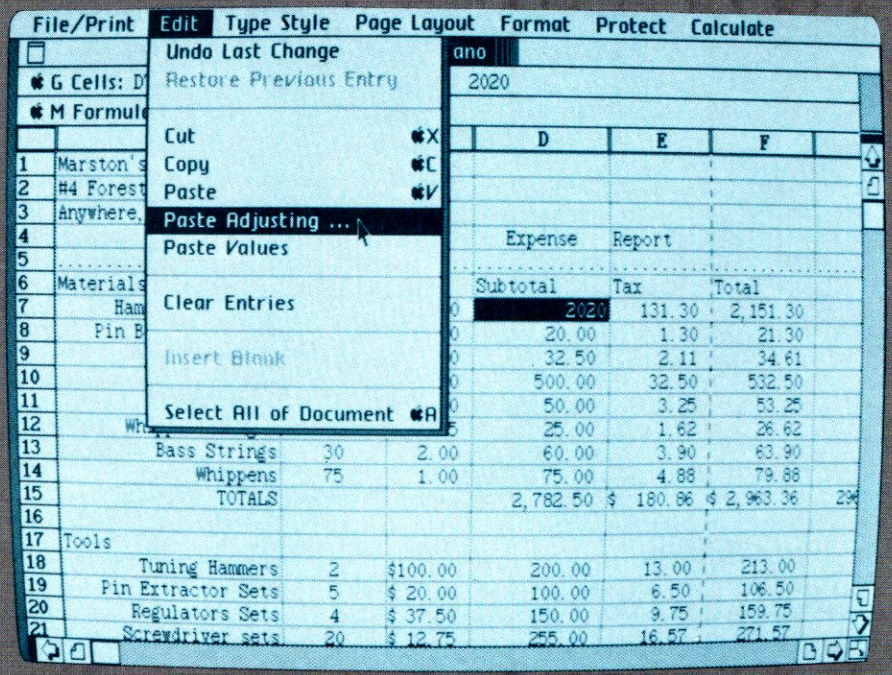


Figure 3: When you're pasting, using the Paste Adjusting . . . option, this overlay appears, asking for confirmation. This feature allows easy replication of formulas for use in other parts of a spreadsheet.

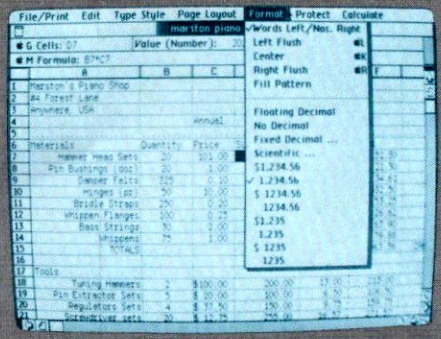


Figure 4: This is the Format Menu. LisaCalc provides for extensive modification of the way numbers and text appear on screen and on paper.

As you can see from the menu, you have several choices regarding the presentation of numbers. Initially, LisaCalc is set for floating decimals, text justified left, and numbers right. Fixed decimal places or no decimals at all are possible too. Regardless of the display format you choose, the program calculates numbers to 15 digits, stored in memory and reformattable at any time. All 15 digits appear in the Value area of the status bar when you select a cell, even though the cell (and printouts) will reflect only the formatted representation.

The Format menu also shows an example number, 1234.56, presented in its various optional formats. As you can see, you have quite a few choices.

You can use the Fill Pattern option for creating a row of, say, periods for dividing your spreadsheet into obvious sections. This technique seems to be the only function that is more cumbersome in LisaCalc than in other spreadsheet programs. It requires a six-step process instead of a two- or three-step one.

Another menu, Page Layout, offers the ability to insert page breaks between selected rows and to change column width by specifying the desired width in numerical form rather than by using the mouse.

The Type Style menu is of particular interest because of its ability to let you display many more rows and columns than most other spreadsheets do. In Figure 5, this contrast is quite obvious. Using small type, the screen can simultaneously display about 105 characters across and 28 rows down.

Text can be right- or left-justified, or centered. You have a choice of five type styles in four different sizes, and the ability to actually show the various type styles and sizes on the screen is an impressive bonus.

Spreadsheet calculation normally

File/Print Edit Type Style Page Layout Format Protect Calculate

marston piano

G Cells: Value:

M Formula:

	A	B	C	D	E	F
1	Marston's Piano Shop					
2	#4 Forest Lane					
3	Random, AK.					
4			Annual	Expense	Report	
5						
6	Materials	Quantity	Price	Subtotal	Tax	Total
7	Hammer Head Sets	20	101.00	2,020.00	131.30	2,151.30
8	Pin Bushings (doz)	20	1.00	20.00	1.30	21.30
9	Damper Felts	325	0.10	32.50	2.11	34.61
10	Hinges (pr)	50	10.00	500.00	32.50	532.50
11	Bridle Straps	250	0.20	50.00	3.25	53.25
12	Whippen Flanges	100	0.25	25.00	1.62	26.62
13	Bass Strings	30	2.00	60.00	3.90	63.90
14	Whippens	75	1.00	75.00	4.88	79.88
15	TOTALS			2,782.50	$ 180.86	$ 2,963.36
16						
17	Tools					
18	Tuning Hammers	2	$100.00	200.00	13.00	213.00
19	Pin Extractor Sets	5	$ 20.00	100.00	6.50	106.50
20	Regulators Sets	4	$ 37.50	150.00	9.75	159.75
21	Screwdriver sets	20	$ 12.75	255.00	16.57	271.57

File/Print Edit Type Style Page Layout Format Protect Calculate

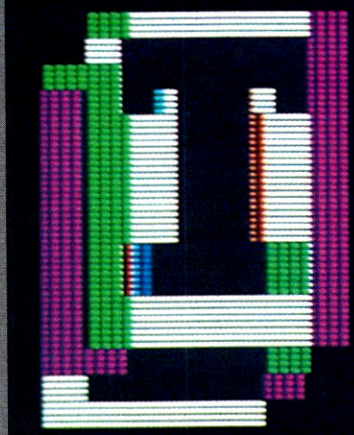
marston piano

G Cells: Value:

M Formula:

	A	B	C	D	E	F	G	H	I
1	Marston's Piano Shop								
2	#4 Forest Lane								
3	Random, AK.								
4			Annual	Expense	Report				
5									
6	Materials	Quantity	Price	Subtotal	Tax	Total			
7	Hammer Head Sets	20	101.00	2,020.00	131.30	2,151.30			
8	Pin Bushings (doz)	20	1.00	20.00	1.30	21.30			
9	Damper Felts	325	0.10	32.50	2.11	34.61			
10	Hinges (pr)	50	10.00	500.00	32.50	532.50			
11	Bridle Straps	250	0.20	50.00	3.25	53.25			
12	Whippen Flanges	100	0.25	25.00	1.62	26.62			
13	Bass Strings	30	2.00	60.00	3.90	63.90			
14	Whippens	75	1.00	75.00	4.88	79.88			
15	TOTALS			2,782.50	$ 180.86	$ 2,963.36	2963.3625		
16									
17	Tools								
18	Tuning Hammers	2	$100.00	200.00	13.00	213.00			
19	Pin Extractor Sets	5	$ 20.00	100.00	6.50	106.50			
20	Regulators Sets	4	$ 37.50	150.00	9.75	159.75			
21	Screwdriver sets	20	$ 12.75	255.00	16.57	271.57			
22	Repinning Sets	5	$ 15.00	75.00	4.88	79.88			
23	TOTALS		$185.25	$ 780.00	$ 50.70	$ 830.70	830.7		
24									
25						Grand Total	$ 3,794.06		
26									
27									

Figure 5: These two screen photos show the differences in spreadsheet viewing areas obtainable through use of the Type Style menu selections.



HE TYPE STYLE MENU IS OF PARTICULAR INTEREST BECAUSE OF ITS ABILITY TO DISPLAY MORE ROWS AND COLUMNS THAN MOST SPREADSHEETS DO.

takes place whenever you make a change in any crucial cell's value. The Calculate menu gives you a choice of either manual or automatic calculation, however, which is necessary to help you avoid long waits between calculations when you're changing several variables in large spreadsheets.

The ubiquitous "what if?" analysis that so many people use spreadsheets for is especially informative in LisaCalc, because each affected cell is temporarily highlighted to indicate where changes may occur—an impressive feature for financial analysis.

As with any spreadsheet, the usual mathematical, logical, lookup, and trigonometric functions are built into LisaCalc. In addition, a host of others are available, including net present value, compound-interest factor, and annuity factor.

Testing spreadsheet speed isn't a simple matter, since some types of calculations will undoubtedly take longer than others. But just for grins, I created a matrix 10 columns wide by 100 rows and gave each cell the formula ((A1*B1)+2)/pi. Variable A1's value was 456789; B1 was 123456.5564. The calculation and redrawing of the screen took 19.5 seconds, which comes to 2/100 of a second per cell. The redraw probably accounts for most of this time—I have noticed that the screen tends to be slow anyway. The possibility of any spreadsheet containing 1000 cells that would all be affected by a change in one other cell is remote anyway, so this speed figure is quite respectable.

Once you are done entering data, printing it out, either on the Apple dot-matrix or daisy-wheel printer, is simple but slow. After you select the Print option for the File/Print menu, an overlay appears that asks how many copies you want, whether you want high or normal resolution, and which pages of the document you want printed. You have an option of a horizontal or vertical printing arrangement. Finally, you have to tell the program whether you want to continue working on the spreadsheet or another document while printing occurs.

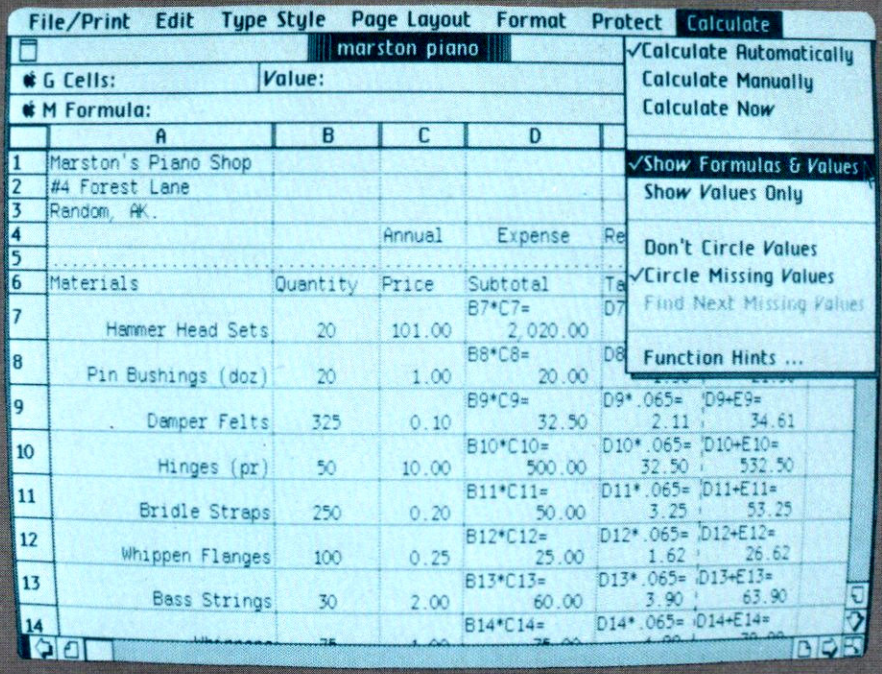


Figure 6: Screen appearance when both formulas and values of cells are displayed.

OTHER FEATURES

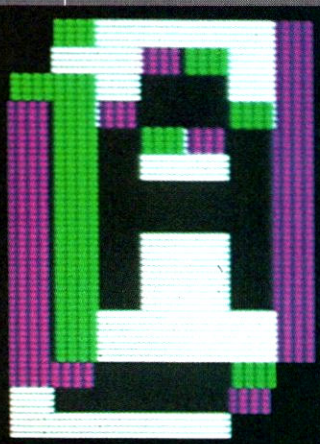
LisaCalc has too many other features to cover in detail, but here are some highlights.

One surprising aspect of LisaCalc is its ability to create spreadsheets of up to 255 columns by 255 rows. The resultant number of cells should allow financial analysis of extremely complicated business prospects. As a comparison, SuperCalc 1 allows 58 columns by 254 rows. Microplan allows only 50 rows and 20 columns. Spreadsheet size is calculated automatically by LisaCalc, eliminating any need for premeditation on your part.

Another useful feature is the ability to display formulas and values of selected cells simultaneously. It lets you see quickly just what's going on in your spreadsheet and possibly correct any formula errors. LisaCalc also does a good job of reorganizing the screen and printouts to display all the information you add (see figure 6). In the printout, cells are actually boxed in, just as they appear on the screen when this function is active. Most spreadsheets allow you to split the screen in order to see two areas of one document at the same time. With LisaCalc, you can split the screen both horizontally and vertically at the same time and scroll each section independently. In addition, thanks to the Lisa operating system, you can have almost any number of documents on the screen simultaneously—until the screen becomes too crowded. This simultaneity makes copying sections from one spreadsheet to another easy.

LisaCalc can figure out how to use dates or parts of dates in calculations and formulas—an important feature for project scheduling. Here are some examples:

```
''9/5/47''+10000 days = 1/
  21/75
''12/25/83'' - ''3/31/83''
  = 269 days
4*Int(3 weeks) = 12
''Date - ''1/1/83'' = days
  since beginning of 1983.
```



S WITH ANY SPREADSHEET, THE USUAL MATHEMATICAL, LOGICAL, LOOKUP, AND TRIGONOMETRIC FUNCTIONS ARE BUILT INTO LISACALC.

(Lisa's internal clock/calendar replaces the word Date with today's actual date.)

Finally, LisaCalc allows you to create templates for data collection that data-entry people who do not need to learn LisaCalc can fill in. You do this by creating a "stationery pad" of a LisaCalc document that has important values protected and missing values circled. By "protecting" all the other fields, you can prevent accidental overwriting of key cells.

This scheme is a nice idea for data entry, but some other spreadsheets that can actually run programs, even to the point of printing out results of a recalculation without user initiation, are more automatic.

DOCUMENTATION

All the LisaCalc manuals are beautifully designed and thought out, and this one is no exception. The first section is a simple tutorial that orients you and gets you doing real work with LisaCalc. When you are ready for more, the second section walks you through an in-depth tutorial covering all phases of LisaCalc. Section 3 contains a detailed reference guide to all functions. LisaCalc even includes instant on-screen documentation that lists all the functions, operators, and constants with examples showing syntax. You can call up this information even while you're in a document.

My only complaint about the manual is that it is too technical and moves too fast, which is probably fine for a businessman who understands financial modeling. For the layperson just learning about spreadsheets, the documentation does not include enough explanation of what is going on and why one would do all the calculations. Pictures and examples are plentiful, however. Five sample worksheets come on the disk, and the instructions are clear, which is more than most other manuals can offer.

CONCLUSIONS

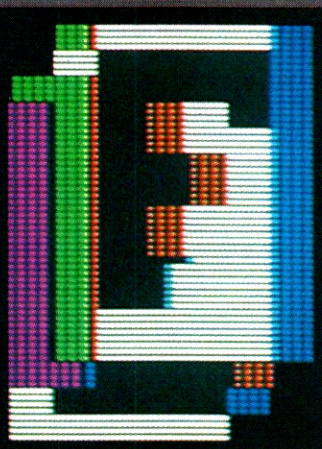
Lisa's visually oriented operating system lends itself neatly to the creation and maintenance of spreadsheet documents.

The mouse and the extended screen display make all the difference. The ability to select a specific cell, row, or column and then move it around, increase or decrease its size, edit its value or formula, change its format, and automatically recalculate—all in a few seconds—can take the drudgery out of financial planning.

LisaCalc doesn't do everything other spreadsheets can do, but it is easy—even fun—to use, and it has some features you can't find anywhere else. Except for loading in and saving files, the program runs reasonably fast (see operating system and program loading times below).

1. *Booting up the Lisa operating system: 1 minute, 38 seconds.*
2. *Opening an existing LisaCalc file from the hard disk: 47 seconds.*
3. *Opening the same file, but from the desktop: 8 seconds.*
4. *Closing that file: 7 seconds.*
5. *Creating a new document: 12 seconds.*

The ability to port your data over to LisaGraph (see *A+*, Volume 1, Issue 2) is certainly something to consider if you need high-resolution printouts of your data. The price is high ($6995 for Lisa, $295 for LisaCalc), but you may find the combination worth it. ✚



IVE SAMPLE WORKSHEETS COME ON THE DISK, AND THE INSTRUCTIONS ARE CLEAR, WHICH IS MORE THAN MOST OTHER MANUALS CAN OFFER.

A + REPORT CARD

Training time	: A
Hardware ease of use	: A
Software ease of use	: A
On-screen messages	: A
User friendliness	: A
Documentation	: B
Speed	: C
Overall performance	: A

LIST PRICES:

Apple Lisa	Including a 5-megabyte hard disk, 2 860K floppy-disk drives, and mouse. No printer. $6995
Dot Matrix Printer	For printing out your drawings. Has 80 columns. $675. Requires an extra parallel interface board, which costs $195 additional.
Daisy-Wheel Printer	Prints in letter quality and also will print graphics, though the Dot-Matrix printer is recommended for graphics. $2195
Software:	Complete package of six Lisa Applications, the Six Pack, is available for $1195.
	Six Pack with Dot-Matrix Printer and parallel-interface card is $1495.
	LisaDraw $395 LisaProject $395
	LisaWrite $295 LisaGraph $295 LisaCalc $295
	LisaList $195
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NOLAN BUSHNELL

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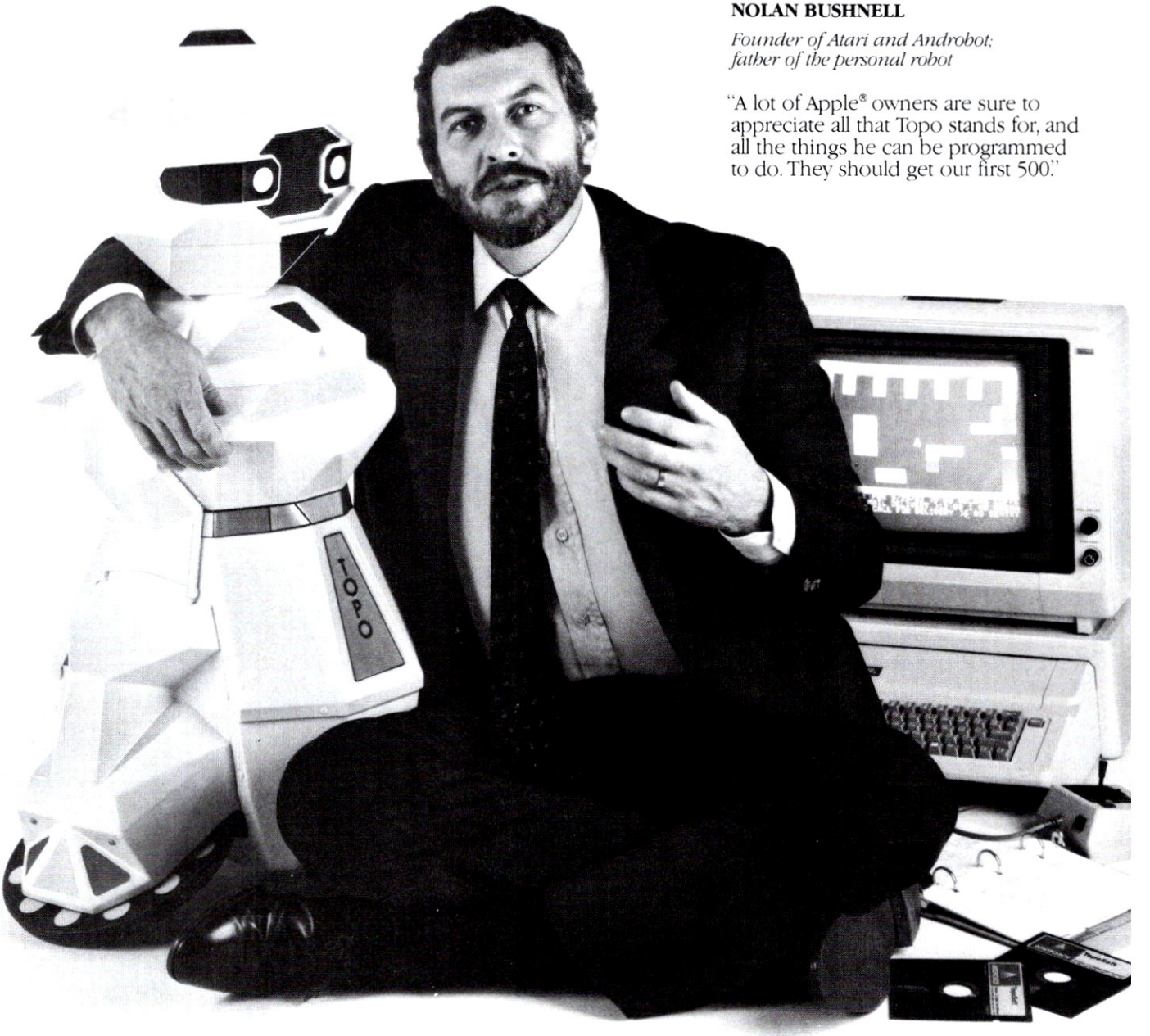
"A lot of Apple® owners are sure to appreciate all that Topo stands for, and all the things he can be programmed to do. They should get our first 500."



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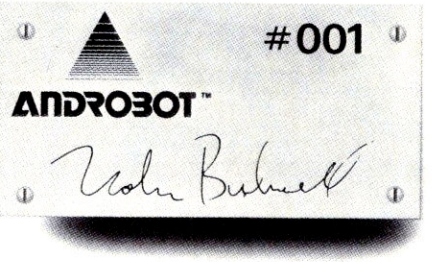

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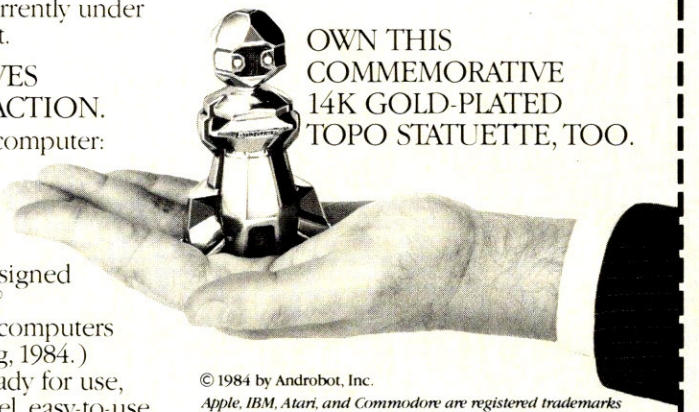

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Nolan Bushnell
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ANDROBOT™

JACK OF ALL TRADES

The Incredible Jack, Version 1.3
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60 East Main Street
Kings Park, NY 11754
(516) 269-1120
List Price: $179 plus $30 for Customer Support Hot Line
Requires: Apple II, II Plus, or IIe;
64K RAM;
two disk drives;
DOS 3.3;
80-column board (optional);
printer

Integrated software has become a popular buzzword recently. Microcomputer users are not content with separate spreadsheet, database, and word-processing programs anymore, even though they used to get the job done. Now, users are demanding software that is compatible with other products. They see no reason why their word processor should not perform calculations and why information from various data files shouldn't glide into form letters to produce calculated results at the same time. In short, now that they are familiar with the power of basic microcomputer software, they see the need for their software packages to communicate in an integrated fashion.

For newcomers to the micro market, the prospect of a single product that can do the job of three "traditional" programs for a single price makes the idea of integrated software financially attractive. For experienced users seeking to avoid entering the results of calculations and database records by hand and for novices on a limited software budget,

Do not expect this program to perform as if it were a combination spreadsheet, database, and word processor.

The Incredible Jack is worthy of consideration.

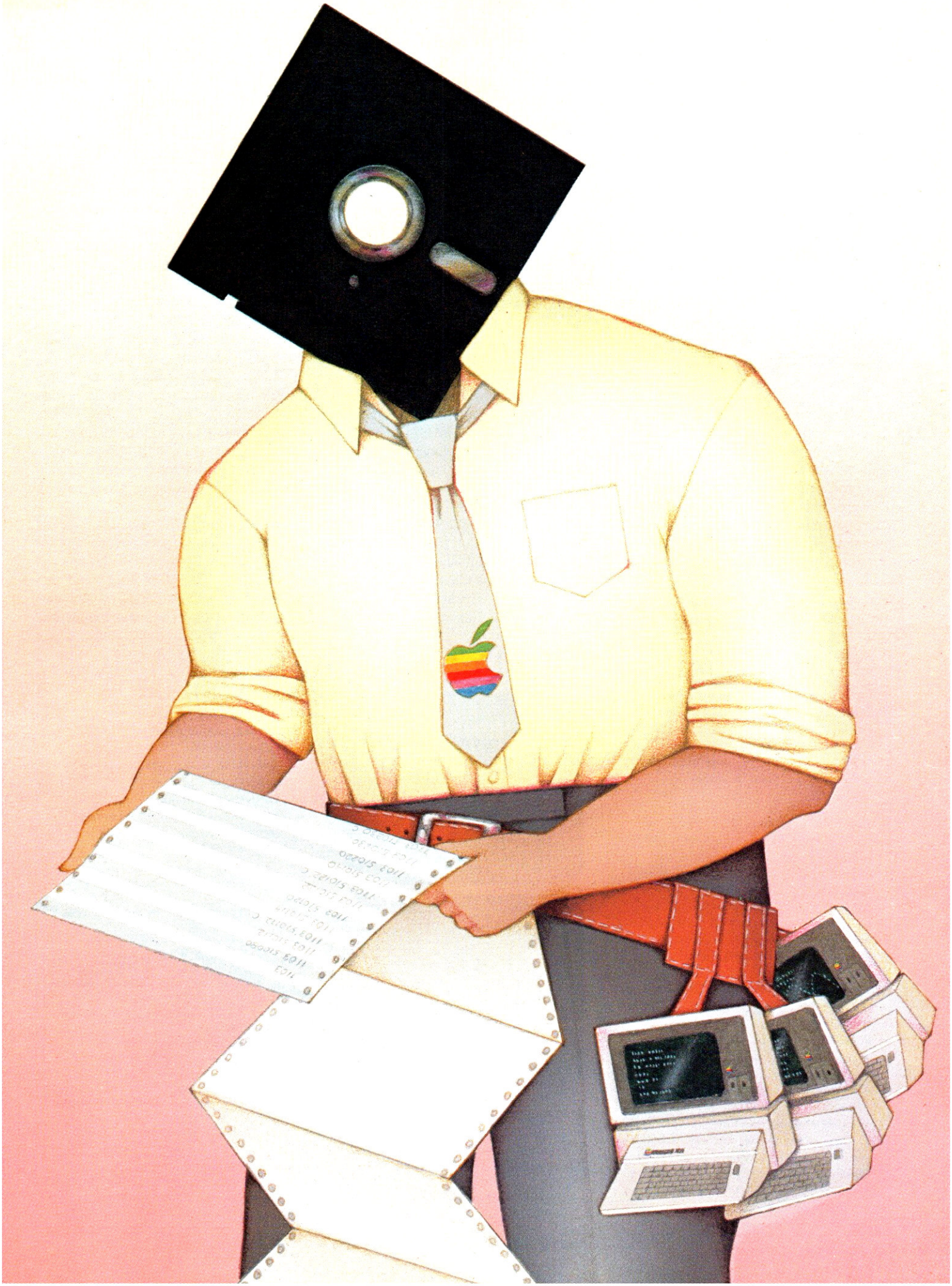
To describe Jack as an integrated piece of software is accurate enough, but do not expect this program to perform as if it were a combination spreadsheet, database, and word processor. It does not contain all of the features of state-of-the-art versions of each of these products. Jack is best described as an enhanced database-management system that lets you perform calculations on a defined field and merge those fields plus the results into forms or letters you have created with its word processor.

Jack will not replace our favorite word processor for tasks involving text composition and editing, nor will we throw away our favorite spreadsheet program when it comes time to determine the possible impact of pending salary negotiations. It is not a substitute for such dedicated products with their many special features.

On the other hand, individuals with small businesses that require billings or mailings of a similar nature, or anyone in need of a micro database that is easy to use, powerful, and well supported should read on. If you have less than $200 to spend on software, we would have a hard time recommending a more versatile product.

The House That Jack Built

You can use Jack with any of the Apple II-series computers. We used an Apple IIe with an 80-column board that makes optimal use of the Tab key and the up- and down-arrow keys. Without the IIe you must learn a set of control characters that are a bit less obvious and require that you consult the enclosed "key card" frequently at first. With the



Apple IIe, the key card is hardly necessary.

Like other pieces of software that perform a variety of functions, Jack uses a series of menus. The main menu, or Command Line, contains four options and appears at the top of the screen once you get the program running. The four options include Disk, File, Select, and Print.

Underneath the Command Line, the screen is organized into four distinct sections. The Tab Lines are located under the Command Line and on the next to the last line of the screen. The Tab Lines indicate the current margin settings, tab stops, and line length. You can easily manipulate them to fit your specifications.

The largest area on the screen is a blank area called the Work Area. All data entry takes place here.

The Footnote Area is where you enter field names, variable names, or equations for your database or form letter. This area becomes most important when you copy records from a file on a disk into another file in the Apple's memory. If field names between such files are incompatible, no transfer can take place. You can change the field names of the file in memory, however, so that information for another file can find its way into the correct location.

The Status Line is the bottom line on the screen. It tells you the filename currently active; record number; line number; the current field indicator, whose default value is the colon; the format for the field values; whether or not a file is locked so that you can begin entering specific data; and whether auto-blanking is turned on or off. When auto-blanking is on, all data from the previous record is blanked. When it is off, the program displays new records with the old values so that you can avoid retyping entries into fields that do not always change from one record to the next. Auto-blanking is on at the beginning of any data-entry session.

In addition to these areas on the screen, error messages appear when you try to do something invalid. The error messages are self-explanatory, and the program's manual explains them in detail.

Jack's Four Modes

Beginning with the Command Line, you can branch out to the four main modes of operation. The Disk mode performs all disk functions, including loading existing files; creating new ones; saving files; copying records into other files; copying file definitions or entire disks; and removing selected records, files, or disk catalogues. The specific options in the Disk mode are Load; Newdisk; Save; Copy a record, file, or disk; and Remove a record, file, or disk.

The program automatically initializes blank disks when you put them into a disk drive. You need at least two drives, one for the program disk, which must always reside in drive one, and the other for the data disk. Jack uses the UCSD Pascal run-time system. As a result, Pascal users will be familiar with the method that Jack uses to move among these various options.

You use the File mode to create, modify, or examine a file. As you enter a file, the first record in the file appears. In this mode you edit existing records or add new records. The Insert and Delete options make it easy to modify a record, and the Copy command allows you to place copies of the most recently deleted text anywhere, as many times as you want.

Included in the File mode is the Foot option. You use it to enter formulas for calculating a field. Such calculations can include IF . . . THEN logic and can make use of both numeric and alphanumeric data. You can round values and

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John Martellaro, **Peelings II**
Volume 4, Number 5

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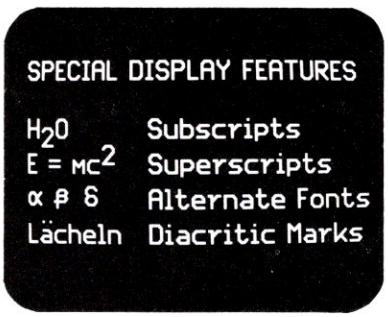

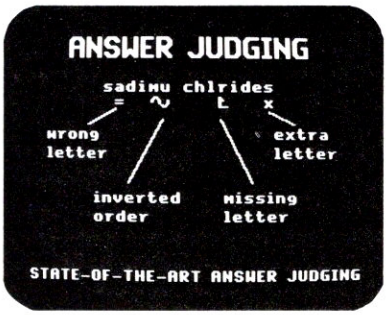

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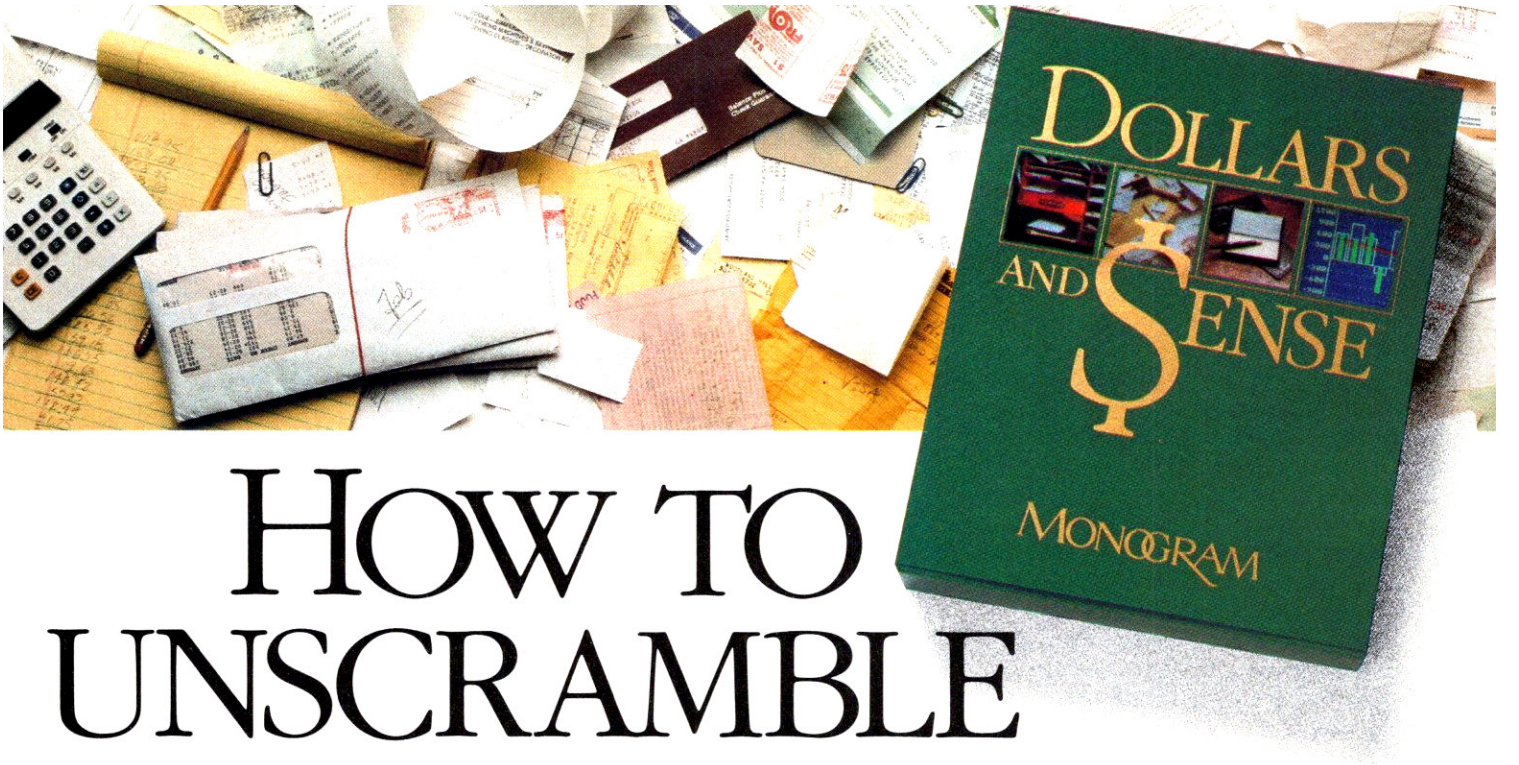

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The interactive demonstration disk will get you started. And the program will keep you going. With sample accounts, on-screen prompts and a user's manual that's written in plain English.

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But only if you use it on your taxes.

MONOGRAM™

CIRCLE 300 ON READER SERVICE CARD

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change variable names.

You can use the GOTO option to hop around within a file. The program lets you change global settings for such things as tabs and margins. You have to save each new record or edited record separately.

The Select mode lets you enter criteria for searching a specific set of records for your file. With this mode, you can sort, print, or merge selected records into a form that you created as another file. You can use Boolean logic, with its ANDs, ORs, and NOTs, for selection; wild-card characters can help you locate a specific string of characters.

In the Select mode, you can do a high-speed search on the first field you created in a file. This procedure is called a key search, and the field name should be unique. Other secondary searches are possible but slower. Thus, make sure that you choose your first or key field carefully.

The Print mode allows you to print the results of your work. Jack can print a little memo, a simple calculation, or a complex merging of selected records from one file into a form letter. It can also take some of the merged fields you've used in calculations and sort them by ZIP code for bulk mailing. The Print menu gives you several options to determine how the printed material will appear on paper or on any special forms that you care to feed into your printer.

Unlike some other packages, Jack allows you to send coded messages to your printer so that you can turn on special character sets, line spacing, or any other features that your printer allows.

Jack allows you to send coded messages to your printer.

As Epson FX-80 owners, we found this feature especially valuable.

Is Jack Really a Big Deal?

Since this program's abilities are limited by the Apple's internal memory and disk space, you should note just how big your files can be. Each Jack data disk can have up to 60 different files. They can vary from short notes or scratch-pad calculations to data bases that fill the disk with a single file. Any single file can contain up to 1000 records. If your business booms, be prepared for a conversion to a larger computer system.

A single record can have up to 100 fields totaling approximately 2000 characters, depending on the setup and on how many footnotes you use to describe calculations. Any single footnote that defines a calculation can be as long as 240 characters long; 20 digits are maintained in all calculations. The round-off error causes the last few figures to be meaningless, however. These numbers compare favorably with those of other database products we have used.

The House of Jack

Jack's single disk and 125-page 5¾-inch-square manual come in an attractively labeled disk box just like one you might purchase to carry about ten disks in. The manual contains a tutorial section that guides you through the creation of a letter, a form that serves as the model record for a data file, a simple form that contains five fields and four calculations, a letter with embedded calculations, and mailing labels. The mailing-label tutorial represents a simple version of merging records from one file into another.

The manual's reference section explains in detail how to use each of the four modes and accompanying options. The appendices help with error messages, warn you about Jack's maximum

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The Lock-It-Up systems are sophisiticated, menu driven copy-protection and duplication utilities for the Apple II Computer. They feature several levels of protection which make standard diskettes virtually uncopyable by even the most sophisticated nibble copy programs currently available.

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DOS or Pascal systems are available for $225 each. CP/M system is available for $695. Each system includes three diskettes, an informative manual, and a non-exclusive license to copy as many diskettes as needed.

DOS VERSION:

- Any standard DOS 3.3 diskette can be protected.
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- Additional CP/M utilities included
- Protected files may be backed-up by user

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The PSIO lets you choose from among an unmatched range of software-selectable options, including variable baud rate selection, form width, form length, auto linefeed, linefeed mask, Xon/Xoff protocol, lowercase masking, shift wire mod support, duplex mode, parity, data format, video echo mode and a slot echo mode.

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CAD-1 utilizes a unique handheld controller which serves as both drawing instrument and function selector . . . there are no key-

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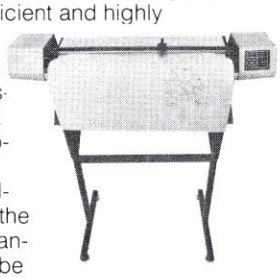
The easy-to-learn CAD-1 drafting process is fast, efficient and highly productive.



To preview this remarkable system, send for a free CAD-1 brochure, or send $17 for your advance copy of the CAD-1 User Manual. Credit will be given when you order a system.

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CIRCLE 183 ON READER SERVICE CARD

capacities, and explain rules for calculations in detail. Several complex but standard business calculations are included, as are a good table of contents, an index, and a glossary.

Is Jack Easy?

As with many products designed to perform useful tasks for businesses, Jack's ease of use depends heavily on users' understanding of some basic concepts. You have to understand concepts such as *file, record, field,* and *merging of files* before Jack will seem easy.

Following the tutorial is simple, and there is a good chance that those who take the time (in our case about four hours) to go through it will greatly improve their understanding of these important concepts.

There is no guarantee that beginning users of Jack can avoid frustration altogether. Until you understand the various menu options, you may spend more time in the Error Message Appendix than you would like, although the error messages are easy to understand.

There is no guarantee that beginning users of Jack can avoid frustration altogether.

To help ease the learning process, Jack offers a hot line. When we called, we talked to someone who really knew the product and easily helped us through a frustrating moment. The company has a standard $30 charge for this service, but it may be worth the price for beginning computer users.

Jack Is

Jack is not a complete spreadsheet, but you can use it for calculations and simple what . . . if computational analyses. Jack is not a sophisticated word processor, but you can use it for letters and memos. The program is especially handy if such documents must include calculations or information merged from other files. Jack's manufacturer does not claim that this product is a data base, but for our money it would be worth the price if that's all it was.

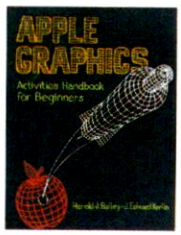
Certainly The Incredible Jack does a credible job of imitating integrated packages that run on larger systems. If you just bought an Apple IIe and are wondering which single piece of software to buy in order to make it start paying for itself, take a look at this product. ✚

Brady Books are right on target

The Brady Company, A Division of Prentice-Hall, has hit the mark with the best books written for the Apple computer. We have assembled the authors to give you the information you need to get the most out of the machine. You will benefit from their years of experience in working with the computer in many enjoyable, readable titles.

And, The Brady Co. is right on target by publishing books for the beginner and the advanced Apple user. Among the long list of titles from which you may choose are:

"Apple Graphics: Activities Handbook"
By Harold J. Bailey and J. Edward Kerlin



This book takes a hands-on approach to learning both low and high resolution graphics for Apple II and Apple IIe. Step-by-step with the accompanying diskette, you'll learn by doing. With the many activities it contains, you can expand your knowledge and use graphics to benefit your home and your business.

1983/300pp/paper/ISBN 0-89303-308-1/ D3081-9/$15.95
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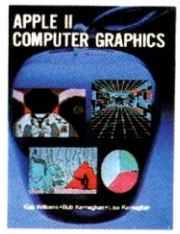
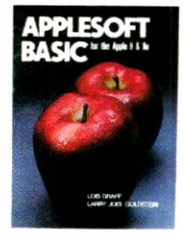
"Apple II/IIe Computer Graphics"
Ken Williams, Bob Kernaghan, Lisa Kernaghan



With a working knowledge of BASIC programming, your fingers are the keys to the most current graphics techniques. Written by Ken Williams, the president and founder of Sierra On-Line Inc., this excellent guide, offers a complete explanation of Apple II and IIe graphics. It explores the range of graphic possibilities from the simple to the complex. Placing dots on the screen, artificial color generation, animation and the sophisticated byte-move techniques, can all be done without assembler or machine language experience.

1983/225pp/paper/ISBN 0-89303-315-4/ D3154-4/$19.95

"Applesoft BASIC for the Apple II/IIe"
Lois Graff and Larry Joel Goldstein



This book is the one you've been looking for to learn the fundamentals of BASIC programming for the Apple II and IIe. Both practical and easy to follow, it discusses the special features found only in the new Apple IIe. "Applesoft BASIC" guides you through the simplest of programming knowledge to the more complex capabilities. This invaluable asset to your library includes chapters on structured programming, sequential and random file usage, graphics, music and error-handling.

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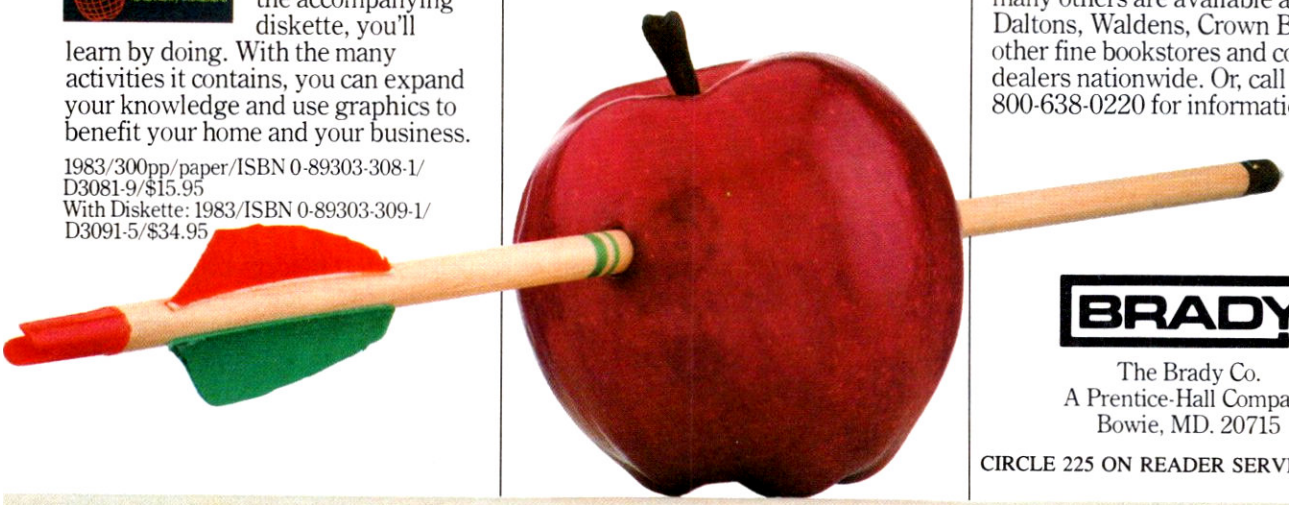

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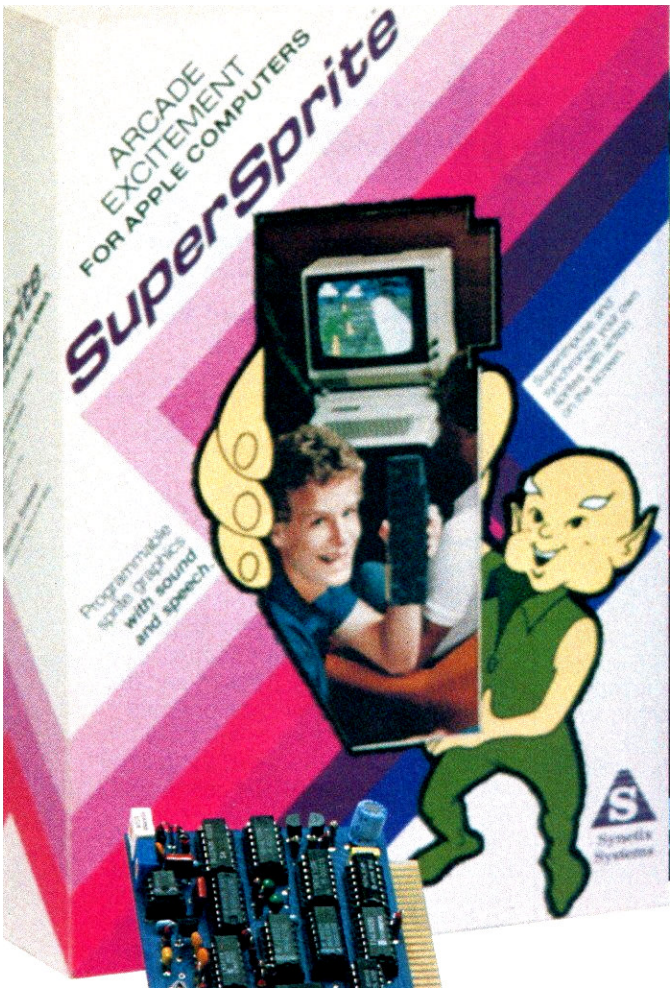

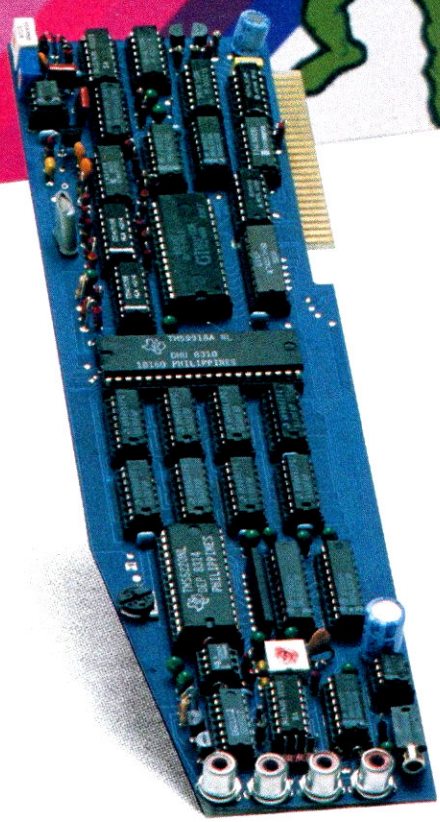

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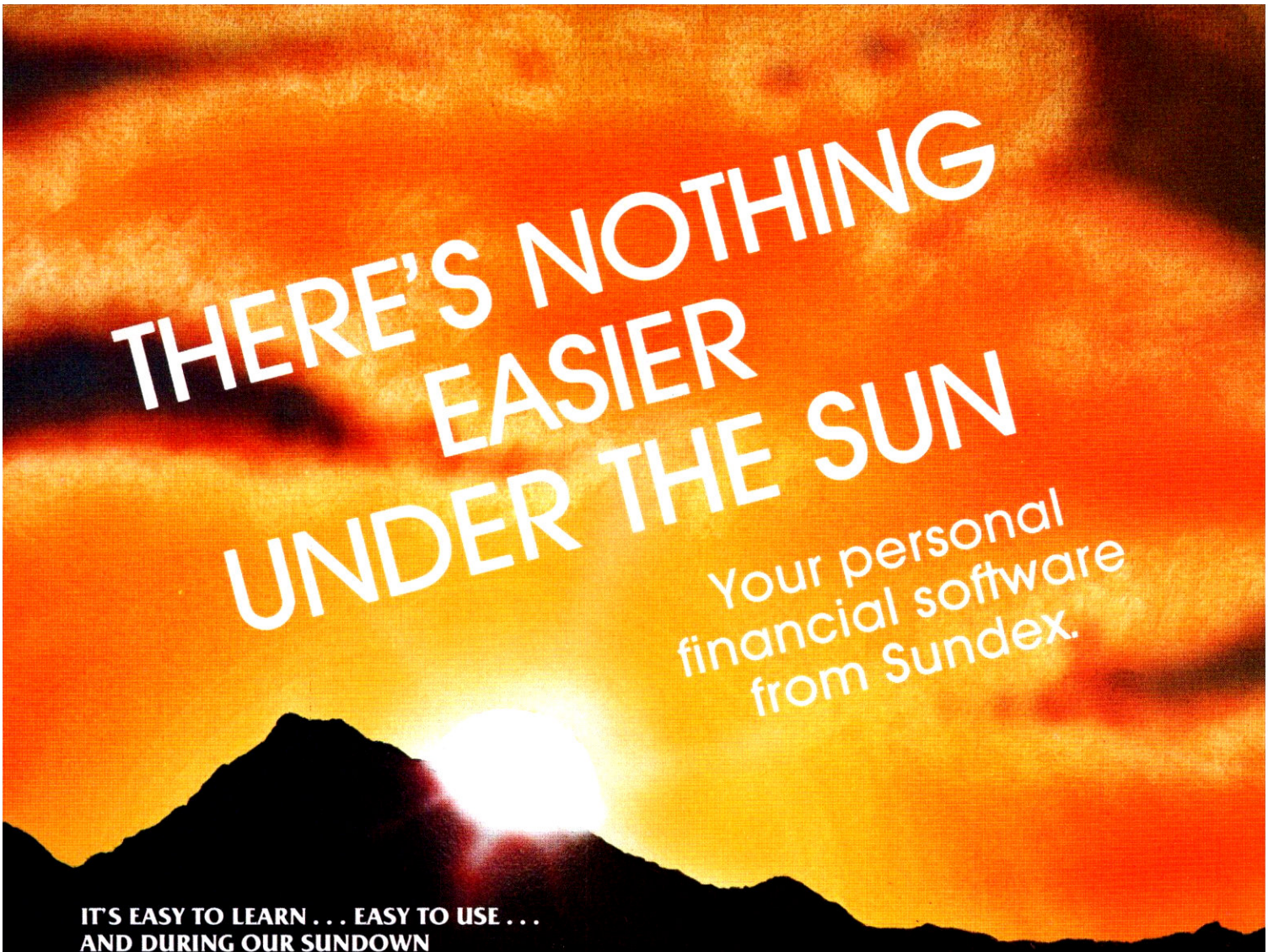

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▶HARDWARE REVIEW/BY HANK HARRISON

ULTRAT

This video-graphics add-in card lets you make the most of your high-resolution monitor.

