

WHOLE EARTH
Software
CATALOG FOR 1986



**RECOMMENDED
software, hardware,
magazines, books, accessories,
suppliers and online services
FOR PERSONAL COMPUTERS**

**STEWART BRAND
Editor in Chief**

**This 2.0
edition has
three levels
of updating . . .**

- 1.** The whole book is revised and updated.
- 2.** It includes a 16-page Last-Minute Supplement.
- 3.** There's an ongoing update every three months in our magazine, **WHOLE EARTH REVIEW.**

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INTRODUCTION TO THE 2.0 EDITION

STEWART BRAND: In all our years doing **Whole Earth Catalogs** (18 years and counting) we've never dealt with a subject so ephemeral and expensive, so in need of subsequent editions and all the apparatus of routine updating. Happily, updating also means refining, and that's not the only reason for increased confidence in this book's recommendations.

- Where the first edition reflected 1½ years of research, this one reflects 2½ years.
- The judgements of the first edition have been massively public for a year. Howlers have been howled at, solid recommendations quietly affirmed, updates updated, and everything in this edition adjusted accordingly. The book itself got the kind of encouragement immodestly quoted on the back cover.
- The computer marketplace has settled down considerably since 1984. There are fewer new products per season and fewer technological "new generations" being promised every minute. It's still a volatile industry, but less punishingly so for the customer. For the computer biz it's a "shakeout"; for the rest of us it is dramatically increasing value at decreasing price.
- Standards have become more entrenched—machine standards, operating system standards, popular program standards. Most of our recommendations cluster conservatively around those standards.
- Computer and software shoppers are far more savvy than they used to be, and that experience is reflected here.
- Perhaps because of its conspicuous hysterias of boom and bust, the personal computer marketplace has developed a core cautiousness that keeps popular machines and programs at the top of the best seller lists for years. We challenge that cautiousness only when we dispute its judgement on particulars.

This year, as last, the impossible (and unachieved) task of the **Whole Earth Software Catalog** is to identify and comparatively describe all of the best personal computer products—especially software, where the most confusion reigns. Part of the impossibility is that those who know a program well don't have sufficient comparative experience; at the same time, the professional wide-comparers don't have the deeper use experience. The only relief from the paradox is sustained discussion, gossip, and argument among the enraptured deeps and the cynical wides, and that's what this book is made of. It came to greater convergence of opinion than we expected, and the convergence grew during the second year's research.

Personal computers are skill machines. We took that as the organizing principle of the research and the book. Playing, Writing, Analyzing, Organizing, Accounting, Managing, Drawing, Telecommunicating, Learning, and that profoundest of skills, Et Cetera. For each, Editor and Research Director Barbara Robertson found and directed a Domain Editor to be responsible for all that appeared and failed to appear in that section, and to collaborate fully with the other Domain Editors.

Everything recommended has been at least tried and usually lived with by its recommender(s). Many of the reviews are

"multi-voiced" to reflect the variety of opinion on a given product (liking and disliking software is intensely personal, i.e. variable) and to convey the passionate advocacy that clusters around good stuff. Since shoppers are by necessity comparison shoppers, we are much as possible comparison reviewers, asserting which is better than which for what and for whom.

A feature that is new this year, and still unique in the field so far as we know, is our showing of "street price" as well as list price with most of the items recommended. Because EVERYTHING in the computer business is available at discount, usually 30 to 50 percent, and the savings are measured in hundreds and thousands of dollars, we realized it would be a disservice if we didn't research and proclaim the discount prices. They'll shift, of course, but almost always to your advantage with the passage of time. (I'll be interested to see if computer magazines adopt the practice of showing discount prices in their articles and reviews; it's somewhat at odds with the interests of advertisers.)

Next to every review of an item that is new to the 2.0 edition you'll find a ★. Two reasons for that. One is to show off how radically New and Improved this edition is (of the 473 items recommended, 207 are new). The other reason is to indicate which products (the unstarred veterans) have held their own at the top of their area. Golden oldies stay golden either because they are too pure to tarnish or because they are constantly repolished with new versions. Each product that appears again was re-evaluated, re-accessed (new price, version number, machines it runs on, etc.) and frequently re-reviewed. Then re-cross-referenced, re-indexed, sometimes re-illustrated, oh the joy.

Many computer books age quickly. That's one reason, heh, heh, there's fewer of them this year. We've taken a number of steps to help keep this one fresh. One is the rapid six-week turnaround with Doubleday's printer, so there's only a couple of months between research and reader. The main body of the **Software Catalog for 1986** was completed in May and June, 1985. Still that cut us off from some major hardware news in Summer '85, so we arranged for a 16-page "Last-Minute Supplement" (p. 209) to be added.

And we have a magazine. Every three months **Whole Earth Review**, which is about everything but also about computers, takes a number of pages to update the **Whole Earth Software Catalog**. That's where many of the new reviews in this edition first appeared. If you want to get it, ordering information is by the photograph.

If you want to contact us editorially, PLEASE DO. We use (and pay for) reviews and suggestions from readers and in any case would like to hear from you.

Our EDITORIAL address: Whole Earth Review
27 Gate Five Rd.
Sausalito, CA 94965
Phone: 415/332-4335

Electronic access: We have a conference on CompuServe (go wec at any prompt); a conference on EIES (Public Conference 1031); and our own regional teleconferencing system (which may be national by the time you read this) called The WELL (stands for Whole Earth Lectronic Link, more info on p. 148)—have your computer call The WELL at 415/332-6106. WELL membership costs only \$8/month, \$2/hour. In due course we hope to have a constantly updated **Whole Earth Software Catalog** available online on the WELL and elsewhere.

WHOLE EARTH REVIEW

The quarterly Whole Earth Review is subtitled "Tools and Ideas for the Computer Age." One of its functions is to update this Whole Earth Software Catalog every three months—along with its evaluation of the rest of the tools civilization offers, along with wide coverage of "unorthodox cultural news." That phrase covers everything from how digital retouching of photographs by mass media has changed the meaning of photography to a detailed story on the "pro" side of clubbing seal pups in Canada. Each issue is about 144 pages. There's no advertising. Single issues are \$4.50 on newsstands or from us.



A subscription costs \$18/year (4 issues) from:

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27 Gate Five Road, Dept. SC
Sausalito, CA 94965

Phone orders with VISA or
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"ACCESS"

Even does surface plots in 3-D . . .

STATGRAPHICS

Neil Polhemus. Version 1.0. Not copy-protected.
\$695 (street \$475). IBM PC/XT/AT and
compatibles (384K; 2 disk drives or hard disk
required). STSC, Inc., 2115 East Jefferson St.,
Rockville, MD 20852; 301/984-5123.

STEWART BRAND: The dense clump of information under the title of each program contains critical information you should scan first, like what machines the product runs on, what other hardware needs it has (joystick, two disk drives, color monitor, etc.), the price!, and whether it's copy-protected. Vast labor went into getting all this accurate (typically, three phone calls per product), so take advantage. The version number tells what stage in the program's evolution was available when we went to press in June '85. Since new versions are usually an improvement, don't buy an earlier number, do buy a later number if you find one.

"or COMPUTER LITERACY"

You'll find that phrase in the "access" part of book reviews. It serves as backup in case your local bookstore doesn't have the book you're looking for. All the books recommended in the **Catalog** are available by mail order from COMPUTER LITERACY BOOKSHOP, 520 Lawrence Expressway, Suite 310, Sunnyvale, CA 94086—the first and largest (with over 9000 computer book titles) all-computer-book bookstore in the land. See p. 201 for details. Point has no financial connection to Computer Literacy.

STAFF

Editor in Chief	Stewart Brand
Editor and Research Director	Barbara Robertson
Managing Editor	Matthew McClure 2.0: Lyn Gray
Design and Production	Dustin Kahn, San Francisco
Production Assistants	Karla Fung, Barbara Gildea, Walter Lynam 2.0: Paula McKenzie, Joani Spadaro, Nancy Yee
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Research Staff	Clifford Figallo James Stockford Lyn Gray Karen Hamilton
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Camera	Don Ryan
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Printing	Typesetting: Mackenzie-Harris Corporation, San Francisco Color Separations: Concept Color, Inc., Salt Lake City Film Production: Lithographic Consultants, San Francisco

SHOPPING

TECHNIQUES OF SEARCH, EVALUATION, USE

STEWART BRAND: Software is a new enough kind of thing in the world that humans are still figuring out how to deal with it. Though it can be bought and sold, you can't see, hear, touch, taste, smell, eat, or burn it. On an unlovely flat artifact called a disk may be hidden the concentrated intelligence of thousands of hours of design, for which you are expected to pay hundreds of dollars, and which you can reproduce on your own computer with perfect fidelity in less than a minute, free.

Personal computers have an inherent outlaw element. This makes them enjoyable and creative and morally interesting. More on that in a moment.

All software does is manage symbols. Unlike letters and numbers on paper, the symbols reside in a marvelously fluid zero gravity noplace, where they dance with impeccable precision to your tune. Software articulates your intentions faithfully, but it eludes understanding. We treat the stuff (it isn't stuff) as if programs were just like the how-to books our **Whole Earth Catalogs** have been dealing in for years. They provide technique. They can transform lives. They sell cheap or dear. Some are better than others. This entire book is about finding the better ones.

Is shopping really worth the trouble? There are some 40,000 commercial programs for personal computers on the market, and they all work. Why not just grab the handiest and proceed? Because software, when it is used at all intensely, comes to feel like an extension of your nervous system. Its habits become your habits. The reason the term "personal" got stuck to these machines is, they become part of your person. Buyer beware.