Videx Ultraterm
Videx Corporation
Corvallis, OR 97330
List Price: $395

The Videx Ultraterm is a multimode video-graphics add-in card for the Apple II, II Plus, IIe, and III computers. This card takes the place of a typical 80-column board but does much more. It offers two distinct alphanumeric character sets and two graphics-generator character sets. It lets you operate in nine screen modes, allowing 80- , 132- , and up to 160-column operation with several screen line settings, for high-resolution monitors.

The Ultraterm has many software options and supports all prior Videx software. The display modes or screen formats selectable under software control for the Ultraterm include 160 columns by 24 lines, 132 columns by 24 lines, 128 columns by 32 lines, 96 columns by 24 lines, and a few others.

Two 80-column-mode settings are available. The default setting is identical to that of the earlier Videx Videoterm 80-column board, while the new 80 × 24 setting adds the high-resolution interlaced character set.

Finally, the Ultraterm allows the system to operate in the standard Apple 40-column mode without your having to change boards, which will prove handy for playing games designed for 40 columns or for using other 40-column software. This product lets you accommodate many video motifs under software control with a single board.

Theory of Operation

You don't have to understand board-level technology to install or use the Ultraterm. If you are planning to purchase an 80-column board and would also like a handsome character set, simply plug the Ultraterm into slot number 3 and connect two wires.

You need not be a programmer to use the Ultraterm, but to take maximum advantage of the card, you must at least read the manual, which is unfortunately flawed, and memorize a few tricky words, all neatly defined in an easy-to-comprehend glossary.

You should also have a clear idea of your needs. Do you want to do word processing, graphics, game development or spreadsheet display, or will you be switching from one application to the next, two or three times each day?

Testing the Ultraterm has shown me that the days of low-resolution CRTs are numbered.

Monitor Requirements

Testing the Ultraterm has shown me that the days of low-resolution CRTs are numbered. If you really want your Ultraterm to "fly," the manufacturer sug-

E R M

gests—and I agree—that you invest in a persistent-phosphor screen unit. Look for an Apple III green monitor or any amber- or green-on-black monitor with a minimum bandwidth of 15 megahertz.

When using the 128- , 132- , or 160-character-per-line modes, the Ultraterm sends a signal to the monitor almost twice as quickly as normal, and the monitor itself must be capable of handling this increased activity. I noticed that monitors such as the Hitachi and Sanyo, old war-horses that operate nicely within the 40- or 80-column range, tend to jiggle and wave when attempting to handle the more complex signals from the Ultraterm. The wavy lines occur because the Ultraterm uses a signal-interlacing technique generated by on-board PAL chips—*PAL* stands for programmable array logic—to achieve denser patterns.

The interlaced-display feature writes the characters to the screen 30 times per second, whereas in the normal mode, the screen is refreshed as often as 60 times per second. Long-persistence phosphor screens are necessary here because they can sustain an image between refresh cycles. Unfortunately, only one of the seven monitors I tested did the job perfectly in all cases. This shortcoming was not the fault of the Ultraterm, but it bears mentioning.

The higher the resolution in the system hardware, the more demands are made on the monitor. Putting an Ultraterm signal through an old black-and-white Apple II monitor is akin to pushing 200 watts of power through a set of worn-out earphones.

After working with the Ultraterm, I concluded that future video-enhancement options and higher-resolution interactive menus, such as the mouse-controlled pull-down menus expected on the Macintosh, are going to force up sales of higher-resolution displays.

Videx claims it has surveyed its Videoterm customers and is convinced that people who really need hi-res enhancements already have hi-res monitors or are simply waiting for a product like the Ultraterm before they buy one.

You don't have to understand board-level technology to install or use the Ultraterm.

In any case, the issue hangs on your definition of high resolution. The Apple Monitor III worked well in the 80-column mode, but even it began to scroll to the side slightly because of excessive overscanning caused by the speed of the board in the more complex modes.

Again, nothing is wrong with the board, but you had better upgrade your definition of high resolution, because the state of the art is advancing. You don't have to run out and buy a new monitor when you install your Ultraterm, but you will not be able to pump its 132- and 160-column features into any old monitor you happen to have kicking around the house.

The test programs I ran on the Amdex 300A amber monitor were impressive, but it was the only monochrome display I tested that fully exploited the features of the Ultraterm. The other features of the

board, such as reverse video, the alternative character sets, the graphic-design provisions, and the brightness-control settings, are of great value and represent worthwhile improvements over normal 80-column boards.

I must also add here that the 160-column mode is not practical on a small screen, regardless of resolution, because the human eye is not designed to look at anything that small for any length of time. Still, I can imagine applications for this degree of character density, especially in the preparation of lecture slides, school presentations, or any material that will eventually be projected on a large screen, and in industrial applications in which characters take a back seat to graphics.

Setting Up

You can set the Ultraterm and forget it in the default configuration, but if you want to switch around from one mode to the next, you will have to develop a few minor keyboard skills. Notice that I did not say *programming skills*. Operating a computer is not programming, but you'll need keyboard skills beyond touch-typing in this situation.

The two most popular and obvious uses for the Ultraterm will be word processing and spreadsheet display. Let us then focus on these two aspects, bearing in mind that the board can be appealing as a menu-driven software-development tool together with a code-generating toolkit such as ORCA-M and as a graphics-terminal emulator.

Word Processing

The Ultraterm character sets enhance readability for any word-processing software. The characters in the 80 × 48 mode are similar to Times Roman Bold —they are full-serif and well proportioned. They also print out well on any printer that can handle graphics code.

Apple Writer

If you plan to use the Ultraterm with Apple Writer, you must purchase an additional Apple Writer preboot software diskette. It will allow you to use an extended memory card on the IIe, giving you up to 128K of RAM.

PIE Writer

Presumably Videx is trying to encourage as many software vendors as possible to support this specialized piece of hardware. Although the preboot diskettes available from Videx for VisiCalc and Apple Writer are available as options, I recently saw an enhanced version of PIE Writer already configured for the Ultraterm, at no extra cost.

WordStar

WordStar comes with a configuration program called Install. You will need to reinstall your WordStar diskettes to configure them for the Ultraterm, which should present no problem, assuming the Ultraterm is in slot 3. WordStar was designed with an 80-column board in mind, and the only tricky area, which has to do with uppercase and lowercase toggles, is covered in the Videx manual.

Spreadsheet Displays

Although wider spreadsheet formats are available on the Ultraterm, the 128-column by 32-line mode is the most suitable. You can easily configure this setting with a special, but optional, VisiCalc preboot diskette.

The demonstration diskette that comes with the Ultraterm displays an entire year, 12 VisiCalc columns on one screen. This layout represents a marked improvement over the sideways scrolling typical of most 40-column spreadsheets.

Hardware

The Ultraterm offers many hardware features at the chip level. The board has a typical Schottky design throughout,

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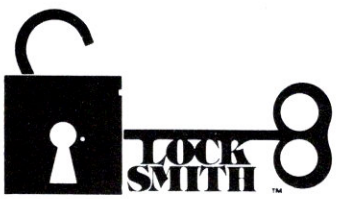

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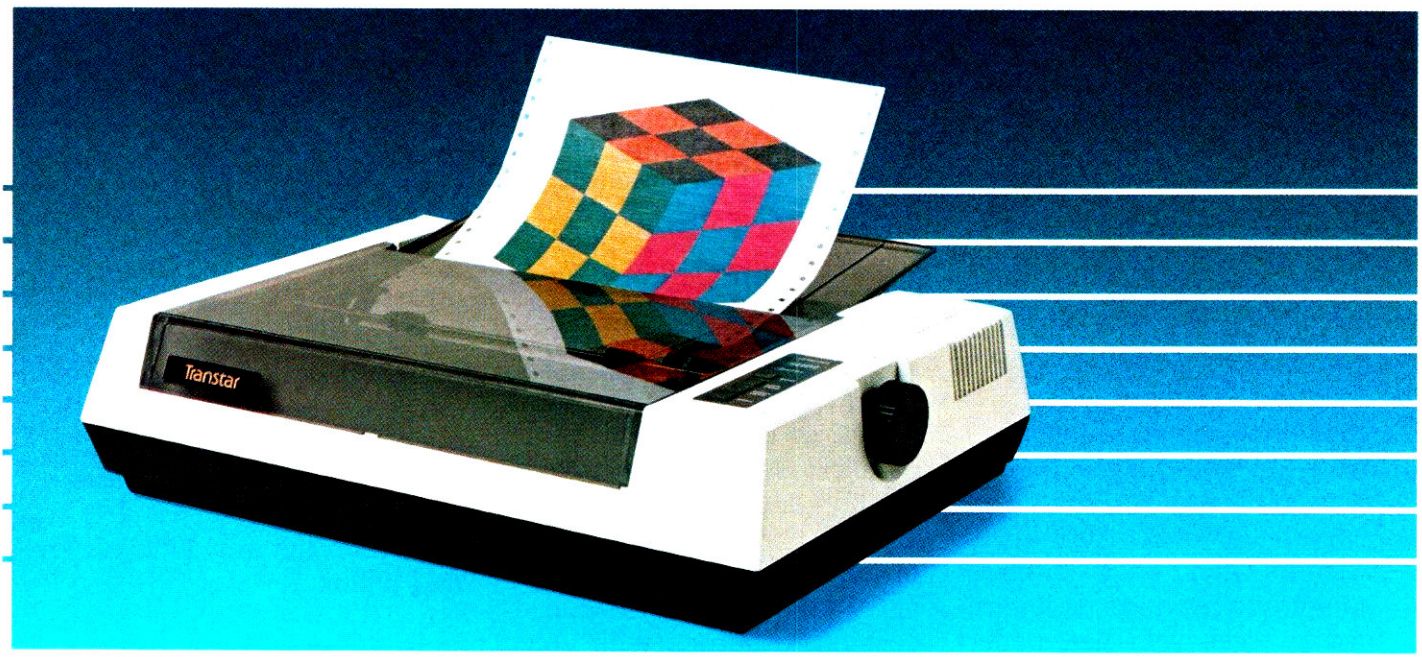

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albeit very densely packed. The only new technology shows up in the PAL chips. These little devils give board designers exact logic states where required, so that they can pack more logic into a smaller space.

The Ultraterm uses 4K of on-board RAM—2K is typical—which allows faster processing of the I/O functions from the CRTC (cathode-ray-tube controller) chip located at the heart of the board.

The CRTC is actually a specially programmed microprocessor that continually converts the character information in the display into video signals, which, in turn, drive the display monitor, much like a distributor in a car.

Firmware

The Ultraterm also operates with an advanced character-set EPROM (erasable, programmable read-only memory), generically thought of as firmware, on board. This circuit stores, in one or two chips, all of the information necessary to generate dot matrices that represent particular characters. The Ultraterm signal transmits a resolution equivalent to that of an 8 × 12-dot matrix on a printer, which is a 40% improvement over standard video I/O products.

The EPROM also lets you set up certain graphics and international symbols and uses true descenders on letters such as *y* and *g*. The symbols for the lira, yen, mark, franc, and pound are included, as are all of the international accents, diacritical marks, the umlaut, and the tilde.

The Ultraterm firmware allows compatibility with Apple DOS, Pascal, both Applesoft BASIC and Integer BASIC, the Softech P-System, and CP/M with the Zilog Z80 card. You can transfer the escape sequences and other control keystrokes directly from the Videx 80-column board. In other words, you won't need any new terminology or skills to operate this product in its standard configuration.

Graphics

The character-set font of the Ultraterm is a major advancement for Apple users. The Ultraterm firmware also includes a 15-character line-drawing set, and a seven-module block-drawing set. These two sets, used properly, enable an experienced programmer to develop amazingly crisp screen images and menus.

I have seen this specialized graphics character set before. It comes standard on the Victor 9000 computer, which is designed around a very-high-resolution screen. I hadn't seen such a building-block approach available for Apple computers in EPROM on a video board, though.

The old technique for creating a menu mask was to build up screen graphics from the asterisk, period, hyphen, the letter *X*, the letter *O*, and the + symbol, because these came in the standard ASCII character set. Now you can use both graphics blocks and graphics lines as well as characters.

Conclusions

The Ultraterm board is the most advanced add-in video-enhancement product I have seen for the Apple II and III family to date. In order to penetrate its deeper mysteries, you may have to master certain technical terms, but generally it is an easy device to use.

No high-resolution EPROM chip can produce valid outputs quickly enough to be useful during a single video-refresh cycle. For this reason, all In/Out signals on the Ultraterm are stored and delayed in a string buffer, or "pipeline," until the CRTC chip and the keyboard request them.

In order to penetrate its deeper mysteries, you may have to master certain technical terms.

The CRTC then handles the signals intelligently and conforms them to custom settings through a DIP switch and software. Most boards are not programmable in this manner.

Generally, the Ultraterm is a product worthy of respect. It is ahead of its time and is ideal for the more advanced monitors that will soon be available. I can even recommend it for improving and stabilizing low-resolution displays.

One sour note: The manual is one of those outwardly beautiful but inwardly awkward things, written by programmers with a certain lack of concern for the average citizen. It suffers from syntax errors and inconsistencies throughout, and it is poorly organized. On the other hand, it is complete, and with a little study you will be able to scrape together all the information you need.

A standard 80-column board may be adequate, but if you're planning to purchase, or already own, a high-resolution monitor, you can't go wrong if you investigate the Ultraterm. ✚

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MAKING HI-RES CHARACTERS

PART II

Part II in a tutorial on making the most of Apple color graphics.

The versatility of high-resolution graphics has always been one of the Apple computer's most attractive features. Last month we covered, in part, the use of HPLOTs to draw pictures and mathematical functions, enlarge figures, and move simple shapes. This month we'll look at a more advanced way of manipulating hi-res figures by using shape tables.

A shape *definition* consists of a series of hexadecimal codes that defines one or more desired graphic figures. A shape *table* is simply a shape definition that includes some other essential look-up information. After you've constructed a shape table once, you'll find it's much easier to do than it will seem on first reading.

The versatility of high-resolution graphics has always been one of the Apple computer's most attractive features.

First, sketch a shape on graph paper, using each box to represent one pixel. We'll start with a 5 × 5-pixel square, since that's a simple shape to draw. Later we'll get to more complex figures such as a man who throws spinning hatchets at a target. (No fair, peeking ahead!)

The first thing you must decide is where you want to locate the starting point of your shape. The computer draws the picture so quickly that you can't see where the square begins or ends, but the computer needs to know the starting coordinates, nonetheless. Your starting point need not be an actual part of your drawing; it's there to serve as a reference. I've chosen to begin in the empty box in the center, so we can spin the square around it later (see figure 1).

When using shape tables, you must tell the computer to move up, down, left, and right (all 90° turns), and you must also specify whether you want the computer to plot (show) a point or just to move forward by one blank pixel.

We'll use arrows in our graph-paper plan to indicate the directions that we'll have to add to the outlined figure in figure 1. By convention, an arrow with a dot at the end indicates that the point is to be plotted, and an arrow with an open end point means that an unplotted move will be made. As we will see, on the screen itself we will not have to confine ourselves to shapes with only 90° turns; only our initial graph-paper plots require 90° moves. To convince yourself of this, draw a picture on your graph paper that matches these directions:

(You should get a diagonal line). Our square doesn't have any slanted lines, and should look like figure 2.

Now pretend that the arrows that make up figure 2 are drawn along a piece of string. If you "unwrap" this string (i.e., pull it out straight), it forms a sequence of vectors (implied moves) from start to finish, as in figure 3.

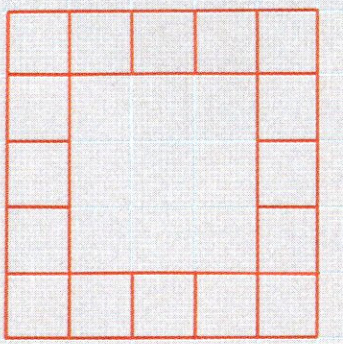


Figure 1.

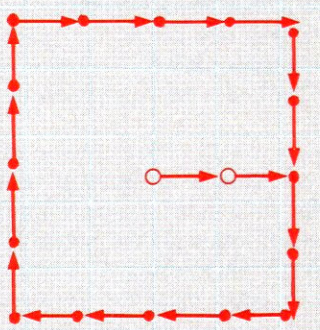


Figure 2.

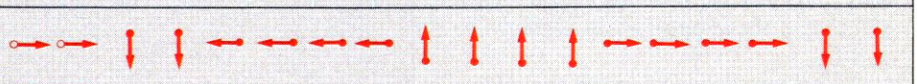


Figure 3.

Reviewing Your A,B,C's

You can make the sequence of plotting vectors we have just formed tell the Apple how to draw a square 5 × 5 pixels in size. The trick here is simply to get the computer to understand what we mean, for we can't just say "move right,"

"move right," "plot down," "plot down," and so on. The Apple stores shape-definition information in bytes within its memory. The bits within each of these bytes are grouped into three parts (see figure 4).

You will notice that parts A and B contain three bits, and C only has two. Bits 0 and 1, 3 and 4, and 6 and 7 will contain the codes that correspond to up, down, left, and right. Bits 2 and 5 specify whether a point is to be plotted or a blank move is to be made. Section C has no plot/move bit; as a permanent default, the Apple assigns move-without-plotting status to the two bits in C. For reasons that will become clear a little later, you cannot use C for moving *up*, either.

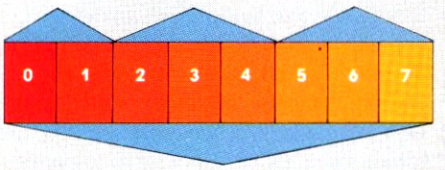


Figure 4.

0 move without plotting	00 up
1 plot	10 down
	01 right
	11 left

Figure 5.

Now we're going to translate our arrow picture (figure 3) into binary codes that will fit into the A, B, C pattern. To do so we must always work from right to left. The codes the Apple uses are in figure 5.

Next, set up a three-column table like the one shown in figure 6. Enter the arrows from figure 3, one at a time, into the chart, following the pattern A, B, C, A, B, C. Skip section C whenever you have an arrow *that either involves a plot or that indicates a move upward*. In the case of our square, there will be no arrows in C at all, for the only "move only" vectors we have are the first two steps, and these must go in sections A and B.

The next step is to insert the codes from figure 5. Our first move is a right vector that does not plot. A nonplotting move is signaled by a 0, and a right arrow by 01, so the first entry in A is 001. Since our next move is the same, we enter 001 in B, as well. The next vector in the sequence is one that plots and moves down, so its code is 110. This can't go in section C (which is why we skipped C when we were drawing the arrows in the last paragraph), so it must go into the next A section. At the same time, we can't leave our first A-B-C byte with only six bits specified, so we fill in C with a pair of 0's. This is a phantom "up" instruction that the Apple will ignore when it occurs in section C. Fill in the rest of the chart in a similar fashion.

This is a phantom 'up' instruction that the Apple will ignore.

Although our example section C will always contain two zeros, remember, in drawing other figures, that the vectors "down" (10), "right" (01), and "left" (11) are all perfectly legal codes for section C. If you arrive at C and need a "move up" (000) vector, put 00 in C (which will then be ignored) *and* enter the code into the following byte at A. If you happen to be drawing a shape that involves putting "up" moves in sections A and B of a byte, you'll *have* to make a move down or to the left or right in section C, or you'll end up with a byte whose codes read 00 000 000. That's the code the Apple interprets as the end of the shape definition!

Your filled-in sequence of binary codes for drawing the 5×5 square should match figure 6. Annoyingly, even though the computer itself operates only on such zeros and ones, we must

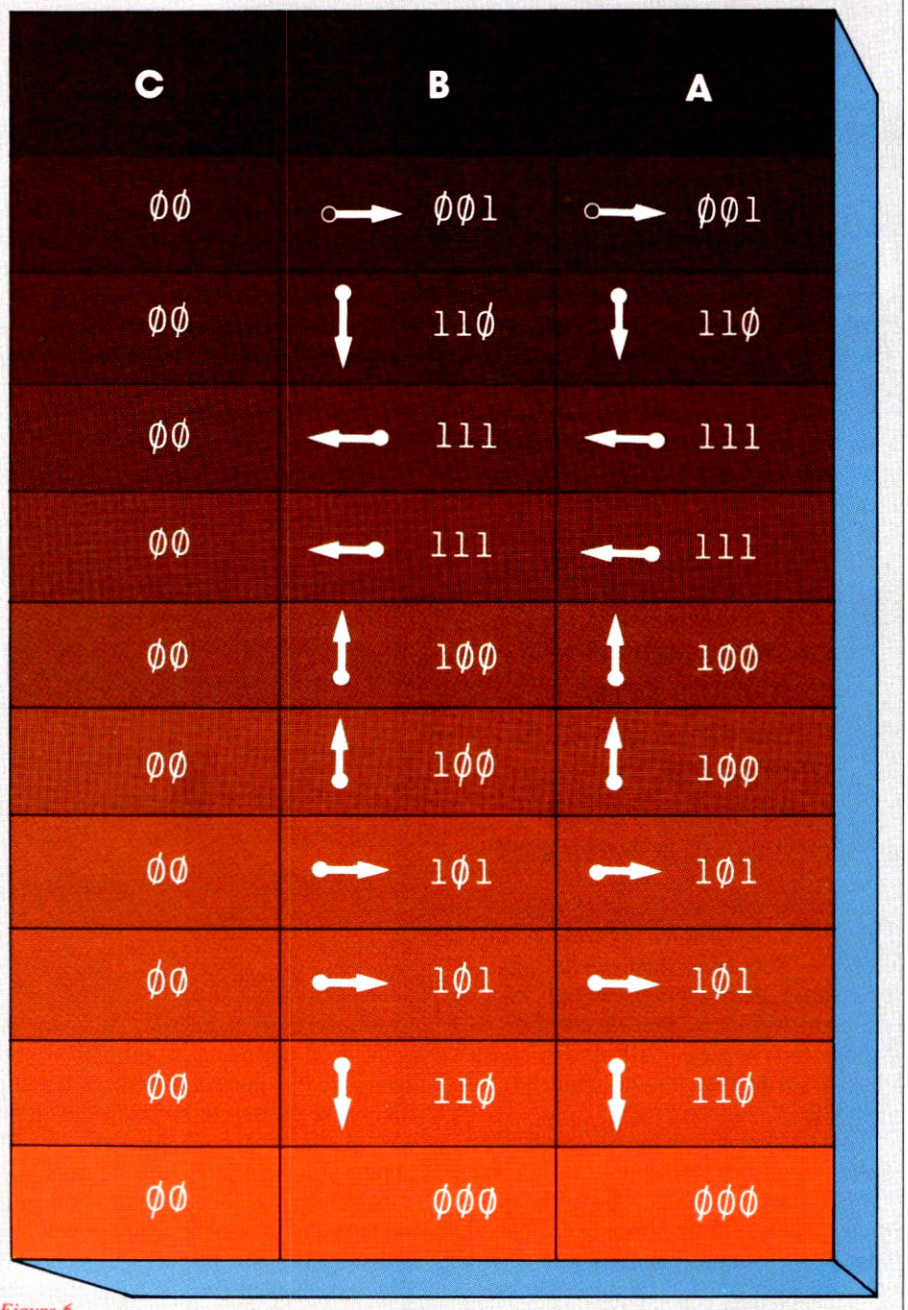


Figure 6.

convert these codes into hexadecimal representation in order to enter them through the keyboard. To do this, we ignore the A,B,C sections we've used previously and, instead, regroup the eight bits of each byte shown in figure 6 into two four-digit numbers (nibbles), as shown in figure 7.

You have to transform the two nibbles in each line in figure 7 into two hexadecimal digits. Just in case you don't find converting binary to hex one of the great thrills in life, the table in figure 8 will do it for you.

Using this information, we arrive at 09, 36, 3F, 3F, 24, 24, 2D, 2D, 36, 00 as the final code for our square. This may seem like a great deal of work just to draw a square (and we still have a little more to do), but you'll soon see that by using a shape table, you gain more control over the square than you do with the HPLOTs discussed in Part I of this tutorial. Once you understand this process, it's longer but no more complicated to draw more interesting shapes.

binary	hex
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

Figure 8.

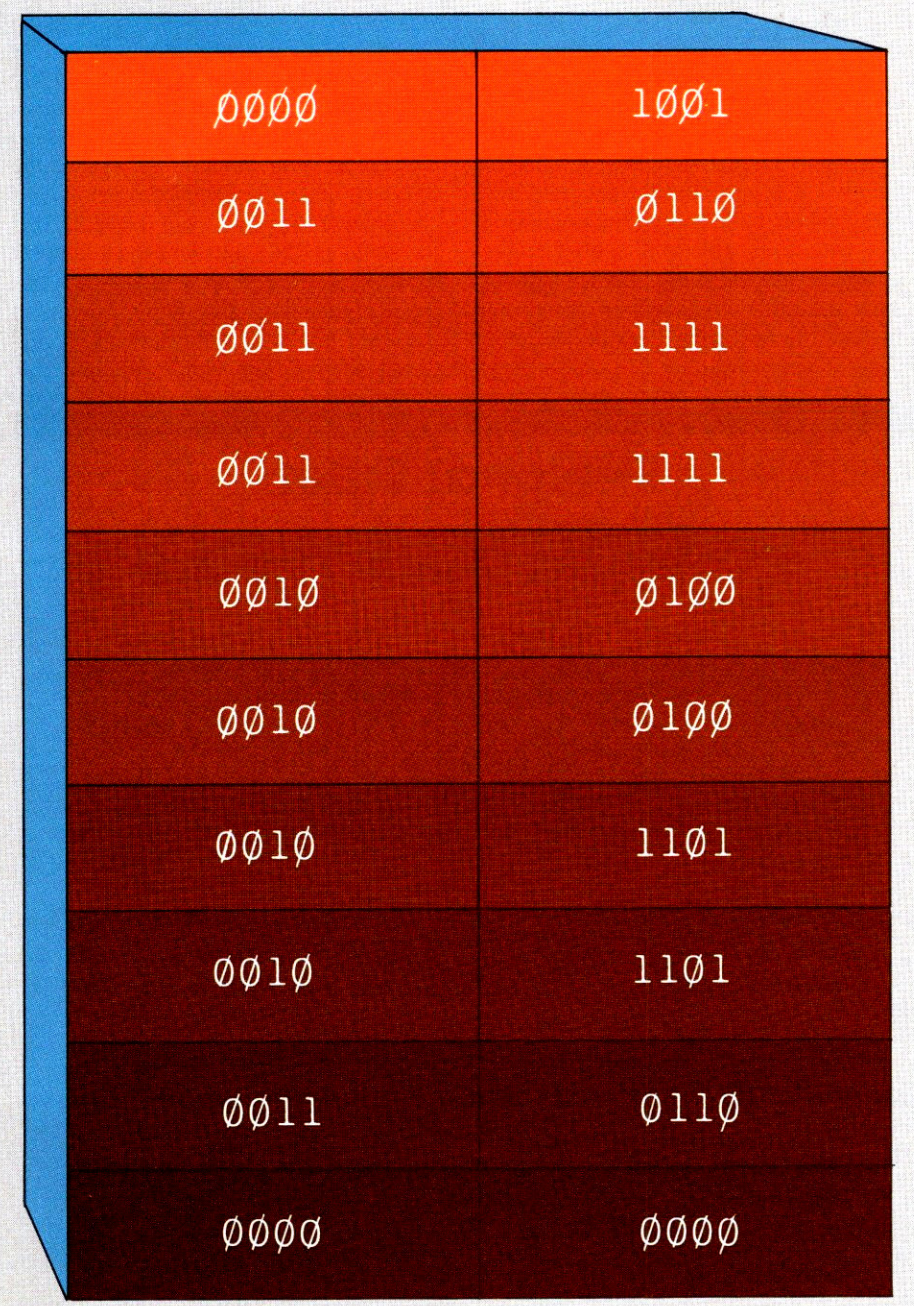


Figure 7.

Setting the Table

At this point we must put the shape definition into memory, where the computer can use it. Before we can key in the shape definition itself, we must first tell the computer how many shapes we're going to define (the maximum is 255). The next byte is unused, so we enter 00. The following *two* bytes represent the total number of bytes, from the first byte in the table (i.e., the one that told the number of shapes) up to the beginning of the shape definition. For any shape table with only one definition in it, the number of bytes will be four. We need two bytes here, because 255 is the largest decimal number that can be stored in one byte, and it is possible for shape definitions to be more than 255 bytes long. The number (two bytes) must be given in low-byte, high-byte order. This means we have to enter our hex 0004 as 0400. Figure 9 makes this a bit clearer.

01	number of shapes
00	unused
04	# bytes from start before
00	beginning of shape definition
09	shape definition beginning
36	
3F	
3F	
24	
24	
2D	
2D	
36	
00	end of shape definition

Figure 9.

Keying in the Code

How do you actually type in these hex codes? First, from BASIC, you use Apple's monitor by typing CALL −151 and a carriage return, which will replace the normal] prompt with a *. Second, you type the memory address at which you want your shape table stored. Follow this with a colon and the information from figure 9. When you are finished, type Control-C and a carriage return to return to BASIC. Thus, your typing looks like this:

```
]CALL -151   <RETURN>

*6000:01 00 04 00 09 36 3F 3F 24
  24 2D 2D 36 00   <RETURN>
```

```
*<CTRL-C>  <RETURN>

]
```

Finally we must tell the computer where we put the shape table. We know that we stored it at address 6000 hex, a conventional spot since it will not interfere with most BASIC programs and rests a safe distance beneath DOS. The computer doesn't know yet to look for the shape table there, however. We must therefore set an address pointer. To give this information, we poke a value into locations 232 and 233 in memory. The number 6000 hex is equivalent to 24576 in decimal notation. You obtain the numbers to be poked by finding out how many 256-byte memory pages this decimal number represents, i.e., by dividing 24576 by 256. The result is 96 with a remainder of 0. So we type

```
]POKE 232,0
]POKE 233,96
```

And, to save it all on disk we type

```
BSAVE SHAPES,A$6000,L$E
```

Or, if you prefer working with decimal:

```
BSAVE SHAPES,A24576,L14
```

The A$ (or A) is followed by the memory address of the shape table, and the L$ (or L) is followed by the length or total number of bytes in the table.

To load the table again, type

```
BLOAD SHAPES,A24576
```

Of course, you can replace SHAPES with any legitimate filename.

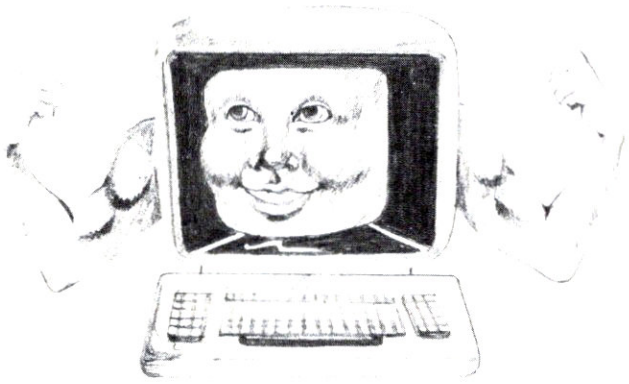
Scaling shapes to many times their original size often results in distorted shapes.

Since the shape-table information is in memory, in the sample programs that follow I will leave out the program lines that load the table and set the pointers. If you want to be able to turn off the computer and use the shapes later, however, save the table as described above and include the following lines at the beginning of your program:

```
1 PRINT CHR$(4);''BLOAD
  SHAPES,A24576''
2 POKE 232,0: POKE 233,96
```

At last we are ready to use our shape table in a program. We must, as usual, enter the High Resolution Graphics mode by typing HGR or HGR2. We must also select a color (black1, green, violet, white1, black2, red/orange, blue, or white2) by using HCOLOR. The colors listed may vary slightly on your particular monitor.

The simplest command is DRAW, which does what its name implies. DRAW puts a shape at specified coordinates on the screen. Its syntax is: DRAW *n* at x,y, where *n* is the number of the shape in the table, x is the horizontal coordinate (0 to 279), and y is the vertical coordinate (0 to 159 in HGR, or 0 to 191 in HGR2). If we put the starting point of the square at the coordinates 140,80, the square will be centered on the screen. You can alter the size of the figure by using the Scale command. You can change the scale from 0 to 255 (0 is the same as 256), but you must be a bit careful. Scaling shapes to many times their original size, especially if diagonal lines are involved, often results in distorted shapes. We won't run into this



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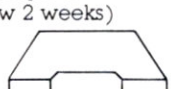

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problem here, however.

```
10 REM--SQUARE SCALE DEMO--
20 HOME: HGR: HCOLOR=3
30 ROT=0: REM EXPLAINED
   NEXT PARAGRAPH
40 FOR S=1 TO 20
50 SCALE=S
60 DRAW 1 AT 140,80
70 NEXT S
```

You can use the ROT command to rotate a shape. ROT=0 is the normal, upright position. ROT=16 rotates the shape 90° clockwise, ROT=32 spins it 180°, ROT=48 turns the shape 270°, and so on. You can choose ROT values anywhere between 0 and 64, inclusive. Values larger than 64 will simply repeat previous angles.

ROT only positions the shape at different angles, but it does not show the shape turning around to reach 180°, for example. Shortly, we'll look at ways to make the shape seem to spin. Meanwhile, the program below draws the square at several different angles.

```
10 REM--SQUARE ROT DEMO--
20 HOME: HGR: HCOLOR=3:
   SCALE=15
30 FOR R=0 TO 32 STEP 4
40 ROT=R
50 DRAW 1 AT 140,80
60 NEXT R
```

Now we come to moving the square. The easiest way is to draw the shape, erase it, and redraw it in a new location. We can use the following new program to draw the square at the left side of the screen, draw it in black (to erase it), and then draw it again further to the right.

The easiest way is to draw the shape, erase it, and redraw it in a new location.

```
10 REM--MOVE SQUARE RIGHT--
20 HOME: HGR
30 SCALE=2: ROT=0
40 FOR X=6 TO 273
50 HCOLOR=3: DRAW 1 AT X,80
60 HCOLOR=0: DRAW 1 AT X,80
70 NEXT X
```

Would it be faster to draw the shape, clear the screen, and then draw the figure in a new location? Try it, by changing line 60 to HGR and moving the HCOLOR=3 statement to line 20. You'll see that this seemingly easier method is slow and causes a great deal of flicker.

Another way to move the shape is to use the XDRAW command. XDRAW ignores HCOLOR and draws a figure in a color opposite to that of the background. In our case the square will be white. A repetition of the XDRAW command reverses the pixels of the square from white to black. This means the computer doesn't have to keep changing the value of HCOLOR. It may seem a bit difficult to see the speed advantage in this method, but for complex shapes this procedure is faster. To try XDRAW instead of DRAW, change the following lines in the previous program:

```
20 HOME: HGR: HCOLOR=3
50 XDRAW 1 AT X,80: REM DRAWS
   SHAPE
60 XDRAW 1 AT X,80: REM ERASES
   SHAPE
```

To make the square move still faster, you can add a STEP value to the FOR/NEXT Loop. For example,

```
40 FOR X=6 TO 273 STEP 3
```


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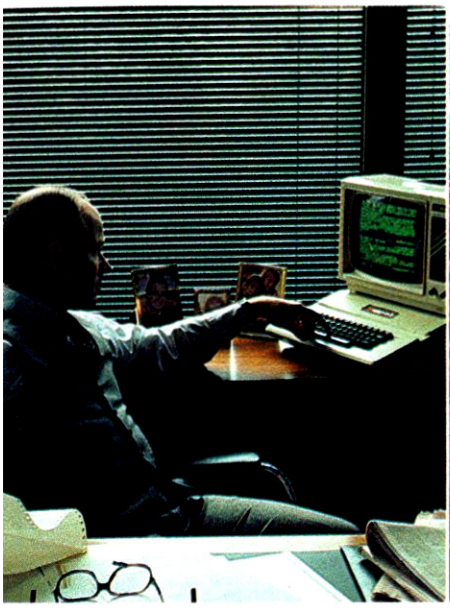

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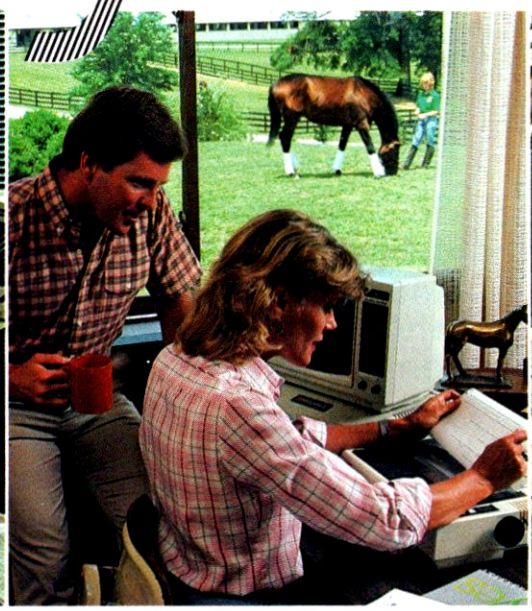
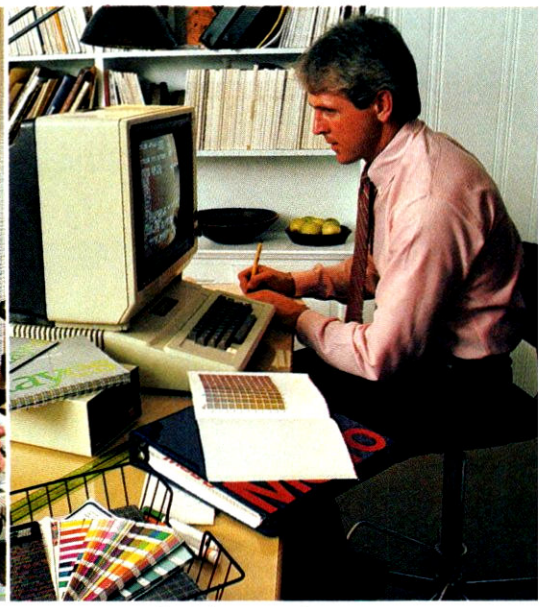
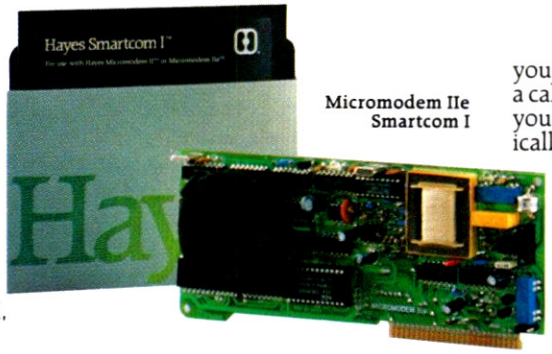


"Gary: The pedigrees for next week's auction are as follows..."



"Attn. Prod., Sales, Purch.: Recommend 50% blue, 30% red screen for closest match."



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Smartcom I

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If we have the computer calculate the new position before erasing the square, the shape will remain on the screen longer than it is off. This will reduce the flickering effect. The program below uses this technique. Lines 90-120 ensure that the square will stay on the screen. These safeguards are written in terms of the scale, so you can change the value of S in line 30 (to change the size) without having to alter other parts of the program. The number 3 in 3 * S corresponds to the number of pixels from the starting point to the edge of the shape.

```
10  REM--BOUNCING SQUARE--
20  HOME: HGR: HCOLOR=3
30  S=1: SCALE=S: ROT=0
40  IX=2: IY=2: REM INCRE-
    MENT
50  X=140: Y=80
60  XDRAW 1 AT X,Y
70  X1=X: Y1=Y
80  X=X+IX: Y=Y+IY
90  IF X>279-S*3 THEN
    X=279-S*3: IX=-2
100 IF X<S*3 THEN X=S*3:
    IX=2
110 IF Y>160-S*3 THEN
    Y=160-S*3: IY=-2
120 IF Y<S*3 THEN Y=S*3:
    IY=2
130 XDRAW 1 AT X1,Y1
140 GOTO 60
```

A. To replace the old square completely with one whose starting point is on the right side, type

```
]CALL -151   <RETURN>

*6000:01 00 04 00 36 3F 3F 24
  24  2D 2D 36 00   <RETURN>

* <CTRL-C>   <RETURN>

]BSAVE SQUARE2,A$6000,L$D
```

B. Alternatively, to make the old square shape #1 and the new square shape #2, type

```
]CALL -151   <RETURN>

*6000:02 00 06 00 10 00 09
   36 3F 3F 24 24 2D 2D 36
   00 36 3F 3F 24 24 2D 2D
   36 00      <RETURN>

* <CTRL-C>   <RETURN>

]BSAVE SQUARES,A$6000,L$19
```

Figure 10.

Just for fun, here are some programs that create interesting patterns with our little square. Any of these would take a long time to draw with HPLOTs. To see how the starting point of a shape can affect the way it is drawn, try making a new shape table with the square, beginning on the right side instead of the center.

Figure 10 shows two ways to create the new shape table, one of which includes the original. The programs marked SET SQUARE TO SIDE are particularly intricate if you use the new shape table, although you can run them with the original, of course.

If we have the computer calculate the new position before erasing the square, the shape will remain on the screen longer than it is off.

In figure 10, the hex codes stand for the following:

02 number of shapes in table
00 unused byte
06 number of bytes from start to
00 beginning of shape #1 definition
10 number of bytes from start to
00 beginning of shape #2 definition
(Note that 10 is in hex and corresponds to 16 in decimal.)
09-00 shape definition #1
36-00 shape definition #2

Sample Programs

Note: If the shape table (new or old) is not in memory when you type in the following programs, you will get unpredictable results. See the section entitled "Keying in the Code" if you have turned off the machine since saving the shape table.

```
10 HOME: HGR: HCOLOR=3: R=0
20 FOR S=1 TO 33
30 SCALE=S: ROT=R
40 DRAW 1 AT 140,80
50 R=R+1
60 NEXT S
70 HCOLOR=0: ROT=32
80 FOR S=33 TO 1 STEP -1
90 SCALE=S: ROT=R
100 DRAW 1 AT 140, 80
110 R=R-1
120 NEXT S
130 FOR T=1 TO 300: NEXT T
140 GOTO 10
```

```
10 REM--SET SQUARE TO SIDE--
20 HOME: HGR: HCOLOR=3
30 FOR S=1 TO 16 STEP 5
40 SCALE=S
50 FOR R=0 TO 60 STEP 5
60 ROT=R
70 DRAW 1 AT 140,80: REM DRAW 2
   IF YOU PICKED METHOD B
80 NEXT R,S
```

```
10 REM--SET SQUARE TO SIDE--
20  HOME:  HGR:  HCOLOR=3:
SCALE=15
30 FOR R=0 TO 60 STEP 5
40 ROT=R
50 DRAW 1 AT 140,80: REM DRAW 2
   IF YOU PICKED METHOD B
60 FOR T=1 TO 150: NEXT T
70 NEXT R
```

```
10 REM--SET SQUARE TO SIDE--
20 HOME: HGR: HCOLOR=3
30 FOR R=0 TO 64 STEP 8
40 ROT=R
50 FOR S=1 TO 18
60 SCALE=S
70 DRAW 1 AT 140,80: DRAW 2
   IF YOU PICKED METHOD B
80 NEXT S,R
```

Axing Some Questions

Now let's draw that hatchet man we promised earlier. To start, we must decide what shapes we'll need. First we'll take a side view of a man. Next we'll need an outstretched arm and a bent arm. Finally, we'll need a hatchet. We'll draw the target with ordinary HPLOTs, since it doesn't need to move. To save space I'll just give you the final code, not all the intermediate steps.

```
]CALL -151   <RETURN>

*6000:04 00 0A 00 41 00 53 00 66
  00 03 20 24 27 64 0C AD 15 2E
  DE C4 96 F1 2E 15 36 36 36 36
  BE 36 36 36 36 36 15 BF 11 3F
  24 24 24 24 24 24 BC 92 92 92
  92 3F 24 24 24 24 24 24 EF 24
  24 24 64 05 00 <RETURN>

*6040:25 27 3E 2D 2D 2D 2D 2D 2D
  3E 3F 3F 3F 3F 3F 3F 00 25 27
  3E 3E 35 2D 2D 2D 2C 3C 3C 3C
  3C 2E 2E 36 3F 3F 00 3C 2E 2D
  2D 05 00 <RETURN>

* <CTRL-C>   <RETURN>

]BSAVE HATCHET,A$6000,L107
```

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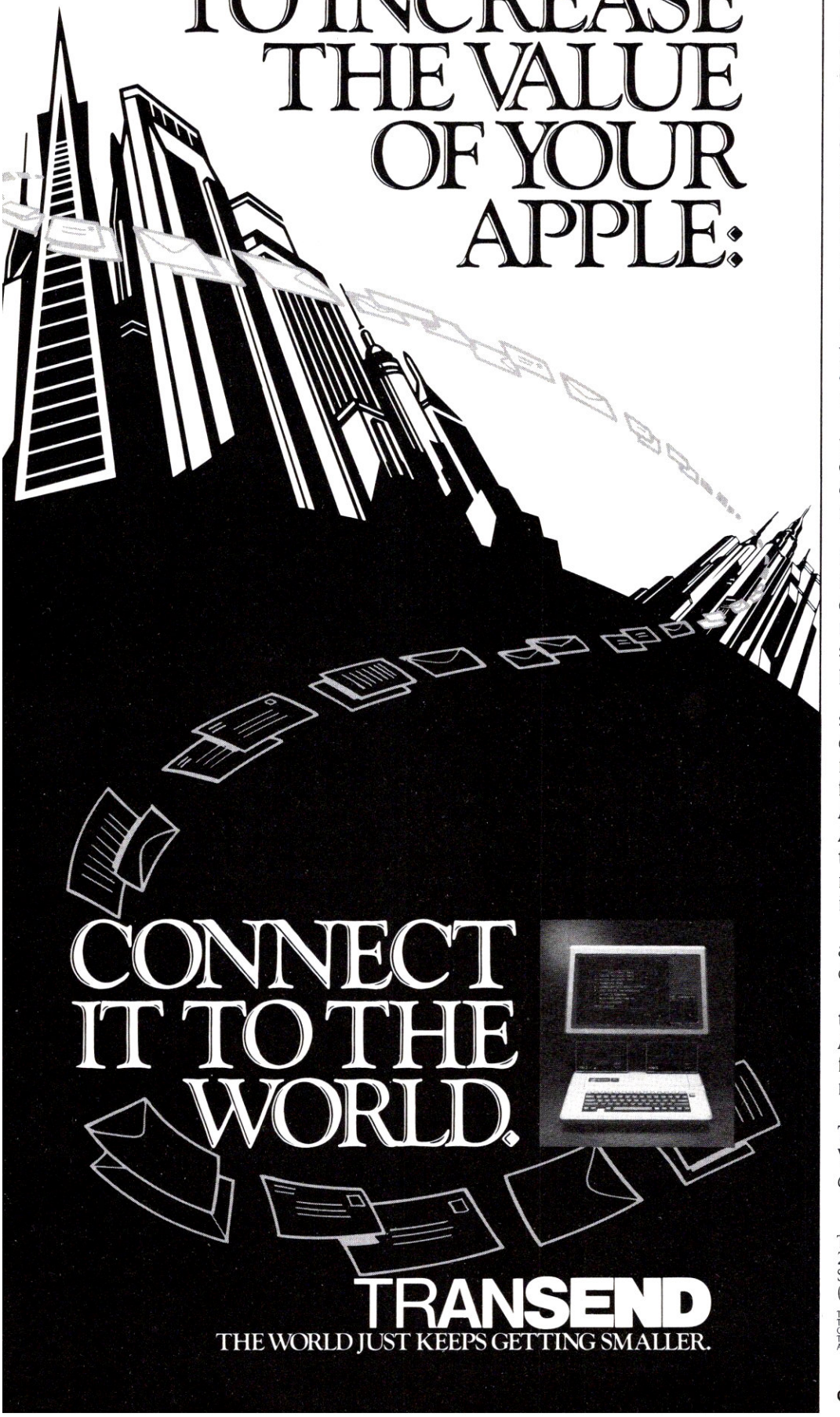

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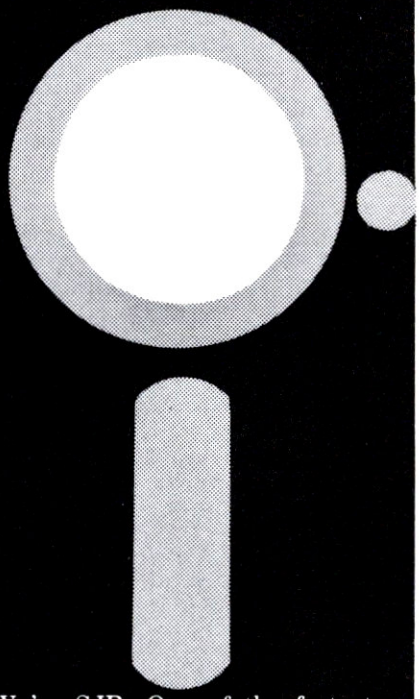

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You create the illusion of throwing the hatchet by drawing the body of the man and flipping back and forth between the straight and bent arms. This method is not unlike the way a cartoon artist draws still pictures that appear to move when shown in rapid succession. You make the hatchet spin by using the ROT command within a loop, and it simultaneously moves across the screen. Since our purpose here is to demonstrate the use of shape tables rather than to create a game, we'll assume that our hatchet thrower is a perfect shot. If you feel comfortable with the program at the end, you may wish to modify it so the hatchet doesn't always hit the center of the target. Perhaps you can combine parts of the square program to move the thrower around before he fires. (Be sure to move his arms as well as his body!)

This method is not unlike the way a cartoon artist draws still pictures that appear to move when shown in rapid succession.

```
1   PRINT CHR$(4);''BLOAD
  HATCHET,A24576''
2   POKE 232,0: POKE 233,96
10  REM--HATCHET THROWER--
20  HOME: HGR: HCOLOR=3
30  HPLOT 270,95 TO 270,120:
  REM TARGET
40  SCALE=1: ROT=0
50  DRAW 1 AT 100,100: REM
  MAN
60  DRAW 3 AT 100,100: REM
  BENT ARM
70  FOR T=1 TO 300: NEXT T
80  HCOLOR=0: DRAW 3 AT
  100,100: HCOLOR=3
90  DRAW 1 AT 100,100
100 DRAW 2 AT 100,100: REM
  STRAIGHT ARM
110 FOR X=104 TO 266 STEP 2
120 XDRAW 4 AT X,100: XDRAW 4
  AT X,100: REM HATCHET
130 R=R+4
140 IF R>64 THEN R=0
150 ROT=R
160 NEXT X
170 ROT=24
180 DRAW 4 AT X,100
190 ROT=0
200 FOR T=1 TO 200: NEXT T
210 GOTO 20
```

If You're Really Hooked on Speed

To reach arcade-quality animation, of course, you'll have to write a machine-level program. At that level you can make use of byte-move shapes that can move very quickly and without noticeable flicker. You can also add sound, move several objects at once, and detect collisions. This type of shape differs from ordinary shape tables in that it is plotted all at once, not as a series of vectors.

Although BASIC is too slow to take full advantage of byte-move shapes, you can get a feel for working with this kind of shape and movement without leaving our familiar language. For a good discussion of this topic, I suggest *Apple II Computer Graphics* by Ken Williams, Bob Kernaghan, and Lisa Kernaghan.

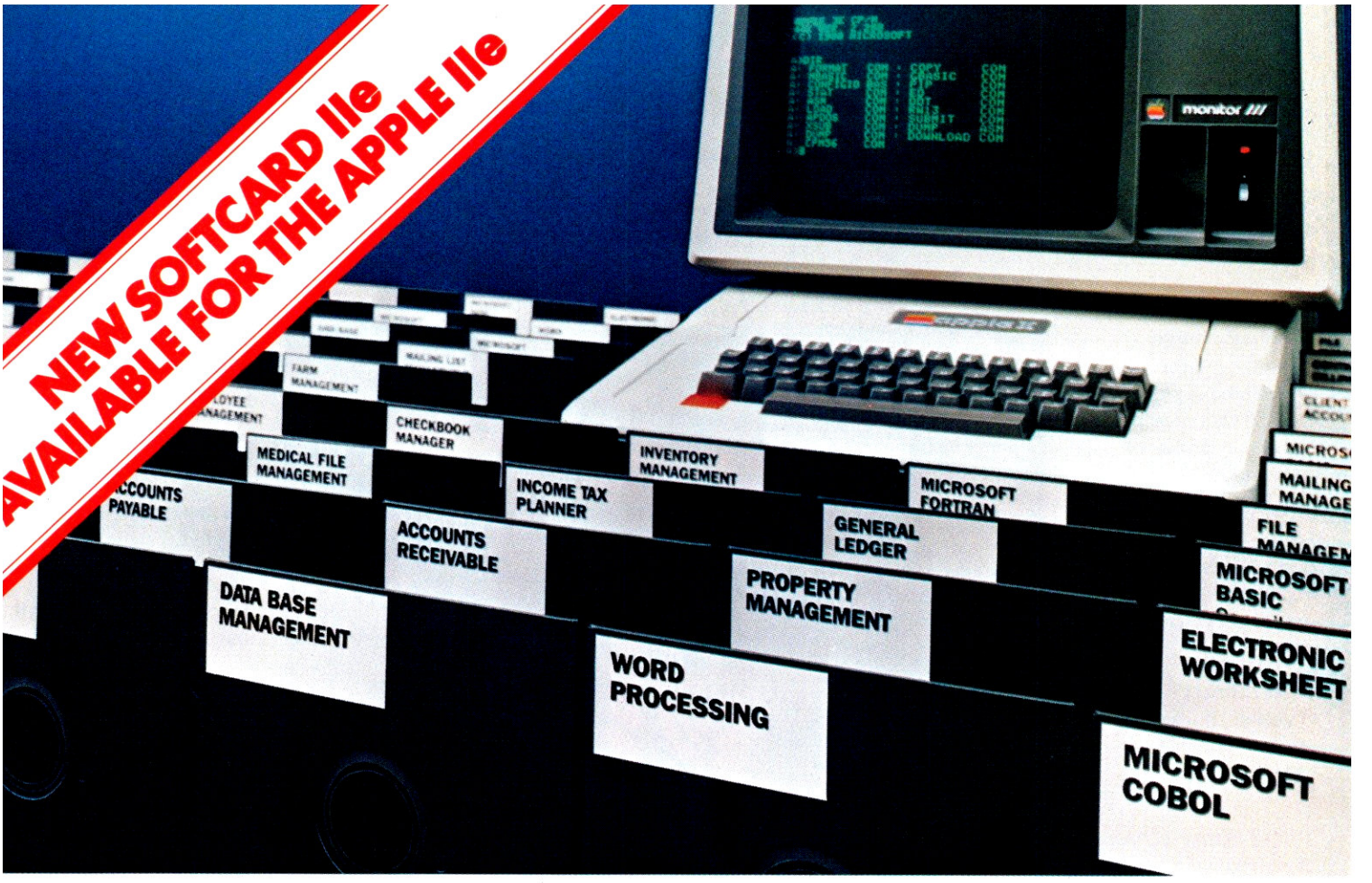
Drawing Your Own Conclusions

You can now write programs to rotate, enlarge, and move shapes with greater speed and with less flicker than you could after reading Part I of this tutorial. The more complex the shape, the more dramatic will be the increase in speed. Further, you now have greater control over shapes and a more readable program than that you can get with endless lines of HPLOTs. This greater control simplifies using the same program with different shapes. For example, you wouldn't have to change much in the moving-square program to move a triangle instead, if the triangle were defined in a shape table.

Shape tables are particularly useful for plotting figures that are to appear in several locations on the screen. You might even consider drawing the letters of the alphabet as shapes so you could plot them on the graphics page. (Another way to do this, of course, is to buy a commercial character generator, many of which provide several different type fonts from which to choose.)

The best way to learn to use them is simply to experiment for yourself, now that you have the background.

In any case, shape tables become much easier to use with practice. Once again, the best way to learn to use them is simply to experiment for yourself, now that you have the background and tools necessary. ✚



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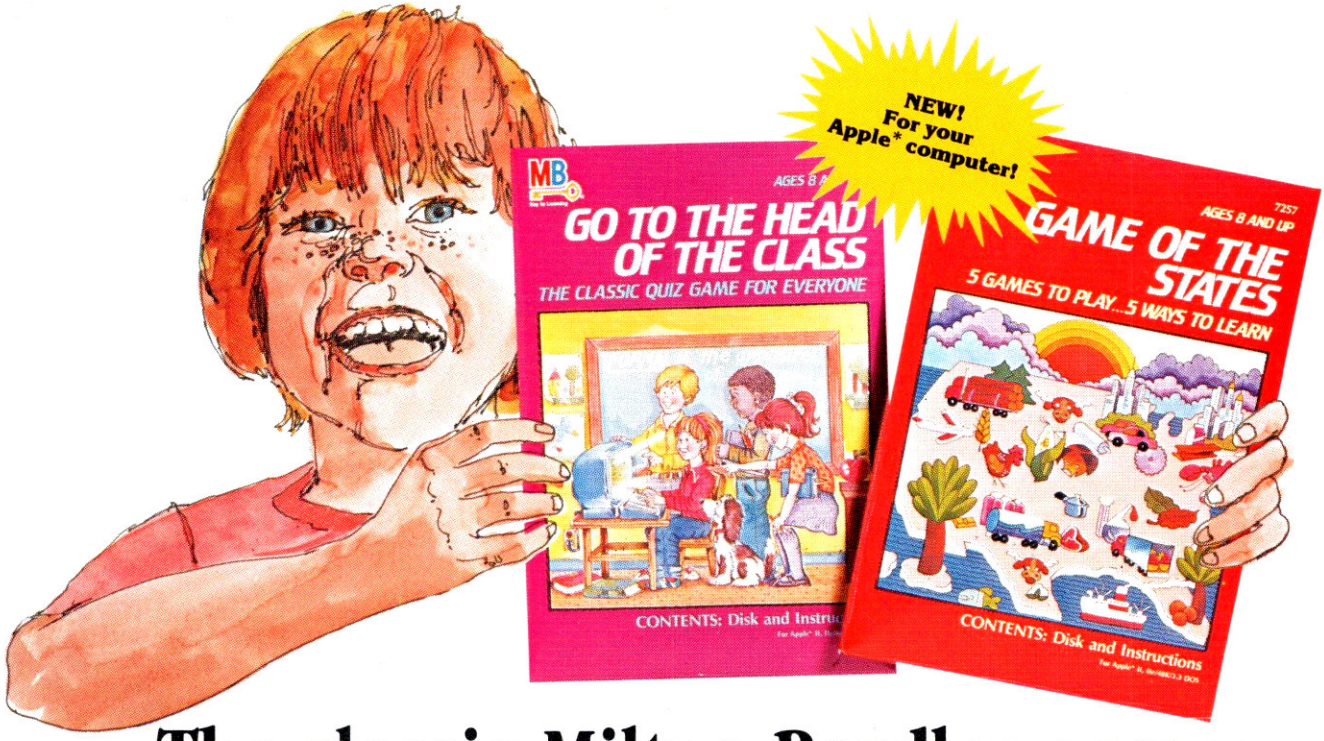

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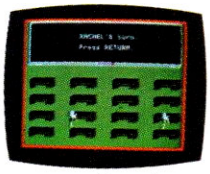

A highly competitive general knowledge game for ages 8 and up. Players advance from desk to desk by giving correct answers to over 300 questions on vocabulary, geography, math and history. Three levels of play are available — junior, senior, or graduate — so the whole family can play at once!

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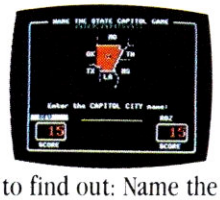

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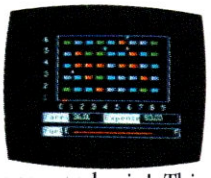

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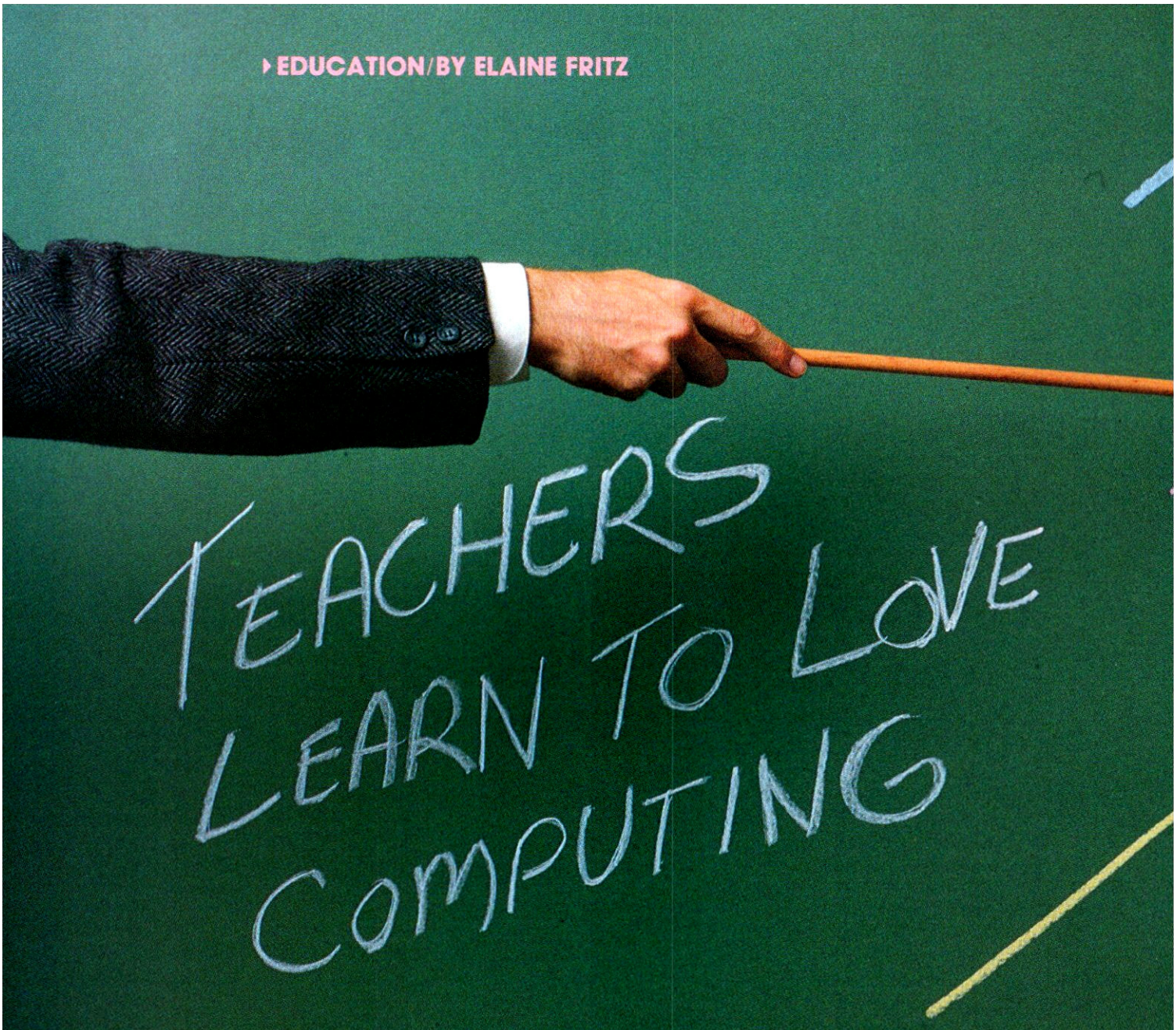


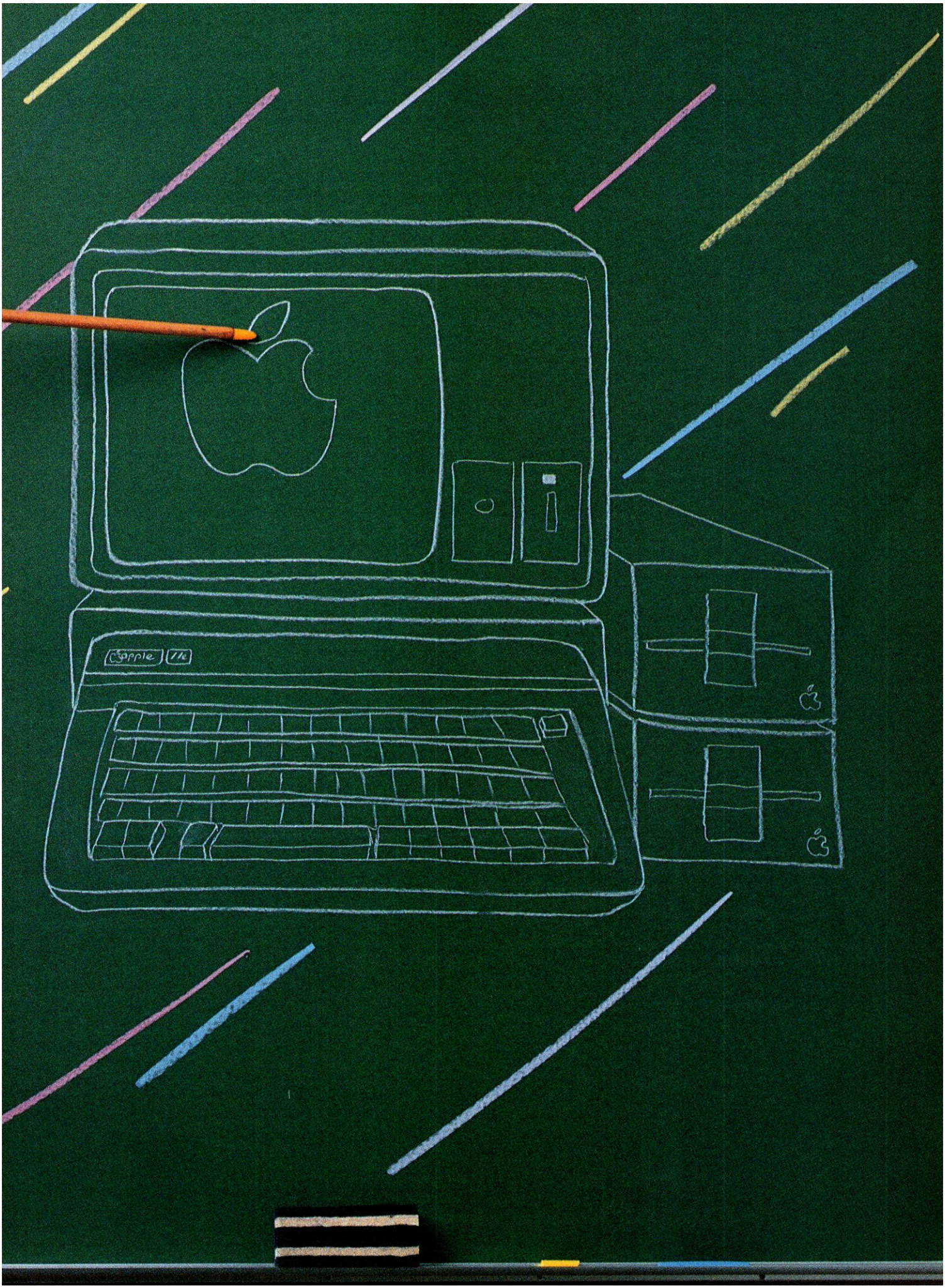
Computers can cause problems in schools. One of the biggest is getting people to go home.

Enthusiastic stories about schools that use computers for teaching have appeared recently in magazines such as *Time* and *Psychology Today*. It would be easy to infer that schools across the country have easily integrated computers into educational programs.

These stories generally focus on schools with resources not available to most public schools: on demonstration schools such as the Bank Street College of Education in New York City, or on schools with heavy manufacturer involvement, such as the Lamplighter School in Dallas. The Lamplighter School has received so much attention that inquiries are handled by the educational marketing department of Texas Instruments.

The overwhelming number of public schools have to improvise with limited funds and skimpy outside help, however. They have to be as entrepreneurial as any high-tech innovator starting out in a Silicon Valley home garage.

When the Eastridge Junior High School in Ridgefield, Connecticut, started using computers for its seventh- and eighth- graders five years ago, there were no curriculum guide-


Apple IIc

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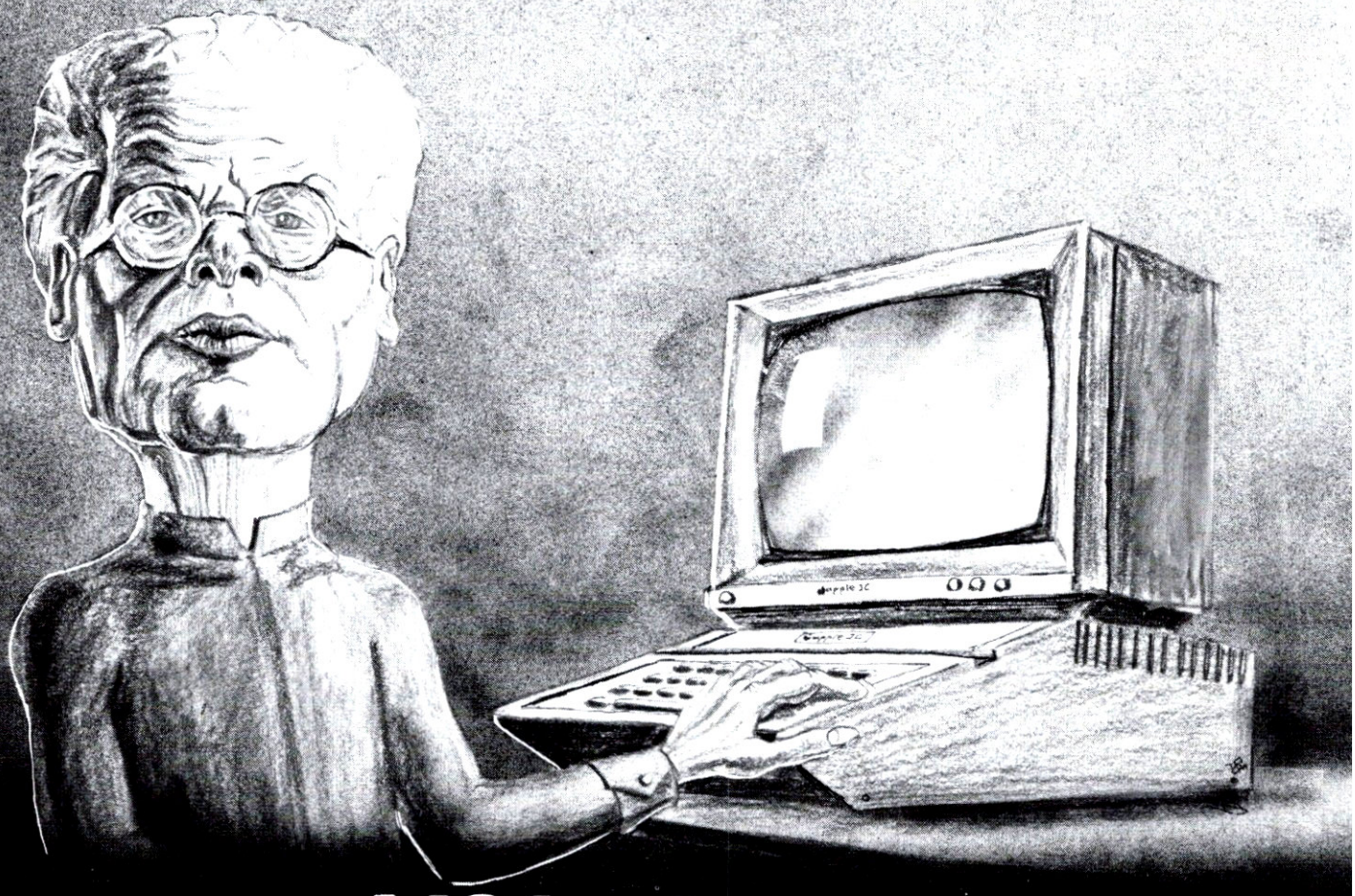

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CIRCLE 147 ON READER SERVICE CARD

lines on which to model a program, so the school officials had to write their own. They wanted a computer licensing test for their students, so they had to write it and do the programming themselves to get it onto the computers. They picked up software here and there, but they still haven't found any textbooks that meet their needs.

When you track back to find out how a school got started using computers, you usually find that a staff member got excited over an application he or she saw somewhere, then championed it with colleagues back home.

Getting the teaching staff excited and trained seems to be the key to success.

Psychologist Ted Perry of the San Juan, California, School District was working with the deaf in 1975 when he visited the California School for the Deaf in Berkeley. "I saw one of my former students, who I knew had a 30-second attention span. I watched him working on an old Teletype that was connected to a Nova 800 computer," Perry said.

"When his time was up, 45 minutes later, they practically had to use a crowbar to get him off his chair. I went back to my district and said, "Give me half a million dollars, and I'll do exciting things.' " Since then, he and another educator have combined $400,000 in federal Title IV-C funds. They *have* done exciting things.

Lee Wille, director of math, music, and instructional computing in the La-Crosse, Wisconsin, school district, saw a demonstration of computer-assisted instruction (CAI) in music at a convention and thought it was "kind of neat."

Both educators since have been involved in their districts' addition of microcomputers to instructional programs. Their initial exposures to an exciting application led them, accidentally, to go about arranging for the use of computers in the way they now know is the correct order: first identify applications for computers, then find the appropriate software for the applications, and only *then* identify the hardware that runs the software.

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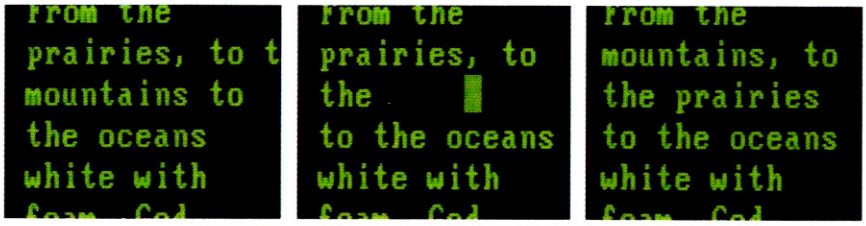

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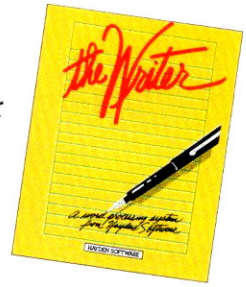

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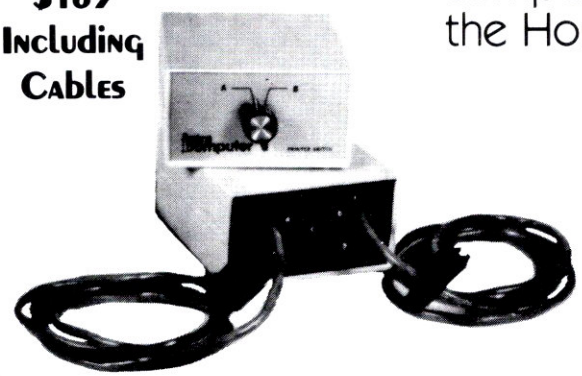

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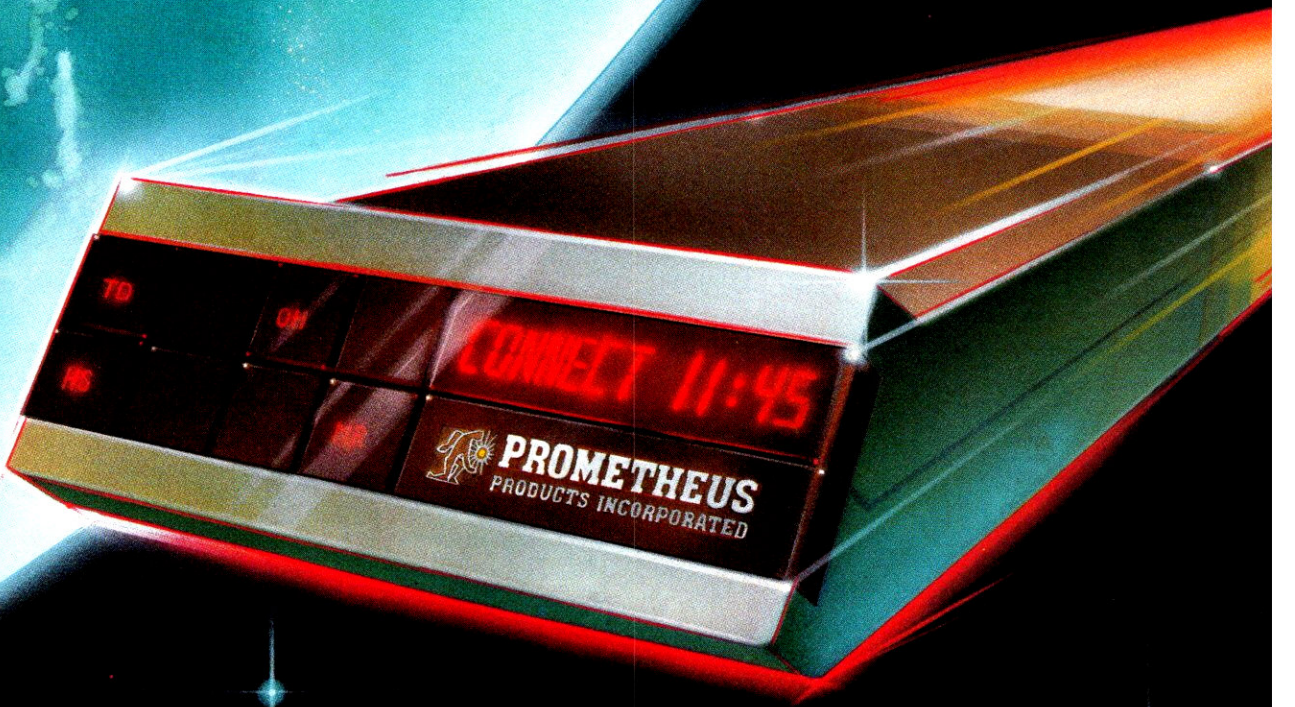

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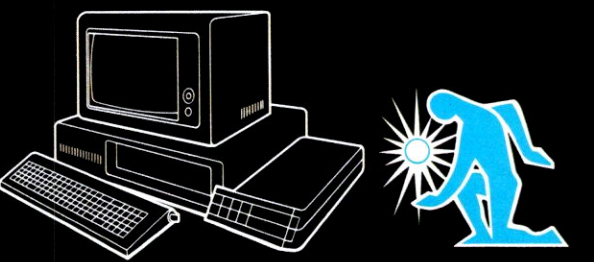

PROMETHEUS

CIRCLE 122 ON READER SERVICE CARD

common way. Usually administrators say, 'The school down the road got some computers, so we'll get some too,' '' Wille says now.

The primary pitfall in not making these decisions in the proper sequence is that, typically, schools go for the inexpensive computers. This can be perfectly fine if they're only used for teaching programming. But pretty soon, teachers who have become computer-aware discover the growing array of software available and find that it won't run on the nice little computers they got so inexpensively.

Ted Perry now trains teachers in computer pedagogy at the Region 4 Tech Center in Sacramento, California, and he gets quite a few calls about which computer to buy. ''I don't always send everybody to Apple. If they *insist* that all they want to do is programming, nothing else, an Apple is a little expensive. We then talk about which language they want to teach in.''

If they want to teach BASIC, they have quite a few choices, many under $100. But if they're teaching kids, he encourages them to teach Logo, and the choices get a bit more expensive. Then he says, ''Now that you're spending that much money, are you *sure* you only want to do programming?''

When Perry was setting up his Title IV-C project, he didn't know which computer it was going to be on, but he settled on Apples because of their dependability—''Back then there were a lot of strange machines that didn't stay running!'' He would still choose Apple, he says, because of the vast amount of software available. ''I really believe that there is more good educational software available for the Apple than for all the rest of the microcomputers put together.''

Even the most experienced schools have only been using microcomputers for four or five years, and they've amazed themselves with what they've been able to accomplish. They got their experience through practice, but some principles for implementing computers in education are beginning to emerge.

For example, many schools start too small. In Arcola, Illinois, school-board chairman Patrick Monihan says, ''The best thing we did was to make the investment in buying 12 Apples to start with. In other schools that I've seen, the math teacher has a computer, and his 20 students use it all the time. Not only do other teachers have a hard time getting to try it, but they also get turned off by this elitist corps of users.''

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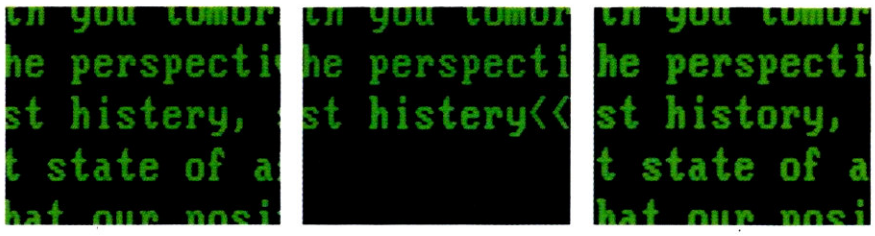

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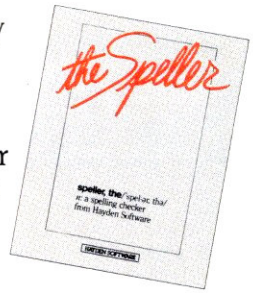

HAYDEN SOFTWARE

CIRCLE 266 ON READER SERVICE CARD

Craig Horsman, associate superintendent in the Monroe, North Carolina, City Schools, agrees. They started out with 11 Apples in their middle school, which gave every child in the school some contact with a machine. But when they added computers in the elementary schools, they started out with one or two machines, which were dominated by the couple of teachers who had some computer expertise. The rest of the school wasn't really affected.

Even the most experienced schools have only been using microcomputers for four or five years.

Getting the teaching staff excited and trained seems to be the key to success. Craig Horsman says that some teachers fear computers initially because they think they have to know how to put the computer together or do programming in order to use it. ''That's not true, any more than you need to be a mechanic in order to drive a car,'' Horsman says.

Sparking Interest

Learning to run the computer is certainly the first step. In LaCrosse, Wisconsin, Lee Wille says that when his staff was getting started, it once blew up 13 disk drives in three days. (The vendor was kind enough to fix them.) ''People weren't plugging them in right. So now we have them take the disk drive and the computer as a unit—you don't even unplug them.''

Once basic procedures are out of the way, according to Wille, ''our difficult task is not to teach people to use computers, but integrating computers in a pedagogically sound way into the existing curriculum. We offer staff development activities taught by teachers who are effectively using computers. They provide models that other teachers can use.''

Schools needing to catch the interest of reluctant staff members increasingly have access to several training options. They can import training from state or regional consortia, send teachers to college campuses for certification training, or bring in expert teachers from nearby districts. As schools get more experienced, they typically begin offering their own tailor-made in-service training.

Many school districts have had to let

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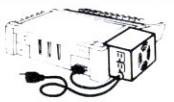

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CIRCLE 290 ON READER SERVICE CARD

their younger teachers go because of declining enrollments, but apparently age is no determinant of enthusiasm for learning computers. In a weekend certification program, one university trainer recently had a principal who looked and talked like a Swedish grandmother. She told him, "I got into this computer stuff because I hated them and thought they shouldn't be in the schools. And then they *got* me!"

Training

Ted Perry's Region 4 Tech Center is one of 15 in California, all mandated to assist schools in putting computers into the classroom. Training is in such demand that the center teaches classes in as many as three shifts a day, and this summer they were running from 7 A.M. to 9 at night.

Here's a sample of Tech Center classes:

- An awareness class called Introduction to Computers. It runs for six hours and covers drill-and-practice, simulations, tutorials, word processing, spreadsheets, databases, and programming. The emphasis in on comfort and seeing that these applications could be useful in the classroom.
- An in-depth class that runs for three days. It goes more deeply into the areas covered in the awareness class, and participants work on miniauthoring formats such as The Game-Show format or Tic-Tac-Shoe.
- Classes in three levels of Logo: an introduction to it, classroom use of it, and an in-depth course that covers word handling and numerical functions.
- A class for which people have to sign up in threes: a parent who's volunteered for classroom work, a teacher, and a child. Each one plays the roles of the other two some of the time.

Side Benefits

In Perry's part of California, the average teacher age is 48, and it's been a long time since some of them have been students themselves. Perry is delighted with an unexpected benefit of the popularity of computer in-service training: It's an opportunity for teachers to review and improve their basic teaching skills.

"There have been opportunities to upgrade methodological skills, but only a small percentage come in and say, 'Gee, I want to do it better.' But almost *everyone* is coming in and saying, 'OK, how do I use the computer in the classroom?' Instead of just giving them a format in which to use computers, I have them examine what they're doing in the classroom, what outcomes and processes they want. Then they're examining their teaching methods, but doing it in a safe way, because what we're really talking about is 'How do I use computers?' "

Student Whizzes

The Eastridge, Connecticut, Junior High program is interesting for its astonishing degree of computer expertise among both staff and students. The school has 15 Apples in its computer-resource room, which is called the Apple Orchard. Each Apple has its own name: Macintosh, Granny, etc. The committee of teachers that supervises computer use is, naturally, the Apple Corps.

'We're already where I predicted a year ago we would be three years from now. I don't know where it all ends.'

Students must qualify for an operator's license by taking a test on an Apple before they have independent access to the Apple Orchard. David Sklarz, director of middle-school education, says that 85% of the seventh-graders have qualified before they finish the year. This leaves them in good shape for the more intensive, mandatory computer work they do in their eighth-grade year.

Eighth-graders learn a little about programming, are initiated into the mysteries of many software applications, and learn how computers are used in professions such as aviation, drafting, and design.

They also learn word processing, and last year, students produced the school's literary magazine instead of farming out the production and layout as before. Two years ago it won a national literary award, and they feel proudly confident that the new computer-produced version will win for them again.

"But you know," says Sklarz, "every time you expand the computers' use, find another application, people say, 'Oh gee, that's one less computer we can use on Tuesdays . . .' We're already where I predicted a year ago we would be three years from now. I don't know where it all ends. . . . It's exciting."

Computers have been accepted so fast in Eastridge that the staff has been taken by surprise by the new problems that

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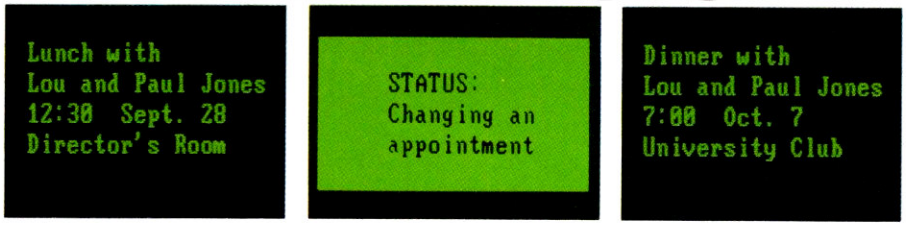

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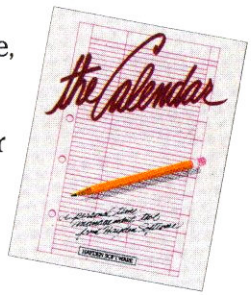

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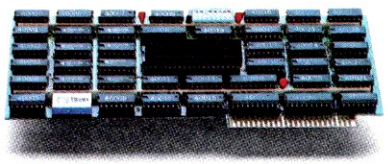

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CIRCLE 179 ON READER SERVICE CARD

seem to arise almost as fast as computer policy can be written. Suddenly they have to worry about monitoring their growing software library. Teachers want to check computers out over the weekend. Students want to pirate programs, or have managed to get into them and make modifications.

When students started bringing their own computer games, the staff strictly forbade it. Then they decided to have one day a month on which kids could bring in their games. "Then we had to create guidelines to say what's a game and what's not a game. We decided that whenever mental dexterity supersedes the manual dexterity needed, it becomes an educational game."

When teachers in LaCrosse, Wisconsin, started showing interest in checking computers out over weekends and holidays, it became official policy to encourage them. Instead of proving a problem, this became a too-lucky-to-be-true benefit: They had an IMC (Instructional Materials Center) burn down, but not a single Apple was lost, because the teachers had them all checked out. Since then, they've had two cases of breaking-and-entering during which other valuables were ignored, but closets around the IMC computer area were broken open in search of computers. They didn't lose any computers then, either.

Lee Wille says that the LaCrosse schools are concerned with monitoring teachers' acquisition of software. In order to make sure only quality material is used, the curriculum committee in each subject area keeps a list of approved programs. If a teacher wants software not on the approved list, he or she submits it to the committee for approval.

Wille believes that his district does an outstanding job of setting policy that promotes accountability. "We have developed a 150-page document that says how we use computers in the district. That's our major triumph!"

Tiny Trend Setter

The computer revolution in public schools hasn't been confined to the big, sophisticated school districts. In Illinois, an early trendsetter was tiny Arcola, a rural school district with a total of 750 students in grades kindergarten through 12. The main local industry is the broom-corn crop.

Students in the system include the Spanish-speaking children of migrant workers there for work in the cornfields as well as Dutch-speaking Amish children, who by law must attend school through the sixth grade.

In 1980, Arcola business-education teacher Jane Lockett chaired the computer committee that researched the use of computers. They found that most of the quality software for their purposes was written for the Apple, and in December of that year, the school board approved the purchase of 12 Apples. With more recent acquisitions, they now have one computer for about every 36 kids.

School-board chairman Patrick Monihan says that small rural districts' enrollments are sometimes so low it's difficult to keep a school going. His nine children attend local schools, and he has contributed a couple of Apples and some software to the schools, as well.

A former IBM systems engineer, Monihan says that he had always thought that one of the salvations of a small school district would be to have a teacher with ten computers, so that students could work simultaneously on a variety of subjects, freeing each teacher to be responsible for educating several children. His fantasy has come true, and it's a personal thrill for him to walk by the computers and see the district's kids, with their diverse backgrounds, hard at work.

Jane Lockett found that locating software took most of the committee's time at the beginning, because there wasn't much quality material available then. She's still not totally pleased with all that is coming out. "Some publishers are producing software to support their textbooks, and I see this as the main way for software to be implemented in the classroom. Some of the independent software publishers have no educational background and do not follow the methodology of the classroom. The software may be cute, the graphics may be excellent, but it doesn't support what's being taught in the classroom," she said.

She's a great believer in communicating with the community. As chairman of the computer committee, she meets with the school board every year to report what's being done with computers. This report gets published in the newspaper.

The school-board members are the main channel for communication with the community, and the school district has a citizen's advisory committee on computer education. All this open communication has created loyalty in Arcola. The school has a foundation based mainly on memorial contributions: If a student dies, community members contribute to the foundation instead of buying flowers. With interest earned by foundation money, the district has been

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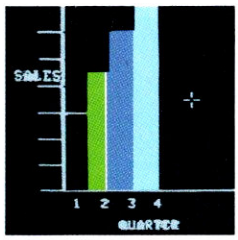

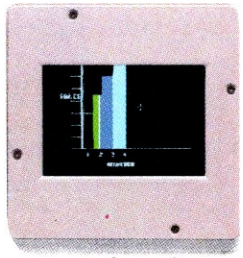

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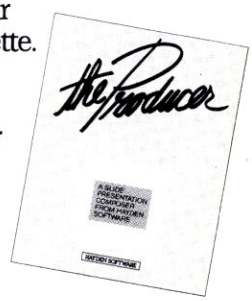

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able to buy computer equipment.

Benefits are coming back to the community because it has supported the development of good computer facilities. The University of Illinois at Champaign, as well as a somewhat distant junior college, are offering evening computer courses using Arcola's computer lab. Businessmen and women who have just bought an Apple because that's the computer the Arcola schools use take these courses.

'You have to make the teachers comfortable with their own computer literacy, or they're threatened by the kids.'

Assessment

So how are schools doing in the computer revolution?

Frederick Williams, a professor in the Annenberg School of Communication, University of Southern California, is involved in a project to study how everyday schools are coping with implementation. The project's report, which Williams co-authored with his wife, Victoria, is based on an extensive literature review and formal observations of 12 different schools.

He thinks that they're doing pretty well and that the individual teacher should be the schools' main focus. Though widely acknowledged success strategies are still to emerge, one thing is clear—there's more than one model for success. He proposes that the best lessons for implementors are drawn from schools with similar circumstances.

Williams warns that computer literacy is an ambiguous term, and expectations differ between schools and the lawmakers who support computer-literacy legislation. Computer literacy is now mandated by California law, for instance, but to some people this may mean a detailed knowledge of programming, while to others it means knowing how to use a computer in your work.

For some youngsters in Palos Verdes, California, futurethink begins in babyhood. Williams' wife started the Palos Verdes Learning Center six years ago. Her forthcoming book from Bantam, telling parents how to teach their babies to use computers, is based on one of the center's programs, "Mommy and Me." She believes babies can learn with the help of computers almost from the day they're born.

Our children's technological future is in enthusiastic hands. ✚

THE VOICE OF EXPERIENCE

Advice to Schools Just Getting Started

Ted Perry (Sacramento, California): "Answer the questions: First, what do you want the computers *for?* Once you figure out what you want them for, find the software. From the software, choose the computers. Find someplace that will give you support—the dealer, the tech center, fellow teachers, or all of them—and tie into them. Take advantage of these resources."

Patrick Monihan (Arcola, Illinois): "I would concentrate on the teachers first, and set up a training program. We tried to train all of them. We still have some who are little hesitant, but we have more than half that are comfortable with the computer and are using it in their curriculum in some way or another."

David Sklarz (Ridgefield, Connecticut): "Before you can make them part of your curriculum, you have to sell it to the people who are going to use them in the classroom. You have to make the teachers comfortable with their own computer literacy, or they're threatened by the kids."

Craig Horsman (Monroe, North Carolina): "I recommend doing one school at a time so you can buy enough computers to make an impact. You'll get 'Why me?' or 'Why *not* me?' But one computer in a school doesn't *do* anything—it's like having a car with one tire."

Jane Lockett (Arcola, Illinois): "You have to communicate with the faculty, the administration, and members of the community. If there is no communication, there can't be any progress. People in the community aren't always aware of how schools operate. Everybody's got to know what's going on and be able to talk about it."

Lee Wille (LaCrosse, Wisconsin): "Now we have a big crisis about accountability in learning. Johnny not only can't read, but he can't compute either. But we don't need to dump lots of money into the school system; we just need to say what we're going to do and then do it. Computers can help us manage all those goals that we said we were going to accomplish."