Strategies of shopping

Acquire as little software as you can get by with, and stick with it. That's hardware critic Richard Dalton's advice. It's easy to get so caught up in the constant onrush of improvements and "next generations" in the software market that you wind up forever getting ready to work instead of working. You can buy last year's computer cheap, get last year's software, which runs beautifully on it by now, take the month to get fully running with it, and then turn your back on the market for a couple years. Your system will pay for itself shortly, the rest is pure profit, and you're spared a world of distraction and itchiness.

Buy the best. That's Analyzing domain editor Woody Liswood's advice. "Get the top-of-the-line program in whatever area you are going to do work. If you don't, you will always wish you had and will eventually spend the extra money to get it anyway. If you are trying to solve a problem, buy the solution. Period." Take a look at Gerald Weinberg's analysis on p. 7. The price of a program, even if it's many hundreds of dollars, may be the least of your costs. A poor program for your purposes, which may or may not be cheap, will escalate the secondary costs, entangle you in its deficiencies, and can easily put you out of business. By contrast, the pleasure of driving a top program is as rich as driving a hot new car, at a fraction the price, and to greater effect.

Use what your cohorts use. If you have colleagues and they already have computers, you'd best blend into their system. It may well be, groan, WORDSTAR (p. 56) and DBASE II (p. 85), but the fact is, you'll be using each other's programs and files, and if you have an odd system you'll either be constantly translating or simply failing to communicate. The advantage of a group standard is the abundance of lore and sagacity about it that will have accumulated, saving you no end of lone bafflement.

Base your hardware decision on your software decisions. That's the conventional wisdom, but it's wise anyway. When users hear about a new computer, they ask, "What runs on it?" When they hear about a new program, they ask, "What's it run on?" No machine runs everything or even a majority of what's available. Check our Hardware section, p. 14, for the basic ultimate decision you'll have to make; then peruse the rest of the book for the programs that best meet your needs and budget, see what machines they run on, and return to p. 14 and your fate. That loop may be one of the best uses of this book.

Criteria of software excellence

Good software does an important job well. The fundamental consideration when you're putting out this kind of money.

Good software is transparent. The term and idea emerged during our research on word processing programs, but it applies to all. Arthur Naiman, author of **Introduction to WordStar** (p. 56), said it best: "The writing tool I always dreamed of was one which would take my thoughts right out of my skull and put them on paper. The better a word processing system is, the closer it comes to this ideal. Thus the quality I look for most is **transparency**. By that I mean that the word processing program (and hardware) intrude as little as possible between you and your thoughts.

If I had to make a formula for transparency, I suppose it would look something like this:

$$\frac{\text{power} \times \text{ease of use} - \text{fatal errors}}{\text{time required to get comfortable}} = \text{"transparency."}$$

In Naiman's formula "power" means the range of the program's capabilities—often called "features." "Fatal errors" don't hurt you or the machine; they may eat all or part of a document you're working on, which leads to swearing, repeated work, and distrust.

Good software is structured like an onion. Richard Dalton: "The ideal program is layered—simple and self-evident on the outside, with all the features anyone needs, but you can also dig into the program for progressively more complex layers." Most complex programs are horrors to learn—DBASE II (p. 85) is a classic. Most simple programs have no depth—PFS: WRITE (p. 54) comes to mind. The great programs have both simplicity and complexity—MICROSOFT WORD (p. 60), 1-2-3 (p. 68), and MACPAINT (p. 127) are examples in that direction. Programs should be like those Russian imperial Easter eggs by Fabergé, with the exquisite jeweled landscapes you peek into—attractive on the outside, magnificent within.

Good software blends well with other software. You can't invite most software to the same party. If they speak to each other at all, they fight. Ideally, all of your "applications" software—writing, analyzing, organizing, accounting, managing, drawing, telecommunicating, and programming—would speak the same language and welcome interaction. They would be "command compatible" and "file compatible"—they would respond to the same instructions from you, and they could work comfortably with each other's documents. This is the great attraction of the "integrateds" like SYMPHONY (p. 111) and FRAMEWORK (p. 110), where a handful of applications are all in one program, but beware what Organizing domain editor Tony Fanning calls "the Decathlon effect"—"one function is done very well, and the others, usually including the data management function, are just fair." The **Whole Earth Software Catalog** gives extra points to programs whose files are in industry-standard formats so they're companionable with other companies' programs.

Good software is well supported. "Support" refers to the cloud of information and other products around a program that give it a rich working context in the world. Some comes from the company's conscientiousness, some from the program's popularity. Good support: lots of machines run the program; lots of other programs will work with it; there are whole books on special applications; the program is routinely upgraded; and the company responds helpfully to users with problems. A typical spectrum of company support: users who call the makers of WORD PERFECT (p. 60) for help with a problem get thorough, friendly treatment; from the makers of MICROSOFT WORD (p. 60) and WORDSTAR (p. 56) they get indifferent treatment.

Good software is not copy-protected. That's a somewhat controversial position on a highly controversial subject. Many manufacturers try to discourage "piracy" (wholesale copying) of their software by various protective devices. Fine. The problem is, if the users can't copy all or parts of the program easily within their own working environments, the tool is much less adaptable, and inconveniences and incompatibilities, sometimes major ones, are introduced by the protection schemes. Therefore we recommend the following: 1) Do not buy or sell illegally copied software; 2) the showing and sharing of copies of software among friends is mostly okay, IF, once you decide to use a copied program in your work, you go out and buy a regular commercial copy and take advantage of its nice manual, company support, and so on; 3) shop preferentially for un-copy-protected software—SUPERCALC3 (p. 67) over 1-2-3 (p. 68), for example, or ENABLE (p. 109) over FRAMEWORK (p. 110); 4) go ahead and use programs like COPY II (p. 172) to defeat the copy protection on software you use. RICHARD DALTON: "I have no compunction whatsoever, ethical or otherwise, to fitting software to my system in a way that makes it reasonable to run and to protect my investment. Protected software is like having a copyright restriction on a book that only allows you to read it with a flashlight." The issue of copy protection is treated, with considerable heat on both sides, as if it were some monumental new problem. It's not; it's like what was worked out with photocopying—you can copy for convenience, but if you sell what you copy, you're in serious legal trouble.

Good software is reasonably priced. Most isn't. Most spelling checkers cost upwards of \$125. The best one—WORD PROOF (p. 62)—costs \$60. Most word processors cost \$300-600. One

of the best—PC WRITE (p. 59)—costs \$10. Because the prices are kept up by confusion in the marketplace, prices of software will come down only when careful shoppers drive them down—it's already under way. Meantime, check out discount mail order, p. 23, and public domain (free) software, p. 25 and in the index.

Post-purchase advice

Send in the warranty card. If it's a machine, you may well need the service. If it's software, the manufacturer will keep you informed of updates and offer very good exchange deals (\$10-200) for new versions, which you should get. You already know the program, and it knows you; new versions won't violate that, they'll reward your loyalty.

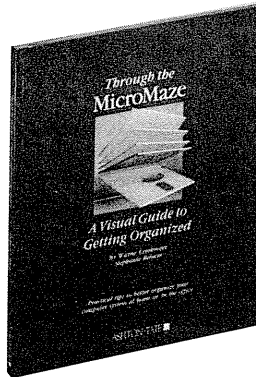
Never fight a problem in the system for more than an hour without making a phone call. First call the friend who has a system like yours. Then call the dealer who sold you the thing that isn't working. Then call the software company. Then call the hardware company. New systems don't work—especially if there's a printer or modem involved. It's not your fault. It's theirs; your responsibility is to hold their nose to the fire until they fix your problem. Be of good cheer—systems work beautifully eventually, and you'll learn a lot that's useful getting there.

The secret to succeeding with computers is to futz with them. BART EISENBERG: Push buttons, move text, insert lines, hit control characters, add dot commands, bring up menus, invoke commands and invoke more of them. Try it backwards, try it sideways, try it upside down. The method, if you can call it that, is vaguely scientific—in that you perform some action and observe the results. A playful attitude will get you further with these machines than weeks of serious endeavor.

Join a user group for your machine. KEVIN KELLY: One of the most unreported grassroots phenomena in America must be computer user groups. I estimate there are at least 2,000 groups meeting right now. Each one serves a small regional area, composed of members in love with all microcomputers or only one brand. Despite the absence of a national association or newsletter, the groups have arisen independently in a similar form all across the country. There is a remarkable agreement of intent, purpose and style. Using our user group in Atlanta as an example, we meet once a month to discuss technical problems, flag new products, swap software, gossip, and co-op buy items like disks. We put out a monthly newsletter. Being more organized than many, we may ask experts or vendors to speak at the meetings. The chief purpose really is to fill the vacuum of information left by the rocketing advance of microcomputers—machines and software arriving light-years ahead of their instructions. User groups are the guiding hands across this stellar gap. The user groups also stepped into another vacuum—software review. Ollie asks if anyone has tried out any new software lately, and Andy gets up and says he's tried SCREENWRITER and it stinks. Well, SCREENWRITER has just lost 126 buyers right off the bat in northeast Georgia. More if you count the trickle effect. If the same number of people showed up for, say, peace or politics, with as much regularity, devotion, interest, and influence as they bring to user groups, they'd be running the country.