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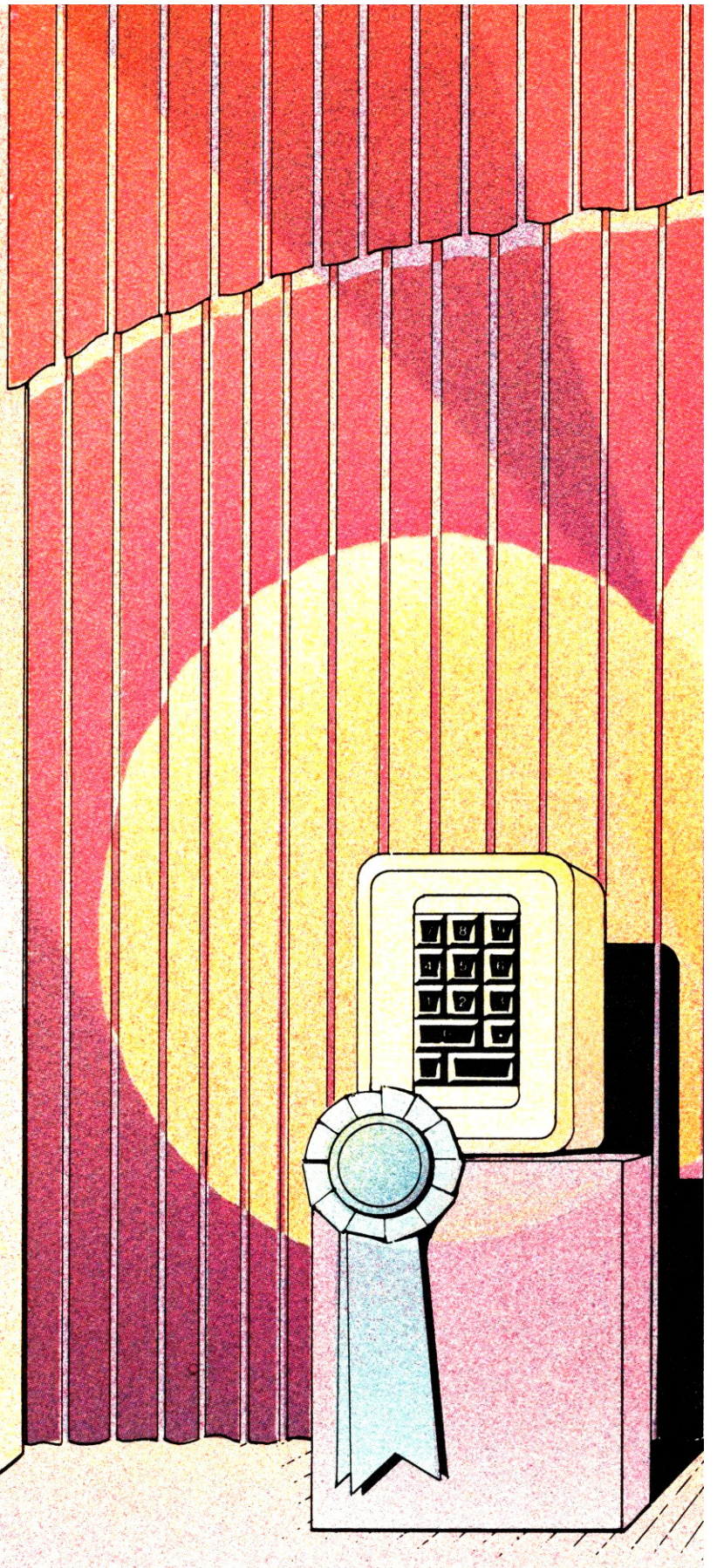
▶HARDWARE

BY ALAN ROSZKIEWICZ

THE PERFECT 10

A comparison of four ten-key pads for the Apple II family of computers



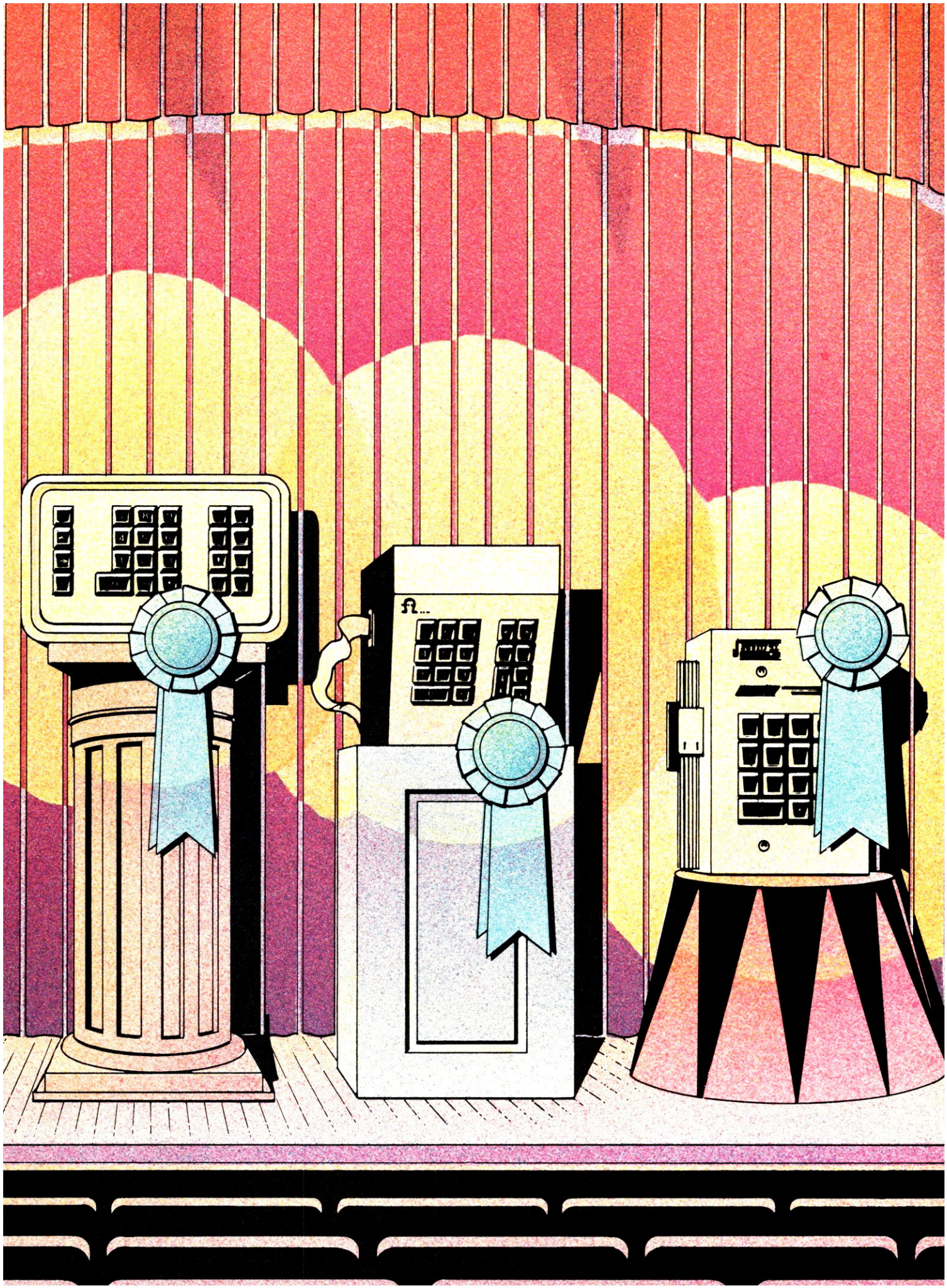
If you've ever used your Apple II, II Plus, or IIe for any serious accounting applications and have lamented the absence of a numeric keypad, this article is for you.

Keyboards vs. Keypads

One of the II series' major faults is its lack of a numeric keypad. Sure you can use the numbers in the top row of every "QWERTY" Apple keyboard—if your typing skills are good, you may find this approach no problem at all. Perhaps you wonder, however, why your accountant or office staff is taking an inordinately long time when using the Apple to enter columns of numbers that you swear took only a fraction of the time when the same person did it on an antiquated office calculator.

What's a Calculator?

Calculators are designed to provide the best possible means of data handling. They have their numbers arranged in a standard 3×3 matrix with the zero and



the decimal point located underneath. The function keys are usually grouped at the right of the numbers in a convenient column or block. These features are universal among office calculators. Computers should have no exemption from ergonomic laws.

So what's to be done to eliminate this bottleneck in data entry? You could buy an Apple III, but a simpler and cheaper approach would be to add a keypad to your II. This solution would allow improved efficiency with a minimum of expense and trouble. This path can bring benefits to your system without making you learn new procedures or programs.

Advanced Business Technology

In this article, I am going to discuss two basic approaches to adapt the IIs to accept an add-on keypad. The first involves soldering a connector to the encoder board on a II Plus. This is fairly easy, since the encoder board already has plated-through holes to accept a standard 9-pin D-type subminiature connector. Anyone with soldering skills should be able to complete installation in under an hour, but it's a job for your dealer or a technician if you wish to avoid any possible loss of your Apple warranty. If you happen to have an Enhancer II that comes with a connector already in place, then you can forget the above steps and simply plug in the keypad with its attached cable to the existing socket.

You would use this procedure for The Keypad from ABT, a keypad with little else but numbers, an Enter (Return) key, a minus sign, and a decimal point. The device is well constructed, but its size and light weight mean that you need an additional stand to position and stabilize the keypad for ease of use. If these basic keys are all you want or need, then you might consider this item with its stand.

With the IIe, just plug The Keypad into a supplied jumper, which you connect, in turn, to the Keypad Connector.

Omega Micro

Another approach to adding a keypad to an Apple II Plus is the installation of a controller board between the motherboard and the encoder board.

Omega Micro's KVA II uses this approach. The simple installation requires taking the case off the Apple, unplugging the keyboard connector from the motherboard, and reconnecting it to the controller board's extension cable. You plug the other controller-board cable into the vacated socket on the motherboard and mount the controller card on the provided mounting plate, which is affixed inside the Apple's case.

To use the keypad, you merely plug it into the controller board with its 20-conductor cable, which you then route out one of the back slots on the Apple.

This keypad has the standard ten digits, plus and minus signs, decimal point, and return keys. Some other keys that could prove useful for VisiCalc and word-processing systems are the space, escape, right-arrow, and left-arrow keys.

Omega Micro plans shortly to release a IIe version offering several selectable options, which will plug directly into the IIe's keypad pins. A minor drawback is the use of 20-conductor ribbon cable, which is only slightly more durable than the 16-conductor ribbon cable that connects to the game I/O port and is notorious for its failure rate in heavy use.

Jameco

If you have a IIe, another possibility is the Jameco JE614 numeric keypad.

This 14-key, 23-function auxiliary keypad has the standard 10-key format as well as VisiCalc cursor controls and word-processing functions. These include four-direction cursor control, scrolling in both directions, Delete, Tab, Home, and Enter. Curiously, this pad

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WASHINGTON (UPI) — The U.S. Air Force/NASA have developed an experimental spacecraft given the title XTM. Due to the vague description as to the design or purpose of the XTM, the press is still in the dark about many aspects of the craft or its intended mission. It has been discovered, however, that at least three pilots have been lost in the current flight testing program of the mysterious
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Not far into the mission, you discover this task is more than you could have imagined. Never knowing what you will encounter next, you manuever your ship from one adventure to another. You draw upon every resource to survive events ranging from battles with Vikings in the past to outwitting aliens in the future for your ship, the lost pilots, even your very life. But prepare, your final challenge is to return to your own time era safely, a feat which has not been accomplished by any pilot before you.
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has no plus or minus keys, but it does feature right and left arrows, a help to VisiCalc users.

Installation of this unit is simple, taking no more than ten minutes. You just plug it into the keypad connector on the Apple's motherboard and pass the cable out one of the rear slots. Then you install a supplied ROM instead of the existing keyboard ROM, and you're done.

The unit is solidly constructed and matches the Apple's looks and style. A possible drawback is its use of a 16-conductor ribbon-connector cable, which could wear if you move the unit around very much. If you're careful, however, this need not be a problem.

Apple Computer

Finally, we have Apple Computer's Numeric Keypad II. This 24-key unit is perhaps the most like the standard adding machine in its format. Besides the usual ten digits and a decimal point, the center 4×4-key matrix has a 00 key in the center row.

Function keys are in 1×4 and 2×4 matrices on either side of the numeral keys. On the left side are right- and left-arrow keys as well as the Escape and Space keys. Right and left parentheses and the usual Return, plus, and minus keys are on the right-hand side.

Three other keys unique to this unit make it more like a standard calculator: multiplication and division signs as well as a useful Print key. Using the Print key before a group of entered numbers and arithmetic operations makes the Apple perform like a standard four-function calculator.

Installation in an Apple IIe means simply running the sturdy cord, with its strain relief, directly into the keypad socket. For the other IIs, the process is only slightly more difficult, as the case must come off. You plug a piggyback board into the keyboard socket and plug the displaced cable as well as the keypad cable into this board. In all, this procedure should take no more than 15 or 20 minutes.

The main complaint centered on the cramped style and placement of the various keys.

This unit places the keys on a level that should reduce arm strain, but it could be improved somewhat by a larger or angled Enter key. Basically, the Numeric Keypad II is a solid unit designed for dependability and utility.

Views from the Office

After I completed the installation and equipment trials of the products I've just discussed, I brought these units to a group of bookkeepers. Here are some of their observations:

All tested keyboards gave the users an uncomfortable "home" position and allowed less-than-ideal arm positioning. The Apple keypad was deemed the most easy to adapt to, but all the units could benefit from several minor design adjustments.

The main complaint centered on the cramped style and placement of the various keys. Users who enter numbers by touch prefer to have the 5 key beveled slightly deeper than the others, in addition to having a raised dot.

The Enter keys, which the little finger normally presses, are ideally in a position far enough away from the number keys to allow a comfortable home or rest position for the hand on the keypad. These keys could also be a bit higher than the others and could be slanted upwards to the outside of the unit to prevent your fingers from falling off the keys. Remember, the object is to allow

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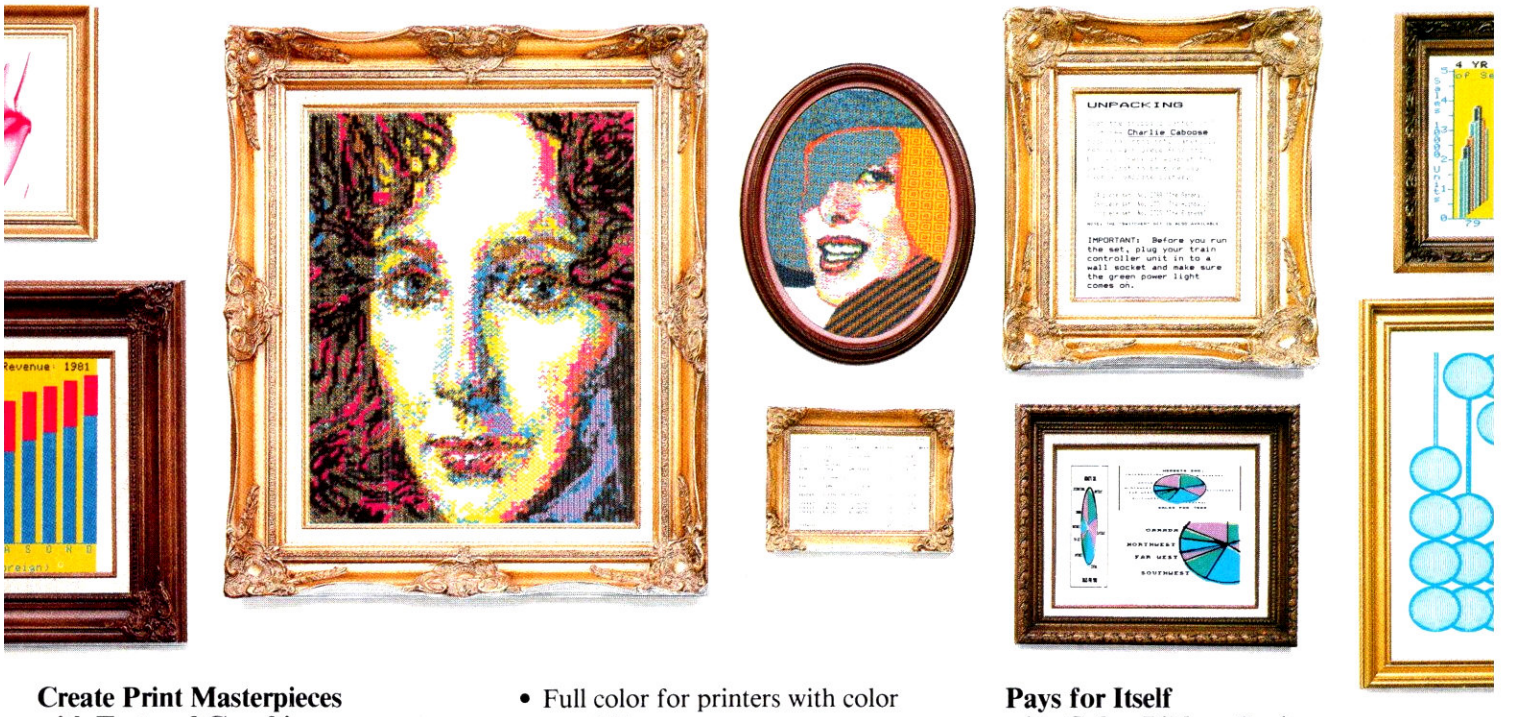

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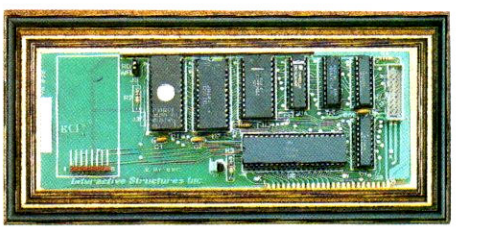

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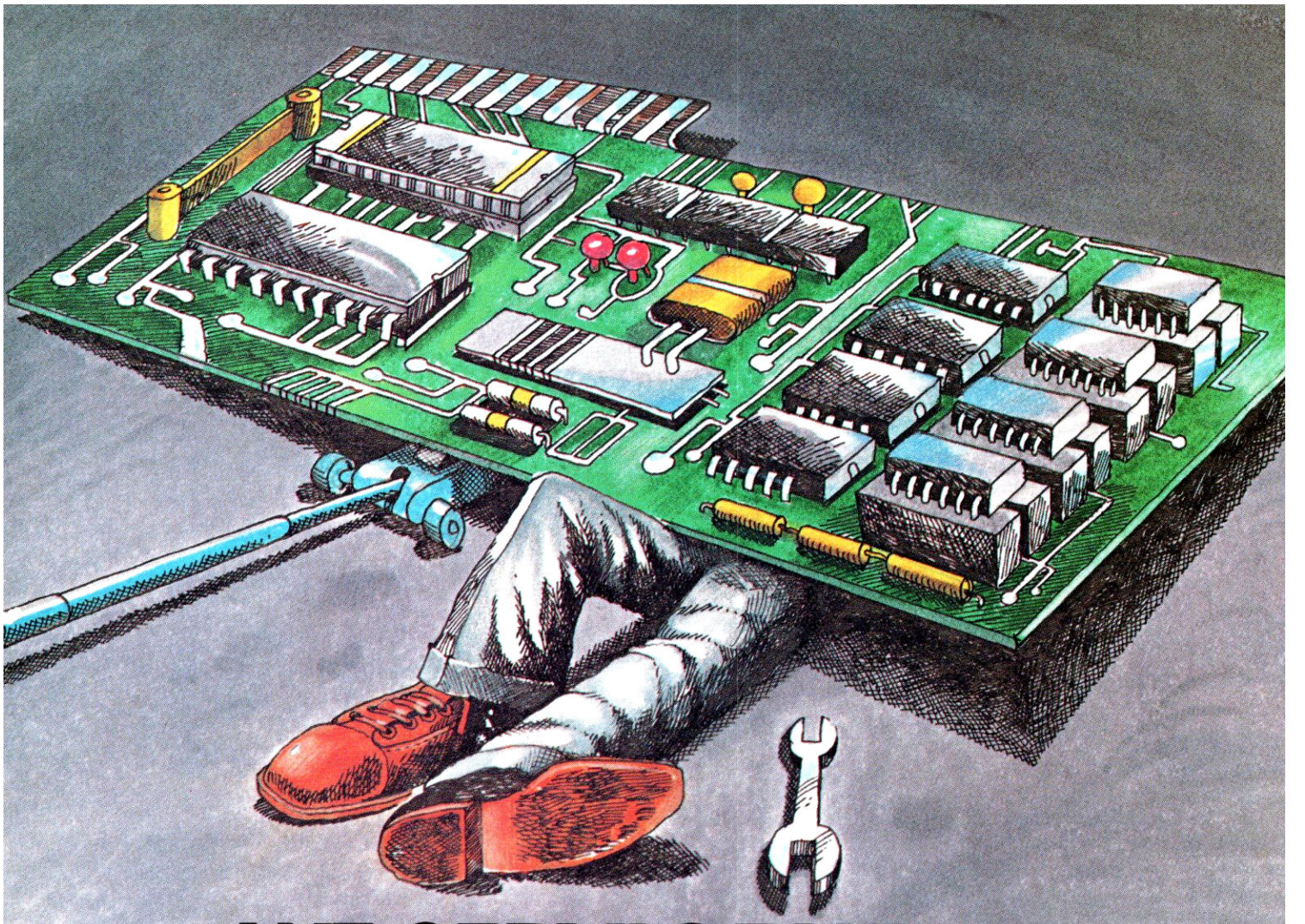

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data entry without making users look at the keypad.

All the manufacturers would do well to take a lesson from the wealth of information incorporated in designing good office calculators. A change as simple as using smaller key tops on the same switches would be an immediate improvement, since the space between the keys gives touch users a better feel and more certain finger placement.

A numeric keypad can definitely increase your productivity. All the units tested were clearly an improvement over the Apples' typewriter numbers for the entering of numerical data. How much you will gain depends on the suitability of your chosen keypad for your particular application. The person who will use it the most should "test drive" various units. It does little good for anyone to purchase an enhancement that ends up in a drawer somewhere because it's just not quite right. ✚

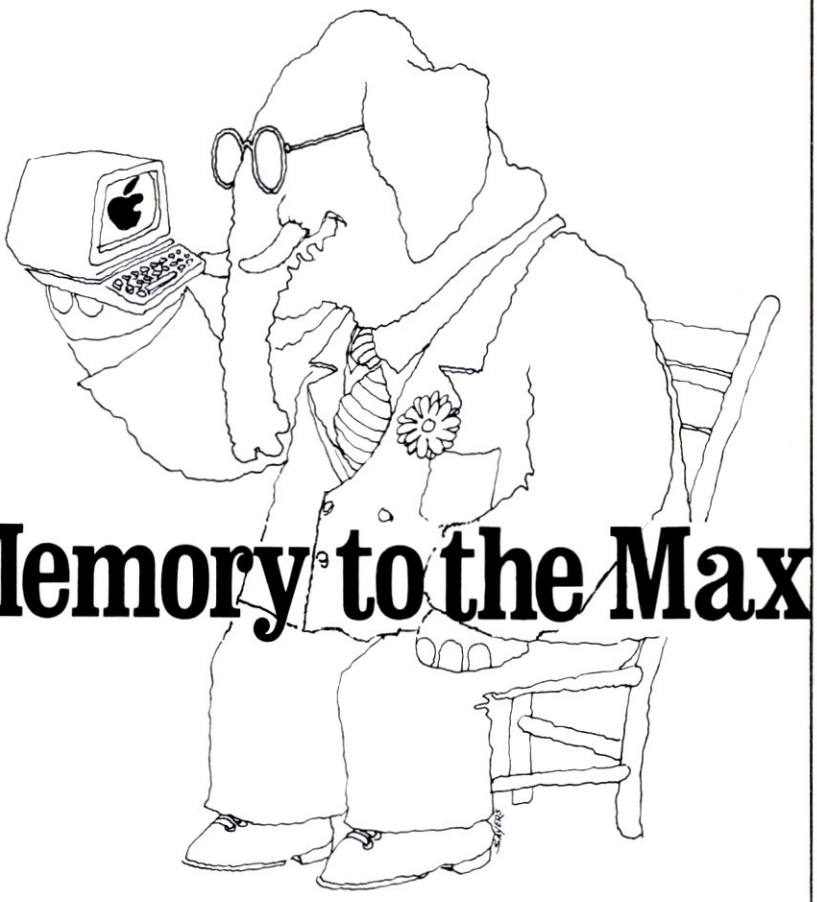
PRODUCT INFORMATION

ABT's The Keypad, Model B
Advanced Business Technology, Inc.
1180 Coleman Avenue
San Jose, CA 95110
(408) 275-9880
List Price: $125
Requires: Apple IIe or Apple II Plus with two-piece keyboard. For older Apples with a one-piece keyboard, use Model A.

JE614 Numeric Keypad for Apple IIe
Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002
(415) 592-8097
List Price: $89.95
Requires: Apple IIe

KVA II Multi-Function Numeric Keypad
Omega Micro
215 West 1st, Suite 105-61
Tustin, CA 92680
(714) 730-1463
List Price: $199
Requires: Apple II or II Plus

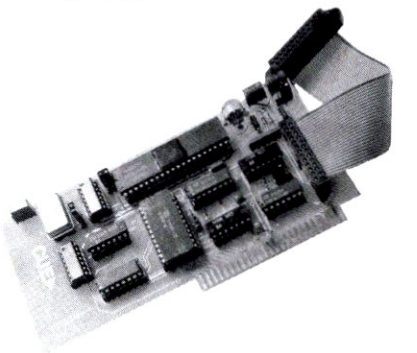
Numeric Keypad II
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 94015
(800) 538-9696 or
(800) 662-9238 in CA
List Price: $159.95
Requires: Apple II, II Plus and IIe



Memory to the Max

The DiscMaster II by Data Cue expands the storage of your Apple II or Apple II compatable systems. The DiscMaster allows you to connect two 8″ or two 3½ ″ double density disk drives per controller to your computer. The drivers are supplied for DOS 3.3 and PASCAL 1.1 operating systems. Optional drivers are available to read and write standard 8″ CP/M, IBM P.C., DEC P.C. and SUPERBRAIN disks.

The DiscMaster II is completely contained on a single Apple II compatible I/O board which can be installed in any one of six of the eight peripheral slots in the computer. The DiscMaster uses the latest technology in floppy disk controllers to give a price performance ratio unmatched in the industry.



Disk size for PASCAL and DOS

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5″ DSDD	**327K**
3½″ SONY	**286K**
3″ AMDEK	**164K**
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8″ SSDD	**512K**
8″ DSDD	**1024K**

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- ★ Non-contact head to disk interface.

The Infax 101A comes with disk drive, data cartridge, power supply, cables and personal computer adapter. Software included supports Apple* DOS 3.3, Pascal and CP/M.** Also included are support software for quick copying, backup and file management. Slot independent. Supports auto-boot capability.

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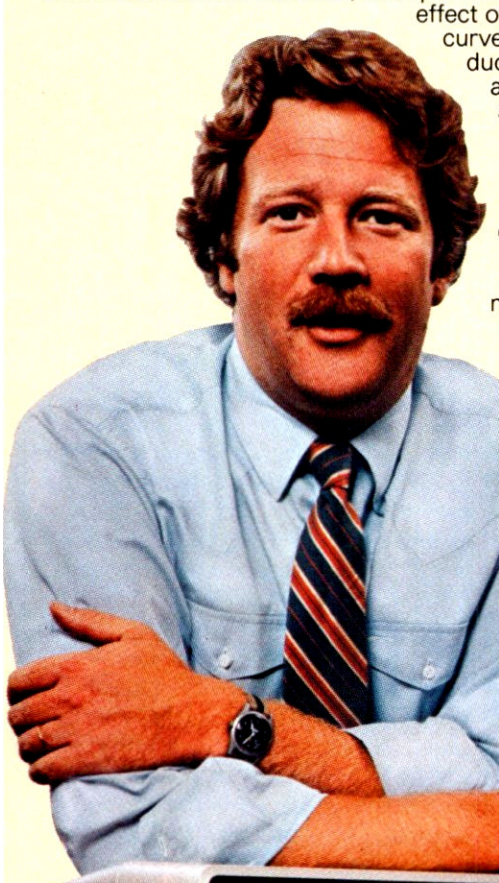

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Softerm Version 1.10
CRT Terminal Emulation for the Apple Computer
Softronics
6626 Prince Edward
Memphis, TN 38119
(901) 683-6850

Requires: Apple II, II Plus or IIe; 48K RAM; one disk drive; DOS 3.3; video monitor; asynchronous serial interface connecting to computer system or modem; 80-column board (optional); printer with serial or parallel interface (optional)

List Price: $150

Data-processing departments used to take care of all computer business with large mainframes. Except for some important executives or engineers, few people at home could dial into a mainframe for information. With the development of microcomputers, however, many executives started sneaking their own micros in the corporate back door, as spreadsheets, databases, and word-processing packages gave them computer power individually.

Together with micro-power came micro-chaos. High-tech execs had one CRT (TV display) on their desk functioning as a terminal for the mainframe, with an Apple next to it for VisiCalc, Donkey Kong, StickyBear, and other programs that the mainframe could not run. In other cases, Apple owners at home or at work were frustrated when they found out that they could not dial into their friendly neighborhood mainframe. There were some machines with which Apples simply would not communicate.

The Brave New World

To the rescue of corporate bigwigs and stay-at-home hackers comes Softerm, a CRT terminal-emulation program for the Apple II family of computers. This piece of software enables your Apple to function as a terminal for virtually any mainframe or minicomputer. It can streamline data entry by letting you transfer data from your Apple to a larger system and vice versa. It supports Apple DOS, CP/M, and Pascal formats, and you can even transfer files from a disk using one format in drive 1 to a disk using a different format in drive 2.

Apple owners at home or at work were frustrated when they found out that they could not dial into their friendly neighborhood mainframe.

Greetings, Dear Host

Softronics claims that the newest version of Softerm, Softerm 2, provides exact emulation of these terminals: IBM 3101 Models 1X (10,12,13); DEC VT100 and VT52; Data General D200 (compatible with D-100, 6052, 6053); Lear Siegler ADM-3A and ADM-5; Hazeltine 1400, 1410, 1500, and 1520; Honeywell VIP7205; ADDS Regent 20, 25, 40, and 60; ADDS Viewpoint; Datapoint 3601; and TeleVideo 910 and 925. The company is also willing to assist users of other terminals if possible.

An asynchronous serial interface is necessary to connect your Apple directly to another computer. Softerm supports the following interfaces: Apple Communications Interface Card; Apple Super Serial Interface Card; California Computer Systems 7710; Mountain Computer CPS Multifunction Card; SSM Microcomputer Products ASIO, APIO, AIO, and AIOII; Bit 3 Computer Dual-Comm Plus; Hayes Micromodem II and Smartmodem; Novation Apple-Cat II; and Intra Computer PSIO.

Softerm is written in 6502 assembly language for fast response time for screen displays and transfer of data. Softerm can operate at serial line speeds up to 9600 baud.

How It Works

For this review we used an Apple IIe and an Apple Super Serial Interface Card to emulate a Data General D200 terminal. We also used an Epson printer with a parallel interface. The Apple was connected to a Data General Eclipse C150 minicomputer by 100 feet of cable. Softerm was designed to work with a large assortment of host systems, but we hope that our particular experience is useful to Apple owners calling other systems.

Softerm uses two diskettes called the Program diskette and the Configuration diskette. The Program diskette contains a special version of the disk-operating system (DOS). The Configuration diskette is a data disk containing files neces-

FRAME

sary for each specific combination of hardware. You can copy both disks and add files to customize Softerm for your specific uses.

Terminal Setup

With a series of menus, the program allows you to specify the exact terminal and hardware configuration you want. The Setup mode lets you save your results to a file on the Configuration diskette. You can save as many different configurations as you need, depending on how many different systems you have access to.

First you have to give the program several pieces of information. You must select the filename for your configuration program, the terminal you want your Apple to emulate or look like, the serial interface, and the 40- or 80-column display. You also have to supply printer and modem information and enter the system parameters of the host computer.

Terminal Operation

After you set everything up, Softerm is ready to communicate with another computer. When you exit from the setup process, you are ready to sign on or dial the host computer of your choice. After you have logged on, you can perform a variety of keyboard functions and use disk and dial utilities.

You can create keyboard macros and load 18 at time to allow a defined character string to substitute as keyboard input. For example, the Control and K keys followed by a 9 can save you the trouble of entering your name and password.

The disk-utilities options that the program can execute while you are still signed on to the host include INIT (initialize), Catalog, Delete, Rename, Lock, Unlock, and Verify. A set of dialing utilities lets you enter, store, and print phonebooks of up to 43 phone numbers and can even initiate dialing.

Terminal Emulation

Obviously, the Apple IIe keyboard is not identical to that of a Data General D200 terminal or any other terminal that Softerm supports. If you use the Control key in conjunction with other keys, however, Softerm can let your Apple keyboard emulate most of the extra function keys it's missing. A few functions and templates are still missing, though.

Transferring files to the Apple IIe allows you to edit them with a familiar word processor such as Apple Writer IIe.

Templates are sturdy pieces of cardboard that fit neatly next to the unmarked function keys. With each different program, such as a word processor or a spreadsheet, you put on a template to explain the new set of tasks that the function keys perform when you use a specific program. Without templates, it would be difficult to move gracefully from one software package to the next.

Although Softerm does not give you the 15 extra function keys of the Data General terminal, it does allow the host computer to think that you have pressed them if you push the Control key and the F key followed by some other key. The program imitates other missing keys or functions in a similar fashion. Softerm comes with a list of how to imitate the function keys on all supported terminals.

File Transfer

You can transfer files in both the Local and Line Transfer modes. Local file transfer lets Softerm function as a file-utility program that recognizes type B (binary) and T (text) while maintaining communications with a host computer system.

The Line Transfer mode transfers files to and from the host computer and microcomputer. Transferring files to the Apple IIe allows you to edit them with a familiar word processor such as Apple Writer IIe. You can also choose to write a program that can use the files you've transferred.

We needed some data files that were collected on Apples in various locations and sent to us for file transfer to the Data General system. We used them to produce reports that the Data General sorted and formatted. Finally a 300-line-per-minute Data General printer printed them out.

People who use their computer at home can use this feature to capture data files or programs that normally appear only on the screen. You can print files as they pass through the Apple to your printer if all you need is a printed copy rather than a disk file.

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Using Softerm can save you money and can give your Apple a dual personality. If you are used to working with a terminal, though, you must be able to adapt to the loss of your special function keys and trusted templates. Perhaps the kindly data-processing department of your company will help you make new ones. On occasion our system seemed to hang up, but the Reset key seemed to bring it back to life.

The program performs well for entering programs in BASIC and for data entry with previously written programs. With the word-processing software on the Data General (CEO), we found that the lack of function keys made for a few surprises, and we lost a few paragraphs before we got the hang of it. This type of emulation is definitely for experienced users of the systems in question.

Using Softerm can save you money and can give your Apple a dual personality.

A Child Shall Lead Us

We gave the task of making Softerm work with the Data General to one of our best tenth-grade students. His experience with computers included both programming classes and part-time programming work. By carefully following the comprehensive Softerm manual and asking for occasional help, he was able to make the Apple emulate a D200 terminal. With more hard work and some support from Softronics, he also mastered the process of file transfer.

After he had taken files in both directions, we gave him the task of writing a set of instructions that would spare us from the challenge of working through the file-transfer section of the manual.

Turning your Apple into a terminal is now possible, but we would not advise that you buy an Apple today and try to transform it into a terminal tomorrow. If you need to emulate a terminal, you will require either some technical background or help. Such help is usually available from the data-processing department to whose computer you want to connect, and also from the people at Softronics.

All the Instructions You Need

Although we've reviewed how Softerm works with Data General equipment, the program's manual contains detailed accounts for other terminal emulations. The Softerm User's Guide is 340 pages of well-organized reference material. You can read pertinent sections that tell you how to use the program for your configuration—skip the parts that discuss other terminals.

The users' guide includes an introduction to the product and sections on terminal setup; terminal operation; file transfer; terminal emulation, including how supported terminals work, how to use supported serial- and parallel-interface cards, and how to use 80-column video boards; and the ASCII character set. You'll also find a list of error messages, information on user support, a glossary, an index, and an addendum of additional information. The manual contains a great deal of technical information.

Will They Help Me?

Softronics offers extensive user support. If you cannot solve a problem by using the manual or by contacting your dealer, you can write or call for technical support. An on-line update service, included on the Configuration diskette, contains new information solutions to user-reported problems.

The product comes with a limited warranty for registered users that provides them with a free replacement for damaged disks and announcements of updates or new products. After 90 days and within one year of purchase, replacements will cost $15.

If you purchased the original Softerm product, as we did, you can upgrade it to Softerm 2 for $50. A less expensive version called Softerm 1 is available for $135 for users who anticipate connecting only to systems that expect Apples to be calling. Examples of these are The Source, CompuServe, and the Dow Jones News/Retrieval system.

The lack of function keys made for a few surprises.

The Way It Will Be

If you have time and patience, you can save money with Softerm. We strongly recommend this product to any organization that has Apples as well as a larger system that needs terminals. If you use your computer at home, it can give your Apple much more flexibility, but if you use your terminal mostly for programs that rely heavily on function keys and templates, be prepared for at least some initial frustration. ✚

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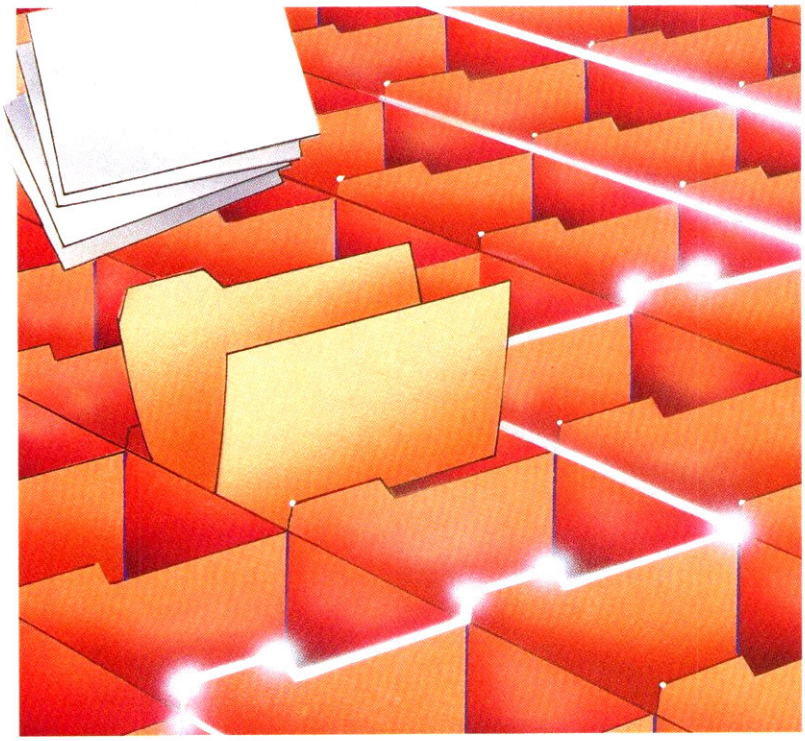

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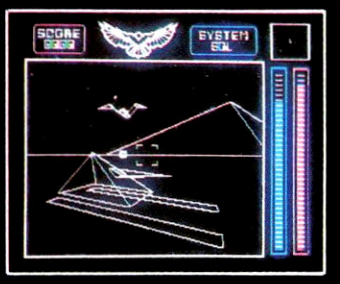
CIRCLE 284 ON READER SERVICE CARD

STELLAR 7

by Damon Slye ™

RAVEN, an experimental Agrav Unit, is Earth's only defense against the Imperial Arcturan Armada. Commanding RAVEN, you will face Arcturan laser tanks, pulsars, sandsleds, assault batteries, prowlers, skimmers, seekers, guise mines, and the rest of the rampaging Arcturan assault. Your wits and RAVEN's biphasal thunder cannon are all that stand between a helpless Earth and the wrath of the Arcturan Armada.



Sandsled and Skimmer

SOFTWARE ENTERTAINMENT COMPANY introduces ***STELLAR* 7,** the ultimate 3-D strategy arcade game by Damon Slye. ***STELLAR* 7** features smooth HI-RES animation, a colorful instrument panel, and 7 unique levels, each more challenging than the last.

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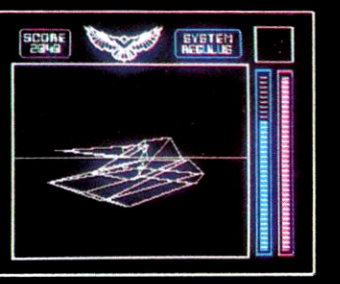


Stalker Agrav Unit

Requires Apple II, II plus, or IIe • Apple II is a trademark of Apple Computer, Inc. • copyright 1983 SOFTWARE ENTERTAINMENT COMPANY

CIRCLE 133 ON READER SERVICE CARD

CHOPLIFTER!

Broderbund Software, Inc.
Entertainment Software Division
1938 Fourth Street
San Rafael, CA 94901
(415) 479-1170
List Price: $34.95
Requires: 48K RAM, one disk drive

CIRCLE 500 ON READER SERVICE CARD

Choplifter! from Broderbund Software isn't the usual chase-'em-and-kill-'em game; it's a helicopter with a mission to rescue hostages. You're in the pilot's seat with a chance to become a hero. But given the odds here, this game would probably appeal more to the Ayatollah Khomeini than to Jimmy Carter.

The object of Choplifter! is to retrieve 64 captives locked into the four 16-person barracks in the land of Bungelings and bring them home to safety. To do so, you must land your copter close to the hostages, give them time to climb in, and then lift off into the air and touch down on the landing pad, where the captives can scramble out to home base. It sounds simple enough, but, as you've probably guessed by now, Bungeling land isn't too friendly a place. As you play, you'll encounter your enemy's weapons, which make your mission so difficult.

Getting Started

To begin play, insert the Choplifter! diskette into the drive and press Return. Your screen displays a moonlit sky with twinkling stars and a helicopter flying randomly across the horizon. Below, in the left-hand corner of your screen, is a post office flying an American flag signifying your home-base landing pad. As you watch the monitor, the ground moves to the right, away from the safety of home base and into Bungeling land, where you catch your first glimpse of the hostages frantically scurrying along the ground trying to wave down the helicopter.

Once the program has run through this introductory scenario, press any key to begin play. You control the helicopter using a joystick with two buttons. Move the stick up, down, left, and right, and it will respond logically. Pressing button 1 faces your copter forward, and button 0 lets you fire.

Each game of Choplifter! is divided into three rounds called "sorties"; each sortie provides you with a new helicopter, giving you another chance to make your great escape. Each round becomes progressively more difficult as the Bungelings get angrier at you and seek revenge.

In the first sortie, though, they aren't too unkind; you'll discover that they have given you a head start by bombing open one of the barracks and releasing the first 16 captives. (Perhaps kindness isn't an accurate explanation here; it seems more likely that you've caught the Bungelings off guard, giving some of their captives a night out on the town.)

You catch your first glimpse of the hostages frantically scurrying along the ground trying to wave down the helicopter.

The title "First Sortie" flashes on your monitor, the sound beeps on, and a barrack full of hostages runs free along the ground. As you peer down at them from your helicopter, you spot your enemy. Start planning your strategy, quick! The Bungelings have three weapons at their disposal: tanks, jet fighters, and drone air mines. Tanks amble along the ground knocking hostages or helicopters dead in their paths. So think fast; those Bungeling tanksters are nasty. Press button 1 on your joystick to face your copter forward and maneuver it into position. Press button 2 to shoot. Now it's safe to swoop down and land so the hostages can board your vehicle. But be careful; if you hit a hostage in the process of landing, you'll kill him, and you certainly won't make a hero of yourself that way!

The hostages that manage to board the chopper are grateful. They appear to be smiling in a naive sort of way, as if they were embarking on a joyride rather than a rescue mission. The chopper has a seating capacity of 16, so technically you could take the whole barrack at once, but the tanks will attack before this happens. You have to interrupt the boarding of the hostages with intermittent lift-offs and relandings in

an effort to avoid your attackers, and you're certain to experience many casualties.

You can't afford to waste time dwelling on them, because you have three more barracks-full to rescue. Blow open a barrack and 16 more captives will run free. To do so, turn your copter sideways and go on a strafing run. A direct hit will blow the barrack open. Note that all 16 hostages in each barrack

The scenario is so unvaried that after a while you may find yourself wishing for new terrain.

must be rescued or killed before you can go on to the next one. On your first venture, the best strategy is to take a full load of captives to home base, because once you've accomplished your first rescue, the Bungelings realize what's going on and go wild with revenge. At this point the game becomes considerably more difficult.

Mission Partly Accomplished

On your next foray, they'll get you with their other two weapons, the planes and the drone air mines. The planes scream out of the sky, attacking you and the hostages, but the drone air mines are the deadliest weapons. They seek out your copter and blow it up on contact. They can even sneak up on you at the landing pad.

A sortie ends when your copter is blown up or crashes, and, considering the number of foes that are out to get you, sometimes this doesn't take very long, especially if you are new to the game. The second sortie is a repeat of the first, at an even more frenetic pace—ditto the third—and while you are busy avoiding all these killers in the air, tanks are knocking off defenseless hostages by the handful. The third sortie of Choplifter! redefines the term *acceptable casualties*. The game ends when all the hostages are dead or rescued, or when you lose your third helicopter.

Waving Goodbye

Your score appears at all times at the top of the screen, in three separate capsules, which the game's instructions call "lemons." (I played the game on a monochrome monitor, but the instructions explain that these lemons are red, blue, and green on a color monitor.) The capsule on the left shows how many hostages have been killed; the one in the middle tells you how many captives are inside the chopper, and the third gives your score, a count of the number of hostages you have returned safely to home base. The maximum score is 64, for the total number of hostages. The first two scoring categories are particularly useful, because the game moves so fast that you often kill or rescue a hostage without realizing it. Some of the hostage deaths appear to be random; you may not have seen them actually being hit. I suspect these deaths are caused by the copter, though. They may have something to do with the angle at which your helicopter lands.

One of the most appealing things about Choplifter! is its graphics. The captives are cute, if not a little pathetic. They wave you down for rescue, and they wave goodbye as they disembark at the landing pad. The twinkling stars are a nice touch, too. On the other hand, the scenario is so unvaried that after a while you may find yourself wishing for new terrain. The game's universe is finite, extending from the post office to just beyond the fourth barrack. When your chopper reaches the edges of the screen, it stops dead and has to reverse direction. The helicopter can't exit and reenter the field of play, which would have been a nice touch.

The most outstanding feature of Choplifter! by far is the maneuverability of the helicopter. The joystick responds to even the slightest thrust, giving you remarkable control. Special keys offer some additional features. Pressing ESC pauses the game during play, Control-S toggles the sound on and off, and Control-V and Control-A reverse up/down and left/right on the joystick, respectively. One last complaint: Your chopper can achieve full speed only when it is flying forward, which is frustrating at times.

Choplifter! is an immediately accessible game—anyone can play it. But playing well is another matter entirely. You can't progress to the second level

Your chopper can achieve full speed only when it is flying forward, which is frustrating at times.

until you've rescued all 64 hostages, so, for mere mortals, Choplifter! is a one-level game. But with enough practice you can learn to outwit your enemies. Who knows? Maybe if Jimmy Carter had played this game . . .

Jennifer deJong

WITNESS

Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138
List Price: $49.95
Requires: 32K, Apple II, Apple II Plus, or Apple III in emulation mode, one 16-sector disk drive.

CIRCLE 501 ON READER SERVICE CARD

When I first saw The Witness, part of the Infocom Mystery Series, I knew I had to have it. The concept seemed perfect for a crime fiction buff such as myself. In the game, the player becomes a detective who sees a client murdered and spends the rest of the game struggling to find and arrest the killer.

With The Witness, I thought, I would finally be able to take all the lessons I had learned from years of reading detective mysteries and put them to practical use as a computer gumshoe.

After all, I'd been coached by the best—Sam Spade, Lord Peter Wimsey, Sherlock Holmes. This computer game, I thought, could do nothing but help make my sleuthing more sophisticated.

I was partly right. Playing The Witness did give me some suspenseful, funny moments. But the program also has some limitations that kept me from running as complete and realistic an investigation as I would have liked.

Clues

The Witness is attractively packaged and comes with a "police file packed to the gills with revealing evidence you'll need to unravel the crime." The file contains a mock 1938 newspaper with stories about the man whose life you are to protect, a telegram he sent you, a suicide note, and a matchbook. The *National Detective Gazette*, a well-produced game handbook, an Infocom reference card, and literature describing the company's other game offerings are also included.

To begin the game, you review the *Gazette*, load The Witness disk, and boot your system. Text appears on the screen and describes your situation and the characters around you. Suddenly, you are one of the characters in an interactive mystery novel.

As the story progresses, you are asked to take action often. According to the documentation, you have 12 hours to solve the mystery, but you don't have to do it in one sitting. You may suspend, restart, or quit the investigation at any time and print out a transcript of the investigation, if desired.

The object of the game is to gather enough evidence to warrant an arrest. When you arrest a suspect the game ends. Later you receive a letter from police department headquarters telling whether the suspect was indicted, and, if so, the outcome of the trial. There are many possible endings to the game.

Hide and Seek

The game gives you a fairly extensive command vocabulary for executing various detection procedures and talking to characters in imperative sentences. It was fun to search for, analyze, and confront suspects with physical evidence. Commands allowed me to follow, hide from, accuse, and arrest other people, and more. And watching other characters' reactions when I ordered them around—"Give me the note," "Show me the gun"—helped me begin to unravel their stories.

But I encountered problems when I began questioning characters in this electronic thriller. The limited questions I could ask and number of words the program could understand hindered, rather than helped, my investigation and made its outcome more dependent on how I handled physical evidence than how I questioned suspects.

You are presented with a situation suspicious enough to warrant thorough

The object of the game is to gather enough evidence to warrant an arrest.

investigation. It is Friday, the end of another hard week, when an urgent telegram reaches you, chief detective with the Cabezaplana, California, Police Department. It is from Freeman Linder, a well-known Los Angeles businessman, whose wife shot herself only a week before. He is writing because he believes his wife's lover,

who blames Freeman for her suicide, is planning to kill him. He wants you to come to his house to protect him that night. It's a story line that would have made Ross MacDonald proud.

Once you arrive at the house, you meet Freeman; his daughter, Monica, who "gives you a look like you're a masher who just gave her a whistle"; Phong, the enigmatic Oriental butler; Stiles, the late Mrs. Linder's lover; and your assistant, Duffy.

Ambiguous Answers

The problem occurs not when you meet these characters, but when you try to communicate with them. The game's questioning options are too limited to make interrogation, the cornerstone of any good investigation, very effective.

The characters are believable, the story well written, and the concept great for armchair detectives.

I couldn't grill my suspects in this game. Witness characters will respond only to two kinds of requests: for information about someone or something, and for the whereabouts of someone or something. ("Linder, tell me about Stiles." "Monica, where is the cat?" "Phong, have you seen the scroll?") When you try to squeeze information out of the characters with these standardized questions, you realize how general they are.

The detective in *Witness* can never ask the question "Why?" This short question can get more information out of people than any other in our language. Ask the parent of any toddler. Yet the detective in *Witness* isn't allowed to use it. This gives the other characters in the game a certain advantage and presents you, as a gumshoe, with some rather sticky problems.

Circuitous Grilling

Instead of asking Stiles directly why he had an affair with Mrs. Linder, I had to approach the question indirectly by typing, "Stiles, tell me about Mrs. Linder," and hoping he would volunteer his motives. He didn't.

When I asked Phong to tell me about Linder and the butler said he would leave his employer and return to Asia in a minute if he had the money to travel, I couldn't ask why. When Monica said no one had understood her late mother better than herself, I could only sit there tongue-tied. I dropped hot leads so fast, it felt as if my hands were full of burning coals.

I also found it troublesome that the program doesn't recognize or let you use many of the words spoken by its characters or used in its descriptions and documentation. The *National Detective Gazette* does say that "the program uses many words in its descriptions that it cannot analyze." Limitations must be expected with any game, but the ones in *Witness* were more extensive than I expected.

For example, at the beginning of the mystery, Stiles sends Linder a threatening note, which reads:

> Linder—
> Since Virginia died, I've lost too much sleep because of you and your harassments. The time has come to put this matter to rest once and for all. I'll be seeing you sooner than you imagine.
>
> —Stiles

As the detective, it is your job to find out what this note means. After reading it, I immediately typed in "Linder, tell me about the harassments," and the program responded, "I don't know the word 'harassments.' " So I tried another tack and typed "Linder, tell me about the matter," only to have the program respond "You don't need to use the word 'matter' to solve this mystery." Since the program could not use two key words in the note, I could only ask Linder very general questions regarding the note and hope he would blurt out some useful information. He was too smart for that.

According to the newspaper I received as part of the game package, Linder ran an international import-export business "devoted to the exchange of goods between the U.S.A. and Asia." At one point, when Linder told me he'd met Phong in Asia, I asked him to tell me about Asia, only to have the program respond "I don't know the word 'Asia.' "

No News Useful News

Two of Linder's close associates, film star Gaunt Rockwood and businessman Yukio Matsuyama, were mentioned prominently in the newspaper article on Linder. When I asked Linder for information on these two characters, the program responded that neither name was recognized. My experience with the newspaper's lead article didn't encourage me to scour the others for leads.

The detective in Witness can never ask the question 'Why?'

I know that a program, no matter how well crafted, cannot accommodate every question I might ask, and I am not saying The Witness should. But I do think the program could have been designed to allow the detective to use more of the tantalizing information offered by the game's characters, descriptions, and documentation.

Although the game does have certain limitations, it is still quite appealing. The characters are believable, the story well written, and the concept great for armchair detectives eager for their own adventure after years of cheering on fictional friends. I have been lured back to the game three or four times to grapple with its sordid scenario and cryptic personalities. The Witness is not the perfect game for an aspiring gumshoe, but it's not a bad start. It has limits, but once you learn to play within them you can have a lot of fun chasing villains on your video screen.

Lindsay McGrath

PLANETMASTER

Magnetic Harvest
P.O. Box 255
Hopkins, SC 29061
Requires: 48K
List Price: $24.95

CIRCLE 502 ON READER SERVICE CARD

American poet Emily Dickinson once wrote, "If I can help one fleeting robin onto its nest again, I have not lived in vain." If only she had lived long enough to play Magnetic Harvest's Planetmaster. Then she could have helped save jofulls, grouxxes, wheepies, waferts, poiboles, leevers, and poodens.

There are no robins in Planetmaster, Emily, but there are bighens.

Planetmaster derives its name from the planetmasters, who act as shepherds of the Intergalactic Greenpeace Foundation in the year 2323. Their mission is to save the animals, much as the current "Save the Seals" and "Save the Whales" organizations attempt to do.

It can give you the feeling that you do make a difference in preserving an environment.

The game requires players to select six endangered species from a seemingly unlimited number of animals and then transport them en masse to a Space Sanctuary Satellite (SSS) for the purpose of preserving and nurturing them.

SSS's are dodecahedronal structures 48 kilometers in diameter. The satellites are segregated into 12 zones, each exhibiting a unique climate. During the four seasons of 30 days each, weather conditions vary as much as 25% from the zone norms.

Whether a species, whose biological characteristics and needs differ from those of other species, lives or dies, depends on the climate you select. A player must also take into account the unpredictable weather conditions; varying geography; several different types of genetically engineered, regenerating food vegetation; birth and death rates; food consumption; and hibernation periods.

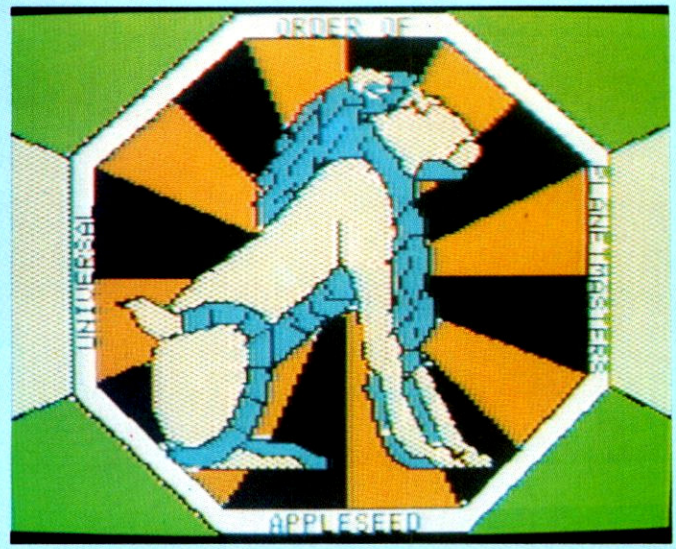
Whew! It's quite a bit of information to remember, but if you overlook even one aspect or make one incorrect calculation or guess, it could mean extinction for an entire species.

After analyzing these important factors, you must herd the animals to different zones, choosing among zones offered. It is best to jot down the animals' characteristics and compare them with the various climates. The game is completed when you've successfully transported the six species for the number of years you previously selected.

With each season you get an efficiency rating of your performance. You have to achieve an overall rating of 85% in order to receive a "certificate," not much of an award for the amount of time and energy put into transporting the six species.

Playing Planetmaster is not an easy task, and therefore you should begin with one year (with four seasons and six species, which amounts to 24 transports) to get a feel for the game. You can choose from five levels of play—novice planettender, journeyman planetkeeper, professional planetkeeper, advanced planetologist, and planetmaster.

Accompanying the software is an instruction booklet, an absolute necessity. In addition to definitions, the booklet contains appendices with climate conditions, maps, plant-growth characteristics, possible range of species biological descriptions, and miscellaneous program information. All player inputs and options are defined on the 50 game screens, but it helps to take notes during game play.



Players seeking elaborate graphics will not find them in Planetmaster. The only graphics are the species, which all look the same; bar graphs; and the "certificate"—all uninteresting.

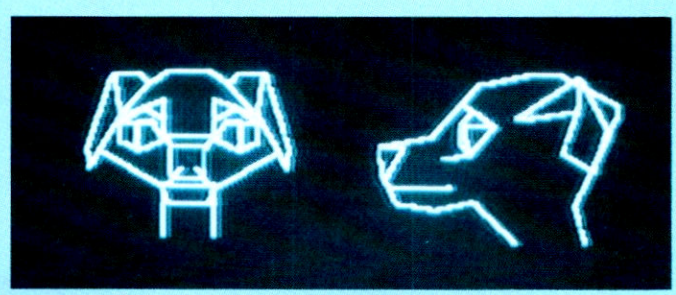
The game is an educational tool, designed to inculcate higher human and cultural values.

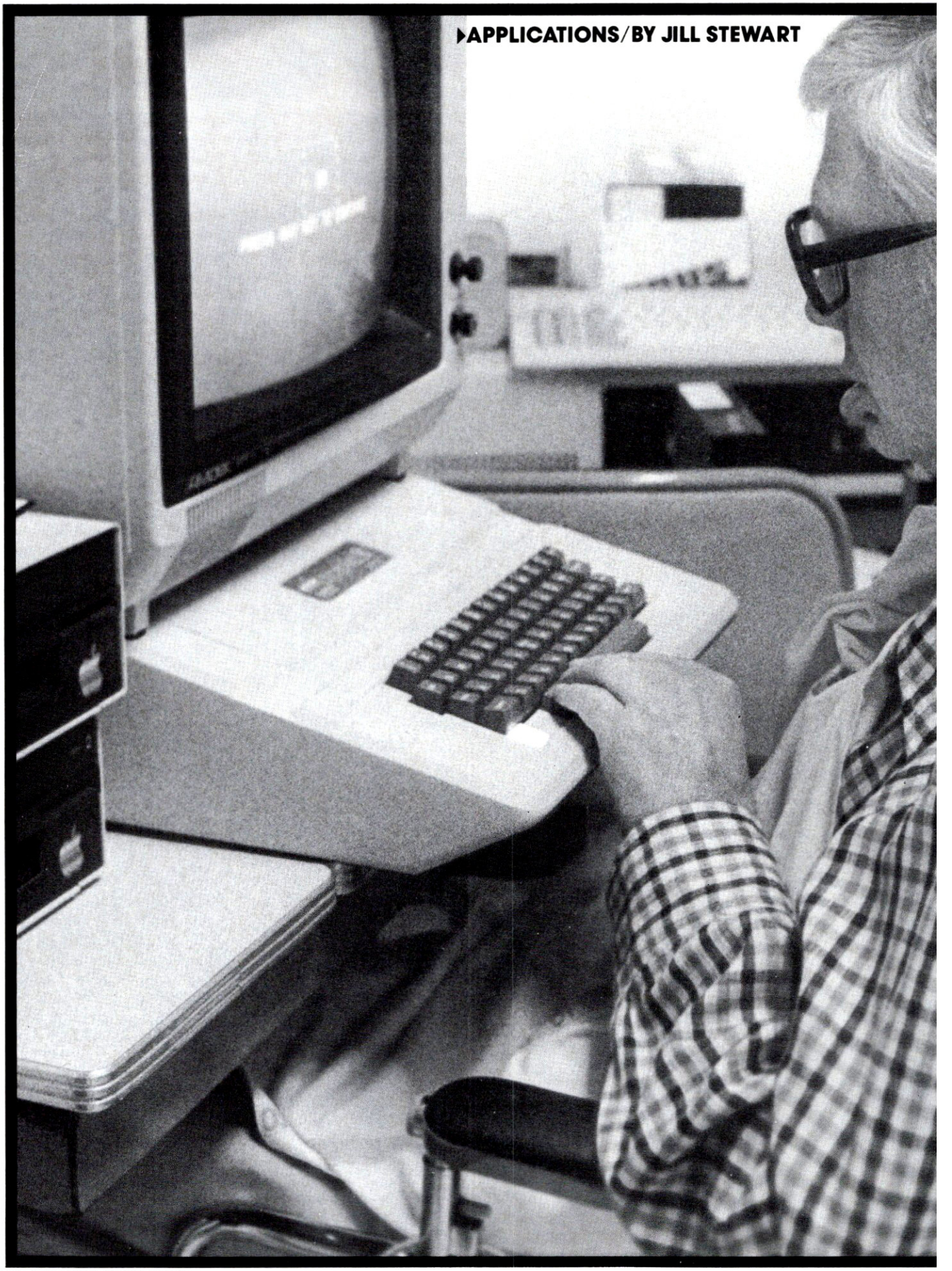
Graphically, Planetmaster lacks the creativity and complexity of other new software, but the game does possess a unique quality: it works on the mind and feelings. In this sense, the game is an educational tool, designed to inculcate higher human and cultural values. It makes you employ your intellect and intuition, for Planetmaster relies on chance and skill.

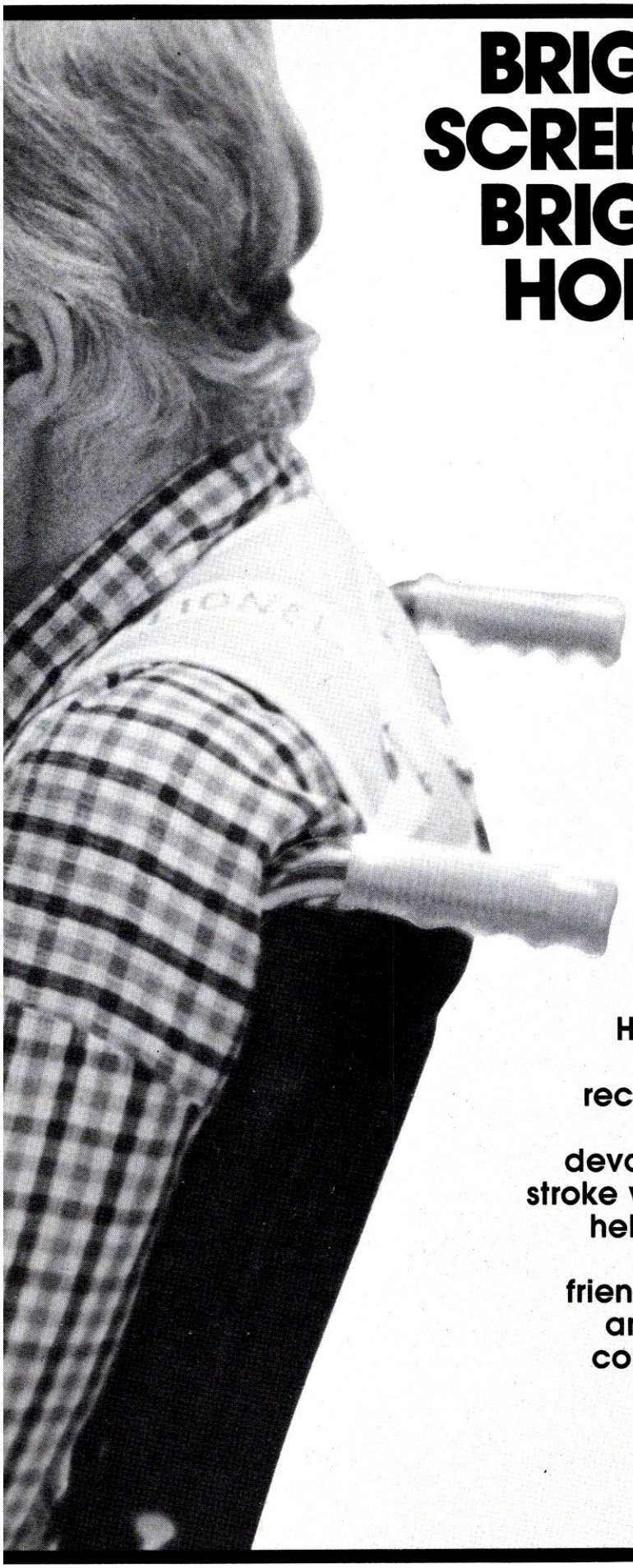
Other features of the game include a copyable program, game replay, player history recall, a one-key menu, specific variable definitions, and key program algorithms to permit experimentation with simulation parameters. What it does not feature, however, is the excitement associated with winning or losing.

As a "game," Planetmaster fails; as an educational tool, it fulfills its purpose. It sets out to challenge the user intellectually and humanistically. If it cannot provide visual diversion, it can give you the feeling that you do make a difference in preserving an environment.

Nell Fields







BRIGHT SCREENS BRIGHT HOPES

How one man is recovering from a devastating stroke with the help of his family, friends, and an Apple computer.

Imagine that a damaged human brain, now void of its information-transmitting grooves, could be repatterned with the help of a computer.

The newly handicapped person, whether a victim of a stroke or an accident, would be forced to pave the data avenues in his brain repeatedly following computer programs designed specifically for brain-trauma patients. Through this seemingly tedious yet innovative process, the lost abilities such as memory, speech, and touch could be relearned or restored so the accident victim could resume a more nearly normal life.

That is the hope of medical and technical experts throughout the country who are pioneering these new concepts. And it's the hope of victims, such as Lionel Mosing, a once-brilliant industrial psychologist who suffered a near-fatal stroke almost two years ago. The stroke critically damaged his left frontal lobe, where the brain's speech center is located, and rendered him aphasiac—a medical condition characterized by the inability to speak or completely understand the spoken or written language—and unable to walk and perform such vital tasks as eating.

"Lionel had the most severe, massive stroke that a person could have and survive," said Darlene Hornbeck, rehabilitation coordinator at St. Mary's Medical Center in Long Beach, California, where Mosing is the focus of a highly experimental therapy program.

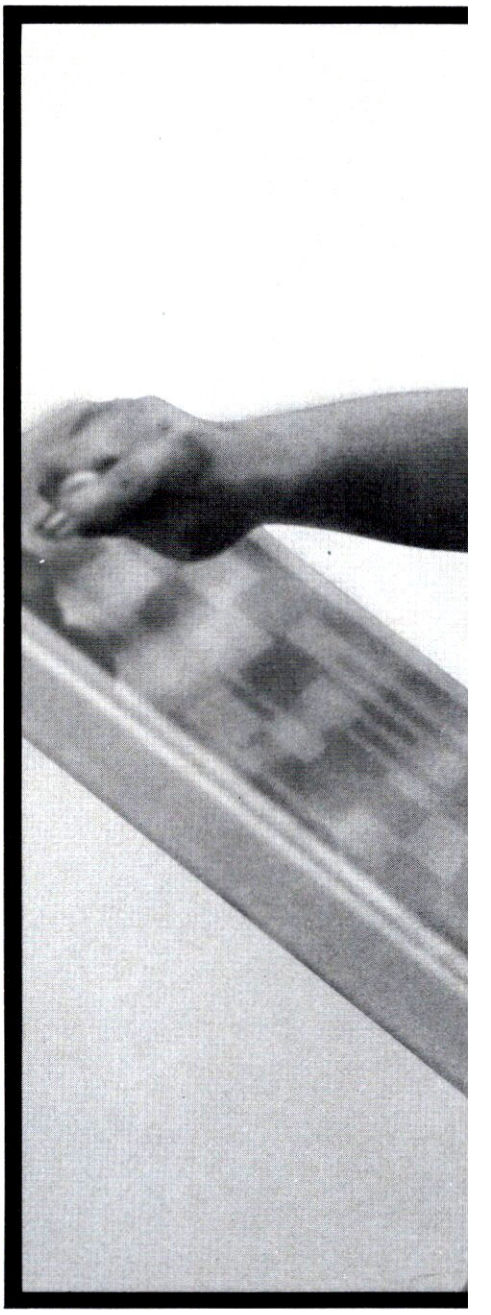
The six-member medical team has introduced the computer rehabilitation into Mosing's daily regimen in an attempt to stimulate his broken thought patterns.

Tony Villano, a former colleague of Mosing, has joined the team to help his crippled friend and has taken a special leave from his job at Xerox Corp. He uses an Apple II Plus computer with an Amdek Color I monitor as part of the program.

"Lionel was always the computer man who said, 'Hey, this won't work with a human being,' " Villano explained. "It's funny, but now I'm figuring out what will work and what will not work with Lionel."

Ended Illustrious Career

Before Mosing's stroke, he was a top computer interface designer for Xerox Corp. in El Segundo, California. Earlier, he was one of the key developers of the Bell Telephone Trimline phone. He also holds eight patents and a doctorate



in industrial psychology.

The stroke in the left side of his brain resulted in paralysis of the right side of his body.

"It's as if you were taken away and plopped down in China without any way to understand Chinese or to make people understand you," explained Dr. Hubert Gulak, director of rehabilitation at St. Mary's, of Mosing's condition.

Through his trial-and-error therapy program, Mosing is being given the chance that many people don't get but should, explained Dr. Gulak, who also works with the team. "Medicare and most insurance plans would never give us the time we need to bring them around. People trapped like Lionel just get shuffled off."

When Mosing was transferred to St. Mary's from a small Orange County hospital in January 1982, Gulak said he was taking on a patient otherwise destined for a nursing home. On January 14 of that year, the daily hospital report noted that Mosing "could not open his mouth with cueing and could not follow a voice in the room. No awareness of pinching." Today, the once-slim hospital report is a nine-inch thick document full of small miracles.

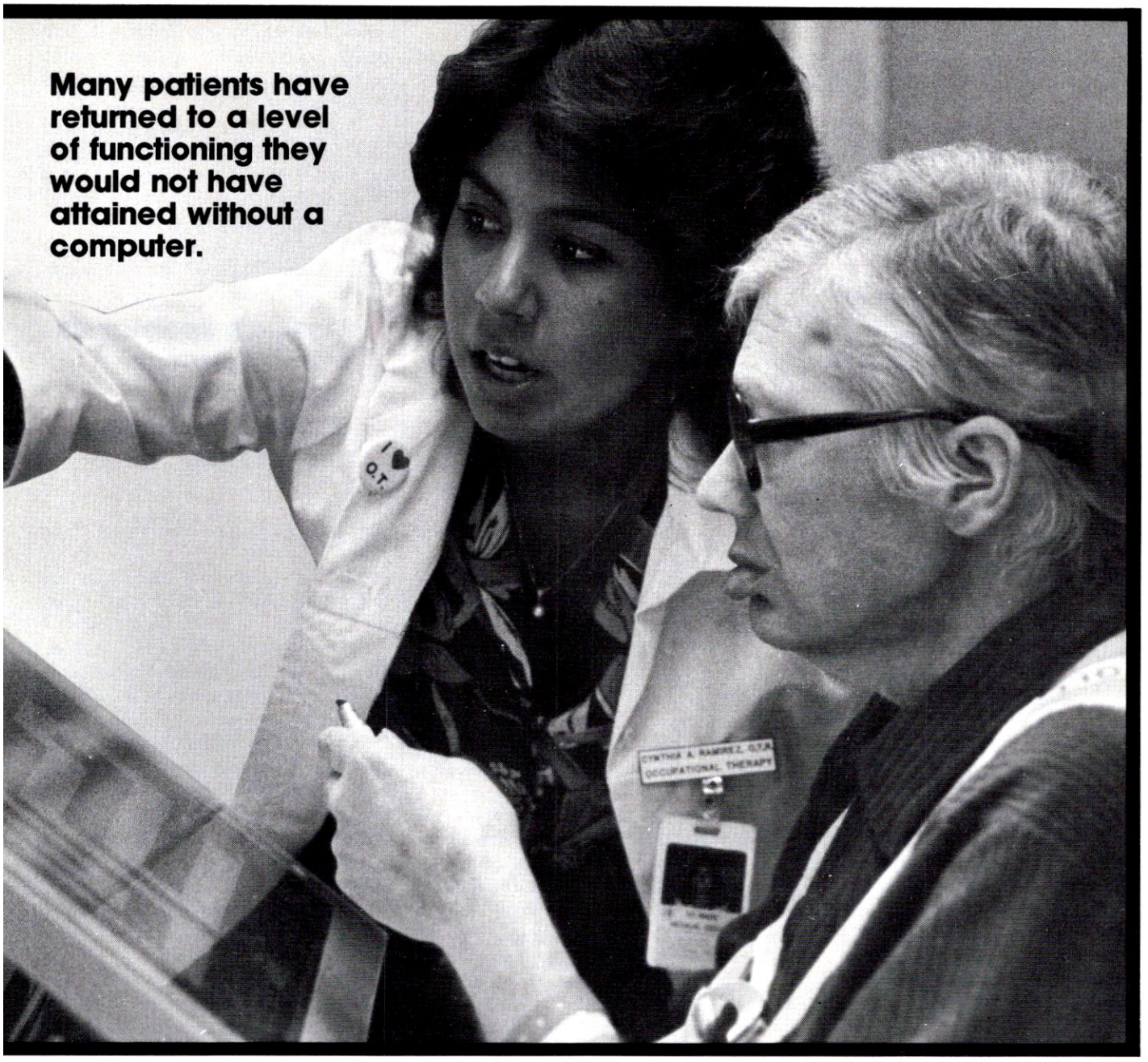
Computer Therapy in Demand

Success stories such as Mosing's naturally have spurred the growth of this fledging field of using computers for brain-damaged victims. The new therapy also has gained popularity because of the increasing numbers of victims who survive incidents that would have killed them a few years ago.

"Survivability is creating a new population," explained Richard Friswell, executive director of the National Head Injury Foundation in Framingham, Massachusetts. "The neurosurgeon preserves the quantity of life, and preserving the quality of those lives is falling to the rest of us."

Friswell estimated that this year about 50,000 people will survive accidents, whereas 10 years ago the number was 20,000. More will live, he said, largely because of advances in emergency room techniques.

At the forefront of this computer therapy is New York University Medical Center's program for stroke and head-



trauma rehabilitation. Its program has shown remarkable success and has spurred interest in the process.

Of the 70 people treated at NYU using computers, only about 5 percent showed no progress at all, while 10 percent returned to their former jobs. The rest hold jobs at sheltered workshops or engage in routine daily activities. With this success rate has come non-stop inquiries, according to Jack Rattock, clinical neuropsychologist at the hospital's Rusk Institute. What the callers want to know is how Apple and Radio Shack microcomputers help restore the concentration and attention span of patients.

The Community Hospital in Indianapolis, Indiana, has compiled an impressive success rate also since it began computer therapy in 1981.

"Many, many of them [the patients] have returned to a level of functioning they would not have attained without a computer," said Dr. Lance Trexler, who is the program's director.

Calling it a quality-of-life issue, Dr. Trexler predicted that the use of computers to re-educate the brain will sweep every rehabilitation ward in the country in a matter of years.

In Los Angeles, Dr. Richard Katz, coordinator of speech pathology at the Veteran's Administration outpatient clinic, is working with a dozen brain-damaged veterans to improve their reading comprehension and math aptitude. He is using Apple computers also.

"We've found that guys who used to come into the clinic for therapy two or three times a week are coming in all the time now," he said. The happy result, he explained, is dramatic improvement in both their ability to recognize words and to communicate.

He added: "Our patients respond to computers just like everyone else—they're excited."

Custom-Rehab

Since the therapy is so new and so individualized, rehabilitation programs vary from patient to patient. The program devised for Mosing, for instance, includes a combination of traditional therapy such as problem solving with colored blocks, table-top word and number games and physical exercises with

his nonparalyzed left side, and several computer games.

For his computer therapy, two programs written in the language BASIC are used.

Occupational therapist Gary Bedell selected the two programs and Villano has found others. Bedell's programs were written by David B. Waechter as part of a brain trauma rehabilitation program at Coastline College in Orange County, California.

Villano also scoured the country in search of appropriate computer programs. He also sought out three other victims of brain trauma who could benefit from computer therapy. He wanted patients who had deficiencies distinct from one another, who needed to relearn different tasks.

In one of the games, called Shape Same, the object is to match the appropriate quadrant with the identical shape in the center. This is accomplished by pushing one of four keys on the keyboard.

What the patient sees on the monitor is a screen split into four empty quadrants with a small fifth section in the center. A brightly colored shape—which looks like a jigsaw puzzle piece, except it has no curving angles—appears in the center section. Each quadrant contains five odd shapes, all similar to the center's configuration.

The other program, called Shapes Different, works on the same principle but with a variation. The four quadrants contain the same shapes as the center and only one shape is different in one of the quadrants. Again, the patient must identify the correct quadrant by pushing a button.

'Our patients respond to computers just like everyone else—they're excited.'

"With all of these programs, we are trying to improve the variety of unfamiliar things Lionel is able to do," Bedell said. "Shape Same forces him to use all four visual quadrants and to enhance his initiation behavior and motor planning. Reaction Time forces him to concentrate enough to move his hand and stop the numbers from counting."

Mosing's team is betting that introducing the computer to his therapy will help snap him out of an unusually long poststroke period.

Progress and Hope

Dr. Gulak said he is now convinced that Mosing's intelligence is intact, locked in behind the blue eyes that twinkle when he smiles and that dart swiftly from face to face when he is frustrated.

"I've gone to Lionel many times in the last year . . . and I've just touched him on the shoulder and said, 'It's going to be OK,' " Dr. Gulak said. "And I think, somehow, he knows what I am saying.

"He is a very intellectual man who realizes his plight and, because of his intelligence, isn't happy about trusting a lot of people," he added.

In May, a few days after Mosing's 53rd birthday, he had a breakthrough in his ability to think in sequence. He completed a simple task of subtraction, which requires use of his short-term memory.

"At each point during the task, I said, 'My gosh, Lionel, do you realize what you've done?' and he nodded his head," said Joyce Block, his speech therapist. "Then I said, 'Did you think you could do it?' and he shook his head no.

"Because he's such an intellectual person, he was very quiet about it," she said. "Tears came to my eyes, not to his."

Today, Mosing can move his left hand and arm to use the computer or warmly shake a hand. But he is still unable to move most of his nonparalyzed left side without help. He can "walk" a short distance between support bars, and he has learned to control his facial muscles so that his lips do not slack. He can nod his head to indicate yes and no, and uses facial expressions to communicate. But his lips can rarely form words, and eating is so much trouble that he receives food through a tube to his stomach.

Known as apraxia, the inability to move nonparalyzed muscles is common among stroke victims and takes time to overcome. For instance, Block explained, Mosing is faced with reactivating the 30 to 40 muscles needed to swallow. He has relearned two words: "yes," and "why."

"Personally, I wish he could cry or laugh and get it all out of him," said his wife, Lois, a sixth-grade teacher. "It's very atypical of him to be this nice, passive guy all the time. I am frustrated for him for that reason."

There are times, too, that others sense Mosing is comprehending what's going on. One of these moments occurred when Villano explained to Mosing his plan to take a social service leave from Xerox and help his crippled friend recuperate. Such a leave is sponsored by the corporation under a year-long community program.

When Villano told Mosing about the idea, "His first reaction was this quizzical look. Then, after I talked about it at different times, he would always take me by the hand and shake it.

"There are times he squeezes your hand so hard that you know it means something, and this was one of those times."

Mosing's specialists admit they are ready to try anything involving computers.

Mosing's specialists admit they are ready to try anything involving computers.

"This is all play-it-by-ear," said Dr. Gulak. "We have nobody to follow in dealing with aphasia, but we have a definite idea where we're trying to go."

According to William Steinberg, the computer adds a novelty that can help both patient and therapist overcome the drudgery of rehabilitation. A computer also can present the same tasks over and over without variation, and can rate the patient's progress objectively. Steinberg, a staff psychologist, works with the St. Mary's medical team.

No Cure-all

However, Dr. Gulak and other specialists warn that computers should not be viewed as a panacea for brain-damaged patients.

"One big fear is that these people will only learn to push buttons right, and nothing else," said Dr. Katz.

But all of this is academic to Lionel Mosing.

Recently, he left the hospital for the second time in nearly two years to attend the graduation party of his daughter, Lisa, who received a master's degree in nutritional science from California State University/Long Beach.

And, in the coming months, he will graduate to increasingly more challenging programs on the Apple II, eventually moving on to programs designed especially for him by Villano.

And, maybe somewhere down the road, the old Lionel Mosing will emerge from the tall, thin man who can't speak or cry. ✚

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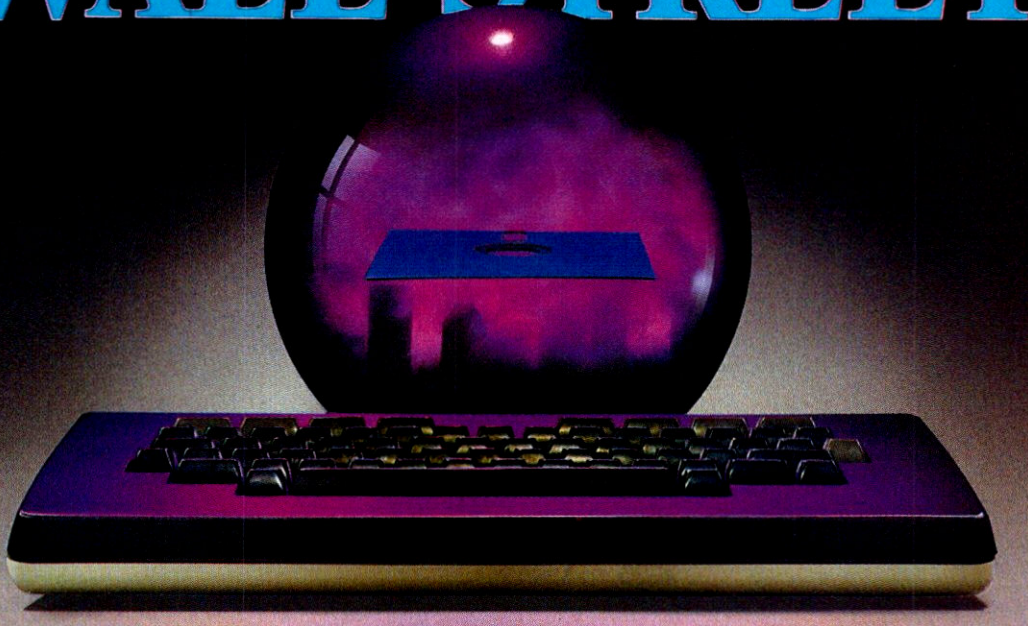

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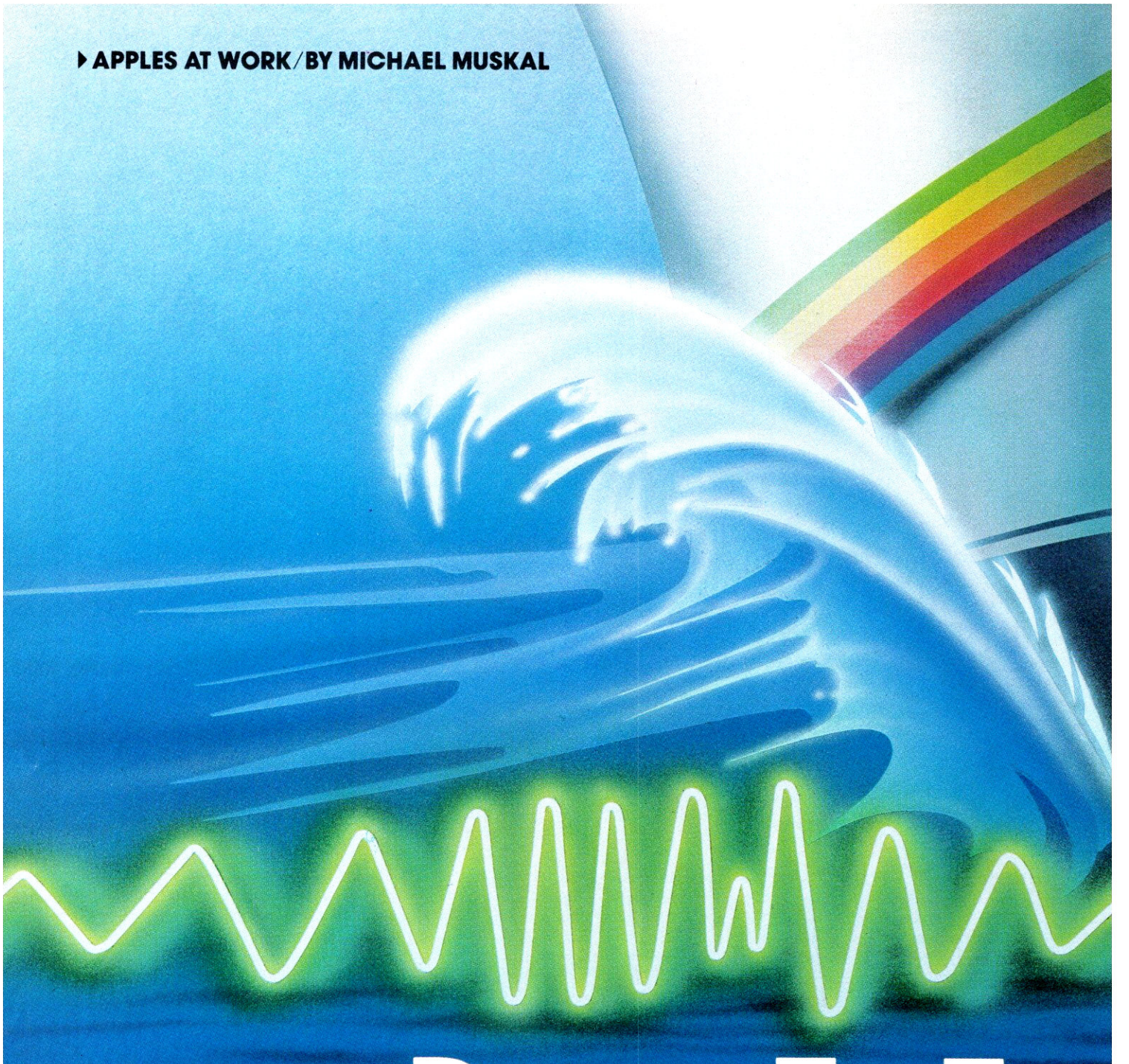

DOWN TO THE

By simulating conditions at sea, Apple helps take the guesswork out of an ancient craft. The result is sleeker, fleeter boats.

At the Lazzara Marine Corporation in Tampa, Florida, in a shed the size of an aircraft hanger, carpenters are building a model of a boat. They are as skillful as the ancient Phoenicians, whose techniques they have borrowed, but this vessel will never enter the water. It bears the same relationship to the final boat as a carousel pony does to the winner of the Kentucky Derby. The two are similar in form, but light-years apart in substance.

Near the woodworkers' building sits another, slightly smaller structure that is one of the world's largest ovens. Inside, heat and vacuum will create a boat hull out of strips of space-age fibers that have

SEA IN CHIPS

been placed on a fiberglass mold made from the wooden shell next door. These modern materials are crucial to the final product, but equally important is the computer research that will make this boat light enough to take advantage of the wind's slightest sigh, yet strong enough to withstand the crunch of a hostile wave. There is an air of excitement here that mixes with the salt floating in on the mist from the Gulf, a tang that comes from working on an innovative project. These craftsmen are combining the resources of modern science—everything from Apple computers to polymers—with the ancient art of shipbuilding.

The Inexact Art

As recently as 10 years ago, engineers couldn't compute with any precision the forces at work when a boat crosses a wave. Everyone knew a hull had to be strong enough to withstand the shock of riding the crest or falling through the trough, but no one could put a number on the power of forces at work. That lack of

knowledge made designing a boat hull a hit-and-miss proposition, according to David Jones, research director for Lazzara Marine.

"What people used to say is, 'Well, we built a 40-footer and the hull was about that thick and it worked pretty good,' " he said holding his hands inches apart. " 'Well, we're building a 50-footer now, so we'll make it a little thicker.' That's really the way people did it."

Unlike other builders who are still guessing, engineers at Lazzara know that they are using exactly the right material to withstand stresses they have calculated from data they collected at sea with the help of Apple II Plus computer. Before the first strip of polymer goes on the mold, engineers have built dozens of versions of the boat that never sails farther than the 40-column width of the Apple's screen. Most of those simulations have broken on the electronic waves projected by custom-made software from the data. There are enough broken boats in the Apple to fill the Bermuda Triangle, but, for the first time, engineers will really know what their boats can do before the first breeze blows the vessel across a five-foot chop.

The Phoenicians would hardly recognize modern boat technology. Shipbuilding, one of humanity's oldest crafts, evolved from simple wooden rafts that were at the mercy of currents, to vessels powered first by muscle and wind, and later by engines. No longer just a form of commercial transportation, boating today has become a major sport whose enthusiasts range from sailors out for a day in the sun on their Lasers to America's Cup competitors on expensive 12-meter boats.

The engineering description of boats is similar to that of birds or airplanes. Water, like air, is a fluid medium. Keels on boats are foils similar to wings. Boatbuilders, like airplane manufacturers, want their products to become lighter, faster, and stronger. Yet boatbuilding has not attracted the volumes of experimental data and research from which flying has benefited.

Marine Construction

"Traditionally, there have been few dollars available for marine research. About three years ago, we knew that not enough was known," said Richard C. Lazzara, president of the yacht company that bears his name.

Lazzara started his company to build custom yachts, the upscale portion of the market that has been a family concern for 13 years. His family owns Gulfstar Inc., a St. Petersburg, Florida, company that produces a line of standard yachts. The difference between the companies is like the difference between Cadillacs and Rolls Royces. Though the entire yachting industry is basically a luxury-class operation, the new company builds boats that can cost over a million dollars and that are designed for competition. At that level of performance, ounces saved in construction will translate to more speed at sea. Efficiency is the watchword.

Lazzara left Gulfstar, where he was vice president and chief engineer, in 1979 to start Advanced Technology & Research Corporation, an aerospace company. During his work with aircraft, he became familiar with "pre-preg" construction, an improvement on fiberglass technology. He founded Lazzara to take advantage of the new technique.

Because the technology is new, no one really knew how much force a particular sample of material could withstand, or, indeed how much force it would have to bear. The aircraft industry is closely monitored by government agencies. The Federal Aviation Administration, for example, filmed dynamic loading tests in which building materials were deliberately broken by stress. How a material fails, under what pressure, and how quickly, are key engineering facts. Such information is not available to boatbuilders.

Ounces saved in construction will translate into more speed at sea. Efficiency is the watchword.

"For this reason, I realized that with our limited knowledge of the dynamic loading that was on a sailboat, it was time to take the next step to develop that information before we could start building pre-preg," Lazzara said.

Enter the Apple

To gain that knowledge, the company launched a research project under the direction of the 30-year-old Jones, whose first step was to recruit two engineering professors from the University of South Florida College, Tony Llewellyn, 50, and Stan Kranc, 40. Llewellyn and Kranc, both boating enthusiasts, designed the software to run the Apple and served as consultants to Lazzara Marine.

"For this project we decided to use Apples because that's where our expertise was. We happen to have a background in Apples because at USF, it became obvious in our departments around 1978 that the small computer was here to stay. When we first realized that very small, cheap computers were available, we decided they would be useful in a number of ways. First, they're calculating engines, that meant that students could do more. More complicated calculations became practical. We also had used computers to take measurements on systems that were changing so rapidly, you couldn't hope to look at the measurements by conventional methods. The Apple is easy to use, especially in an engineering environment where the first thing you want to do is pop the top off it and plug things into it, not just a box that you wiggle the keys on," Llewellyn said.

As part of an earlier project on pollution, Llewellyn and Kranc had taken the Apple to sea to run testing equipment, so when Lazzara contacted them about their project, it was natural to choose an Apple, Llewellyn said. "We had this practical acquaintance with it. I had a lot of confidence the thing could survive being knocked around."

Research Afloat

To measure the forces, the group took sensors and placed them directly into the hull of the boat. Sensors are pressure transducers that include a crystal and are about the size of a pencil eraser. Any pressure on the crystal is translated into voltage, which is transmitted to the oscilloscope. The electric current is displayed as a rapidly-changing curve. The digitizing oscilloscope, a Tektronix 5223, also converts electric pulses into numbers. The Apple was also connected to a PCB Electronics peak meter that measures maximum pressures. Because of the speed of the forces, there was no way, other than computers, to monitor the system.

The first laboratory test of the equipment was in late 1981. By the following year, the group had outfitted a 60-foot Gulfstar sloop named Reba with equipment. The whole assembly easily fit on board in a specially-designed cabinet. The brain was the Apple II Plus with standard 48K random-access memory and two disk drives, one for the software program and one for filing data. The Apple was connected by an IEEE-488 bus to the oscilloscope. Another board connected the computer to the peak meter. The set-up ran on the boat's power, which required an additional converter. The team connected a printer and a

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clock to the machines so that data could be retrieved on paper and tagged with the time measurements.

As the newly-outfitted Reba sailed in the Southern Ocean Racing Conference regatta, each wave that pressed on sensor appeared on the oscilloscope, and the whole pattern of pushes and pulls pulsed across the screen like a heartbeat. That data was translated into numbers that were downloaded to the Apple, which stored it on a disk. Reba didn't win that race, but the information has proved invaluable for future yacht designs.

"The idea is to try to deduce what the patterns of the forces are on the hull, and, ultimately, on the rigging when the boat is sailing in various sea conditions on various courses," Llewellyn said. Kranc added: "We're trying to understand how the patterns interact with the structure of the boat. First, what is the push? Second, what is the response?"

Pressure Patterns

The team is still studying the data it has accumulated. "I've been looking at the data. We have 27 disks of data and approximately eight-and-a-half miles of strip chart. We've been going through it trying to pull out relationships," Jones said.

But there have been some early findings, including being able to quantify what happens when a boat, for example, hits a wave at a 45-degree angle. That is not unusual in an even moderate sea where the impact of the wave on a sailboat can be harder than a grown man slapping a table so hard that it bounces. Half of the boat's hull could rise out of the water before it plows into the next wave. Depending on sea conditions, that force could be as much as 16 pounds per square inch— about equal to the weight of the Pittsburgh Steeler's entire offensive line thrown against a space one foot square. That force could hit in just a few milliseconds, according to the preliminary data.

"You want the boat to survive that, but you don't want it to be any heavier than it has to be. That's the research area and that's what nobody knows about. We don't know what the magnitude of the forces is, and the qualities of the material are only approximately predictable," Llewellyn said.

Simulations

While the data is still sketchy, the group has been able to use it to actually build a boat. That process also involves the Apple, now safely, though temporarily, landlocked in the company's offices.

When boats were built of wood, you could enter a workshop, wade through pounds of shavings, and smell the aroma of different planks waiting to be cut to size and bent to shape. Fiberglass changed that, and "pre-preg" construction, borrowed from the aircraft industry, threatens to change it all again.

New Materials

Fiberglass boat construction is a smelly, time-consuming process. Various compounds are painted onto a mold or are sprayed from an air-pressure gun. Polymers are mixed on the mold during that spraying. Often several layers, sometimes separated by variously-shaped cores of other material, are applied on top of one another. Pre-preg eliminates several of these steps, where errors can occur. Pre-preg comes in premixed, uniform sheets that are stored in a freezer until they are pressed onto a mold. This new technology prevents bad mixing or uneven application, problems that can impair a boat's structure and, eventually, its performance.

"Technique is really the key. You make a keel, stick it on a boat, and if it's not perfectly true, it doesn't work well. If you have one true foil, it's similar to a wing and will work much better than if it's not true," Jones said.

Fiberglass boat construction is a smelly, time-consuming process.

Improved technique is only half the story. New materials are lighter and stronger than ever. In the past three decades, synthetic fibers and new adhesives have opened a smorgasbord of possibilities. Such materials as Kevlar and graphite can be layered or separated by a honeycombed core that creates a triple-ply panel. This panel, called a laminate, is the basic unit-hull construction. Whether the laminate can withstand the pressures of the sea depends on the materials, the type of core, and on how well it is bonded. Once the only way to test that strength was to build and break the laminate, a time-consuming process. Now that process can be simulated.

Prototypes

Using the Apple and additional software designed by Llewelyn and Kranc, Jones can construct a theoretical laminate and subject it to different pressures and twists based on the data the group collected at sea. The program is menu-driven, which allows the user to choose different materials for the laminate. "I can go into the software and build the laminates right there on the screen. I can enter the properties of the core, and the different layers of the material, where I'm going to put Kevlar and where I'm going to put graphite," he said, punching numbers into a modified spreadsheet. He can also test the laminate against sea forces measured during the Reba trial. He can even plot graphically how the laminate will break, and can compare various constructions with one another.

Computer prototypes can easily cut design time in half. "In the next half hour, I can study 20 different laminates. It would probably take me all day to build them by hand," he said. Using the simulation, Jones was able to design 40 different laminates for a 50-footer now under construction. Eventually he selected six different laminates for different parts of the boat.

Once the laminates are chosen, pre-preg makes construction relatively easy. Workmen lay sheets of selected material onto the fiberglass mold built from the wooden model. The structure is baked at between 200 and 250 degrees Fahrenheit to start the catalyst that bonds the materials. Pumps suck out the air so that the pressure helps seal the panel. Depending on the size of the boat, the process can be finished in one long workday. Use of pre-preg cuts the hull construction time by at least 10 percent.

Future Sensations

Jones foresees a time when the research department will be a profitable venture. Already, he said, other boatbuilders have called asking to run some stress comparison tests for their products. Consulting will probably increase after the next test run, scheduled for later this year. The group now is modifying a 24-foot sailboat, called Starship, to do further tests at sea. They hope to plant sensors throughout the hull and eventually put them into the rigging as well.

"We measured the bow and just one small section of the bow during the Reba tests. We took what we intuitively felt was a hot spot, an area of greatest magnitude, on the boat. On the Starship we will double the number of sensors and move them around.

"So far," Jones continued, "this has helped us to understand the forces and the magnitude of the forces. It has helped us get into the ballpark, now we know what game we're playing."

"You're beyond the stage," said Kranc, holding his fingers inches apart as Jones had done earlier, "of saying make it this big." ✚

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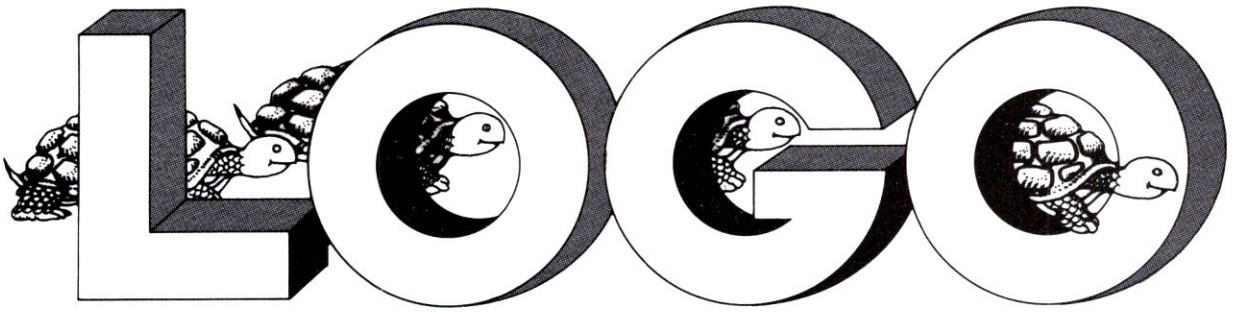

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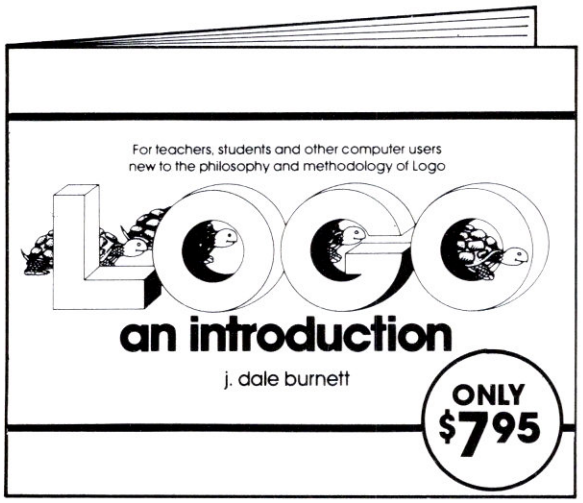

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APPLE

A successful undercover operation used an Apple III to lead thieves from drink to the clink.

The staid and boxy Apple III as a daring crimefighter—that image may seem as ludicrous as your aged Uncle Fred skewering terrorists with his poison-tipped umbrella. But the Apple III revealed its secret identity as derring-doer earlier this year, when the police department in San Jose, California, informed the public of the success of a gigantic "sting" operation, a $1.5 million scam coordinated by the trusty beige computer.

It all started back in July 1982, at a bar called Russ and Rosie's on North 8th Street in San Jose. Just another bar on the face of it, maybe a little cleaner than most, the usual pool tables, dart boards, liar's dice, beer posters, and tacky hand-painted mirrors. A good working-class bar, with decent prices for food and beer, even if some of the clientele were a little strange, like the scruffy men who occasionally sauntered in with ill-concealed weapons . . .

Let's back up for a minute. Perhaps this story actually started three months earlier, when the San Jose police department was formalizing its plans for a "sting"—that is, to set up a legitimate front for a bogus fencing operation that would buy stolen goods and arrest the sellers later.

The department decided then to operate a bar as its cover for the sting, a business that apparently hadn't been tried before, according to Lieutenant Harry Stangel, commander of the burglary-prevention unit (BPU) of the SJPD. The operation received an initial $39,000 to build and operate the bar and to buy the property.

Around this time, a grateful Apple Computer, Inc., donated an Apple III to the department, through the San Jose city council, as thanks for helping the firm recover more than a quarter-million dollars' worth of stolen computers. As Detective Terry Moudekas of the burglary-prevention unit put it, "Someone in Apple security said, 'Hey, you guys need a computer.' "

The BPU duly received an Apple III, a ProFile hard-disk drive, two floppy-disk drives, and a monochrome monitor, with software donated by Software Publishing Corporation of Mountain View, California.

While the custodians of the Apple III were initiating it into the needs of police work, Russ and Rosie's opened its doors. The detectives of the burglary-prevention unit had built the bar themselves.