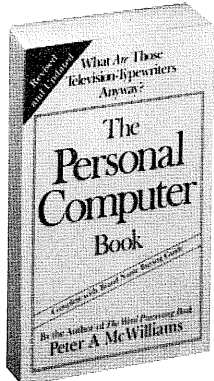
THROUGH THE MICROMAZE

Through the MicroMaze: A Visual Guide to Getting Organized; Wayne Creekmore and Stephanie Behasa; 1984; 64 pp.; \$9.95; Ashton-Tate Publishing Group, 8901 La Cienega Blvd., Inglewood, CA 90301; 800/437-4329 or, in CA, 303/799-4900; or COMPUTER LITERACY.



fundamentals of your computer's operating system. With color pictures and good clear diagrams and, most important, really sensible advice, the book is a comfort and a blessing. The operating systems covered are MS-DOS (IBM PCs, Compaqs, etc.) and CP/M (Kaypros, Morrows, Apples with CP/M card). That leaves out the Apple IIe and IIc, Macintosh, Commodore 64, and laptop portables.

The McWilliams **Personal Computer Book** is a publishing success story. Self-published until this October '84 edition from Doubleday, it was frequently updated and far more personal, funny, and judgmental of products than is the New York norm, and it sold like crazy. This edition, Peter's last, is completely revised with a full 100 pages more than before. For McWilliams' word on word processing, see p. 48.

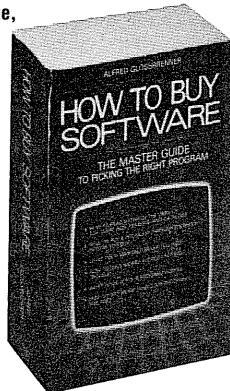


THE PERSONAL COMPUTER BOOK

The Personal Computer Book; Peter McWilliams; rev. ed., 1984; 299 pp.; \$9.95; Quantum Press/Doubleday & Co., Inc., 501 Franklin Avenue, Garden City, NY 11530; 516/294-4400; or COMPUTER LITERACY.

HOW TO BUY SOFTWARE

How to Buy Software; Alfred Glossbrenner; 1984; 648 pp.; \$14.95; St. Martin's Press, 175 Fifth Avenue, New York, NY 10010; 212/674-5151; or COMPUTER LITERACY.



Glossbrenner's amazing book has the best explanation I've seen anywhere of how personal computers work, put strictly in terms of a *shopper's* perspective. Dense with good information, the book is big and comprehensive but never heavy. Its rich sprinkling of tidbits and tips keep you turning the pages looking for more. The book is divided, like ours, into chapters on each kind of software. The shopping advice is sound enough and general enough that it's surprisingly up to date for an early 1984 book. For Glossbrenner on public domain software, see p. 25, on telecommunicating, p. 139.

Other books

The Book Company annually does **The Book of IBM Software**, **The Book of Apple Software**, **The Book of Commodore 64 Software** (\$19.95, IBM and Commodore versions; \$24.95, Apple version; Arrays, Inc./The Book Division, 11223 So. Hindry Ave., Los Angeles, CA 90045; 213/410-9466; or COMPUTER LITERACY) which have good evaluative comments on a fair range of programs.

Digital Deli, edited by Steve Ditlea, has computer gossip, much of it great computer gossip. A couple days with this well-edited book can save you two years of perusing 15 computer magazines to acquire the anecdotal ambience it takes to feel comfortable around computer fanatics. The scores of contributors, a who's-who of computerdom, cover a multitude of inside perspectives and fringe ravings. They directly convey the excitement and bemusement these machines keep reinspiring. (**Digital Deli**; 1984, 398 pp., \$9.95 from Workman Publishing, 1 West 39th St., New York, NY 10018; 800/722-7202; or COMPUTER LITERACY.)

STEWART BRAND: These stand head, shoulders, and torso above the competition as introductory computer books. The **MicroMaze** book because it is so graphically inviting and sophisticated about the utter basics. Peter McWilliams' **Personal Computer Book** because it is irreverent, accessible, and full of clear explanations and frequent sharp advice. Alfred Glossbrenner's **How to Buy Software** because it is the definitive text—the book we most strongly recommend as supplement to the **Whole Earth Software Catalog**.

Through the MicroMaze is the introductory computer book I've been waiting for. Its subject is the setting up of your personal computer scene—that two week obstacle that keeps the almost-ready-to-jump from jumping. How to lay out your work area, how to hook everything up, how to get fluent in the

The purchase price of the program is probably the smallest expense . . .

HOW COMPUTER PROFESSIONALS BUY SOFTWARE

GERALD M. WEINBERG: Once upon a time, I wanted to be a high school track star. Fortunately, only one other kid in the school was *willing* to run as far as a mile, so I was assured a place on the team even though I couldn't run very fast. All the same, I often earned a medal in dual meets because the other schools were in the same situation—they had one good miler,

like my teammate, and one turkey. My strategy was to let *their* turkey trot himself out trying to keep up with the two leaders. At the three-quarter mark, I would usually pass him as he lay puking on the inside lane.

Track has come a long way in 35 years. In my day, girls weren't allowed to run a mile. Today, Eagle Junior High School has at least ten girls who can beat my lifetime personal best. In today's improved environment, my method of making the team simply doesn't work. And it's the same in software. When Apples first fell off the tree in the Garden of Eden, any software that could run a mile could make the team. Today, there may be a hundred packages that can go the distance, so we need more sophisticated selection methods.

Perhaps we can use the packaging as a criterion: Does he look like a miler? Does it look like a slick spreadsheet? Well, my running shirt says "Sub-4,"—under four minutes—but that's my time for the *half*-mile, so you know you can't believe what it says on the package. Perhaps we can use a trial run at the computer store? We haven't room to let him run, but look how well he lifts weights! No, we've all fallen for that one, too. There's really no alternative: To pick winners with any consistency, buyers have to learn sophisticated evaluation methods.

In my work consulting with large data processing organizations, I recommend a multistep selection method based largely on the work of Tom Gilb and Ken Orr. I use exactly the same method when selecting software for our little office, so I believe just about anyone can use it. The method resembles the way you'd produce a winning miler, and has four major steps: PREPARATION, MEASURING HEALTH, MEASURING FITNESS, and TRAINING.

Preparation

The preparation step encompasses all the work you do before you even look at the candidates. Preparation itself has three substeps: define objectives, estimate investment, and budget for the decision.

Objectives—what you expect the software to accomplish—have to come first. If you don't know what you want, how can you hope to get it?

Of course, you might be lucky. The people who produced the package surely know your needs, don't they? They don't, but you still have another out, something psychologists call "cognitive dissonance." You may fall in love with your stupid purchase in order not to feel stupid. Cognitive dissonance lets you love *anything* you buy. If the product causes you immeasurable pain, you'll probably boast, "No pain, no gain."

If you're not into pain, though, try defining your problem before you start shopping for software solutions. Start with a general list of objectives, which you will later refine into more quantitative form.

The next step is to estimate your investment. A list of investment factors should look like this:

Training	\$ _____
Lifetime	_____
Usage	_____
Maintenance	_____
The package	_____
In-conversion	_____
Out-conversion	_____
<hr/>	
Real Cost	\$ _____

On this list, *training* is the cost of preparing people in your firm to use the new software, and you must not forget those people who aren't yet around. To estimate complete training costs, then, you must estimate the next factor—*lifetime*, or how long you will use the package before replacing it. You'll also need to know the lifetime to estimate usage and maintenance investments. *Usage* is the cost of labor, space and supplies needed to operate the system. *Maintenance* is the cost of

keeping it running—fixing bugs or working around them, installing new versions, or supplying enhancements to get exactly what you want.

Like the cost of the package, *in-conversion* is a one-time cost, independent of lifetime. In-conversion is the cost of changing over from your present system—reformatting your existing data files, for example, or modifying your operating system. *Out-conversion* is the cost of getting rid of the package when you go on to something bigger and better. Out-conversion can cost 100 times the initial package cost, as when you replace one programming language with a different version, or when you have accumulated hundreds of files that have to be translated.

When my office recently changed its word-processing software, these costs broke down roughly as follows:

The package	\$50-500 x 4 copies
Lifetime	2 years
Training	40 hours per person x 4 people
Usage	20 hours per week per person (no difference in supplies)
Maintenance	2 hours per week for one person
In-conversion	From \$0 to cost of rekeying all files
Out-conversion	From \$0 to cost of rekeying all files

A hobbyist might set the labor cost at zero, making the package cost the only factor, but we're in business and have to put a price on our labor. Even at \$10 per hour, the usage cost over a two-year lifetime would dominate all others; ultimately, according to the estimate, we'd wind up investing close to \$100,000 in this word processor. The point of making such an estimate up front is not to be exact, but to gain a sense of what we're deciding and what alternatives we have. Given the above figures, a more efficient package that would save one hour per week per person would be worth at least \$7,000. Therefore, our estimate tells us we can afford to consider rather "expensive" software that a hobbyist might not be able to justify.

The estimate also indicates the size of the decision we face. As a rule of thumb, I always budget 2 per cent of the estimated total cost for the decision process, and thus would be willing to invest several thousand dollars in making this choice. Without the estimate as a guide, this might seem an unreasonable amount to spend in deciding on one package. The hobbyist might allocate an equivalent amount of personal labor, but almost nothing in terms of out-of-pocket cost.

On the other hand, without the estimate as a guide, we might waste too much time on a decision. In certain circumstances—for example, when we needed a package that would be used sparingly by only one person for a limited time—it would be cheaper to buy the first satisfactory product that came to our attention. The estimate itself can usually be made with sufficient accuracy in fifteen minutes.

Measuring Health

If only a few people can run a mile, each can be considered in some detail, but if many can, efficiency demands some initial qualifying heats. The same is true for packages. Where there are many candidates, I allocate about half the decision budget for eliminating the unhealthy, leaving half for picking the fittest from among the few remaining.

(continued on p. 8)

8 SHOPPING

(continued from p. 7)

By “unhealthy” I mean “doesn’t meet my objectives.” For example, if I need a database manager that can handle multiple-disk files, I can immediately eliminate those that cannot. I won’t be swayed by a sales pitch claiming “three times the speed”—what good is fast access if it can’t handle my whole file? To avoid this kind of trouble at the point of purchase, potential buyers need to distinguish between functions and attributes. Functions are things the software *must* have; the question to ask here is “Yes or no?” (Is it there or isn’t it?) Attributes are things it would be *nice* to have; the relevant question here is “How much does it cost?” It’s obvious from this distinction why we look first at functions, then at attributes. If we’re looking for triathletes (swim, bike and run), then we’re not impressed by the marathon times of nonswimmers. As John von Neumann once put it, “There’s no sense being precise about something if you don’t even know what you’re talking about.”

In your search for office automation software, you might need such functions as: *Maintain* manuscript files; *Produce* printed manuscripts; and *Transmit* electronic manuscripts. So when you examine particular packages, you need to determine whether these functions are present or absent. Go down your list of specifications and ask “Yes or no?” for each one. If you need to, you can break down each of your specifications into necessary subfunctions. For instance, you might break down *Produce* printed manuscripts into: *Number* pages; *Extract* table of contents; *Print* letter quality; and *Provide* math symbols. Someone else might require line drawings but not math symbols. Only by successively and explicitly refining your own objectives will you avoid buying a package that perfectly fits someone else’s needs.

Here are three universal standards that should head your list of objectives:

1. It must work.
2. It must work in your environment.
3. It must work in your environment tomorrow.

If you can’t get “yes” answers to these three questions, asking about specific functions won’t make much difference.

This may seem ridiculous, but I assure you it is not. I recently spent \$25 for a financial application to work on my Commodore 8096. At that price, I couldn’t afford too much investigation. The program was advertised to work with disk systems, but it came on a cassette. When I wrote to complain, the company replied that “all you have to do is transfer it from cassette to disk.” When I wrote again to say that I didn’t have a cassette drive, they wrote to say that I should “get someone in the neighborhood with a cassette drive to do it.” My only neighbors are cows, and the nearest cassette-equipped 8096 is 60 miles away.

Cheap Tests for Trouble

Nevertheless, I eventually did get the cassette transcribed (my in-conversion cost now exceeded the purchase price). The program never worked on disk, however, and an examination of the source code showed that it never *could* have worked with a disk system. In retrospect, of course, I should have dropped it the minute I learned what “works with disk systems” meant to the producer. Even if I had written off my \$25 at that point and thrown the program away, I would have been way ahead of where I finally wound up after transcribing the tape.

If you’re looking for a miler, you don’t want someone who can’t climb a flight of stairs without pausing for breath. Until there are enforced industry standards for software, you need to look out for quick signs of serious trouble. To start with, when a package doesn’t install as advertised, send it back immediately for a refund—there are bound to be other faults.

Next, inspect all available written material for poor quality—a sure sign of danger. Errors in a product are like cockroaches in a kitchen—there’s never just one, and they’re never all in the same drawer. I recently received a mail advertisement for a spelling corrector. The ad contained two spelling errors. Three months later, the company folded. A friend of mine bought a statistical package. The manual contained an example giving the population distribution of various counties by sex and income. In one of the counties the distribution was 75 per cent males and 88 per cent females. The program was of the same quality.

Put prospective dealers to the test. If they can’t refer you to actual users, look for another package—unless your objective is to be a software pioneer, complete with arrows in your back. If you get referrals from a dealer and discover that these buyers don’t use the package, back off! But if they’re using it and say they don’t *like* it, don’t be overly disturbed. At least they’re using it. Ask them what specifically they don’t like. You might not even be interested in those features.

Remember, too, that the software must *continue* to work in your environment, which is largely a function of the quality of the dealer. If your dealer doesn’t answer calls, find another dealer. Dealers who won’t respond to a sales prospect will never respond to a request for service. You can test dealers further by calling and pretending that you have already purchased the package but are having some difficulty. If they aren’t helpful and courteous, look elsewhere. Also look for another dealer if you can’t try out the system in the store, or if they don’t seem to have a manual around for you to read. Finally, avoid any dealer who answers your questions by slapping you on the back and saying, “No problem!”

Measuring Fitness

Once you have eliminated the candidates that can’t run the distance, or are likely to have a stroke trying, you might find yourself with one or zero remaining packages. In that case, the decision-making process is essentially over. If you still have two or more packages to choose from, you can then begin to measure fitness by checking attributes. Generally, you can assess attributes with respect to three distinct variables: resources, satisfaction and lifetime. Resources are what the attribute will cost you—in money, time, people, space and supplies. Satisfaction is what you will get out of it—ease of use, performance, security, pleasure, inspiration, pride. Lifetime is how long the attribute will continue to yield the satisfaction your resources have bought—correctability, modifiability, portability, scope of application.

When you have written down the various attributes, you can use Tom Gilb’s Mecca Method to measure the fitness of each candidate. First you attach a *metric* to each attribute. The figure shows a simplified example of three metrics you might assign to the attributes of an accounts receivable system. Each attribute is reduced here to specific quantitative measures. If you can’t

produce such a measure, then you don't have an attribute. Sometimes assigning a number value is difficult, but in those cases you'll always learn something important from the effort. For instance, "reliability" sounds nice in any system, but unless you translate it into something measurable, you'll be a sucker for the first smooth sales pitch.

ATTRIBUTE	METRIC	GOAL		PERFORMANCE	GRADE	% WEIGHT	GxW	
RELIABILITY	ERRORS TO CLIENT / INVOICES	1/5000	1/1000	.40	30	.12		
COST	\$/INVOICES	0.90	.93	.95	50	.475		
PERFORMANCE	RESPONSE SECS / % ACHIEVED (UNDER MAX-LOAD)	2/95	2/90	.75	20	.15		
overall grade =							.745	

Once you have the metrics, you must set a goal and assign a weight to each attribute to show what will be satisfactory and how important it is to you. Again, trying to assign these goals and weights will tend to expose your unstated—and thus dangerous—assumptions.

Once you're finished, you are ready to examine the actual candidates, making a score sheet for each. Take the grade sheet with you when you talk to a salesperson or to your friends and use it as a checklist. The sheet will keep you from being swayed by others' enthusiasm and from forgetting something important. Translating everything into numbers tends to bring blue-sky talkers down to earth. If you can't get the information to fill in your grade sheet, don't buy the package.

Each grade sheet will yield an overall score for its package. Use good sense in interpreting these scores. The difference between .745 and .750 cannot truly be significant in light of the rough nature of the calculations. If the packages are this close, you can flip a coin, or choose the one in the shiny box. But where the scores are, say, .49 and .75, the package with .49 will probably be much less satisfactory than the other. Still, never go against your instincts. If you're still inclined to buy the .49, even after you've compared the scores, it would be a good idea to reexamine your application of the Mecca Method. The package you favor might have an important attribute that you haven't identified explicitly, or perhaps one of its attributes is more important to you than you realized. Repeat the method as many times as necessary to get a good feeling about your decision, dropping out obvious losers each time. At the very least, each repetition will give you a better understanding of yourself, which is always worth the time invested.

Training

Once you've chosen your potential champion, you've begun your relationship with the package. Choosing is not the same as purchasing, and you can often make up deficiencies in the package by negotiating with the vendor. In such a situation, the grade sheet can guide the negotiation by showing correctable weak spots. A friend of mine wanted a word processor whose spelling corrector graded low on speed. After seeing the grade sheet, the dealer tossed in a free stand-alone corrector. Another friend narrowed down her choice to two accounting packages that graded dead even. Using the grade sheets, she showed each dealer what he would have to do to raise his product's grade. In the end, she got a smart keyboard at half price to overcome one package's problems with keyed control sequences.

Even after making the purchase, you're still far from finished. Using a new package is very much like taking up running. Champions are made, not born, and the road to championship goes through four clearly identifiable stages: pain, stumbling, romance and realism.

In the pain stage, the package will seem impossible to use. You might need a lot of help from the vendor, who could suddenly be hard to find. Remember that only 2 per cent of your estimated cost was dedicated to the choice. Before long, your investment in the vendor's system will be a hundred times greater than the vendor's investment in *your* system. You can avoid a great deal of pain if you negotiate a 30-day money-back guarantee, giving the vendor an incentive to help you reach the stumbling stage.

In the stumbling stage, usage will be clumsy and inefficient, but you will probably have surpassed your vendor's knowledge. Now is the time to get in touch with other users. One good user group is worth fifty poor manuals. Other users can teach you about those obscure features you skipped when reading the manual—or that aren't even in the manual. A few minutes of discussion can save you many hours of work. Even so, you should now read the manual a second time, and a third. You may even begin to appreciate it, which is a sure sign you're falling in love with the package.

In the romance stage, you'll believe the package is the Olympic Games, and you are the gold medalist. Prospective buyers looking for information should steer clear of users in the romance stage. They can be identified by their inability to give any rational reply to the question, "What *won't* it do?" Most package users never graduate from the romance stage, because they are unable to overcome the power of cognitive dissonance. Who cares what it costs, as long as you *feel* like a champion?

To realize the full payoff on your investment, you must be able to identify specific shortcomings of the package for specific jobs. When you've reached this stage, that of realism, you've become the ideal referral for prospective buyers. You can help fill out *their* grade sheets, to find a package that meets *their* objectives. In fact, you'll be ready then to retire from racing and start coaching. Or to start looking for a replacement package of your own.

10 MAGAZINES

MITHRIDATIC COMPUTER MAGAZINES

Mithridatism—Tolerance for a poison acquired by taking gradually larger doses of it.—mithridatic.