Shortly after it opened, undercover officers started spreading the word on the street that Rosie's Bar did more than just sell booze. No questions would be asked.

"Once someone heard that a person could come in and sell us stolen merchandise, he'd tell a friend. Customers were our best advertising," said Moudekas. In fact, he joked, "One criminal brought us so many customers that we bought him a bottle of his favorite beverage at Christmastime."

The team was surprised at the amount of high-tech property it received.

The bar was only eight blocks from the police department. Nevertheless, the detectives who were tapped to work at the bar didn't go back to the home office for nine months. The bar was run completely by sworn police officers, except for one man from the Alcohol, Tobacco and Firearms division of the U.S. Department of the Treasury; he worked as a bartender.

Seven officers worked regularly at the bar, including Moudekas, and seven to eight support personnel helped out. The only person there from the department who wasn't undercover was Lieutenant Stangel himself, who became the liaison between the bar and the BPU. He would casually bring in operating funds, money to buy the stolen goods, and (most important) the paychecks. Eventually he became known as a regular customer, though nothing more. "Obviously I didn't wear a three-piece suit," deadpanned Stangel.

The bar did quite well at first. When Russ and Rosie's started doing business, most of the bar's patrons were people from the construction industry, "a good blue-collar crowd, real honest people," said Moudekas. But when the illegal side of the business started to trickle in, the good customers vanished, and the legitimate business went down. "A lot of people would get nervous about other people coming in with guns tucked into their waistbands."

But then, their plan wasn't to have a profit-making bar anyway, he added. They plowed what profits there were back into running the actual business.

Like any other small-business owner, Moudekas took pride in the cleanliness and profitability of the bar, despite its genuine purpose. "We kept it real clean, and we never had a fight there," he said.

As soon as the Apple III was ready, it became the sting's behind-the-scenes accountant, recording the names of the criminals who brought in goods, the type of property offered, the case numbers, the categories of materials, and the number of the videotape cassette on which each transaction was recorded.

Yes, the less-savory patrons of Russ and Rosie's should have looked at the bar's decorative mirrors more closely—they told the story. The mirror in the actual barroom, which depicted a dissipated-looking Russ and a blowsy Rosie, featured a prominent bee with a highlighted "sting" perching on Rosie's head.

STING

The mirror in the back room, where the money and stolen property changed hands, didn't have any obvious visible hints, but just above the center of the mirror hanging over the couch a close observer might have discerned a video camera whirring behind the two-way glass.

Managers at electronics companies seem curiously reluctant to say that large quantities of components have been stolen.

During its nine months of double dealing, Russ and Rosie's Bar played host to 278 transactions of a questionable nature.

The setup ran like this: prospective "customers" would call first on the phone and make an appointment. They would park in back—this was important, since their cars might be loaded with "hot" property that wouldn't be appropriate for public viewing.

Then, said Moudekas, they would stroll into the gloomy back room to start haggling over the price. "Never give the customers their original asking price," was the policemen's motto. "We didn't pay top price for anything. We were cheap; we were real cheapskates. We were just minor bureaucrats with a budget. Besides, this would throw suspicion off."

The rumor on the streets was that the staff at Russ and Rosie's was connected with organized crime, an impression the staff didn't openly foster but wouldn't discourage either, as a kind of safety measure.

Three undercover officers took part in every transaction in the back room: one behind the desk, in view of the camera; another on the couch, beside the people with goods to sell; and one more behind the office's bar, off-camera.

The point, according to Moudekas, was always to keep the criminals outnumbered and at a disadvantage.

Moudekas and the other principal staffers, Steve Lewis, Will Montano, and Russ Royal, had different cover stories to lure in desired types of property. Montano, born in El Salvador and raised there until he was 12, posed as a gunrunner searching for weapons to ship to Salvadoran rebels. Moudekas, who is of Greek extraction, sometimes asked for guns on the pretext that he would smuggle them to Arab connections in the Middle East.

Investigators later entered the relevant information about the purchases onto the Apple's floppy disks. The files included the names of the suspects, the kind of property, the "Wasp" number ("Wasp" was the department's code name for the operation), the case number, and the location of the transaction within the mass of Wasp videotapes. The sting eventually accumulated 66 cassettes' worth of taped sales.

From these entries a plethora of lists could be assembled—lists of cases, transactions by seller, unidentified property, or even property with sufficient identification to be returned.

Sixty-five percent of the stolen property the undercover agents bought was returned to its original owner. The items for which the department couldn't locate a victim were signed over to the city for auction. One of the biggest gripes the BPU had about the property they received was that, though they knew almost everything had been stolen, the owners hadn't marked their property, making it difficult to return.

"There were times when I bought property within five to ten minutes after a burglary. We were at the edge of an industrial area, so many burglaries occurred right in our own neighborhood," Moudekas said.

The sting team bought everything from dancing shoes to machine guns, including an RPB M-10 45-caliber weapon supposedly bought to go to El Salvador.

One of the buying strategies was to ask criminals openly for guns, credit cards, and other items that could be traced readily. Said Stangel, "We looked for readily identifiable items, and guns, to get them off the street. Also credit cards, negotiables, and checks. We bought half a million dollars in negotiable securities and travelers' checks, figured on current market value, and that $1.5 million total didn't include credit lines." Manufacturing credit cards is where the real money is, he said.

The team was surprised at the amount of high-tech property it received: several hundred thousand dollars' worth of stolen computer chips and microprocessor parts, and about $100,000 worth of hard-disk drives.

Strangely, many of the computer-related items went unclaimed, said Moudekas. For instance, 5000 custom integrated circuits with a company's imprint languished in the department storeroom, circuits with a company's imprint, yet

The Apple III became the sting's behind-the-scenes accountant.

the company didn't report them missing. "The electronics industry is real lax on security," he said. Also, managers at electronics companies seem curiously reluctant to say that large quantities of

components have been stolen. When questions arise, they're likely to say, "It must have been expended somehow" and request more money for the next year's budget, he mused.

Videotapes of some of the electronics transactions are revealing and often amusing. In one case a trio of men brought in an Apple II Plus, complete with peripherals, transporting the equipment to the bar in a car stolen just for the occasion. As the leader of the group displayed his wares, he began listing his "qualifications" for the sale, burglary and grand theft among them. His father was an attorney, he said proudly, as he continued to brag about his exploits.

The thief unquestioningly complied, greatly easing the task for his future captors.

continued to brag about his exploits.

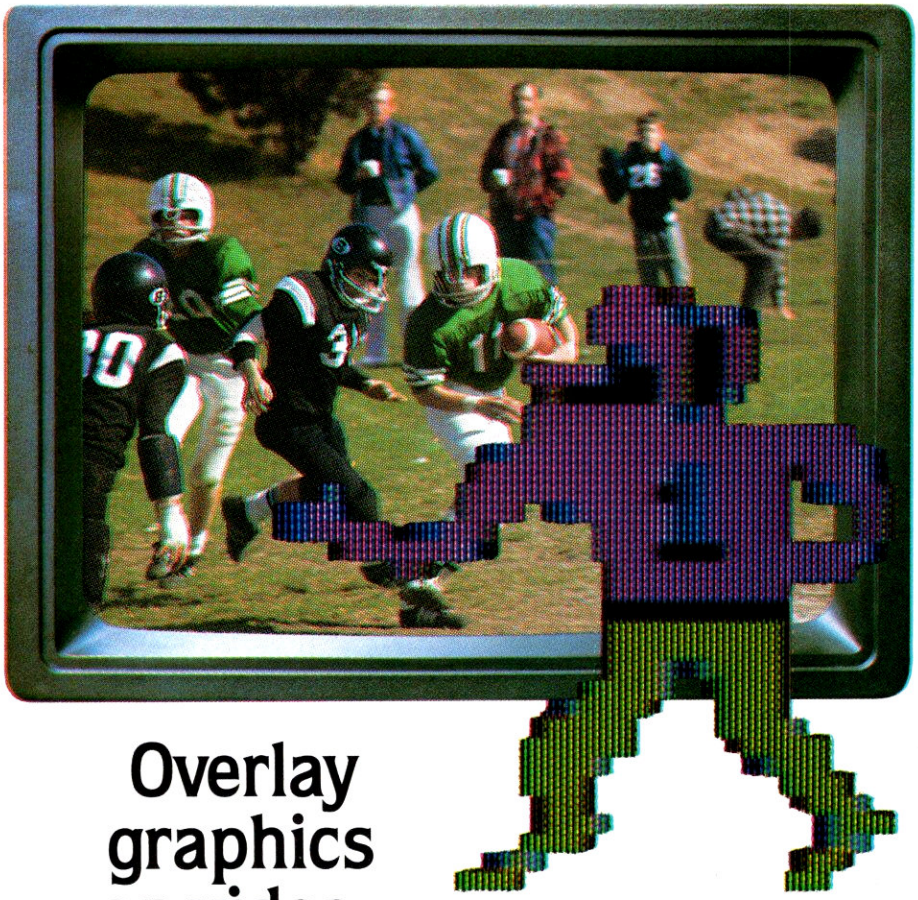
Another man who offered a stolen computer for sale inadvertently aided the police when one of the undercover officers asked him innocently how he knew the computer worked. "Oh, it works," the thief said. "Show me," said the detective. The man hooked up the computer and asked, "Well, what should I type?" "How about your name and address?" was the reply. The thief unquestioningly complied, greatly easing the task for his future captors.

Funniest of all might have been the pair of cocaine addicts who proffered a load of stolen computer chips. When they first brought in their booty—worth $600–700—the chief negotiator told them it was worth only $20 and offered them that for the whole batch.

At first the men begged for more money, protesting, "I have kids, he has kids," but a few minutes later the truth came out. One of the men was "sick."

"I gotta get me some dope. Cocaine, I'm a cocaine man."

They gave him some walking money, telling him that all he had were some relatively worthless "ten-position dual-edged card connectors" but that he could come back later for more money. When he returned after scoring the drugs he needed, he pressed again for further cash. When the undercover men questioned whether he was carrying a gun, he demonstrated that he was weapon-free by dropping his pants partway. "We



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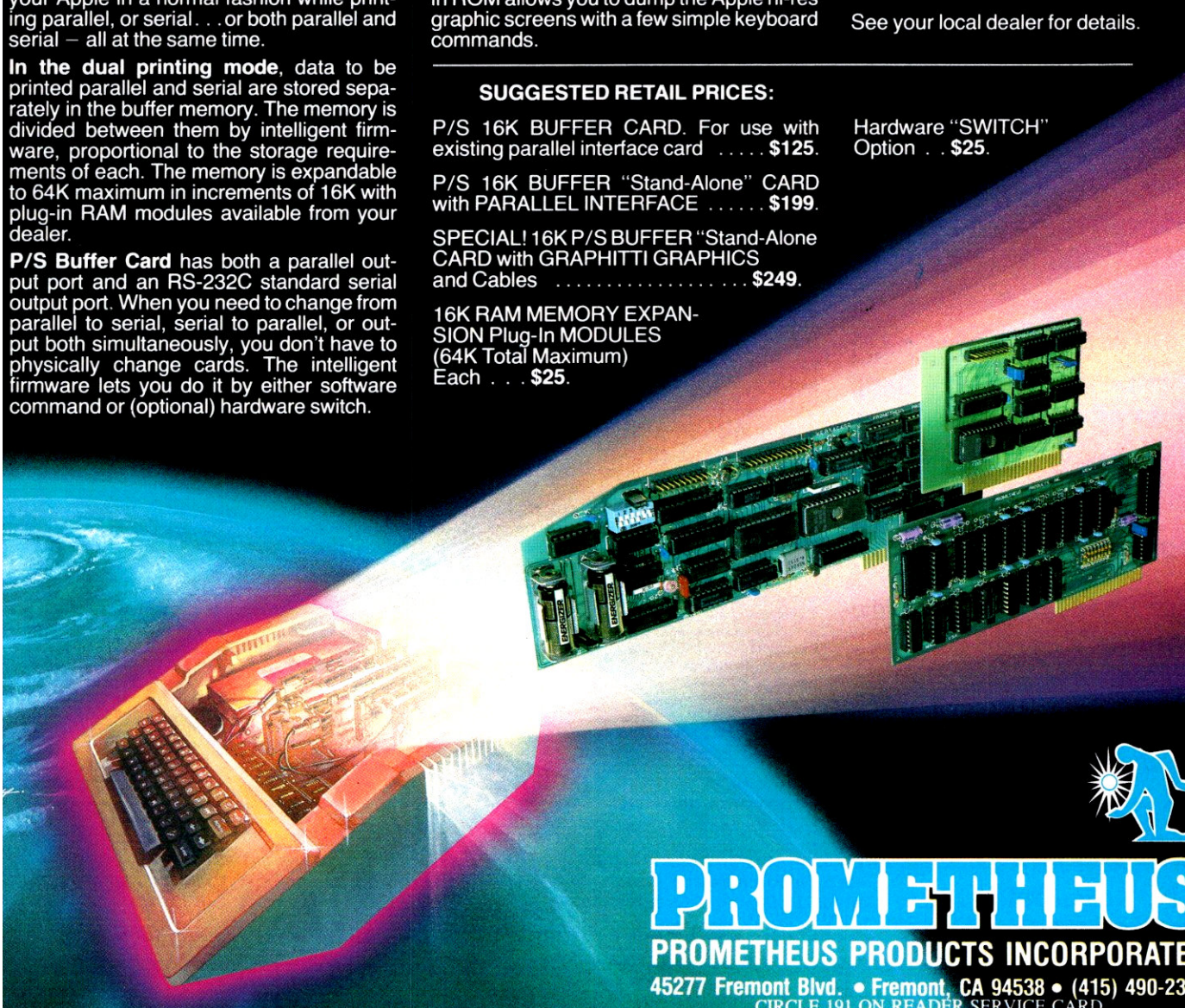

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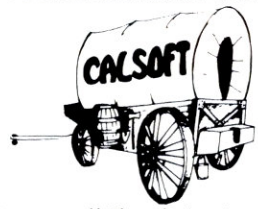

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gave him $5 extra for the show,'' Moudekas laughed. Nevertheless, the man received a total of only $30 for the chips, the show, and his Timex watch.

That man, Moudekas added, had escaped from a Michigan state prison on charges of second-degree murder and has since been extradited.

Thanks to the BPU's videotapes and to the meticulous record keeping of the Apple III, the SJPD has had a 100% conviction rate on all the sting cases that have come to trial, according to Stangel. When the arrestees came up for arraignment, all the judges had to do was look at lists. ''It gave the judges a good ballpark figure to work with [on the amount of the theft or sale] and didn't tie up my investigators' time.''

One judge told Stangel that the city had saved about $50,000 in the first two days of court proceedings, with only the first 15 or 20 criminals she'd sentenced.

One hundred seven criminals had been arrested as of October 1983, with 11 fugitives still at large. The sting officially shut down in the early spring, but the court cases are still being tidied up. At this writing, 48 people who have pleaded guilty or have been found guilty have been sentenced to state prison. Approximately 20 more, who were convicted of lighter offenses such as selling a single marijuana cigarette or one car stereo, have been sentenced to county jail.

What the BPU liked most about the videotaping and recording on computer of these transactions, Moudekas said, was the skirting of complex constitutional questions.

''We short-circuited the criminal-justice system. There was no problem with a search warrant being declared invalid later. Here, these guys bring in the property, we hand them $200 in cash, they give us the stolen property. No search and seizure. On film and sound there's really not much defense. Once they see the tape, they're more than willing to plead guilty.'' The department has yet to go to a jury trial for any of its arrests from the sting.

'Once they see the tape, they're more than willing to plead guilty.'

Stangel noted that the San Jose sting operation was one of the most successful stings ever put together in the United States. Thanks again to the Apple III, the cleanup procedures took only eight days, instead of the several weeks common after such major undertakings. ''We *could* have done it without [the Apple III], but it sure made our job a hell of a lot easier,'' said Moudekas.

The Apple III now holds all of the BPU records, management records, data on court cases, and intelligence information. All disks with sensitive data are locked up in a vault at night.

After working so closely with the computer, Stangel is sold on the machine.

''We're working on getting everything on it,'' he said. ''Within three to four months, everything I need as a manager will be there. Instead of in file cabinets, it will all be on disk.''

The BPU isn't the only unit of the San Jose police department to get computer-happy, though. According to Stangel, ''We're probably the most computer-oriented department in the whole U.S. Our department does much more with less personnel, and a lot of the department's efficiency can be attributed to computers.

''Any department that hasn't gone to computers by now will lose in the long run.'' ✚

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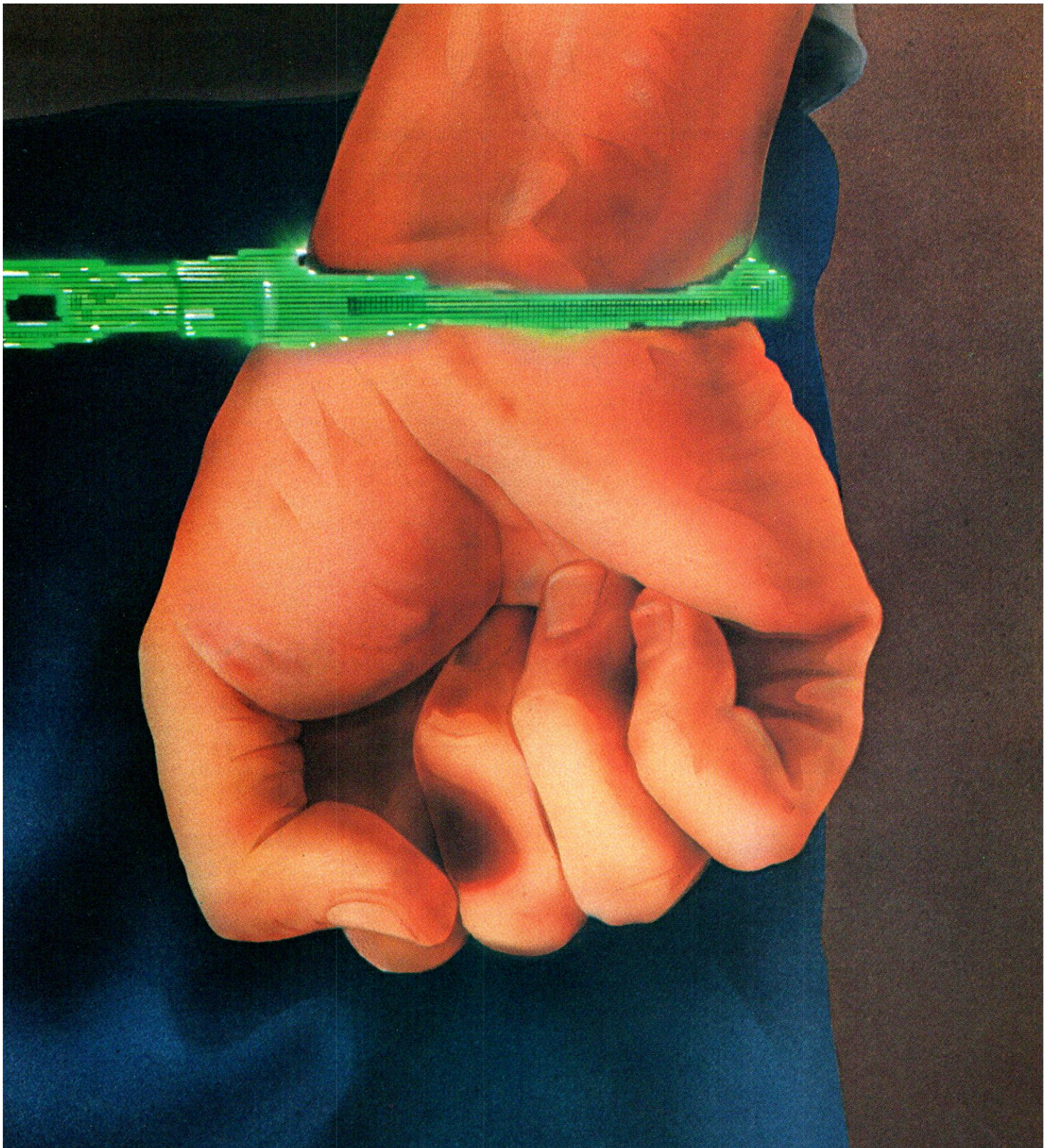
▸APPLES AT WORK

BY T.A. ARNOLD

COMPUTER CRIME STOPPERS

The Apple's just got the facts, ma'am. And now the police have an electronic dragnet.



Early one morning in 1981 a man climbed onto the second-story balcony of an apartment building in a small California town. He was approximately 6 feet tall, dressed in dark clothes, and had his hair cut short. The man entered the apartment through an unlocked sliding glass door and found the occupant, a woman, asleep. He waited a while, then attacked her. Eventually she broke free and escaped to a neighboring apartment. The manhunt began.

Shortly after the attack, two detectives, a sergeant, and a records clerk were called in. Their duty—to find the suspect—was clear, but their methods were out of date. While a detective and patrol officers interviewed the victim and witnesses, other officers began combing local records by hand for names of any persons who might match the partial description of the attacker. The files searched included those of known criminals, field contacts, and crime with a similar method of operation, and were strictly in the local and neighboring community.

In most cities in the United States, the collection and processing of evidence and information is an unwieldy process. The complexity of the process has led some police agencies to think about spending part of their budgets on microcomputers.

The amount of information commonly confronting police makes the computer's potential clear. For example, if the suspect had received a traffic ticket on the night prior to the attack near the same location, without a computer the investigators might never know about it. It is not feasible to cross-file and index every detail—sex, race, height, weight, hair and eye color, date of birth, etc.—that is recorded on a traffic citation in a manual system.

Computers may not be nuclear hand grenades, but they still have to stand the test of the patrolman on the graveyard shift.

In fact, procedures to hand-search record files are so costly and time-consuming that the method has been reserved for major crimes only. Few agencies have the resources to initiate a major search for each petty theft, auto burglary, act of vandalism, or other minor crime.

Therein lies the problem. How can law enforcement agencies gain quick access to records? Not just federal or state files, but their own incident records. How can they develop reliable statistics from these files?

Information Network

Over the years, police departments, like all government bureaucracies, have developed massive index, cross-reference, and cross-cross-reference systems. Unfortunately, in a number of cases, these systems have become "one-way" files—information comes in but never goes out. For example, a homeowner's association in a large metropolitan area calls its police department to ask a simple question: "How many daytime burglaries have we had over the past month?" Unless the department is willing to begin a manual search covering the reported locations of all burglaries in the city precinct to find those in the target area, the answer to the homeowner association's question will probably be an estimate that could be 20% higher or lower than the actual number.

Since the problem of too many statistics and too much information management afflicts many city agencies besides the police, the solution for some municipalities has been to purchase a city-wide computer system or engage a data-processing company. For some, the cost of daily records has been in five or six figures.

Special Problems

This has led to problems for police departments: Public-domain software is not always sufficient for the investigative needs of law-enforcement officers, and there are confidentiality problems (the Water Department or a data-processing company don't need access to a list of juvenile offenders). Perhaps most important, in some ways, the police are just like the population at large—some simply know nothing about computers and some are computerphobic.

Nevertheless, law-enforcement officers are a unique breed. They are intelligent for the most part, suspicious, and highly curious. One training instructor at the Alameda County Sheriff's Department Training Center in California said, "If you gave a cop a nuclear hand grenade and told him not to use it, he'd probably have to take it around behind a barn and test it."

Computers may not be nuclear hand grenades, but they still have to stand the test of the patrolman on the graveyard shift.

Despite their potential, in a number of departments computer use has been limited. Either because of operating problems or management fears, only a select few staff members have become system users. Often line patrolmen and detectives cannot spare time from other responsibilities to develop the skills to operate the computers. And during the more routine investigations that occupy over 90% of their time, they are forced to use machines during limited hours or through a time-consuming chain of command.

Apple to the Rescue

In mid-1980, with personal computers becoming increasingly important, a programmer named Mark Worsnop developed a simple filing program for the Apple II to keep track of Field Interview (FI) reports for the San Mateo County Sheriff's Office in northern California.

The department's problem was indexing and retrieving the large quantity of FI cards produced each week in the county. These reports were on 3-by-5-inch index cards that were filled out by patrol officers when they encountered possible criminal activity. Before the Apple, detectives reviewed the cards each morning. If he saw something of interest about a possible criminal, the investigator would copy the information. Afterwards, the FI cards were filed alphabetically, and the information disappeared into the file.

Worsnop's early FI file was a simple program with up to 18 user-definable data fields and on-screen prompting.

Members of the sheriff's office were shocked by how easy the program was to use and at its relatively low cost. More San Francisco Bay Area departments began investigating the use of micros—particularly Apples—to supplement their citywide systems. And in March 1981, Apple Computer sponsored a grant program in which six police agencies were given Apple II's.

As a result, a users' group formed in the Bay Area and Mark Worsnop developed ISCARS, which is a law-enforcement program. This software allowed agencies to design files with up to 18 fields, password file security, menu selections and prompting, utility functions, patterned logic searches, report generation, and statistical analysis. To run ISCARS, the department needed an Apple II or Apple II Plus with 48K RAM, a monitor, and at least one disk drive and controller.

The participating departments tested the software and had a few minor complaints that Worsnop remedied. But generally, they were pleased with how easy the system was to use. A patrol officer or detective could be trained on the Apple in approximately 30 minutes.

Lt. Jerry Little and the Los Altos Police Department in California have been using ISCARS and the Apple II since 1981. Some of their successes included the solving of a neighboring jurisdiction's sexual assault case. Los Altos detectives were contacted with a request by the other agency to search through their system for possible suspects in a number of laundromat rapes. With only a partial description of the suspect, they queried their system and came up with six possible names. Through investigation, one was identified as the rapist. This arrest cleared numerous rape cases throughout the county.

Members of the sheriff's office were shocked by how easy the program was to use and at its relatively low cost.

Since the pioneer software was introduced, Mark Worsnop has opened Solon Corporation and developed an upgraded

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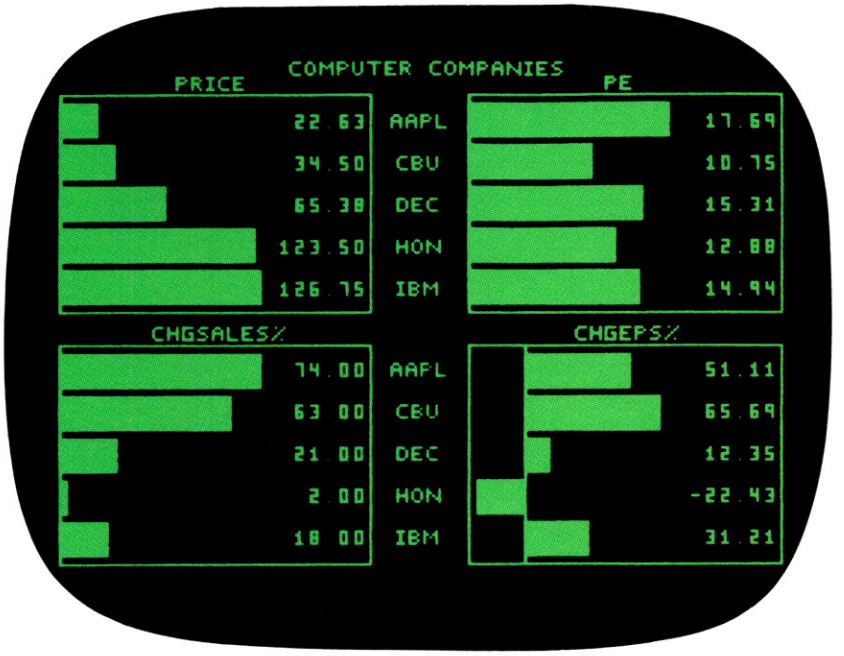

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version, which he named WISCARS. This new system includes the features of its predecessor and more. It has up to 40 data fields; controlled password entry to portions of the program; user-defined field length; indexed searches; series entry; optional network of up to 64 work stations; and 6-to-80-Mb data storage using a Corvus Hard Disk system.

A WISCARS system can be accessed via modem by an outside agency that uses an Apple computer system. With this, local police departments can retrieve FI and other investigative information from neighboring cities or counties at any time.

Detailed Records

The applications for the Apple in law enforcement is almost as diverse as the profession itself. The system with either the ISCARS or WISCARS software can be used by police administrators, records staffs, crime-prevention specialists, investigators, and patrol officers.

All of the agencies surveyed said that the Apple was a reliable and dependable tool, and some officers expressed surprise that the computers were able to survive the workload.

At the San Mateo County Sheriff's Office, a department with a staff of 249, their one Apple II is in service seven days a week, 24 hours a day. According to Lt. Harvey Rutenberg, approximately 50 people are assigned and trained to feed in data. This list includes station officers, records clerks, crime-prevention staff members, and administrative staff. Their Apple, operating with the WISCARS software package and a 5-Mb hard disk, is used almost exclusively for management information. Each month, it produces a detailed report that is approximately 200 pages long. This report includes analyses of reported offenses and incidents, beat activity, dispatched activity, automated alarm card, and traffic citation report. Much of the information is cross-filed.

While reviewing his list of monthly reports, Lt. Rutenberg said that the Apple has become one of the best crime prevention tools in the county. Members of the Crime Prevention Unit can review the monthly report and direct their activities to where they will be most effective. What were once just estimates on criminal activity have been replaced by facts.

For other police agencies using the Apple, the list of applications may also include any number of the following:

- *Case management:* The tracking of criminal cases after the original report has been turned in. This can include automated investigation notes, follow-up and disposition.
- *Crime analysis:* This is the crystal ball work of law enforcement. The prediction of crime is made much easier with accurate data on trends.
- *MO files:* This involves a cross-index system between certain known criminals based on their specific modus operandi or method of operation. It has been a fairly effective tool for the police, since most criminals stick with familiar techniques.
- *Known-criminal files:* Apple computers have made the storing and retrieval of data on criminals much easier. A set of floppy disks or a segment of a hard disk can replace huge file cabinets to store this information.
- *FI files:* When officers come into contact with persons possibly involved in criminal activity, they complete this simple field information report. Name, physical description, address, age, clothing, involved vehicles, companions, time, date, and location can be indexed and cross-filed.
- *Traffic-collision management:* This involves tracking all of the information on auto accidents to identify problem areas for specific enforcement.
- *Traffic-citation files:* Data in this file is entered in the same format as the FI files. Locations can be compared with the traffic-collision-management files and information on drivers can be cross-referenced for investigation.
- *Department statistics:* The Apple can reduce the massive task of compiling crime statistics, activity logs and reports. Individual formats can be designed to eliminate transcription.
- *Administrative files:* This might include officer training files, time sheets, and personnel records.

The applications for the Apple in law enforcement is almost as diverse as the profession itself.

And the list goes on and on—it's long enough that even police traditionalists are welcoming Apples to their ranks.

ISCARS and WISCARS are both products of the Solon Corporation. For more information, contact the Solon Corporation, 654 Bair Island Road, Redwood City, CA 94063, (415) 369-4934. ✚

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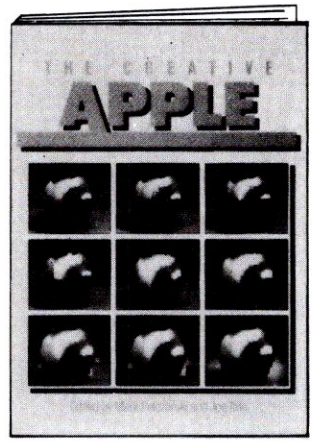

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The Creative Apple brings you the best articles and features on the Apple to appear in the past four years of *Creative Computing*. Revised and updated, this wealth of material gives you dozens of ways to tap the tremendous potential of your Apple, improve your programming skills, and expand your computing knowledge. Graphic utilities, animation, digitized images, music editing, educational software and applications, telecomputing, home control systems, VisiCalc and many other timely topics are thoroughly examined and discussed. Ready-to-run programs give you immediate use of this informative and stimulating collection, while a chapter on tips and tricks for easier programming lets you unlock the versatility of the Apple computer—and your own resourcefulness.

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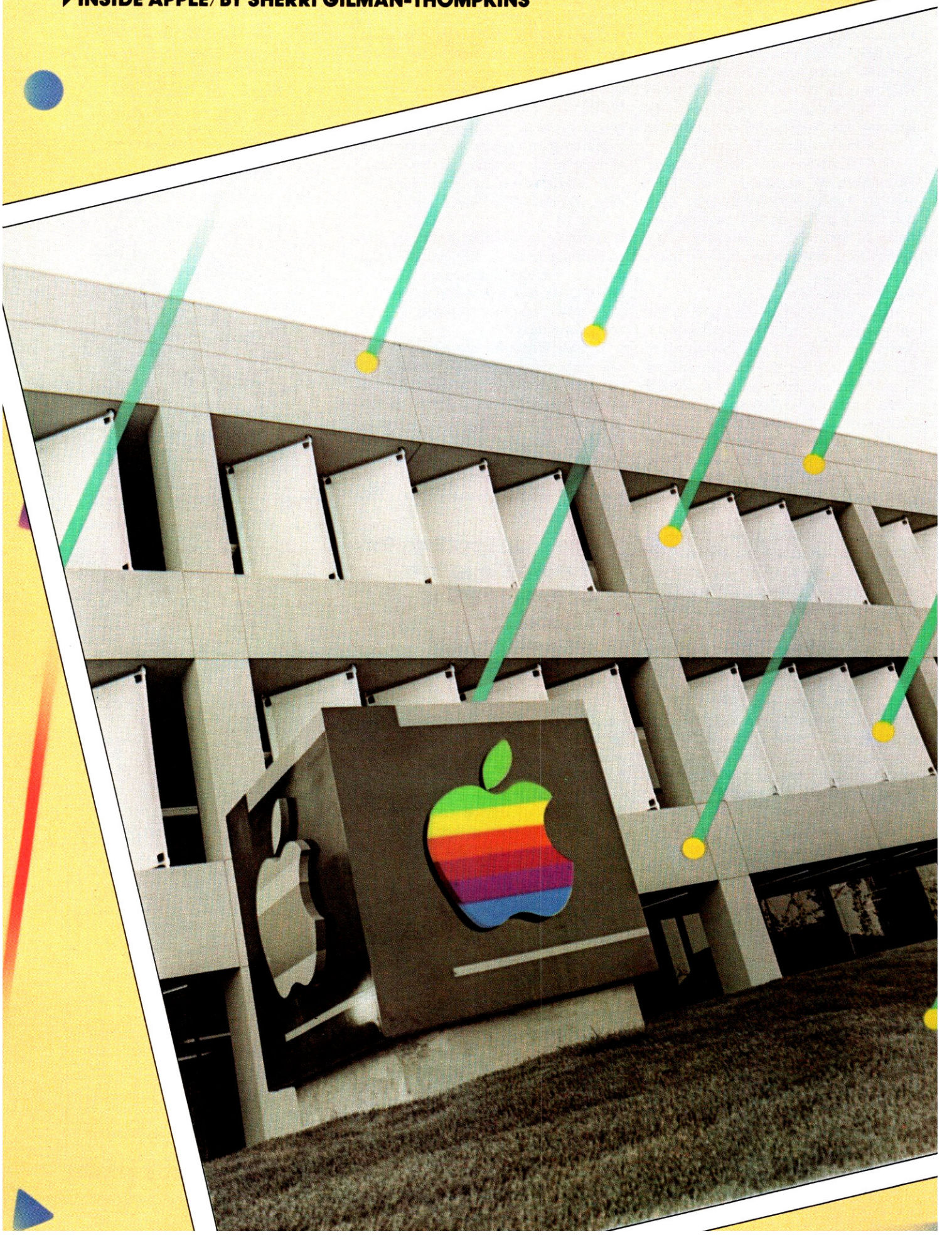


WOMEN AT WORK

BEHIND THE SCENES AT APPLE COMPUTER

Is Apple the ideal place to work? Women interviewed by A+ think so.

Talk to the women at Apple Computer and you may mistake them for a pep club. Apple's pep club, that is.

Apple women who spoke to *A+* have nothing but praise for their employer. They describe the company in idealistic terms, saying it's a special place where common concerns of the workplace such as low productivity, boredom, and sex discrimination simply don't come up. Creativity and energy needed to get the job done take priority above all else, they say, including spare time with friends and family or for an outside hobby.

Working, Working but Loving It

Apple women say they routinely work 50-hour weeks. One woman admitted to having worked 90 hours one week, and many say that during busy times 70 hours on the job is commonplace. Some women acknowledged that sandwiching personal time into work time may be a juggling act, but they don't mind the long hours and rigorous schedule. It's the nature of the beast—of the computer industry, they claim—particularly at Apple.

As described by the women we interviewed, Apple is full of young—the average age is 28—enthusiastic overachievers who are concerned primarily with getting the job done well. The company itself is only six years old.

"You take personal responsibility for your goals there," said Ellen Nold, 37, the manager of marketing support for the Lisa computer division. "For the first time, I have a boss who gives me in-depth feedback on my work. When you do well for the company, it does well by you."

No Hocus-Pocus, Just 'People First'

According to Jay Elliot, vice-president of human resources, there's really nothing magical about Apple.

The work atmosphere is determined by the underlying Apple philosophy—that people are regarded and rewarded for their contributions as individuals. He said the company operates with a basic sense of trust and that employees do jobs they like and find stimulating. "The essential part is the people. The brains of our employees are what is going to make Apple tick," he said.

That philosophy is further enhanced, Elliot explained, by a generous benefit plan. Apple's employee package includes profit sharing, competitive salaries, dental and health benefits, and stock options.

Women make up 48% of Apple's 4500 employees worldwide, and the jobs they hold are as varied as their backgrounds. Jobs at Apple can be as intimately involved with the product as testing a microchip to much broader concerns such as tackling problems in contemporary education.

Hard Work and Dedication

"There's an energy at Apple I don't find everywhere. [It's] where there are very creative people. I feel as if I'm on a mission. People work very hard. It sounds Pollyannaish, but people are very dedicated to the product," said Joy McCulley, an office market manager.

It was McCulley's job to see that the new personal computer, called the Lisa, met its deadlines. During the year-and-a-half-long period when the project was underway, she coordinated the duties of between 300 and 400 people and worked 80- to 90-hour weeks, filled with meetings and strategy sessions. In one particularly grueling stretch during that period, McCulley remembers, she came to work at 7:30 A.M. and left at 9 P.M. the following day.

'The essential part is the people.'

After the Lisa hit the market, McCulley, who is 40, took three weeks off to unwind. Since then, she has promised herself that such marathon days and weeks won't creep into her life again. Yet, she normally works 50 hours a week and said her job at Apple provides the constant challenge of ensuring that schedules are met and the best work is done.

"You make a commitment to doing a job, and you have no choice," she explained.

Define Your Job

What particularly impresses Barbara Bowen about Apple is the company's philosophy that each employee is an important part of the corporation.

"You talk to people and try your idea," she said. "You're allowed to write your own job description. This company will let you do as much as you're capable of. It's the direction we receive that is so wonderful."

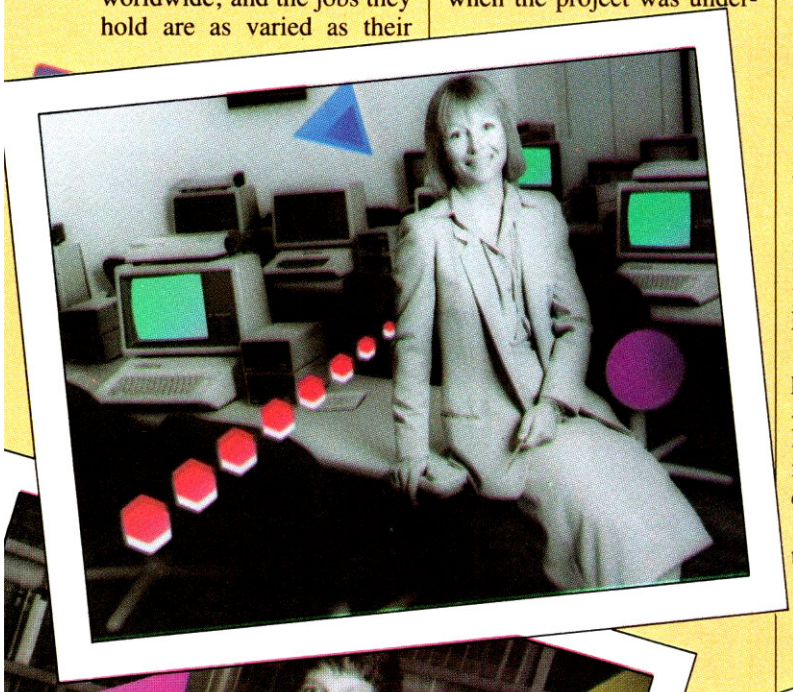
Bowen, 38, is director of the Apple Education Foundation. Prior to coming to Apple, she was a mathematics teacher. Her goal is to create a set of educational projects nationwide, through the company's educational division. The program aims at improving teaching and learning by using microcomputers. Bowen's specific target area is the problems in American public education documented earlier this year by a presidential commission.

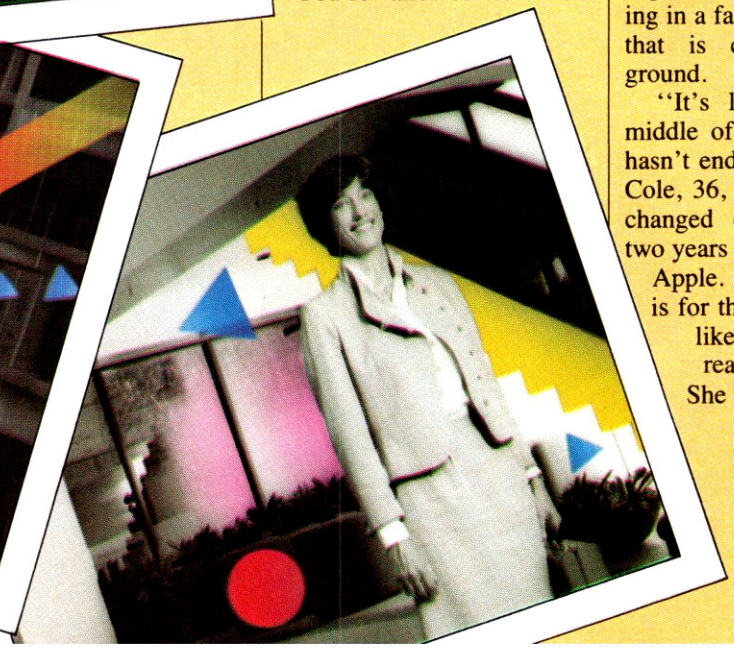
"I think teachers have low morale right now," she explained. "They can learn by using a micro; it's a unique tool for making a whole variety of materials available that were never before accessible."

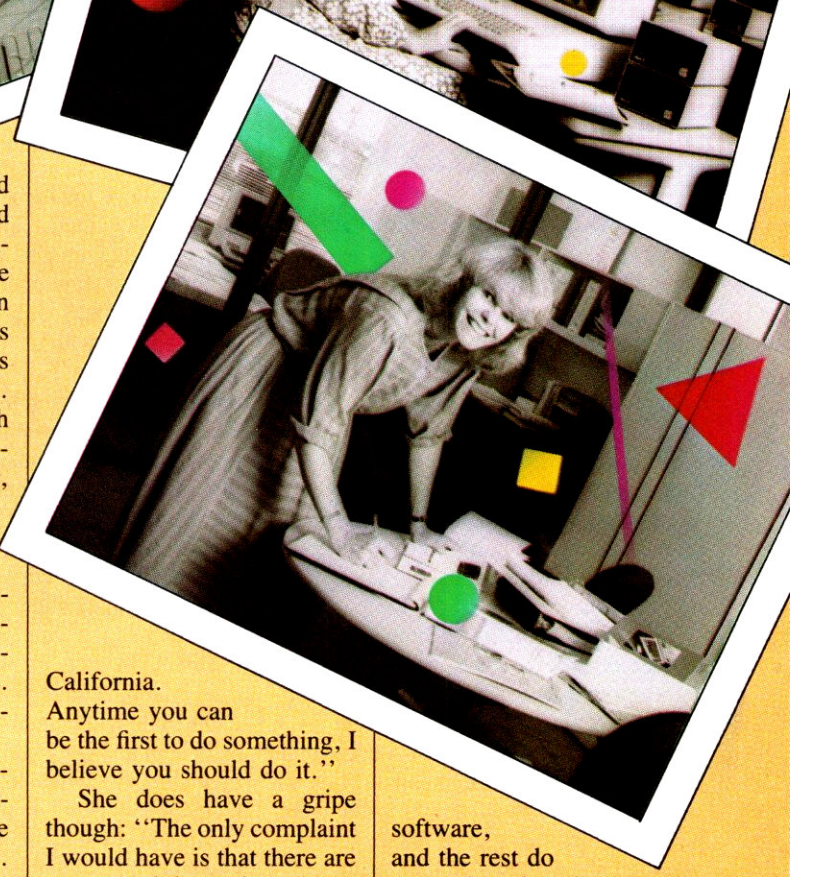
Ida Cole, director of marketing for the Personal Computer Systems (PCS) division, now oversees 120 employees in what is her fourth job since coming to Apple; this sums up her feelings about her work: "I love it."

And that was after Cole had finished a 70-hour week at Apple. The schedule suits Cole because she's caught up in the excitement of the work. That excitement, Cole explained, stems from working in a fast-moving industry that is carving out new ground.

"It's like being in the middle of a case study that hasn't ended yet," she said. Cole, 36, admits her life has changed drastically in the two years she has worked for Apple. To her, the switch is for the better. "I sound like a martyr, but I'm really not," she said. She explained that get-togethers with friends, although important, are just less frequent. Extended







shopping trips or weekends away now are out of the question, she added.

"It sounds like a big sacrifice, but I prefer the work," she said. "There is tremendous satisfaction in it. It's really compelling."

Is there another job in the offing for Cole? "You never know what Apple has in store for you," she said.

From One-Woman Show to Full House

One thing that Jean Richardson has seen at Apple is the phenomenal growth of her department. That expansion naturally followed the mushrooming of the company itself.

When Richardson began at Apple five years ago as the director of marketing communication, she was a department of one whose job was to oversee all the corporation's advertising except in the European market. Her job still is the same, but she now has a staff of more than 100.

It's almost like being in Hollywood.

Doubly interesting is that Richardson knew nothing about computers when she accepted the job, but she was personally interested in the computer's impact on society. Before coming to Apple Computer, she had been a housewife and never had worked steadily outside the home.

Richardson sought out Apple after reading a newspaper article about founders Steve Jobs and Steve Wozniak and how they got their company started. She thought the story about two young men working out of a garage was compelling and their ideas about business intriguing. She saw this effort, which has since become the growing Apple Computer, Inc., as a place to genuinely excel.

"The product looked good. A glimpse of the people was good," she explained, recounting the impression left by the article. "It sounded like the company I wanted to work for."

Most women, or most Apple employees for that matter, have worked full time before joining the company. Some have backgrounds only in unrelated fields, but others grew into jobs through other experience in the computer industry.

JuLee Friedeck, now a national account executive at Apple, worked for computer giant IBM before her Apple days but prefers the smaller, less-structured company where opportunities are greater. Her present job is to sell Apple products to Fortune 1000 companies.

"Within the 1000, I specialize in banking, brokerage, and the oil industries," she said. "I came to Apple because I had the chance to be the first national account representative in Northern California. Anytime you can be the first to do something, I believe you should do it."

She does have a gripe though: "The only complaint I would have is that there are not enough hours in a day to communicate to the many corporations the value of utilizing a computer to increase productivity."

All That Pizzazz

To Karin Blomstrand, once a DEC employee, being at Apple is like working in Tinsel Town.

"It's the only place I've worked that really grabs me," she said. "People want to see [the products] hit the market. It's almost like being in Hollywood—all that pizzazz," she said.

Now the manager of software development for PCS, the 37-year-old Blomstrand manages a department of 34. Two-thirds of her staff write software, and the rest do research and testing.

Blomstrand agrees that the enthusiasm comes in part from the age of the company and its employees. "It's a very young company run by young people," said Blomstrand. She believes Apple would be a different place if it were dominated by older employees.

Yet, those older employees offer a valuable perspective. "They have a sense of the industry as a whole," she said. "They have a broader view. It's less focused on a specific hot item. We have seen attempts and we have seen what things work well. I think you learn. Experience has that value." ✚

ProDOS

First there was the Apple DOS, then there was Apple SOS, now there's ProDOS.

In 1983 Apple introduced two exciting products—first, the Apple IIe, and now ProDOS, a new operating system for the Apple II family.

ProDOS represents a significant advance over previous Apple II operating systems. Both programmers and users will benefit from its advanced features: hierarchical file management, support of mass storage devices and interrupt-driven processes, and compatibility with the Apple III Sophisticated Operating System (SOS).

Currently ProDOS is being licensed to software developers for applications development only. "Software developers have expressed great interest in a standard operating system for the Apple II that provides advanced capabilities for such applications as networking, business graphics, and large database management," says Bill Schjelderup, ProDOS product marketing manager. "ProDOS is our response to this need."

This means that more sophisticated applications software—programs that require mass storage and interrupts—will be available for the Apple II. Users will find that programs run faster because of ProDOS's more efficient memory and file management. And because ProDOS shares data formats and file-naming conventions with Apple III's Sophisticated Operating System (SOS), data files and media can be interchanged between the Apple II and Apple III.

MORE SPACE

The impetus behind ProDOS was to make it possible for the Apple II to support mass storage beyond the 140 kilobytes provided by the Apple II disk drive. It had become apparent that the Apple II could support data communications and networking as well, tasks that DOS 3.3 wasn't prepared to handle because it lacked interrupt capabilities.

The ProDOS development team, engineers who had been working with Apples since the Apple II was invented, decided that a new operating system should allow for these capabilities.

What resulted, after almost three years of research and development, was a completely new operating system, not a modified DOS 3.3. ProDOS runs on any Apple II with at least 64K of memory (any Apple IIe, or an Apple II or Apple II Plus with 48K RAM and a language card). When Applesoft BASIC is required, the Applesoft ROM must be installed on the motherboard (as it is on the Apple II Plus and the Apple IIe).