The American Heritage Dictionary

Computer magazines are mithridatic. You always start with one, build up to doses which would kill a beginner, and probably end up immune to all of them. —Tony Fanning

STEWART BRAND: Welcome to a field where the magazines are more important than the books. (Check p. 202 for indexes of each.) Books serve well for whole overviews (like this one, hopefully, and the ones on p. 6) and for specialized use, but books by themselves, including this one, are simply too out of date, and books don't *teach* as well as magazines do. Magazines give you the seething marketplace (some publications too heavy to read in bed because of their weight of advertising) and the

voices of confusion and reassurance of users and reviewers and ware designers soft and hard. You can study a book; you wade into magazines.

Since computer magazines are notoriously ephemeral (no other section of this book has changed as much since last year), you might think twice before getting long subscriptions. I would not be surprised if this list were fifty percent different again next year, and we're recommending the stabler magazines. Computer mags live by the volatility of the computer business, and they die by it. And they still haven't caught on that it's safer to serve readers than advertisers.

All of the Domain Editors studied software reviews collected for them from dozens of periodicals and immersed themselves in the detailed market-watching that goes with trying to anticipate your situation and opportunities in the winter of '85-'86. The magazines reviewed here are ones that served us best and should do the same for you. Many of us have worked for and will work for various of these publications, so bear in mind that our judgement may be too intimate. We're reviewing our relatives, with relish.

Weekly News

The industry, with glee . . .

INFOWORLD

\$31/yr (weekly); InfoWorld, P.O. Box 1018, Southeastern, PA 19398-9982; 800/544-3712 or, in PA, 215/768-0388.

STEWART BRAND: Our favorite, the source of the most conversation that begins, "Didja see in . . . ?"

ALFRED LEE: Two years ago I took a break from an accumulating burden of personal paperwork to drive across the continent with my family. I had already begun to suppose that a personal computer might help me fight my way out of the paper, and the long trip included trance-like stretches (e.g., Kansas) when I thought about all the wonderful things a computer at home might do for me. When we got back to New Jersey, my first trip to a computer store taught me in five minutes that I had no business out on the street with a credit card in my state of ignorance.

That same day I saw the tabloid **InfoWorld** perched between **Rolling Stone** and **Penthouse** at the local tobacconist. It changed my life.

At my level of experience, then and now, the breezy daily-newspaper style trivializes the subject matter, which is what I need. Makes me feel like I can hack it. At first I'd buy it at the tobacconist's whenever the cover motivated me, then every week just to read John C. Dvorak's column, then I subscribed. What I like best about Dvorak is that he walks over clichés as if over water, keeping his feet dry by **boldfacing the clichés**.

The news notes are compressed enough that I can get a feeling for microcomputer trends by osmosis. The weekly "theme" was more instructive when I was greenhorn than now. The reviews aren't more timely, descriptive, or reliable than in the monthlies, but four issues cover more new products than any four monthlies.

Few if any issues are "exciting," in the way a single issue of **Byte** or **PC Magazine** can hit several different topics that interest me. It's more lovable than great; I crawl into bed with it for two or three hours every week, then count the days until it comes round again. Reading **InfoWorld** was the first step I took toward mechanizing my professional life, and it's still an instructive hobby, still a serial guidebook to the industry.

DARRELL ICENOGLE: Even those who hate it read it. It captures the spirit of the fast-moving industry better than any other mag.

TONY FANNING: **InfoWorld** and **PC Week** are great! It's wonderful not being tied to the normal 3-4 month lead time which monthlies can't avoid. I like the sense of **ACCELERATION** a weekly gives.

CHARLES SPEZZANO: The reviews in **InfoWorld** are too inaccurate too often for me to know when to take them seriously.

STEWART BRAND: The problem with the reviews, as with nearly all computer magazines, is that they're not comparative enough. Something will get blasted or praised strictly in its own terms; you can't tell if the reviewer has any experience with competing products. **InfoWorld** reviews are long and searching and cover hardware as well as soft, but you have to read carefully between the lines to get full value.



White water rafting on your IBM PC compatible . . .

PC WEEK

Free to qualified subscribers; \$120/yr (52 issues); PC Week, 15 Crawford Street, Needham, MA 02194; 617/449-6520.

RICHARD DALTON: More comprehensive and better written (surprisingly) than either **PC** or **PC WORLD** who both seem to be trying for the statesman position in the PC/MS-DOS segment. **PC Week** is closer to **InfoWorld**; the others looking to out-**Byte** each other. Not unimportantly, it's free to "qualified subscribers," which seems to be people with an interest in the subject and residual eyesight great enough to at least scan the pictures.

BARBARA ROBERTSON: Once you get past the first couple of pages the magazine often reads like a rehash of press releases, but if you're determined to know about the latest products that work with (or instead of) your IBM PC or compatible, you'll find the news here.

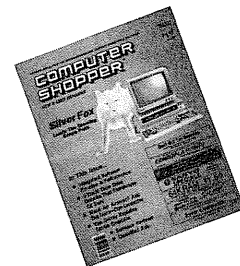
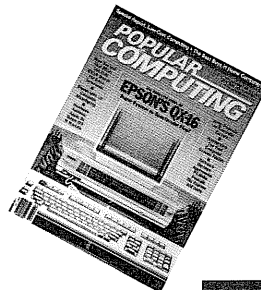
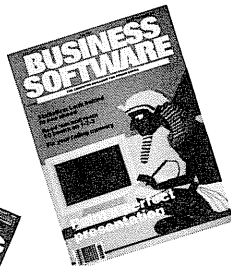
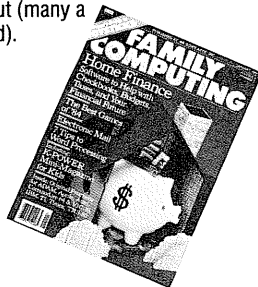
Home and Business

Binding the generations . . .

FAMILY COMPUTING

\$19.97/yr (12 issues); **Family Computing**, P.O. Box 2886, Boulder, CO 80322; 800/525-0643 or, in CO, 303/447-9330.

STEWART BRAND: For me the tireddest question in the business is, "What use do computers have in the home?" Every month this magazine comes up with 100 pages or so of answers—stuff for the kids, stuff for home business, and home application goodies from party planning to cooking to home finance. It has brief but useful product reviews. If your family is unsure about whether getting a computer is worth the cost and nuisance, watch this magazine for a couple months and see if you're enticed. My hunch is that TVs divide the family somewhat, while computers connect it somewhat, since both kid and grownup may be equal beginners. But beware the resentment of anyone left out (many a wife, many a daughter, I am told).



The shameless . . .

WHOLE EARTH REVIEW

\$18/yr (4 issues); **Whole Earth Review**, 27 Gate Five Rd., Dept. SC, Sausalito, CA 94965; 415/332-4335.

STEWART BRAND: Since there's no chance of objectivity reviewing our own magazine, I'll try only to describe where we fit in the computer magazine spectrum. The definitive elements are: no advertising, nonprofit, computers-in-context. That makes our reviews more comparative and judgemental than most others'—as you can see (many of the reviews in this 2.0 edition of the **Whole Earth Software Catalog** first appeared in the **Whole Earth Review**). In a field driven by marketing, the **Review** works at bypassing the hype, connecting users and designers directly. In a field that acts as if it were the entire universe, the **Review** works at connecting computers to the rest of life. About 20-25 pages of each 144-page issue is about computers—serving as a quarterly update to the book you're holding. More info on page 3.

Moving up . . .

BUSINESS SOFTWARE

\$25/yr (12 issues); **Business Software**, P.O. Box 27975, San Diego, CA 92128; 415/424-0600.

STEWART BRAND: Important subject, good magazine. There are innumerable computer magazines aimed at business, but nearly all of them lust after the Fortune 500 and their megacorporate needs for Big Glitter. This modest publication just minds the store, thank you very much, and does so in a businesslike way. A business never stops shopping for software and never, if it's smart, makes a rash decision about what set of programs to stake its life on. **Business Software** does nicely as an ongoing guide.

Everything for everybody in business . . .

POPULAR COMPUTING

\$11.97/yr (12 issues); **Popular Computing**, P.O. Box 307, Martinsville, NJ 08836; 800/258-5485 or, in NH, 603/924-9281.

STEWART BRAND: In the shoot-out for top general computer magazine we prefer **Popular Computing** over the equally popular **Personal Computing**. The range, the carefulness, the writing quality, the general usefulness look consistently better to us, but a newcomer to the field may want both for a while, just to get up to speed.

BARBARA ROBERTSON: **Popular's** range changed in the last year. They're now aiming editorial content directly at business users and, for the most part, ignoring home computer users. **Personal**, so far, continues to cut a wide swath between the two, trying to satisfy both. **Personal** is fatter. **Popular** is meatier.

Shopping

The bazaar . . .

COMPUTER SHOPPER

\$15/yr (12 issues); **Patch Publishing Co., Inc.**, 407 S. Washington Ave., P.O. Box F, Titusville, FL 32781-9990; 800/327-9926 or, in FL, 305/269-3211.

ART KLEINER: The heart of this newsprint tabloid is classifieds—used computers, mail-order software—and listings—user's groups, bulletin boards, and meetings. Range, nationwide. Features are uneven, but they cover each major type of micro and pick up on low-cost and public domain news that most other magazines miss. I've come to feel affection for it in a gritty technical kind of way.