ProDOS contains all the features of Apple III SOS while maintaining as much compatibility as possible with DOS 3.3 in the Applesoft BASIC environment. In fact, from an assembly-language programmer's viewpoint, ProDOS looks very much like the Apple III SOS. For an Applesoft BASIC programmer ProDOS will do a lot more than DOS 3.3, yet the great majority of DOS commands will work identically.

ProDOS FEATURES

The main features of ProDOS include its hierarchical filing system, support of mass storage devices, compatibility with Apple III SOS and DOS 3.3, and support of a defined interrupt protocol.

Hierarchical Filing System

ProDOS organizes information in a hierarchical filing structure. This allows you to keep files in subdirectories and organize your stored data better than in a single-level directory structure. Several other operating systems, such as Apple III SOS, UNIX, and PC-DOS 2.0, also use this filing structure.

The hierarchical filing system keeps track of data stored on a disk, just as you would store papers in folders in a filing cabinet. The folders are analogous to subdirectories, and the papers in those folders are analogous to files in the subdirectories. Because of this organization, information stored on your disk can be retrieved very quickly. When you request the operating system to get a file, it doesn't have to search through hundreds of files in the directory. It simply searches through several subdirectories until it finds the one you want.

Mass Storage

ProDOS allows the Apple II to handle large files—up to 16 megabytes in size. And the hierarchical filing structure provides the hard-disk user with an organized method for managing large numbers of files.

Suppose you had a 5-megabyte hard disk attached to your Apple II. DOS 3.3 would not allow you to store on it a file larger than 140 kilobytes (the size of a DOS-formatted floppy disk). ProDOS frees you from this constraint and, with its hierarchical filing structure, provides an efficient method for storing data.

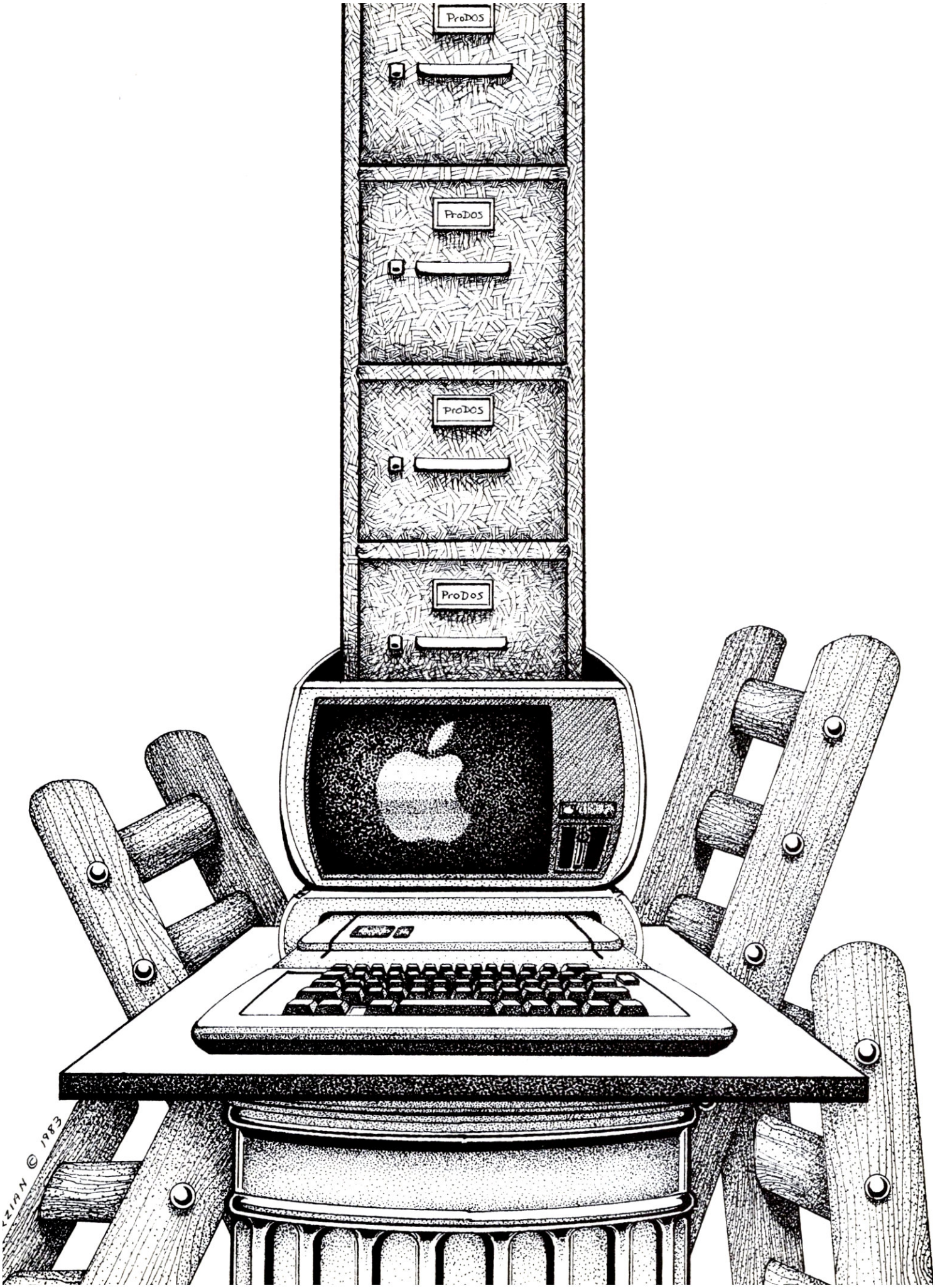
The hierarchical filing system keeps track of data stored on disk, just as you would store papers in folders in a filing cabinet.

Apple III SOS Compatibility

Because ProDOS uses the same file structure and data formats as Apple III SOS, a true Apple II and Apple III family tie has been created. ProDOS data files saved on an Apple II may be used by an Apple III. This compatibility means that you can use your Apple IIe at home to type a memo (using the ProDOS-based word-processing program) and edit it on the Apple III at your office (using a SOS-based version of the same program).

DOS 3.3 Compatibility

ProDOS is also compatible with DOS 3.3. When you run Applesoft BASIC under ProDOS, you can use most of the DOS 3.3 commands. There are a few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commands ProDOS does not support, such as INIT, MON, and NOMON, but other commands are new or enhanced under ProDOS. The Applesoft BASIC under ProDOS is also significantly enhanced (see figure 1).

ProDOS FOR SOFTWARE DEVELOPERS AND USERS

As a result of ProDOS, more advanced applications software, which can take advantage of larger data storage and interrupt capabilities, will become available for the Apple II. These include local-area networking, data communications, animation, word processing, spreadsheets, and other highly interactive applications.

Software developers who have used ProDOS are enthusiastic. "What interested me in ProDOS," says Greg Mainis of Desktop Computer Software, "was that it's an upgraded system from DOS 3.3, has a hierarchical filing structure, and contains some improved commands." Mainis recently transferred Graph'n'Calc to the ProDOS environment. (As a decision-support graphics package that works in conjunction with spreadsheets and databases, Graph'n'Calc performs sophisticated statistical calculations that cannot be programmed onto a spreadsheet.) "Graph'n'Calc is a big program, and some of the features of ProDOS were perfect for it," he says.

ProDOS also supports the extra 64K of RAM on the Apple IIe's extended 80-column card as a separate volume. "What we've done is taken all the graphics and, if the user has a 64K expansion board, we just load it up into RAM. This allows us to load graphic screens with blinding speed," Greg says.

ProDOS data files saved on an Apple II may be used by an Apple III.

Converting Applesoft BASIC programs under DOS 3.3 or 6502 assembly-language programs to ProDOS is fairly straightforward. Applesoft programs usually require little or no change, while assembly-language programs require reworking of disk-access routines. Users will now be able to convert DOS 3.3 data files to work with ProDOS-based application programs to take advantage of the capabilities that ProDOS provides. ✚

	DOS 3.3	SOS	PRODOS
APPLE LANGUAGES SUPPORTED	APPLESOFT BASIC 6502 CODE INTEGER BASIC	BUSINESS BASIC 6502 CODE PASCAL III	APPLESOFT BASIC 6502 code
MAXIMUM VOLUME SIZE	0.140M	32M	32M
MAXIMUM PHYSICAL FILE SIZE	.362M	16M	16M
DIRECTORIES PER VOLUME	ONE	UNLIMITED	UNLIMITED
FILES PER VOLUME	105	UNLIMITED	UNLIMITED
DIRECTORY ACCESS METHOD	SEQUENTIAL	SEQUENTIAL	SEQUENTIAL
FILE ACCESS METHOD	SEQUENTIAL	B-TREE	B-TREE
NUMBER OF INTERRUPT VECTORS	NONE	4, NESTED	4, SEQUENTIAL

Figure 1: Operating Systems Comparison Chart for ProDOS, DOS 3.3, and SOS.

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HOW TO dBASE II

PART III

In a tutorial series on dBase II, a popular program for database management.

In some of the examples in this tutorial, the command lines (the part you type) are too long to fit in one of our typeset column lines. Unless a <CR> indicates a carriage return, do not insert one. Rather, just type the command as one line terminated by a <CR>.

So far in this series of dBASE II tutorials, we've covered techniques for creating databases and storing information in them. The last issue also introduced some methods for data retrieval. This time, we'll explore more efficient means for interactive data retrieval, along with approaches for general database maintenance.

If this is your first copy of *A+*, you can catch up somewhat in this series by creating a database called PHONEBK with the structure listed below. (See your dBASE II manual for details on the Create command.)

Make sure that you include the data records here for use with some of the examples later on.

```
STRUCTURE FOR FILE:   A:PHONEBK.DBF
NUMBER OF RECORDS:   00000
DATE OF LAST UPDATE: 00/00/00
PRIMARY USE DATABASE

FLD        NAME       TYPE WIDTH DEC
001      first:name     c    010
002      last:name      c    015
003      street         c    022
004      city           c    013
005      state          c    002
006      zip            c    005
007      phone          c    012
** TOTAL **                 00079

first:name :WACKFORD :
last:name  :SQUEERS        :
company    :RALPH NICHOLBY INC.  :
street     :374 TIPPLEMEYER AVE  :
city       :CORNMONT     :
state      :CA:
zip        :94709:
phone      :415-555-1111:
work:phone:415-555-1212:

first:name :NIMROD
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```
zip          :89751:
phone        :717-555-1597:
work:phone:717-555-7951:

first:name  :ADRIATOR
last:name   :BEDWAX          :
company     :RUG FLOX INC.       :
street      :158 SNOREWELL BLVD.  :
city        :SLEEPYHOLLOW:
state       :CA:
zip         :02587:
phone       :207-555-7014:
work:phone:207-555-4107:
```

Those of you who have been following along in the past two issues should take a moment to double-check your structure too.

Tutorial Conventions

Just to differentiate between what you type and what dBASE II responds with, the lowercase words are the ones you type. Uppercase works too, so it doesn't really make a difference—it's just clearer this way. Some examples may have you type uppercase letters also, but they always involve a series of words between quotation marks. The dBASE II responses are in uppercase letters. The <CR> means to press the carriage-return key.

Getting Started Again

To bring up dBASE and open your Phonebk file, type

```
A> dbase <CR>
```

Then fill in the date and press Return. When you get the dot prompt, type

```
. use phonebk <CR>
```

As you may remember, the Use command tells dBASE II to open any file you stipulate. In this case, it is your Phonebk file. Next, type

```
. display structure <CR>
```

You should now see your Phonebk file's structure as it appears in the example beginning on page 159.

Last time, you experimented with the Display command quite a bit. Using that command, it was fairly easy to list whatever information you wanted, based on a particular field. For example, you listed all California residents in your database by typing

Don't be alarmed if you hear lots of disk access going on. This is the result of dBASE II analyzing every record.

```
. Display for state=''CA'' <CR>
```

The Display command is much like the List command, except that it shows you only 15 records at a time. The List command scrolls information off the screen unless you manually stop it with a Control-S.

Suppose you want to do more than just list streams of data. Perhaps you want to position the dBASE II pointer on a specific record and then edit (make some changes in) that record, or maybe just display that particular record by itself.

You can accomplish this and many other manipulations of specific records with the help of the Locate command.

If you happen to know the approximate vicinity of the record you are searching for, the Next clause can limit this aggravation.

Locating Specific Records

The Locate command works like this. By using a "for" phrase (just as with Display) after the Locate command, you cause dBASE II to start at the top of your database (GOTO TOP) and search for the first record that meets your requirements. dBASE II reports only the record number and waits for you to do something. The record-number pointer remains positioned on the chosen record. If no records contain the data you are looking for, dBASE II responds with END OF FILE ENCOUNTERED.

Why not try using the Locate command yourself? Assuming you have the dBASE II dot prompt, type in the following (be sure to use uppercase where indicated):

```
. locate for last:name=''SQUEERS'' <CR>
  RECORD 0125     ← or some other number
```

Your record number is probably different from this one, but, in any case, your record-number pointer should now be positioned on Wackford Squeers' data. Typing

```
. display first:name, last:name, phone <CR>
```

should get you

```
0125 WACKFORD SQUEERS 415-555-1111
```

Simply typing

```
. display <CR>
```

will show you all the information in the current record.

In order to see if any more poeple in your database have the last name Squeers, type

```
. continue <CR>
```

This command repeats the search, starting at the current pointer position, rather than at the top of the database. If another Squeers shows up, you can display that record in the same way as before.

If your database is large, a Locate command may result in a time-consuming search. Don't be alarmed if you hear lots of disk access going on. This is the result of dBASE II analyzing every record, one at a time, in order to determine which records fit your search requirements.

If you happen to know the approximate vicinity of the record you are searching for, the Next clause can limit this

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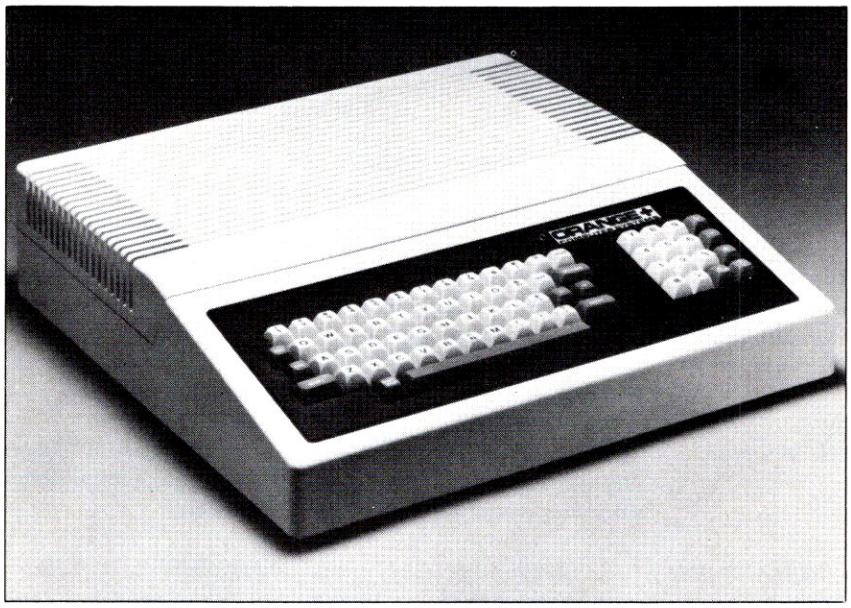

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aggravation. Let's say you wanted to check only the next 100 records for a particular person. The syntax would be as follows:

```
. locate next 100 for last:name=''SQUEERS''
  <CR>
```

You can also use the Continue command here, but when dBASE II gets to the end of the 100 records it is searching, the message END OF LOCATE SCOPE will appear.

Editing Your Data

No useful phone and address book can be carved in stone. People seem to enjoy moving around, and acquiring new addresses, phone numbers, jobs, and pets. In anticipation of

The Browse command can display up to 19 records on the screen at a time.

the ever-changing nature of most databases, dBASE II allows you to edit your data records easily. This flexibility is particularly nice in the case of our "phonebk." Unlike handwritten, personal phone books, databases don't have the mess of crossed out numbers or pages worn out by multiple erasures for your *really* transient friends.

You use the Edit command in much the same way as Append, but for editing, dBASE II needs to know the number of the record you desire to modify. Incidentally, Edit is one of the few commands that calls for a record number.

For example, to edit record number 10, you can simply type

```
. edit 10 <CR>
```

The contents of record number 10 should appear now, just as they did during the Append process. You can use the control codes listed below to move the cursor around and change the data. (The ^ sign means to hold down to Control key while pressing the designated letter key.)

```
RETURN   Moves cursor to next field
     ^X  Moves cursor one field ahead (same
  as RETURN)
     ^E  Moves cursor one field back
     ^D  Moves cursor one space ahead
     ^S  Moves cursor one space back
     ^C  Moves forward to the next record in
  your database
     ^R  Moves backwards to the previous
  record
     ^Y  Erases field contents (press
  twice)
     ^V  Toggles Insert mode on/off
     ^G  Erases character at cursor
  position
     ^U  Marks the record for later deletion
  from file
     ^W  Saves all changes and returns you
  to the prompt
     ^Q  Leaves all records unchanged and
  returns to prompt
DELETE   Deletes the character to the left of
  the cursor
```

Go ahead and try to edit one of your records. Even if you accidentally change all the data in it, you can tell dBASE II to revert to the previous version (undo your changes) by typing ^Q. This procedure returns you to the dot prompt and exits from the Edit mode. Just pressing <CR> at the bottom of one record doesn't get you out of Edit—it advances you to the next record. Make sure to type ^W (for *write*) to get out of Edit and save your changes.

In most cases, you won't know the number of the record you want to edit. This is when the Locate command, followed by a modification of the Edit command can come in handy:

```
. locate for last:name=''SQUEERS'' <CR>
RECORD 0125 ← or some other number
. edit # <CR>

first:name  :WACKFORD  :
last:name   :SQUEERS         :
company     :RALPH NICHOLBY INC.  :
street      :374 TIPPLEMEYER AVE  :
city        :CORNMONT     :
state       :CA:
zip         :94709:
phone       :415-555-1111:
work:phone  :415-555-1212:
(Type ^Q to get out.)
```

What happened? Actually, this is a good trick to remember. You are already familiar with the first command. It merely positioned the pointer on the record you wanted to change. Then it was a simple matter to tell dBASE II, "OK, let's edit it!" The # sign, as you may recall from the ? # command, is the record-number function. Typing *edit #* just means "edit whichever record the pointer is now on." *Edit record 125* would have worked just as well, but *edit #* is easier.

Browse—the Movable Window

Another dBASE II command can make updating your data a bit easier. It's called Browse and is in reality a powerful command for viewing and editing. It lets you scan through your database as though you were reading a newspaper with a magnifying glass. This command lays out a table of rows and columns on your screen as though your database were on grid paper. Using control codes, you can pan backwards and forwards through your records, as well as right and left through your fields.

In anticipation of the ever-changing nature of most databases, dBASE II allows you to edit your data records easily.

The Browse command can display up to 19 records on the screen at a time, with one record per line. The number of fields shown at one time varies, depending on their length. You can edit data and delete records by using the normal full-screen editing codes.

With that in mind, try browsing through your Phonebk file. Just type

```
. browse <CR>
```

Now you should see a matrix of columns and rows. Use the following codes to move around:

```
^A   Left one field
^F   Right one field
^S   Left one letter
^D   Right one letter

^R   Save record and back up one record
^C   Save record and move to next record

^B   Pan the window right
^Z   Pan the window left

^W   Save record and exit
^Q   Exit without saving changes in current
     record only
```

A few notes about the Browse command are in order. A field will not appear on the screen unless all of it can fit. You may have to pan left or right several times to get a display of some larger fields. Also, the ^Q and ^W commands apply only to the record you are currently on. Once you type ^C or ^R, the record you were on is saved as you left it. In other words, if you mess up a bunch of records and then type ^Q, thinking that none of your changes will be saved, you are in for a surprise.

Replacing Specific Field Data

What if all you want to change is the data in one specific field? Isn't there an easier way than using the Edit command and all those control codes? Yes. You can use the Replace command.

As with Edit, you can use this command with the record

Beware that this command will modify the street address of all Neverburgers in your database, not just the first one. This is an example of the type of command that can wreak havoc on your database if you aren't careful.

number in mind, or you can use a slightly longer syntax if you don't know the record number. Say Nimrod Neverburger moved from 77 Easy Street to 33rd & 3rd Street and you wanted to record this change. Can you think of several ways to do it? Try it yourself. Then, if you get stuck, use these commands (remember that your record numbers will be different):

```
. locate for first:name=''NIMROD''<CR>
RECORD 00126
. replace street with ''33rd & 3rd
    Street''<CR>
000001 REPLACEMENT(S)
```

The first command positions the dBASE II pointer on Nimrod's record. The second one changes the data in the Street field.

To achieve the same result with one command, you could have used the "for" phrase to tell dBASE II to look through

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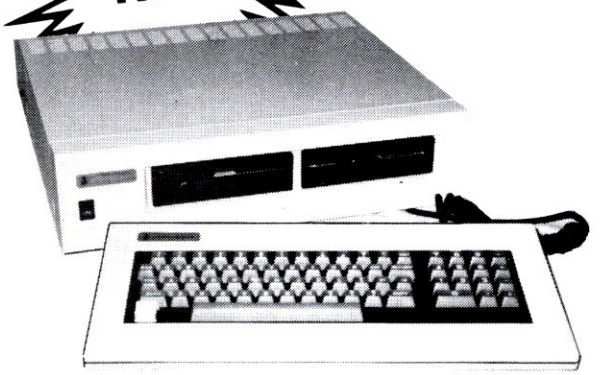

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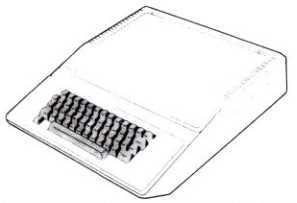

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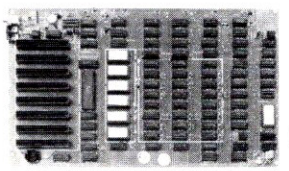

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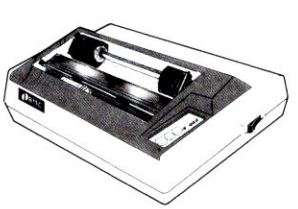

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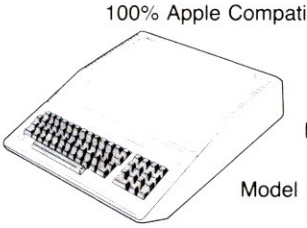

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CIRCLE 212 ON READER SERVICE CARD

all your records and make the change only to Neverburger's record:

```
. replace street with ''33rd & 3rd
  Street'' for last:name=''NEVERBURGER''
  <CR>
00001 REPLACEMENT(S)
```

dBASE II will take a little longer on this command than on the last one because it will search the entire database instead of stopping at the first occurrence of NEVERBURGER. Also, beware that this command will modify the street address of all Neverburgers in your database, not just the first one. This is an

Erroneous and outdated records can slow down locating and other processes. They can also lead to other types of data contamination.

example of the type of command that can wreak havoc on your database if you aren't careful. On the other hand, it exemplifies dBASE II's ability to eliminate drudgery through ''automatic'' editing.

As another example of using the Replace command for automatic editing, let's say several of your business associates work for the same company. If the company were to change its phone number for some reason, you would have an easier time using the Replace command to update the phone numbers than changing each record individually. The command line would look something like this:

```
. replace work:phone with ''415-555-1212''
  for company=''THE PRINTER WORKS'' <CR>
  00005 REPLACEMENT(S)
```

Eliminating Unwanted Records

Keeping your database clean and uncluttered is central to optimizing dBASE II's efficiency. Duplicate, incomplete, erroneous, and outdated records can slow down locating and other processes. They can also lead to other types of data contamination and potentially embarrassing situations such as invoices and phone calls going to the wrong people. So, it is good practice to purge your database of unwanted records regularly.

What's the procedure? You may have noticed that the list of control codes in the Edit section includes one for deleting records (^U).

By pressing ^U when you are editing a record and then saving the changes by typing ^W, you tell dBASE II to mark the record for *later* deletion. If you tried this, you probably noticed that a little sign (DELETED) appeared on the top line of your monitor. Pressing the ^U once again removed the sign. This on-and-off action is called a ''toggle'' because it is like a light switch. All the Delete command really does is insert an asterisk between the record number and the first field. It doesn't actually erase the record from the database, to prevent accidental catastrophes. (Another step, the Pack command is necessary before dBASE II will eliminate the record for good—more about this later.)

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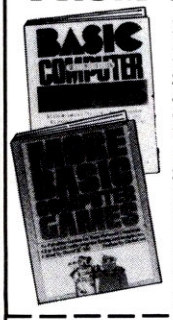

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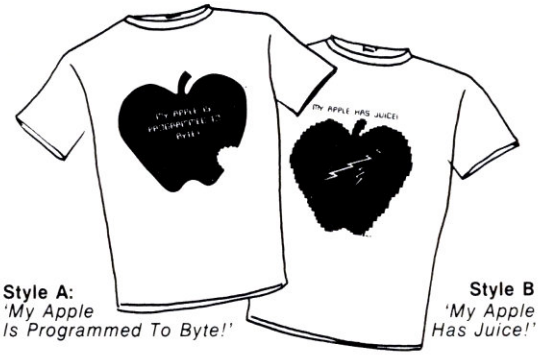

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CIRCLE 198 ON READER SERVICE CARD

Other Deletion Techniques

You can use the Delete command, like Edit, in several ways—in fact, this is the case for most dBASE II commands,

You can use the Delete command, like Edit, in several ways—in fact, this is the case for most dBASE II commands.

with identical rules in most instances. Here are a few examples of ways, besides using ^U, you might mark a record for deletion. Let's eliminate Adriator Bedwax for the simple reason that his (her?) name is just too preposterous.

```
. locate for last:name=''BEDWAX''<CR>
RECORD 127
. delete <CR>
00001 DELETION(S)
```

Or, more simply . . .

```
. delete record 127
```

Or, instead of the last two commands . . .

```
. delete for last:name=''BEDWAX'' <CR>
00001 DELETION(S)
```

Any of these methods would work. Now, just for your future reference, here are several other ways you could use the Delete command. (Refer to last issue's section on the pointer if you're in doubt about these.)

```
. delete all <CR>
. delete next 10
. delete next 10 for company=''ABC GUM''
. delete for first:name=''VALERIE''.and
  .last:name=''KULETZ''
```

Don't let that last one throw you. It just tells dBASE II to look at two fields instead of one before deleting the record. Using this type of syntax, you could have dBASEII delete JOHN SMITH while leaving BILL SMITH alone.

Who's Deleted Already?

After trying all these commands, you have probably marked lots of records for deletion. Just to find out who's marked for deletion, type

```
. display for * <CR>
```

or, for a less cluttered screen . . .

```
. display first:name, last:name for * <CR>
```

Oops! or Undeleting Records

Now, what if you decide that you want to hang on to those records after all? No problem. You can ''undelete'' them with the Recall command. It works exactly like Delete, except in reverse. To save all your deleted records, just type

```
. recall all <CR>
```


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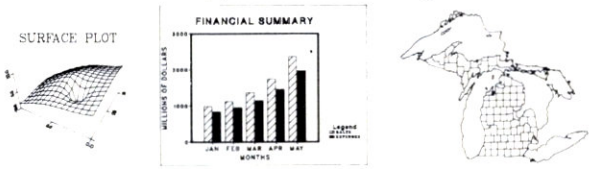

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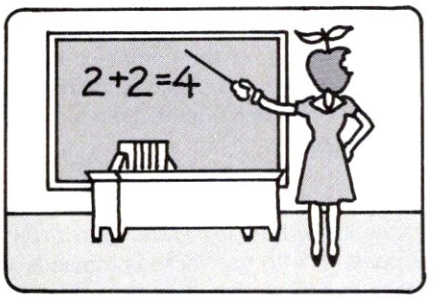

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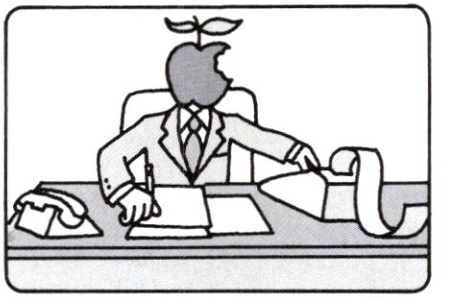

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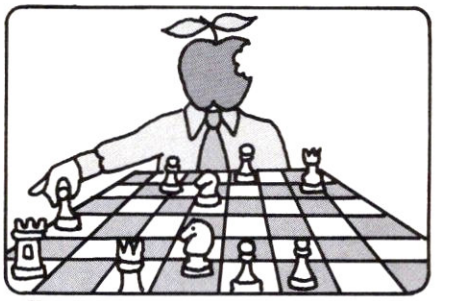
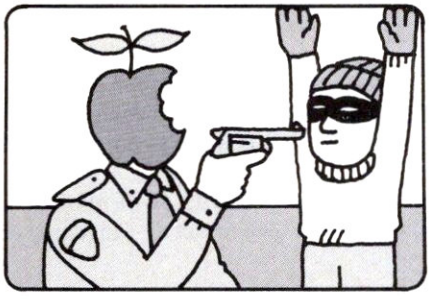


A game opponent?



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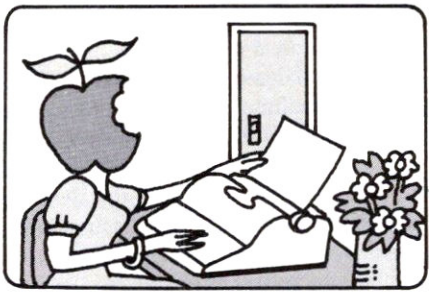

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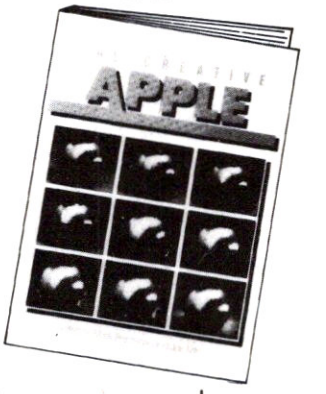

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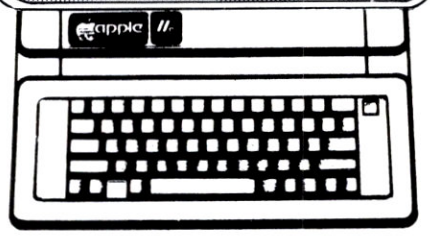

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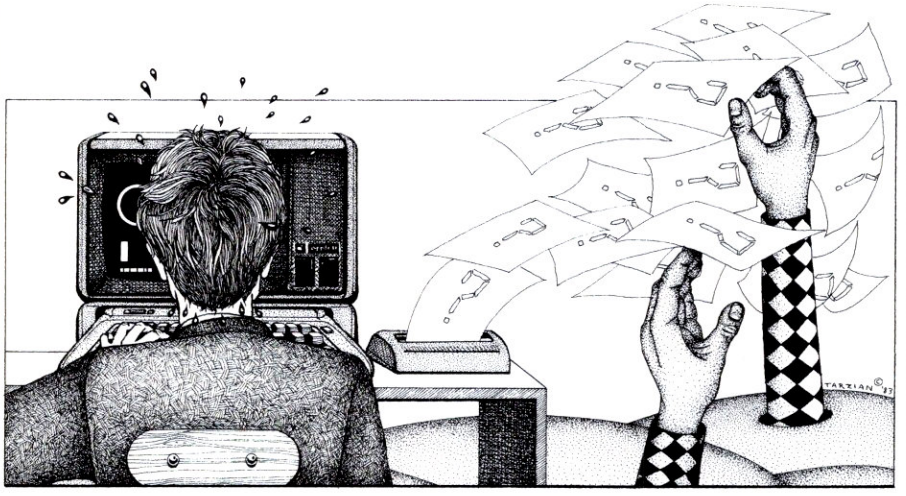
RESCUE SQUAD/BY LINDSAY McGRATH

How to keep the Apple II Plus from stopping in the middle of a program, and how to print Business Graphics



Garbage Collection

Q: Here's a mystery for you. Sometimes, unpredictably, my Apple II Plus stops in the middle of a program it's running, pauses for several minutes, and then starts up again. I used to be afraid I'd lose my program during these lapses, but once the computer starts running the program again, everything is fine. What causes these pauses? Is there something wrong with my computer?

A: *There is nothing wrong with your computer. What you're witnessing is called garbage collection. It's Applesoft's way of throwing out old data filling up its free memory. There is no way to prevent or predict these pauses, but you can expect garbage collections periodically when you handle a lot of data or work with restricted memory on your Apple.*

Applesoft interrupts your program to throw out old, unused string-variable values that are filling up its available memory. Every time Applesoft changes the value of a string variable in a program, it stores the new value in memory but does not erase the old value. If there are enough variables in the program, all the free memory is soon full of old unused strings.

That's when Applesoft steps in and performs its garbage collection. It sorts through all the strings in memory, and collects and discards any unused ones. The more string variables, the longer Applesoft's sorting and tossing will take.

If you are a programmer, there is a way you can incorporate garbage collection into your software. Applesoft collects garbage when it encounters the FRE(Ø) command. Here is a sample line you can use to initiate garbage collection if it's necessary: 1000 IF PEEK (112)-PEEK (110) < 2 THEN PRINT "BE PATIENT": A=FRE (Ø)

There is a way you can incorporate garbage collection into your software.

This line tells Applesoft to check the value of PEEK (112)-(PEEK 110) and, if it finds that value is less than two, to print the message "PLEASE BE PATIENT" and execute a FRE (Ø) command. Execution of the FRE (Ø) command causes garbage collection to occur.

***Business Graphics* on the C. Itoh**

Q: How do I print *Business Graphics* to my C.Itoh printer?

A: Business Graphics *for the Apple III and Apple II and IIe can be printed to a variety of printers. This is made possible by having your authorized Apple dealer install the proper printer interface on the* Business Graphics *disk. The Printer Interface Kit (PIK) is made by Business & Professional Software in Cambridge, Massachusetts, and can be obtained through your Apple dealer. The package comes with software for many printers, and the Apple dealer will install only the one you need. It is not necessary to purchase the entire PIK. Printers and plotters supported are listed below.*

- Anadex DP9001(A), DP9501(A)
- Apple dot-matrix printer, daisy-wheel printer, Silentype printer, plotter
- Centronics 122, 352, 353
- C.Itoh Prowriter 1550, 8510A
- Diablo 630, 1610, 1620, 1630, 1640, 1641, 1650
- Epson MX-80, MX-80 W/GRAFTRAX, MX-80 F/T, MX-80 F/T W/GRAFTRAX, MX-100
- Houston Instruments (HIPLOT) DMP3, DMP4, DMP6, DMP7
- Hewlett-Packard plotters HP-7220, HP-7221, HP-7225, HP-7470
- IDS Prism, Paper Tiger 440G, 445G, 460G, 560G
- NEC Spinwriter 3510, 3550
- Okidata 82A, 83A, 84
- Qume Sprint 5/45, 5/55
- Strobe plotter model 100
- Watanabe plotters WX4633, WX4634, WX4635, WX4636, WX4637, WX4638, WX4671, WX4675
- Xerox printers 1710, 1720, 1730, 1740, 1741, 1750 ✚

Please send your questions and problems to Rescue Squad, A+, 1 Davis Drive, Belmont, CA 94002.

The ComRiter CR-II daisy-wheel printer

HARDWARE

ComRiter CR-II

The ComRiter CR-II is a new daisy-wheel printer with low-cost accessories. This complete letter-quality printing system can perform as either a word processor with most personal computers or as a stand-alone electronic typewriter with two-color printing ability.

The new accessories are a lightweight keyboard and a cut-sheet feeder. The keyboard can convert the CR-II into an electronic typewriter, and the cut-sheet feeder provides automatic paper-handling features previously found only in more expensive word-processing systems. A tractor-feed accessory rounds out the system.

The CR-II, which runs at 12 characters per second, is compatible with most microcomputers and word processors. The printer's features include superscript, subscript, backspace, underline, boldface, double strike, and proportional spacing. The CR-II also has a 5K buffer that allows users to reproduce original and multiple copies of documents stored in its memory. The buffer can store up to three pages of data.

The ComRiter CR-II measures 19.3 inches wide, 6 inches high, and 13.1 inches deep. The CR-II lightweight keyboard can be used on a desktop or on a lap. The keyboard has alternate shift keys and an adjustable stand. It features 46 keys, 96 characters, and a 48-character buffer memory. The feeder, which has an adjustable paper hopper, has a capacity of 250 sheets. *(List Price: $599)*

Requires: Apple II, II Plus, or IIe.

Comrex International, Inc.
3701 Skypark Drive
Torrance, CA 90505
(213) 373-0280

CIRCLE 550 ON READER SERVICE CARD

ShuffleBuffer

A printing buffer designed to "shuffle" text, graphics, spreadsheet information, and other computer-generated materials into various combinations for printing, plotting, or telephone transmission. Applications include mailing lists, letter mergings, and preparation of personalized form letters.

The product features two additional modes of operation: the standard, dumb-buffer function of first-in, first-out (FIFO) printing of material that does not need rearranging or reprinting; and Bypass, the interruption of a long printout in order to produce a separate document on an immediate basis.

Shufflebuffer is an enhanced version of Interactive Structures' Pipeline random-access printer. The ShuffleBuffer features front-panel controls to permit stacking and is slim enough to fit underneath a disk-drive unit.

The printing buffer is available in 8K increments. (*List Price:* 8K, *$260;* 16K, *$273;* 32K, *$299;* 64K, *$349;* 128K, *$445. Other pricing to be announced.*)

Requires: Apple II, II Plus, IIe, or III; printer.

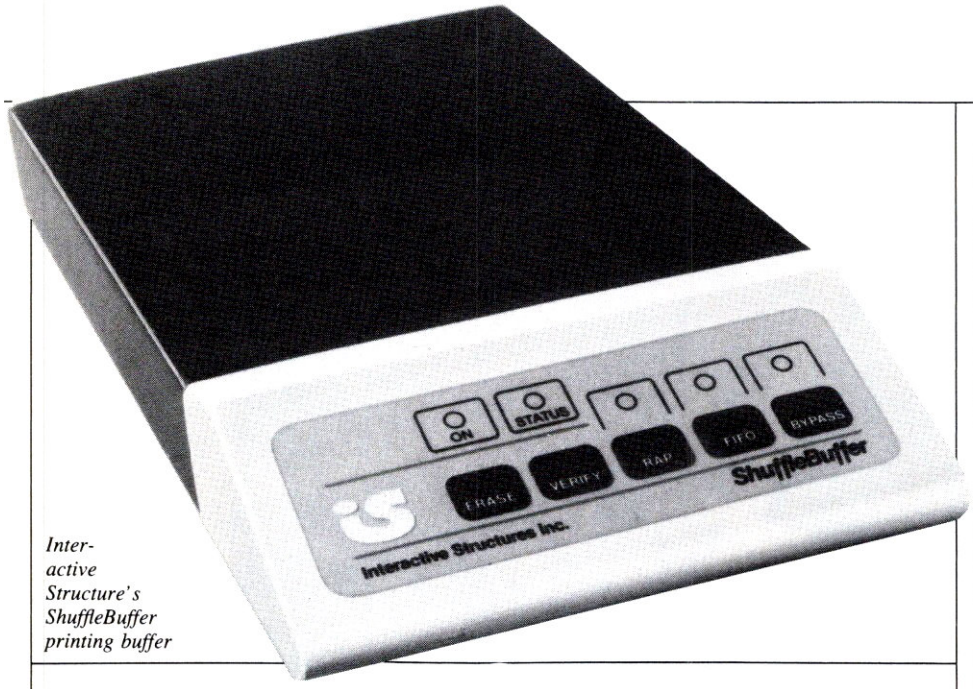
Interactive Structures, Inc.
146 Montgomery Avenue
Bala Cynwyd, PA 19004
(215) 667-1713

CIRCLE 551 ON READER SERVICE CARD

Micro-Sci A82

A disk drive that combines large storage capacity with the ability to read 35-track software.

The A82 is an 80-track, 328K 5¼-inch floppy-disk drive that offers a 5-millisecond access speed. It will boot



Interactive Structure's ShuffleBuffer printing buffer

and read most 35-track diskettes, including half-track protected software, with no modifications.

The disk drive plugs into any existing Micro-Sci C2 or Apple Disk II controller card. With each drive, Micro-Sci supplies a utility software diskette containing programs that modify DOS 3.3, Microsoft CP/M (2.23 and 2.20B), and Pascal 1.1. (*List Price: $569*)

Requires: Apple II or IIe.

Micro-Sci
2158 South Hathaway Street
Santa Ana, CA 92705
(714) 662-2801

CIRCLE 552 ON READER SERVICE CARD

HARDWARE/SOFTWARE

Soundmaster II

Soundmaster II is a product that gives Apple II, II Plus, and IIe arcade-level stereo sound capabilities. The Soundmaster II package includes a Soundmaster II card, an instruction manual, and a demonstration disk containing sample sounds and preprogrammed output routines. You can program Soundmaster II in BASIC or assembly language to produce a variety of sound effects. The demonstration disk contains helper programs to make Soundmaster II easy to program, even for novices.

Soundmaster's two audio amplifiers can directly drive two inexpensive 8-ohm speakers, and RCA plugs allow direct connection to hi-fi systems for louder sound effects.

Each Soundmaster II board contains two sound-generating circuits that provide a total of six tone generators, two noise generators, six mixers, amplitude controls, two envelope generators, and six D to A converters. (*List Price: $119.95*)

Requires: Apple II, II Plus, or IIe.

Kearsarge Industries, Inc.
12310 Pinecrest Road
Reston, VA 22091
(703) 620-5760

CIRCLE 553 ON READER SERVICE CARD

Savvy One and Savvy Pro

Two new versions of the Savvy programming language designed to offer users a high-level programming language integrated with the Savvy operating system and database-management system.

Savvy One includes the Savvy programming language, a database-management system, a text editor, and coprocessor printed circuit card containing a Z80A processor. The software's Draft Database feature enables users to establish databases for a variety of record-keeping tasks. You can also use Savvy One to teach basic computer procedures and elementary programming techniques to computer novices.

Savvy Pro, designed for multiple- and hard-disk systems, includes an automated database builder, as well as the Savvy programming language, database-management system, and coprocessor.

Both products include Savvy's programming language, which incorporates an adaptive pattern-recognition ability that frees users from memorizing complex commands and highly structured syntax, and substitutes simple descriptions of tasks to be done. Savvy, in all configurations, can run the CP/M operating system and most standard 44K CP/M-based application programs. (*List Price:* Savvy One, *$349;* Savvy Pro, *$495*)

Requires: 48K; Apple II Plus or IIe; Savvy One requires one disk drive; Savvy Pro requires two disk drives.

Excalibur Technologies Corporation
800 Rio Grande Blvd.,
N.W., 21 Mercado
Albuquerque, NM 87104
(505) 242-3333

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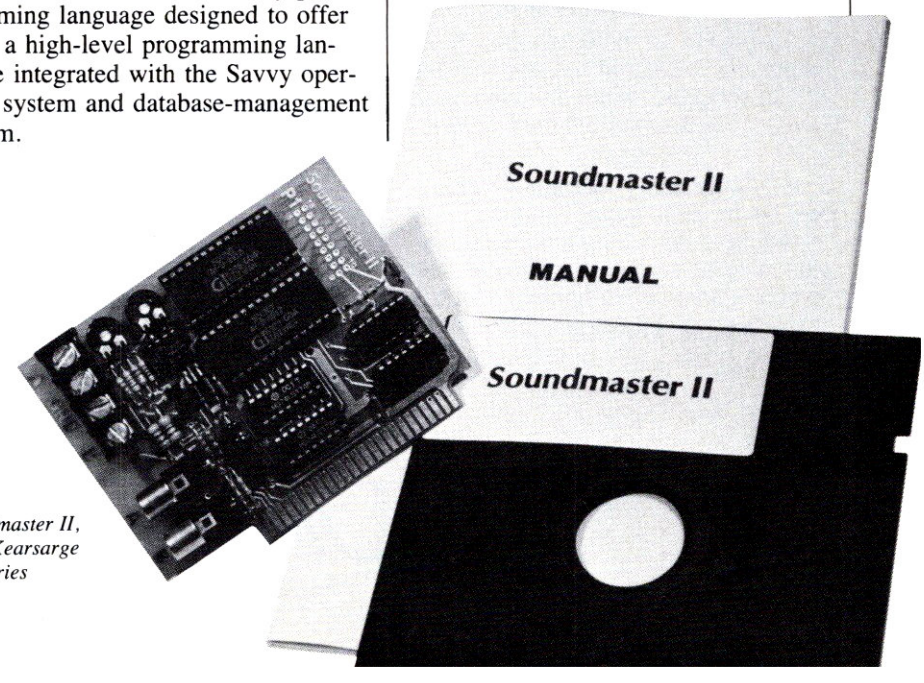
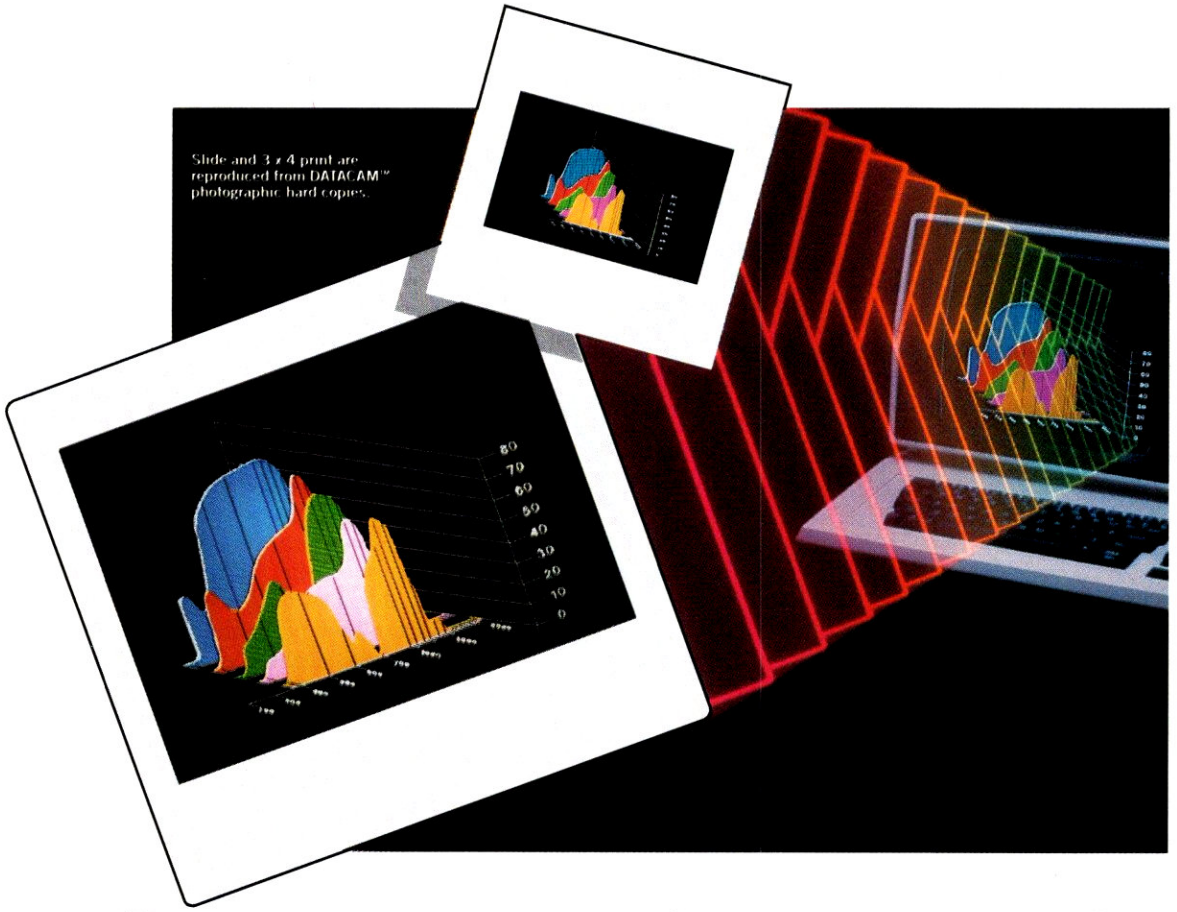


Soundmaster II, from Kearsarge Industries



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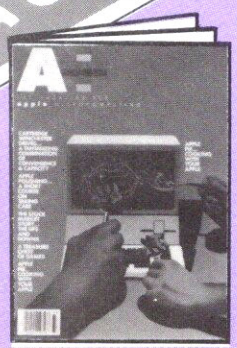

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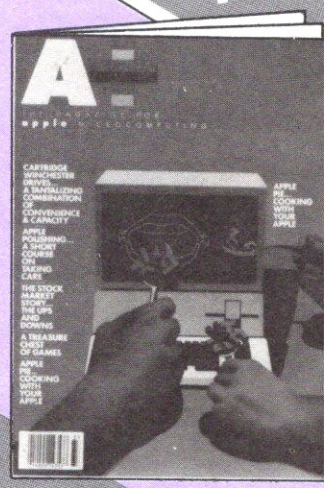

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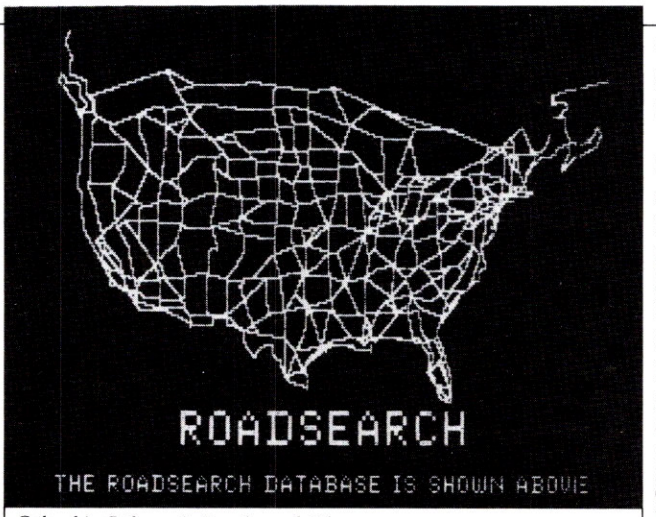
PRODUCT NEWS

SOFTWARE

Roadsearch-Plus

Roadsearch-Plus is a computerized road atlas for the Apple II/IIe personal computer. This program simplifies the process of determining driving routes for anyone who travels over the interstate-highway system by computing different types of routes. The most powerful program determines and prints the shortest practical route between cities in its database. This program can also avoid toll or other roads. Another program develops routes that may be longer, but more suitable to a user's specific needs.