RICHARD DALTON: Readers in Northern California will be better off with **Computer Currents** (free at computer stores, newsstands, libraries, colleges and universities. Home delivery: \$18/yr (25 issues); Center Productions, 2550 9th St., Berkeley, CA 94710; 415/848-6860)—better industry coverage and better prices than **Computer Shopper**, and it's free.

Good old . . .

CREATIVE COMPUTING

\$24.97/yr (12 issues); **Creative Computing**, P.O. Box 2886, Boulder, CO 80322; 800/525-0643 or, in CO, 303/447-9330.

STEWART BRAND: Now up to Volume 11 (1985), this quiet, competent magazine predates the computing marketing frenzy of the mid-'80s, so it has managed to maintain a rare unhysterical perspective. It's like having a great uncle who is pleased you've become interested in a field he's been hacking in since the early '60s. Without condescension **Creative Computing** educates and encourages, turning outsiders into insiders. It covers the whole field, from home computers to office net machines like the IBM PC AT.

12 MAGAZINES

Valuable reviews . . .

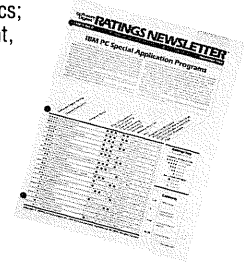
SOFTWARE DIGEST RATINGS NEWSLETTER ★

\$185/yr (10 issues; includes 10 free back issues); *Software Digest*, 1 Winding Dr., Philadelphia, PA 19131; 800/223-7093 or, in PA, 800/222-3315.

STEWART BRAND: The closest thing to *Consumer Reports* that exists for software. If you buy software at all professionally, it's certain to be worth the substantial price. Nobody does as thorough a job of

comparing programs feature by feature, virtue by virtue, in painstaking fashion. Each major application program for MS-DOS (only) machines is tested by new users, bench-tested (for speed primarily), compared to its competition, and rated. While we do not always agree with *Software Digest's* summary ratings (they often weight ease-of-learning much too heavily over other more important qualities that only show up over time), we make considerable use of their research, often drawing on their detailed findings to come to a quite different conclusion about a program.

The publication comes out ten times a year, each time on a different kind of program—Word Processors; File Managers; Relational Databases; Spreadsheets; Integrated; Graphics; Project Management, etc.—60 pages or so of invaluable evaluations.



Machine Specifics

Flashy original; homely, loveable newcomer . . .

MACWORLD

\$30/year (13 issues); *Macworld*, P. O. Box 20300, Bergenfield, NY 07621; 415/861-3861.

THE MACAZINE ★

\$18/year (12 issues); *Icon Concepts Corp.*, P.O. Box 1936, Athens, TX 75751; 214/677-2793.

JAY KINNEY: When the Macintosh was first unveiled, *Macworld* was the magazine to get if you wanted to stay informed about the latest peripherals, software, and other news related to this ground-breaking machine. In fact, the early issues of *Macworld* rivaled—and in some cases surpassed—the user handbooks that come with the Mac: since ad pages were still relatively scarce, *Macworld* fleshed out the magazine with thorough introductions to all aspects of the machine and the initial software releases. Now, with the trickle of Mac software grown into a steady stream, *Macworld* has come to resemble most other machine-specific publications, with briefer articles drowning in a sea of ads.

I find it worthwhile to supplement my scanning of *Macworld* with the regular perusal of a second publication, the *Macazine*. Formerly a Mac newsletter called *Concepts*, the *Macazine* is now a monthly slick-paper, multi-color publication featuring a higher percentage of critical, down-to-earth reviews of Mac programs than you'll find anywhere else. In distinct contrast to *Macworld*, there's a strong dose of amateurism at work in the *Macazine*, which means that articles tend to be unpolished reports from nonwriter types including user-group leaders, cottage-level software developers, and just plain average Mac owners. The *Macazine* is simultaneously homely and loveable, and nigh impossible to find on newsstands.

Indispensable Apple II mag . . .

A+ ★

\$24.97/yr (12 issues); A+, P.O. Box 2965, Boulder, CO 80322; 800/525-0643 or, in CO, 303/447-9330.

STEVEN LEVY: With the premature demise of *Softalk*, my favorite Apple II magazine is A+. Though the tone of the magazine is stiffer than was *Softalk's*, and doesn't quite reflect the freewheeling spirit of the Apple world, A+ has a cleaner, easy-to-read look and plenty of helpful articles. Products for the Apple II family are usually reviewed in roundup articles (one month you'll see music-making software, another month a comparison of modems). This is not as useful as a continual barrage of new-product reviews. But if nothing else, A+ is indispensable for its ad pages, which represent a virtual catalog of what's new for my machine.

Problem-solving for Commodore users . . .

COMPUTE!'S GAZETTE ★

\$24/yr (12 issues); *COMPUTE!*, Circulation Dept., P.O. Box 961, Farmingdale, NY 11737; 800/334-0868 or, in NC, 919/275-9809.

JUDITH LUCERO TURCHIN: Though its parent magazine, *COMPUTE!*, also devotes quite a bit of space to the Commodore 64, the *Gazette* is more useful, as it addresses strictly Commodore issues. As with any publication dependent on advertising, reviews are rarely sharply critical—but the *Gazette* does not hesitate to report bugs and suggest alternatives in its in-depth columns and tutorials. The "Feedback" column is particularly helpful, consisting of readers' comments, questions, and surprisingly elegant solutions to problems.

Everything for the IBM PC-compatible . . .

PC

PC (The Independent Guide to IBM Personal Computers); \$34.97/yr (26 issues); *PC Magazine*, P.O. Box 2886, Boulder, CO 80322; 800/525-0643 or, in CO, 303/447-9330.

STEWART BRAND: A year or so after the introduction of the IBM PC computer, *PC Magazine* split in two over a management/ownership beef, and the aggrieved "good guys" went away and started *PC World*. After two years of head-to-head competition, they're both alive and well—PC the more so, in our opinion. *PC World* does good things, but *PC* has more goods more often (biweekly instead of monthly) more translatable into direct use. You'll need a sturdy shelf for back issues—the magazine is fat and frequent—but there's no better way to keep up with the huge volume of good stuff that continues to pour out for MS-DOS machines.



For the Incurably Enthusiastic

Technical authority . . .

BYTE

\$21/yr (12 issues); Byte, P.O. Box 590, Martinsville, NJ 08836; 800/258-5485 or, in NH, 603/924-9281.

BARBARA ROBERTSON: It covers the microcomputer field—particularly innovations—in depth. Technically accurate and objective, it's part of the history and well aware of the responsibility this implies.

STEWART BRAND: Barbara was a West Coast Editor of *Byte* before she came to Whole Earth. The magazine is for the profession, by the profession; many of the contributors are in the industry. No computer magazine has better covers or better cover stories behind them on the major trends in the business. Nobody has more immediate and thorough

coverage of new machines. *Byte's* long interview with the design team of the Macintosh was the best thing I saw anywhere on that machine, when everybody was covering it. Software coverage is techie—interesting but less useful to the buyer than others, and often late in the game.

BARBARA ROBERTSON: *Byte* probably has more ads and more advertising revenue than any other computer magazine, yet I know from personal experience, as an editor at both *Byte* and *Popular Computing*, that publisher McGraw-Hill adamantly, rigidly, and actively protects the editorial staff from any possible pressure from advertising salespeople—so the salespeople don't even try.

Byte's editorial plans include a new teleconferencing system called BIX, offered to subscribers at very low rates compared to the Source and CompuServe (p. 140). You're more likely to find *Byte* editors and other techie types running conferences on microprocessor architecture and plasma displays than, say, gardening or how to choose a computer, but if that strikes your fancy, there'd be no better place online for that kind of interactive information.

Delicious gossip from old pros . . .

DTACK GROUNDED

\$15 (10 issues); DTACK Grounded, 1415 E. McFadden, Suite F, Santa Ana, CA 92705; 714/835-4884.

ALAN KALKER: Microcomputer drag racers hang out here. Over a six-pack of Heineken's dark they swap tales, dreams, and news of the latest high-speed gear: math chip turbochargers and 68000 hot rods with the DaTa ACKnowledged pin grounded (like welding the throttle full open). Your genial host makes even novices feel welcome with plainspeak explanations and a spicy fricassee of computer industry bloopers and quaint customs. Quite palatable if you have a strong stomach for droll parable and irreverent parody.

The setting is the back of a Santa Ana speed shop. Off in the corner, the mighty **ONE MEGAFLOP** is beginning to take shape. You can eavesdrop as an old pro (a relic of the days of bamboo slide rules) debates options for his newest creations with a peanut gallery of top university and industry hackers. Hang in there when the talk turns technical. Even if you have to skip parts requiring assembly language, you'll learn lots of fascinating stuff that will shape the future of micros and gain you an appreciation of true engineering elegance.

The hacker's voice . . .

DR. DOBB'S JOURNAL

Dr. Dobb's Journal (Software Tools for Advanced Programmers); \$25/yr (12 issues); P.O. Box 27809, San Diego, CA 92128; 415/424-0600.

THOMAS SPENCE: Where *InfoWorld* is my meat and potatoes, I find *Dr. Dobb's Journal* is my monthly visit to a trade show "hospitality suite." Some months it is chips and dip and a Coke while other months it is cracked crab, caviar, and champagne.

Dr. Dobb's is very much a "hacker's" magazine and makes no bones about it. Until recently contributors were not paid for their efforts. Even now submitted articles and programs are placed into the public domain.

Dr. Dobb's seems to have its finger on the pulse of the proletariat of the computer world. This steady-handed approach in a computer magazine is a welcome relief from the blowin'-in-the-wind feeling I get from most other mags every time a new computer comes onto the market.

I will probably never trash-can my *Dr. Dobb's* back issues, because they make excellent reference materials. Being that I am a programmer (software engineer?) by trade, I find back issues invaluable for finding tricks-of-the-trade subroutines.

STEWART BRAND: *Dr. Dobb* himself, itself, reviews utility programs on our p. 173.

From the Brits . . .

PERSONAL COMPUTER WORLD

UK £15, Overseas £40 (12 issues); Stuart Cruickshank, 53 Frith St., London W1A 2HG, England; 01-439-4242.

STEWART BRAND: British computer journalism is significantly better than the American kind. Better writing, often better researching, more invidious comparison of products, greater passion. Since the U.K. computer market is about two years behind the U.S., a lot of that better journalism is directed at American products. There are dozens of good British computer mags, but the acknowledged best of the lot is *Personal Computer World*. As many people read London's *The Economist* to get perspective on the world of finance, you might read this magazine to get perspective on the computer world, particularly since it is increasingly a world phenomenon.



HARDWARE: HARD CHOICES

STEWART BRAND: Which machine you buy is the most irrevocable and consequential decision you make around personal computers. 1) Whatever you get, you're eliminating utterly all the software that doesn't run on your machine. 2) You're making the biggest single expenditure of your system. And usually it's the first expenditure you make, when you know the least.

So: buy conservative. Buy from a large, proven manufacturer. Buy a middle-of-the-road, popular machine with a wealth of software available for it—not too old, not too new. That preserves your options. There's always news going on in the hardware department—check our Last Minute Supplement on p. 209 for some—but don't buy into it unless you relish being a test pilot.

At present you're offered five major choices:

- Commodore 64—cheapest
- Apple IIe or IIc—most home software, and some business
- IBM PC and compatibles (Compaq, etc.)—most business software, and some home
- Macintosh—graphic, innovative software for home and business
- AT&T UNIX PC—heavy duty business software

Whichever road you choose eliminates the other four.

Before detailed shopping, there are some technical generalities to address. Not many. If you know a little about Memory, Storage, and Operating Systems, you know enough to shop intelligently.

Memory. Expressed in K, as in "You need 192K of memory in order to run 1-2-3 on that machine" or "CP/M machines like the Kaypro are forever limited to 64K." More K is better K, and costs more. Memory is sort of like the machine's consciousness—the amount of material it can hold in mind at once to think about and act instantly upon. Machines with larger memories can work with more complex programs and work conspicuously faster. Another term for memory in this sense is RAM—Random Access Memory. With some machines you can add more memory as you go (in the form of "cards"—circuit boards you can easily install yourself in "slots" in the machine), a handy way to keep up with growing ambitions.

Storage. "Old-timers will tell you. If users will maim for main memory, they'll kill for disk storage."

—John Gantz, **InfoWorld**.

Also expressed in K. "How does the Macintosh get 400K on those 3½ inch disks when the Hewlett-Packard 150 only gets 270K?" The disk is where your information lives when it's not in active use. A "bigger" disk (more K) means bigger programs will run comfortably, and there's more room for your data files. One kilobyte (1K) equals about 150 words of text, so at 250 words per double-spaced page, a standard disk of 360K will hold 216 pages.

There are only three consequential kinds of disk these days—the 5¼" "floppy" (Commodore, Apple, IBM, 160 to 1200K); the 3½" "floppy" (more of a hardshell actually, some laptops, Macintosh, Amiga, 270 to 800K); and hard disk (Apple, IBM,

Macintosh, 5 to 200-plus MB). Hard disk is what one aspires to. It measures storage in megabytes (MB), each megabyte a million bytes (1000K). Woody Liswood: "I cannot live without a hard disk. I really do not remember how I existed before. With 2.5 megabytes available for WORDSTAR and related spelling and grammar, and others, I am completely spoiled. The additional storage and quickness of response will save you *hours* of frustration in working with large files."

Operating systems. This is the troublous realm of "compatibility." A program written for one operating system won't operate on another one unless it's translated, which is either a nuisance, expensive, or impossible, depending. "The IBM PC is a clunky machine, but everything runs on it," said editor Barbara Robertson, on her way to buying one. The IBM's operating system, PC DOS (generally, MS-DOS, hence the term "MS-DOS machines"), is the closest thing we have to a standard these days, so software writers flock to it, and so do hardware manufacturers in the 16-bit generation. Ah.

There are three generations of personal computer hardware alive in the market just now. The oldest is 8-bit, with three different standard operating systems—Commodore 64, Apple II, and CP/M-80 (on machines like Kaypro and Morrow). The current dominant generation is 16-bit, with one standard (hence its attraction)—the MS-DOS operating system that runs the IBM PC family and hordes of compatibles and sort-of compatibles. The cutting edge is 32-bit, with three standards and probably more to come—Macintosh, AT&T UNIX PC, and Amiga. Every now and then I understand the difference between 8 and 16 and 32 bit, but it doesn't matter to understand it, so I forget again.

Now then. Hardware shopping advice from an expert. Richard Dalton has been in the computer field for 18 years. He's a hardware buying consultant and editor of the office technology newsletter **Open Systems**. A founder of this **Catalog** project, his bemused voice appears throughout the book.

RICHARD DALTON: We think there's more value in digging out the best in personal computing, not the newest. New products, especially hardware, are going to have problems. This was true of the vaunted IBM PC right after its announcement and frustrates our office today as we try to get the interesting and ambitious new AT&T UNIX PC to turn itself on properly. That doesn't invalidate the UNIX PC—they're just having predictable early production glitches.

FIRST RULE: Don't buy serial number "1" of any system (or anything close to it).

Second reason: a new computer system that is revolutionary (the ST from Atari is a good example) will not have enough software immediately available to satisfy the average buyer. It generally takes one or two years for the software producers to catch up with a new machine.

SECOND RULE: Buy a computer that offers a number of choices in each software category (writing, organizing, drawing, etc.) that interests you.

Since personal computers (and, of course, the programs that make the beasts work) are becoming more capable each year, a natural tendency is to hold back and await next year's developments. That's a valid approach *if* you don't have

anything currently important to do that a personal computer would substantially improve. If you do have, waiting won't help much.

THIRD RULE: *Think about what you can gain from a personal computer. If it's a lot, crash ahead. If you're uncertain, either wait or buy cheap and do some exploring.*

FINAL RULE: *So that you know the machine and know that the one you're buying works, don't buy any computer unless you have: Typed on the keyboard for at least 15 minutes • Started a program, ended it and started another • Created a file and printed it • Looked at the display and tested the system (not a demo) yourself for at least a half hour. If a dealer won't let you do the above, sheath your MasterCard and move on.*

STEWART BRAND: Keyboards and monitors are of the essence. They're the parts of the computer that wear on your body day in and day out. Don't get a machine your fingers aren't happy with. One way to objectively test keyboards—in the store or with friends' machines—is with TYPING TUTOR III (p. 48), which tells you your words-per-minute rate as you mess with it. I like the Apple IIe keyboard better than the IBM, but TYPING TUTOR proved I'm a lot faster and make fewer errors on the IBM.

Monitors. It's an almost theological choice between high-resolution monochrome, lower-resolution color, and expensive high-resolution color. If your computer life is strictly numbers and characters, monochrome will lessen the eyestrain. If you use graphics at all, color carries its own bonus of information. An RGB (red, green, blue) monitor—Taxans are our favorite—is so much better than a TV screen that it's worth paying the extra couple hundred bucks, even with the cheapest systems. Screens smaller than 9 inches diagonal are too hard to read, larger than 12 inches a waste of space and money.

Given all these considerations, what are my top computer recommendations? Really only three—Apple, Compaq, and Macintosh. We recommend a good many more in the next few pages, but these I regard as the safest of the safe. The Apple is for any situation that involves kids; all the best learning and playing software runs on it, but it also has good application programs for adult use. Apple IIc if you want a tidy system, ready-to-use-out-of-the-box; Apple IIe if you want expandability. Compaq is the reliable workhorse computer, the best of the IBM PC clones. If you're doing serious computing, don't mess around, get one with a hard disk, the Compaq Plus or a DeskPro. The Macintosh is a fine sports car, snazzy and fun so long as you don't expect it to do truck duty. I drive a Compaq Plus.

That's the crude recommendation. Taking it a degree finer, a little more richness emerges . . .

Disposable computer . . .

COMMODORE 64

\$150; disk drive, \$200; Commodore Business Machines, Inc., 1200 Wilson Dr., West Chester, PA 19380; 215/431-9100.

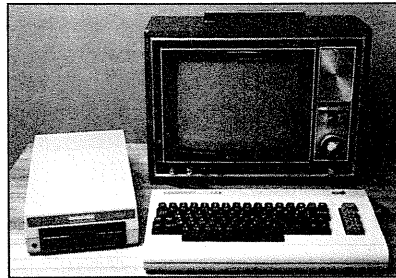
JOHN SEWARD: The Commodore 64 is the Bic lighter of computers. It works great, but it's not destined to become a family heirloom. I've been writing software for the 64 ever since it was introduced and am familiar with its strengths and weaknesses.

Compared to the Apple IIe, the 64 has the same memory, an augmented version of the same processor, better color graphics yet costs one-fourth as much. The Apple looks more substantial and has a well-deserved reputation for reliability, which Commodore lacks.

STEVEN LEVY: Looking at ads I see the street price is somewhere around \$320 (\$140 for the computer, \$160-180 for the disk drive.) Since you can get a color monitor for \$200 or so (or use the TV) this is one cheap system. You could add a fast-load cartridge, word processor, draw program, Multiplan, a few games, the whole package for well under \$800.