Roadsearch-Plus contains a database of 406 cities and road intersections and about 70,000 miles of interstate and major highways throughout the U.S. and Canada. The program also contains a Roadmap Development System that lets users customize their roadmap with up to 50 additional cities or road junctions and 100 additional road segments anywhere in North America. The user can add local roads, favorite shortcuts, and new destinations, as well as keeping his database current with the latest roadmap revisions.



Columbia Software's Roadsearch-Plus

The printed outputs from Roadsearch-Plus include the driving route, distances, travel times, and fuel usage in different formats. *(List Price: $74.95)*

Requires: Apple or Apple IIe

Columbia Software
P.O. Box 2235A
5461 Marsh Hawk
Columbia, MD 21045
(301) 997-3100

CIRCLE 555 ON READER SERVICE CARD

Queen of Hearts

A video pinball game designed for true pinball addicts. Queen of Hearts features a sequential scoring system just like that in real pinball games, five different flippers to keep the ball in

SCRG PRESENTS

For Your Apple][, Apple][+, Apple //e, Apple /// & Franklin

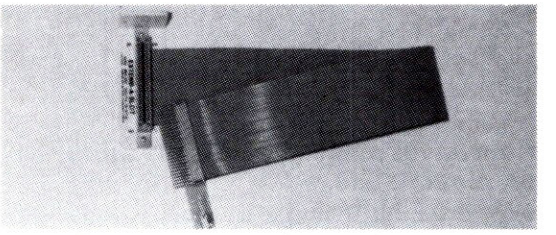
switch-a-slot

The **switch-a-slot** connects to any peripheral slot of the computer through an 18" cable. The user can plug up to four cards in the **switch-a-slot**. The desired card is chosen by using a switch on the front, and only the selected card draws power. This product is suitable for most peripheral cards. The **switch-a-slot** is perfect for selecting between different printer cards.

- **Holds 4 peripheral cards**
- **Saves wear and tear on delicate connectors**
- **All connectors are gold plated for reliability**
- **Only selected card draws power**
- **Works with most cards**

$179.50

Extend-A-Slot



The EXTEND-A-SLOT brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability. **$34.95**

These products work well with all slow to medium speed cards, such as Modems, Printers, Clock, Music, etc. They are not recommended for high speed data transfer devices such as alternate processor and disk drive controller cards.

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CIRCLE 198 ON READER SERVICE CARD

System Saver® didn't become the Apple's number one selling* peripheral by being just a fan.

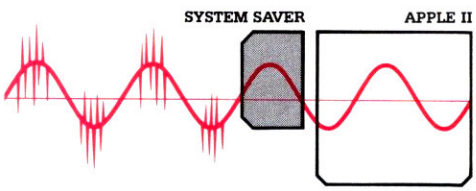
What made over 100,000 Apple® owners fall in love with System Saver? The answer is simple. It's the most versatile, most convenient, most useful peripheral ever made for the Apple.

System Saver filters out damaging AC line noise and power surges.

70-90% of all microcomputer malfunctions can be traced to power line problems** Problems your System Saver guards against.

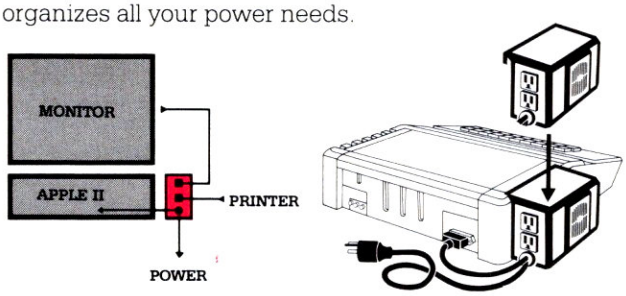
Power line noise can often be interpreted as data. This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing.

System Saver clips surges and spikes at a 130 Volts RMS/175 Volts dc level. A PI type filter attenuates common and transverse mode noise by a minimum of 30 dB from 600 kHz to 20 mHz with a maximum attenuation of 50 dB. You end up with an Apple that's more accurate, more efficient and more reliable.



System Saver makes your Apple more convenient to use.

No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.

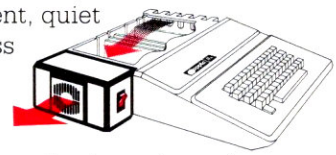


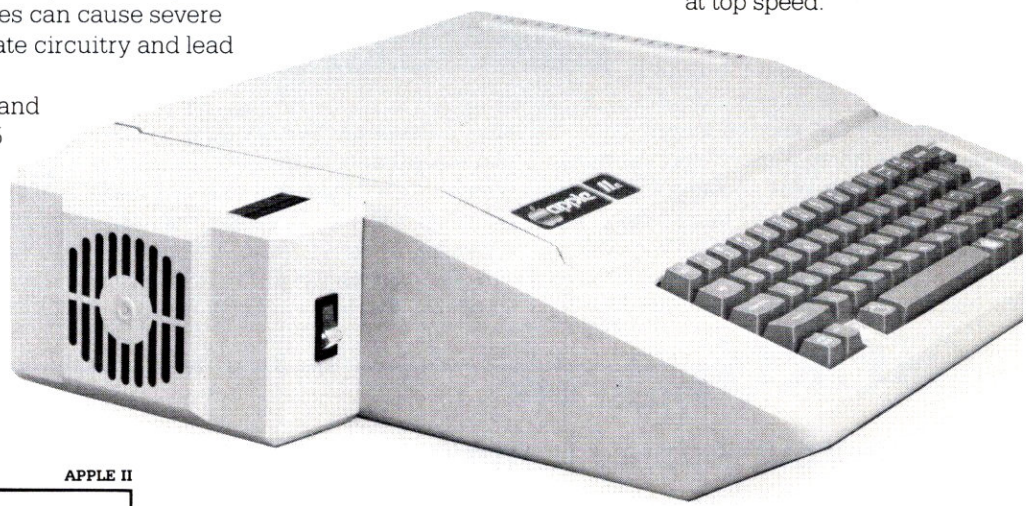
It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

System Saver lets your Apple keep its cool.

Today's advanced peripheral cards generate heat. In addition, the cards block any natural air flow through the Apple IIe creating high temperature conditions that shorten the life of the Apple and peripheral cards.

System Saver's efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots. It leaves your Apple cool, calm and running at top speed.





So if you want to keep damaging heat, line noise and power surges out of your system for good, pick up the only peripheral that's in use every second your computer is in use. The System Saver. You'll soon come to think of it as the piece Apple forgot.

Compatible with Apple stand

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(212) 486-7707 Telex: 236200 KEN UR

*Softsel Computer Products Hot List. **PC Magazine: March 1983.

System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Available in 220/240 Volts, 50/60 Hz.

CIRCLE 132 ON READER SERVICE CARD

System Saver is a registered trademark of Kensington Microware Ltd.
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play, a Tilt feature, and a scoreboard that keeps track of four players' points and displays the all-time high score. (*List Price: $39.95*)
Requires: 48K; Apple II, II Plus, IIe, or III; one disk drive.
Strategic Simulations, Inc.
883 Stierlin Road, Bldg. A-200
Mountain View, CA 94043
(415) 964-1353

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Coins

A program that lets coin collectors catalogue entire collections and generate various reports for personal-investment purposes.

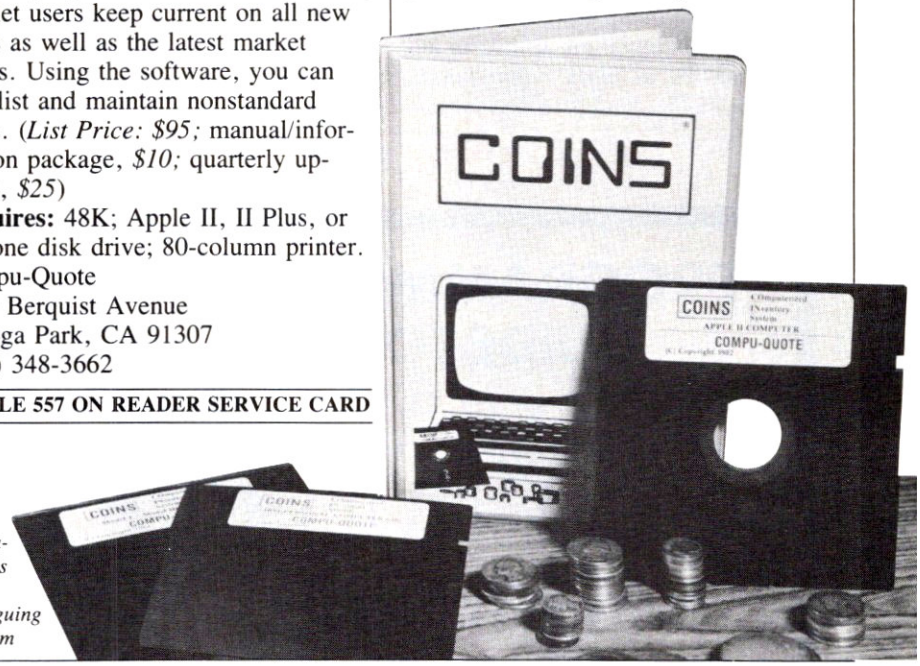
Coins (computerized inventory of numismatic stock) features a built-in, standard coin file. The file contains a total of 1600 common U.S. coin descriptions, along with their latest market value for most grades. This enables users to track the value of any collection.

Coins also provides special reports showing yearly purchases and sales. Quarterly update diskettes are available that let users keep current on all new coins as well as the latest market prices. Using the software, you can also list and maintain nonstandard coins. (*List Price: $95;* manual/information package, *$10;* quarterly updates, *$25*)
Requires: 48K; Apple II, II Plus, or IIe; one disk drive; 80-column printer.
Compu-Quote
6914 Berquist Avenue
Canoga Park, CA 91307
(213) 348-3662

CIRCLE 557 ON READER SERVICE CARD

Transend 1, 2, 3

An upgraded communications-software product line designed to provide intel-



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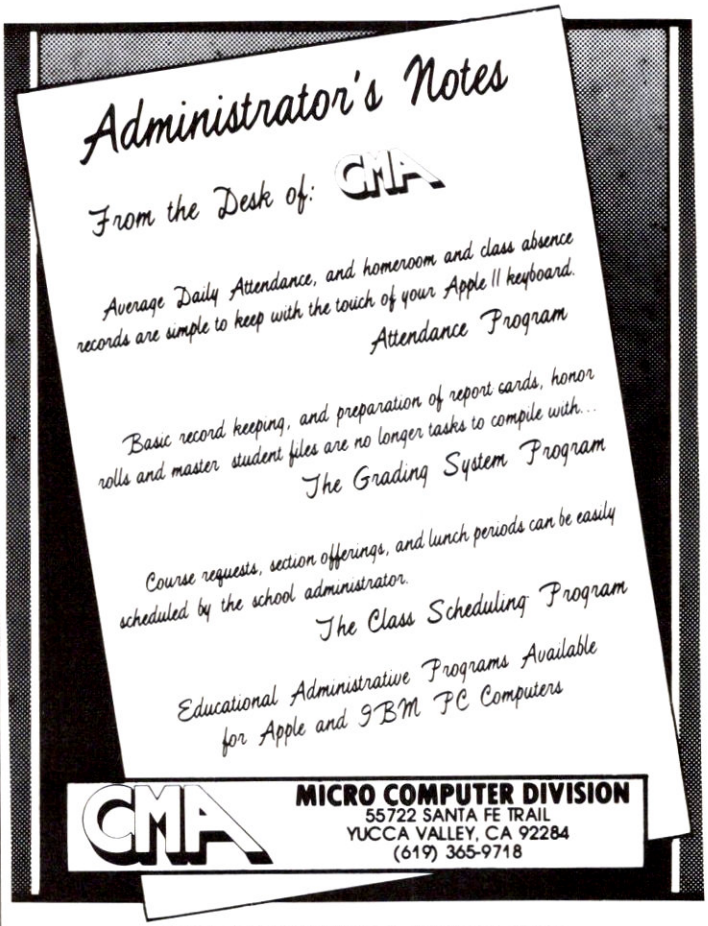
CIRCLE 180 ON READER SERVICE CARD



CIRCLE 165 ON READER SERVICE CARD

ligent-terminal communications, verified file transfer, and electronic mail.

Transend 1, 2, and 3 are designed to incorporate many new features. With auto-configuration, users can enter a particular terminal or peripheral option, and Transend then configures itself automatically. The new software features automatic log-on ability, keyboard macros that combine a series of functions under one keyboard stroke, and "skip-through" menus. With the software, you can program a computer to dial up to eight different systems automatically or to link 22 keyboard macro functions.

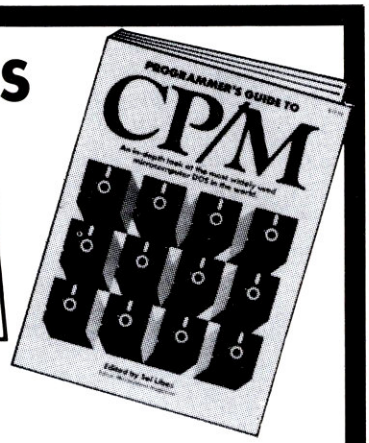
Users can enter a sequence of menu selections from anywhere within the program and page ahead automatically to another program location. (*List Price:* Transend 1, *$89;* Transend 2, *$149;* Transend 3, *$275*. Registered out-of-warranty Transend owners can purchase the upgraded version of the software for $20.)

Requires: 48K; Apple II, II Plus, IIe, or III in the Emulation mode; one disk drive.

Transend Corporation
2190 Paragon Drive
San Jose, CA 95131
(408) 946-7400

CIRCLE 558 ON READER SERVICE CARD

PROGRAMMER'S GUIDE TO CP/M



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Here's an important collection of CP/M insights that you'll never find in any CP/M manual. CP/M is the most popular microcomputer DOS in use today, and this widespread use has generated many innovative techniques and enhancements of CP/M. *Programmer's Guide to CP/M* tells you what these enhancements are and how to put them to use, how to get around apparent limitations of a CP/M system and why CP/M is far more versatile than you might have imagined. Every article in *Programmer's Guide to CP/M* originally appeared in MICROSYSTEMS between January 1980 and February 1982. Except for this collection, these articles are now unavailable! *Programmer's Guide to CP/M* gives you an in-depth look at CP/M from the viewpoint of the programmer—the individual who creates the software that interfaces directly with CP/M, or who is installing CP/M on systems for which configurations do not already exist.

Contents include "An Introduction to CP/M," "The CP/M Connection," "CP/M Software Reviews," "CP/M Utilities & Enhancement," "CP/M 86" and "CP/M Software Directories." 200 pages, $12.95.

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A-Stat 83 allows you to process data directly from disk files. All routines are menu-driven and prompting or command-driven. The command-driven syntax is a subset language derived from the mainframe and minicomputer system: P-Stat 78.

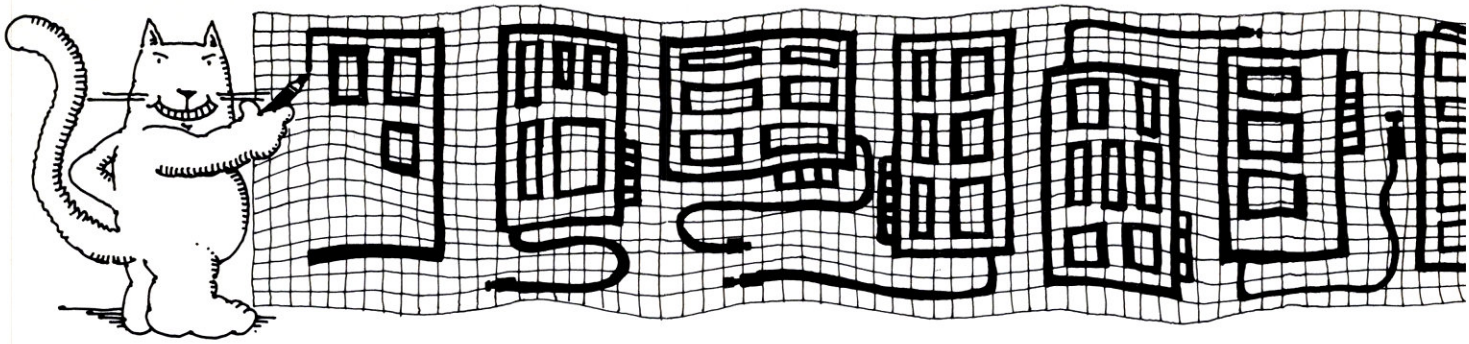
The software includes procedures for univariate variable descriptions, continuous and discrete frequency distributions with histograms, cross-tabulation with over 14 measures of association, correlational analysis with pairwise or listwise deletion of missing data, and more.

A-Stat supports various forms of data entry including full prompting, free format, or fixed format. You can enter data directly from the keyboard, or from system-disk files created by other programs or imported from other computer systems. The package supports full DIF interfaces as well as Apple Plot and File cabinet interfaces.

The software is also available in a CP/M version. (*List Price: $200;* CP/M version, *$300*)

Requires: 48K; Apple II, II Plus, IIe, or III; one or two disk drives; CP/M card required for CP/M version.

Rosen Grandon Associates



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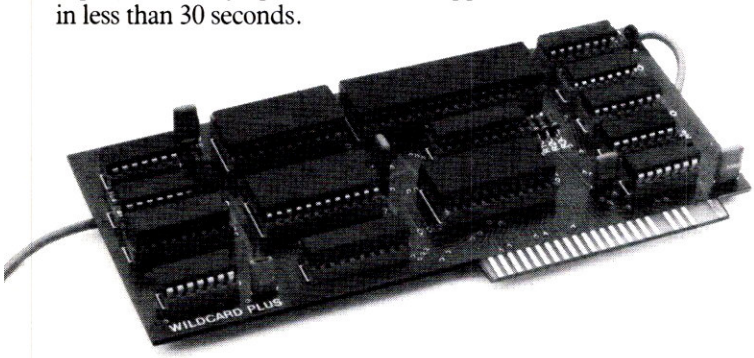

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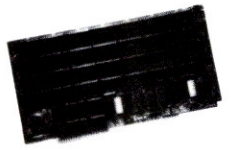

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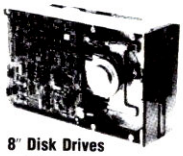

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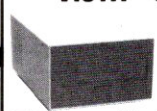

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Math formulas can be calculated automatically for such items as balance due, tax rate, commission, and price extension. All formulas in a file, or in a select group of records, can be recalculated at once.

The program accepts up to 65,535 records per file and 99 fields, 1020 characters per record. The software is written in assembly language for fast operation. *(List Price: $300, complete with Microsoft CP/M Softcard)*
Requires: 64K; Apple II, II Plus, or IIe; Microsoft CP/M SoftCard; two disk drives.
The Small Computer
Company, Inc.
230 W. 41st Street, Suite 1200
New York, NY 10036
(212) 398-9290

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Quiz Master

A program to aid development and duplication of custom educational software, Quiz Master allows the user to create and save, on disk, quizzes of up to 50 multiple choice or true/false questions and, on a single diskette, up to 250 student records. Students can take the tests on computers and their results will be stored on disk, or multiple copies of each test can be printed with different arrangements of question-and-answer keys.

The program includes password protection to prevent unauthorized access to data; mastery and failure levels, which can be set for minimum scoring to continue to the next quiz or return to the previous quiz; and a summary output report showing data for all students. The program is written in assembly language for speed and offers graphics capabilities. *(List Price: Unlimited Single License $99.95; additional licenses $29.95)*
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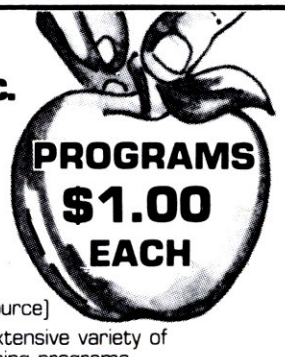

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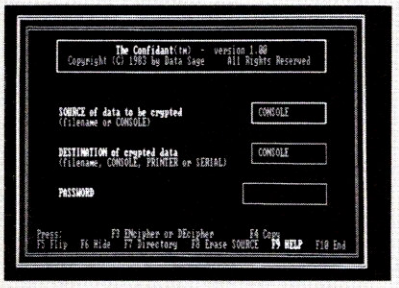

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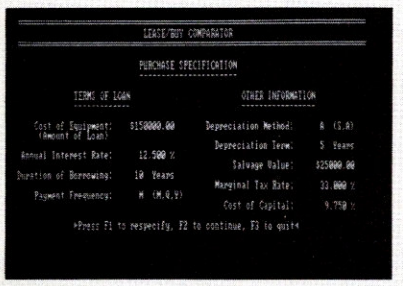

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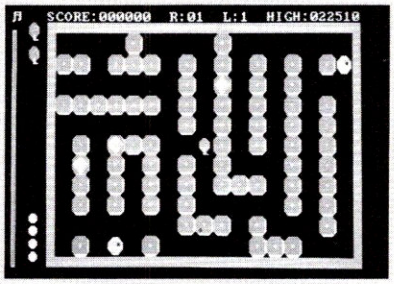

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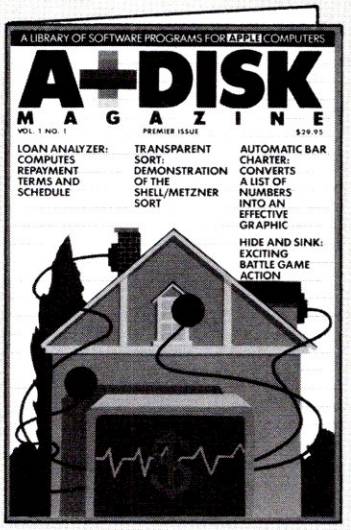

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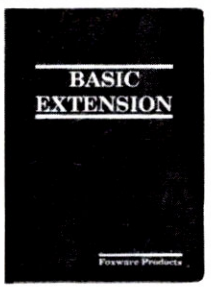

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The improved version is for use with Apple DOS word processors, while each Sensible Speller package includes a version for use with Apple CP/M and Apple Pascal. Two disk drives are required to add or remove words from the supplied dictionary disks. *(List Price: $125)*

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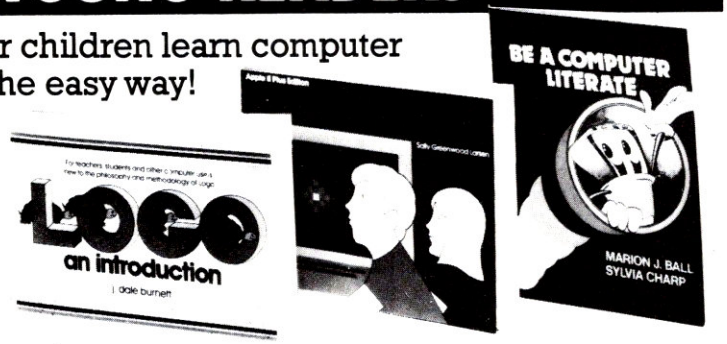

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A beginner's guide to the popular language that teaches computer literacy. Helps novices create geometric shapes, curves, learn about programming, math, and more. Written in an open-ended style for both teachers and students. 11" x 8½", softcover, illustrated. $7.95 ($1.50). **#12L.**

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By Sally Greenwood Larsen

Written for the elementary-age child, this easy-to-read book tells how to do calculations and graphics, save and load programs, write flow charts and use BASIC. Includes section for parents. 8½" x 11", softcover, illustrated. SPECIFY EDITION: Apple® $5.95 ($1), **#12G**; Atari® $5.95 ($1), **#12J**; IBM-PC® $5.95 ($1), **#12K**; Sinclair or Timex Sinclair $5.95 ($1), **#12S**; TRS-80® $5.95 ($1), **#12H**; Commodore VIC®-20 $5.95 ($1). **#12V.**

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By Marion J. Ball and Sylvia Charp
Illustrated by Jonathan Byrd

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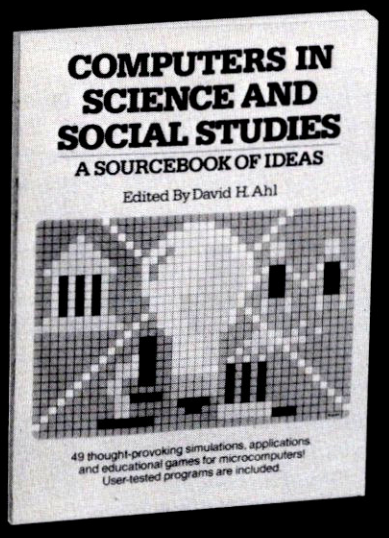

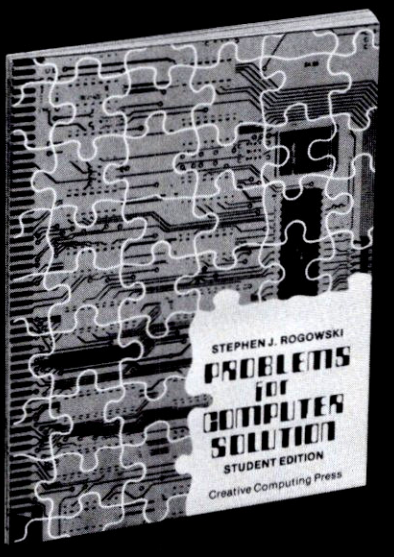

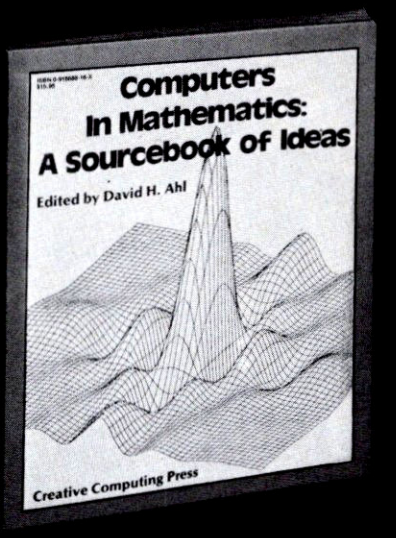

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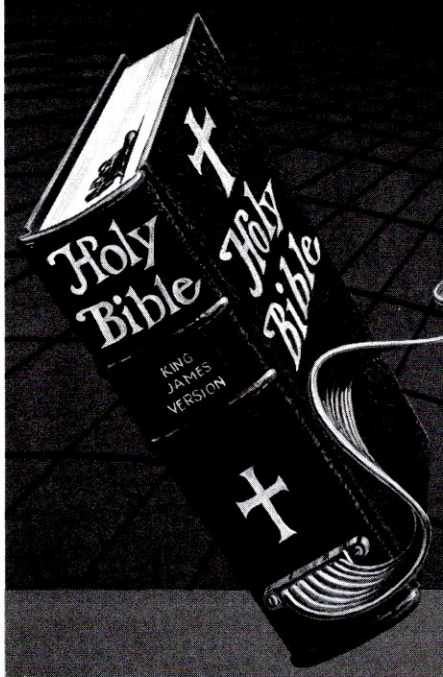

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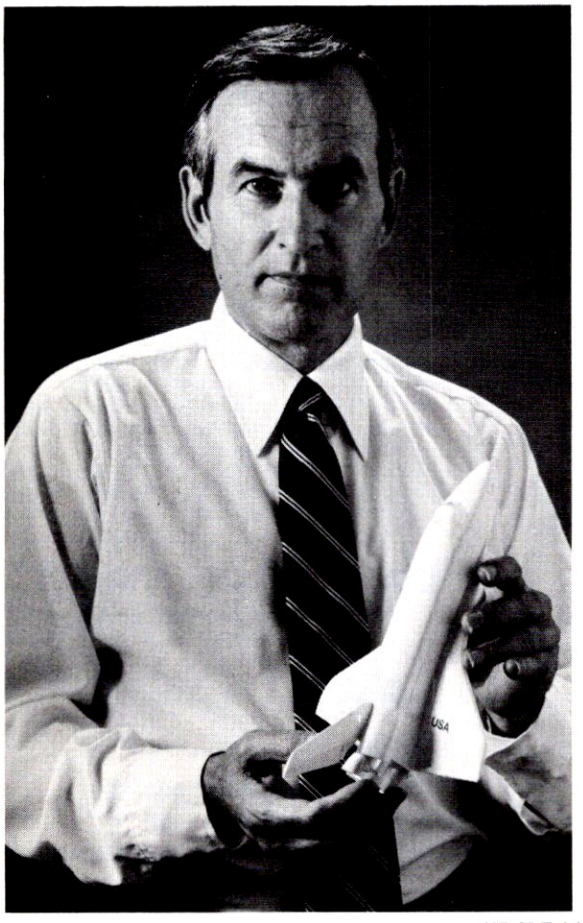

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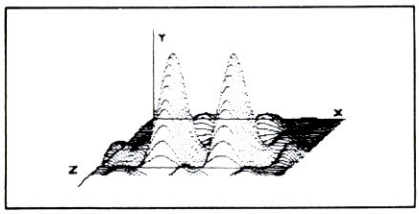

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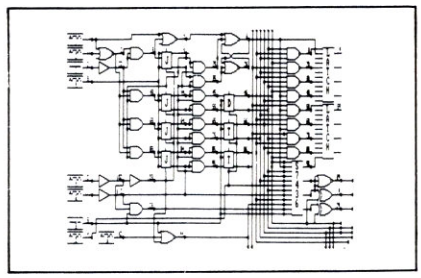

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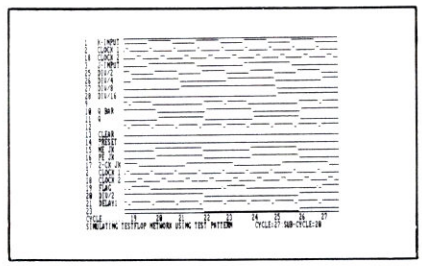

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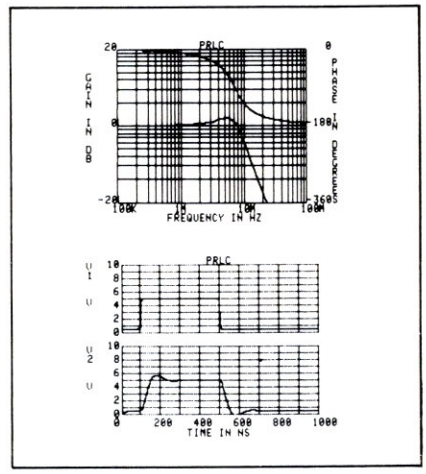

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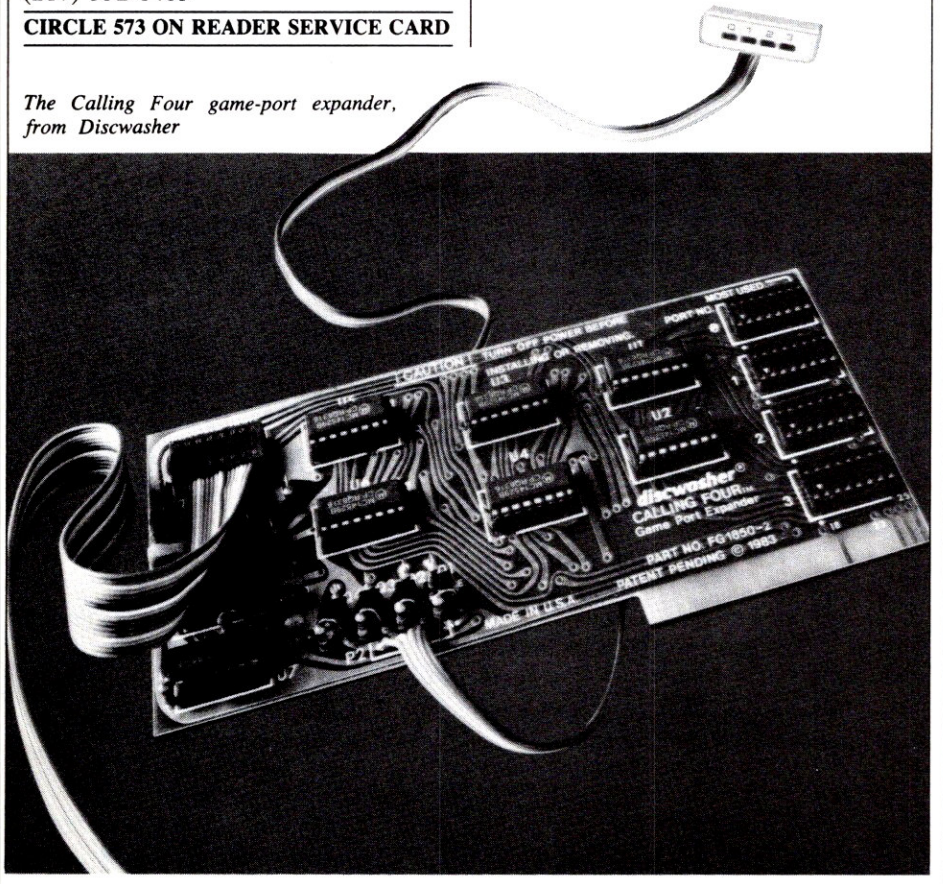

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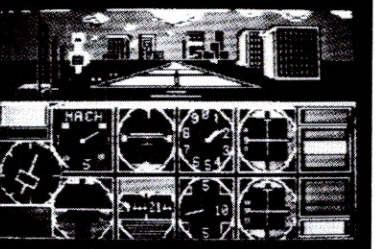

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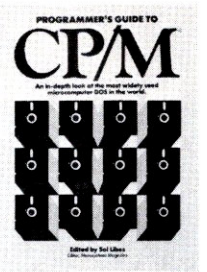

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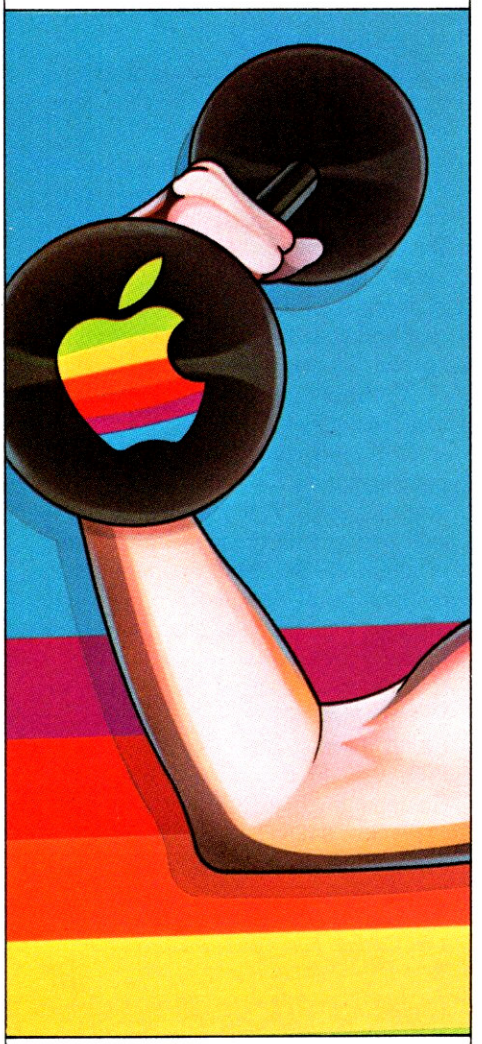

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That's not all—when you plug a PDQ II into your Apple, it will provide the advanced features of the 16/32 bit MC68000 microprocessor. Your Apple will be capable of utilizing sophisticated, "next generation" software products.

ONE SIMPLE SOLUTION

PDQ II eliminates the need for numerous add-ons — it includes an integrated high speed pseudo-disk, printer/communicatons buffer, memory extension capability and a powerful 16/32 bit processor. PDQ II consists of two system boards which simply plug inside your Apple, making your Micro think it's a Mini.

INSURANCE FOR THE FUTURE

PDQ II provides a powerful p-System run time environment, making it possible for your Apple to take advantage of many of the hundreds of high-quality p-System applications...the same applications available for Digital, IBM, HP, and other computers.

PDQ II technology makes your current investment in software and training more productive, while providing an almost unlimited growth path.

PDQ II comes with a full one year warranty and will be available through your local Apple dealer.

If you simply cannot wait, send your check or M.O. for $1495 (postage included) to: Enhancement Technology Corporation, P.O. Box 1267, Pittsfield, MA 01202. Mass residents must include 5% sales tax.

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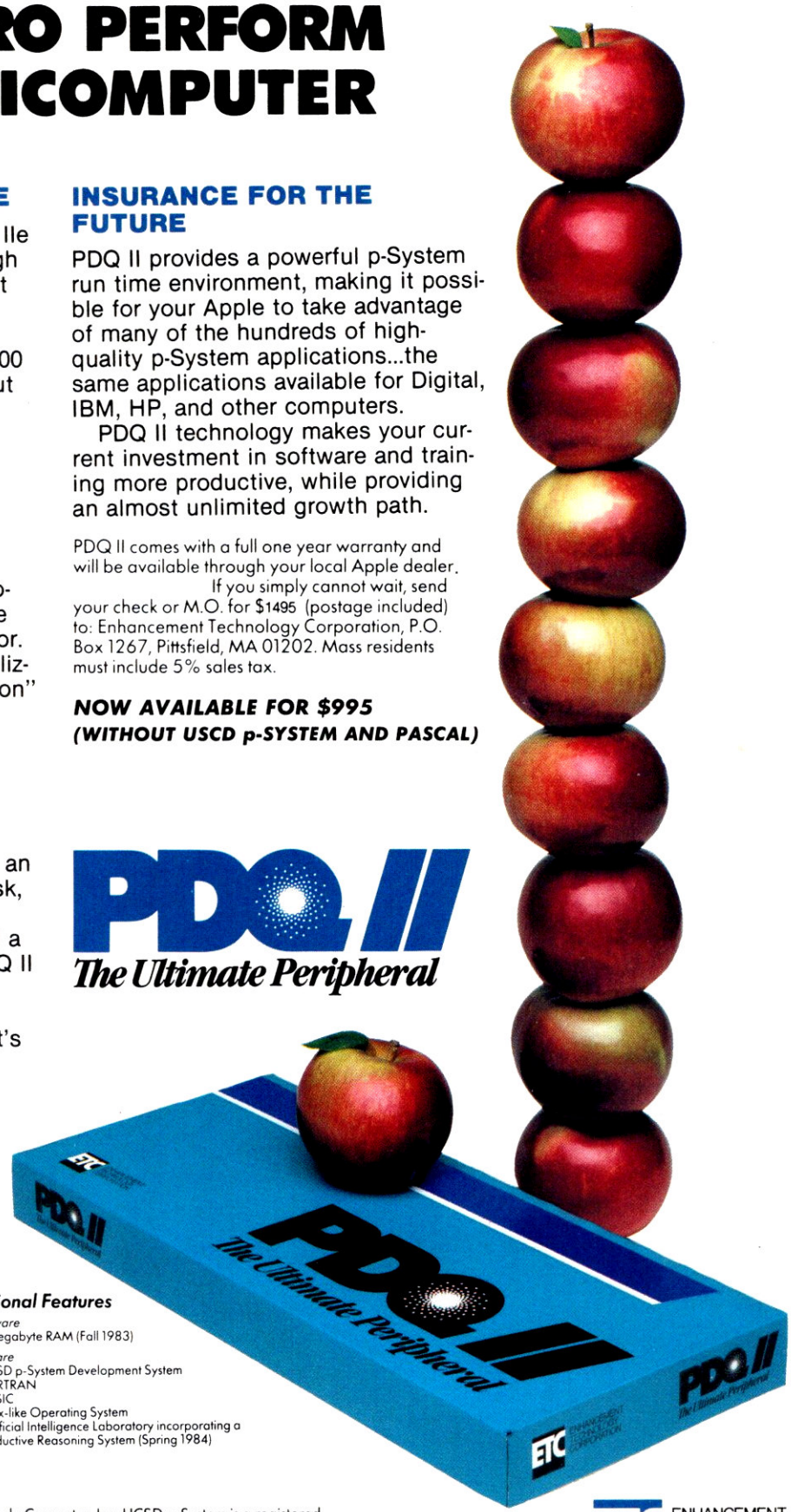
The Ultimate Peripheral



PDQ II SYSTEM SPECIFICATIONS

Standard Features

Microprocessor
- 16/32 bit MC68000
- 10 MHZ

User Memory
- 256K Bytes RAM

Integrated Functionality
- Multiple printer/communications buffering
- Pseudo-disk operations
- Track buffering (p-System)

ETC Software
- ETC MC68000 Assembler
- ETC MC68000 System Monitor
- ETC p-System (version IV) to Apple DOS Interface Utility

Languages and Software Systems Supported
- Applesoft BASIC Compatibility & Speed up
- Apple DOS 3.3
- UCSD p-System (version IV) Interpreter—executes UCSD Pascal, FORTRAN-77 and BASIC P-Code
- UCSD Pascal (***Now Included!***)

Optional Features

Hardware
- 1 Megabyte RAM (Fall 1983)

Software
- UCSD p-System Development System
- FORTRAN
- BASIC
- Unix-like Operating System
- Artificial Intelligence Laboratory incorporating a Deductive Reasoning System (Spring 1984)

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ETC ENHANCEMENT TECHNOLOGY CORPORATION

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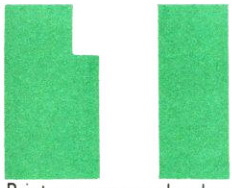

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Mail the card, and the information on the products you requested will be mailed to you free of charge by the manufacturer.

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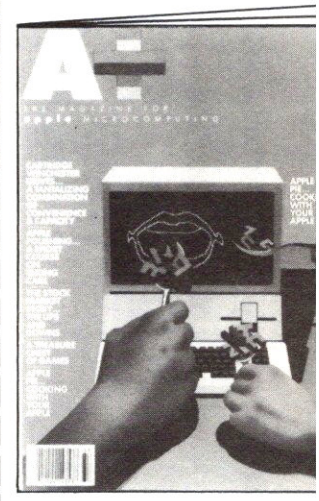

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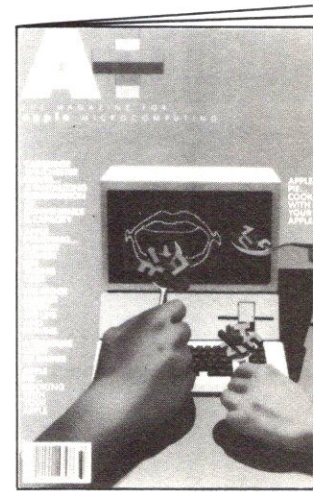
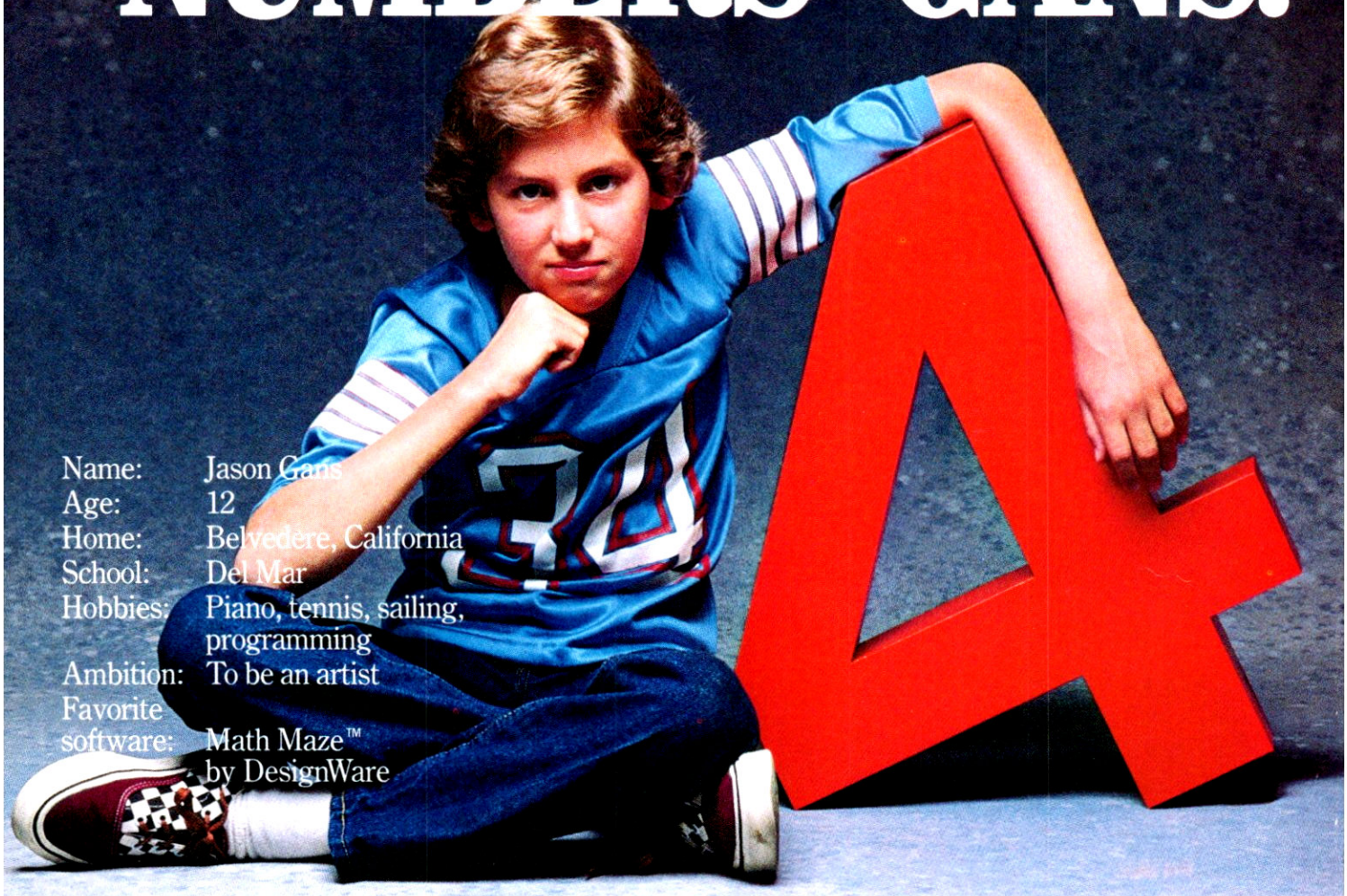


THEY CALL HIM "NUMBERS" GANS.



Name: Jason Gans
Age: 12
Home: Belvedere, California
School: Del Mar
Hobbies: Piano, tennis, sailing, programming
Ambition: To be an artist
Favorite software: Math Maze™ by DesignWare

"Math Maze is neat because you do more than just add and subtract numbers all the time. You've got to find them first. And then get there before you get caught.

"It's got real good graphics. I can even change the background color. And make the math as challenging as I want.

"There's lots of mazes, too. But the best thing is, I can make up my own. So when my friends come over, I've always got something new."

DESIGNWARE ON CREATIVITY.
Children learn the most through creative problem solving. That's why *Math Maze,* like so many DesignWare games, is an open-ended exercise that challenges and nourishes young minds. In a way that's a lot of fun.

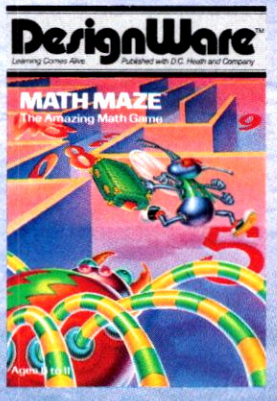
DesignWare programs encourage kids to draw on something they just happen to have an unlimited supply of—imagination!

SPELLING, MATH, OR LANGUAGE
Games like *Math Maze, Spellicopter*™ and *Creature Creator*™ inspire youngsters to tap into that fertile idea-field. To actively become part of the program, in effect creating "new" games as they go along. And all the while building up solid skills in the basics. And all the while having a lot of plain old fun.

DesignWare. We make learning come alive. On Apple II,® IBM® and Atari® computers.

Ask for DesignWare products at your local software retailer. Or call us at 800-572-7767 (in California, 415-546-1866) and ask for our free catalog.

As Jason Gans says, "Hey—they don't call me 'Numbers' for nothing, you know!"



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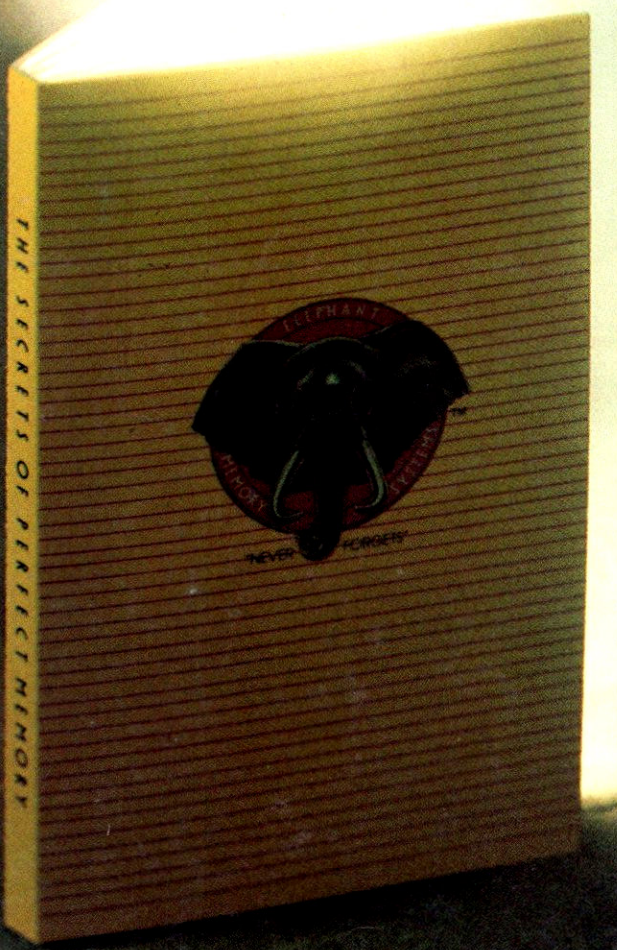

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