JUDITH LUCERO TURCHIN: The best Commodore 64 book (**Commodore 64 Home Companion**; George Beekman; 1984, 360 pp., \$19.95; Datamost, Inc., 19821 Nordhoff St., Chatsworth, CA 91324; 818/709-1202; or **COMPUTER LITERACY**) costs one-seventh

the price of the computer, but it's worth it. It has everything—basic programming, telecommunications, software shopping, accessory hardware, books, magazines, users' groups, and bulletin board systems.



In England the Commodore 64 is a serious business machine, and good application software exists for it. It'll display on your TV (as here), but you're better off getting a cheap color monitor—if you move "up" later, you can use the monitor with the next computer. The Commodore 64 is a good machine to mess around with while you're deciding whether to mess with computers at all, or while you're waiting for something ideal to come along. If you got more time and patience than money, it's bargain computing. If you have destructive kids, you'll grieve less at the peanut butter in a Commodore keyboard.

There is one true statement about microcomputers: NO MATTER WHAT YOU BUY, THE FIRST PERSON YOU MEET AFTER YOUR PURCHASE WILL TELL YOU THAT YOU SHOULD HAVE PURCHASED SOMETHING DIFFERENT.

—Woody Liswood

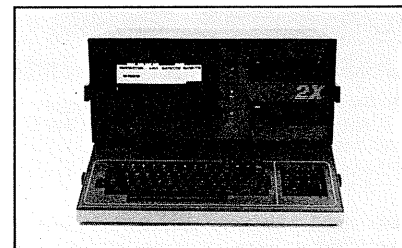
The CP/M transportable bargain . . .

KAYPRO 2X

\$1595; Kaypro Corporation, P.O. Box N, Del Mar, CA 92014; 800/452-9776 or, in CA, 800/952-9776.

RICHARD DALTON: Basically, Kaypro offers a pile of quality software (WORDSTAR, THE WORD PLUS, INFOSTAR, CALCSTAR, MICROPLAN, MITE, MBASIC-80, CP/M-80 version 2.2) at a substantial discount and throws in their computer for free. You unpack, plug in the power cord and start writing, organizing, calculating, telecommunicating, or programming.

STEWART BRAND: With its high resolution screen, two 392K disk drives, built-in 300 baud modem, built-in clock/calendar, and transportability, the Kaypro 2X is a neat package. But its CP/M operating system imposes three major limitations: 1) almost no new software is being written for CP/M; 2) you're forever limited to 64K memory; 3) there's no graphics worth mentioning, or games.



The Kaypro 2X is complete, a bargain, and somewhat outdated.

For home and school and tiny office . . .

APPLE IIe and IIc

Apple IIe: \$895 (street price \$650); disk drive, \$329; monitor, \$229; **Apple IIc:** \$1195 (street price \$750); monitor and stand, \$238; **Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.**

PAUL FREIBERGER: The Apple IIe and IIc are the most recent descendants of the legendary Apple designed by Steve Wozniak and Steve Jobs in a Silicon Valley garage in 1976. Since the latest machines still use practically the same processor as the previous two million, buyers can count on an enormous and diverse library of programs.

Choosing between the two models requires careful thought. The basic IIe (\$895) is an open and expandable system, not unlike a starter kit. There is a plethora of products from independent firms that offer such features as: more memory, speech synthesis, graphics tablets, drawing with a light pen, and the capacity to build your own home security system.

The IIe requires a willingness to tinker with a computer, to pull off the lid and to insert add-on boards. Since many buyers only want to *use* their computer, Apple altered its "open-architecture" approach with the compact, closed-system IIc. Built into the very portable IIc are all the most commonly used features of any Apple II—one disk drive, 128K of memory, a keyboard that

allows you to choose between standard QWERTY and Dvorak layout, 40- and 80-column text mode, and ports for a mouse or joystick, a modem, a flat-panel or RGB (red, green, blue) monitor, a monochrome monitor, a headphone, and a second disk drive. By packing these features into the system, Apple has saved you from making numerous additional buying decisions. The idea is to make the computer as easy to set up as a stereo. First-time computer owners will also appreciate the six interactive tutorials that come with the IIc. Besides offering hands-on training to learn computer basics, the tutorials introduce APPLEWORKS (p. 108), an integrated word processing, spreadsheet and filing program.

The IIc includes "double-high resolution" graphics (560 by 192 pixels), available only as an option on the IIe, and Apple also built "Mousetext" into the computer's ROM to encourage programmers to develop software that works with a mouse and appears similar

Apple IIe (left) and IIc (right), open architecture versus closed, same machine otherwise, offering the largest library of software in the business. The IIe is more adaptable, but many of the things you might add are already included in the IIc.



to programs designed for the Macintosh. Thus the Apple II software library should continue to improve.

STEWART BRAND: Because all the great learning and playing software runs on the Apple, this is the premium choice for a house with kids (or school, where it's the standard machine). At the same time there is excellent grown-up application software—APPLEWORKS, WORD JUGGLER (p. 55), MULTIPLAN (p. 70), etc.

STEVEN LEVY: With **The Endless Apple** (Charles Rubin; 1985; 258 pp.; \$15.95; Microsoft Press, 10700 Northup Way, Bellevue, WA 98009; 206/828-8080; or **COMPUTER LITERACY**) you have a how-to book with a controversial thesis. For most applications, Rubin insists, you can find good-as-MS-DOS software or you can make hardware modifications so your Apple II or IIe performs as dazzlingly as the IBM PC or newer machines.

Still the most popular laptop . . .

RADIO SHACK MODEL 100

\$499 (24K); \$399 (8K); 8K RAM expansion modules, \$120 per kit; capacity to 32K; Tandy Corporation/Radio Shack Division, 1700 One Tandy Center, Ft. Worth, TX 76102; 817/390-3700.



The Radio Shack Model 100 at \$499 is a bargain, and its easy portability is a whole different way to think about computers.

Incompatible operating systems have taken over where religious differences left off.

—Cathy Guisewite

STEWART BRAND: The original laptop computer, which changed the industry when it came out two and half years ago, is still the one we recommend most confidently (for other laptops, see the Last Minute Supplement, p. 209). The Model 100 became popular because it was cheap, good, and more useful than anyone expected. Its popularity then built a whole world of support around it, and so its value continues to grow.

In one handful you get: a keyboard (faster for some typists than regular desktop computers), a liquid crystal screen of 8 lines by 40 columns, a neat word processor, a shockingly easy telecommunicator (the first to have one built in), an address file, a scheduler, and BASIC, all in 24K run by batteries, all for under \$500. For several professional computerists we know, it is their entire system. All manner of programs and add-ons have emerged to enhance the little guy—check the Model 100 index. One of the advantages is the utter ubiquity of Radio Shack stores for sales and service, though if you want even better prices (by 20% usually) try Nocona Electronics, P.O. Box 593, Nocona, TX 76255; 817/825-4027.

JIM STOCKFORD: **Portable 100/200** (\$3.95 single issues; \$29.97/year [12 issues]; Camden Communications, P.O. Box 250, Highland Mill, Camden, ME 04843; 207/236-4365) is the magazine for keeping up with latest products for the Radio Shack Model 100.

The TRS-80 User's Encyclopedia (Model 100) (Gary Phillips, Jacquelyn Smith, Julia Menapace; 1984; 239 pp.; \$14.95; Arrays, Inc./The Book Division, 11223 South Hindry Avenue, Los Angeles, CA 90045; 213/410-9466; or **COMPUTER LITERACY**) supplements the very clear Model 100 manual with a lot of extra information, including a memory map and good explanations of specific Model 100 functions and general computer terms. This is the book I turn to when I'm stuck; I've thrown the rest away.

RAM + (\$425; Portable Computer Support Group, 11035 Harry Hines Blvd., #207, Dallas, TX 75229; 214/351-0564) is a hardware/software combo that adds an extra 64K of RAM to your Model 100. It has enough memory to free me completely from my cassette recorder and desk top computer.

Setting the MS-DOS standard . . .

IBM PC

\$2295 (street price \$1700); includes 2 disk drives and 256K; IBM Entry Systems Division, P.O. Box 1328, Boca Raton, FL 33432; 800/447-4700.

STEWART BRAND: Thanks to its marketing clout IBM has done the personal computer

Clone 1: cheapest . . .

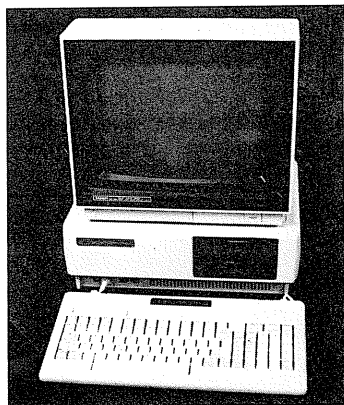
TANDY 1000 ★

\$999.95. Tandy Corporation/Radio Shack Division, One Tandy Center, Ft. Worth, TX 76113; 817/390-3700.

RICHARD DALTON: The newish Tandy 1000, at under \$1,000 with 128K memory, one 360K disk drive (second addable), no monitor, and reasonably good IBM PC compatibility, is a good buy, especially backed by the resurgent Radio Shack chain of 6000-plus stores. The machine comes equipped with a set of programs called DESKMATE that is surprisingly useful for giveaway software.

STEWART BRAND: Unlike the IBM PC, the Tandy 1000 comes with graphics adapter, MS-DOS, and parallel printer interface included. Apparently to appeal to the home market, it also has connectors for two joysticks and a light pen, along with enhanced sound and music capabilities. It takes up far less space than the IBM whale, but that has a price—the three slots for add-on boards are three inches shorter than the standard 13-inch long board IBM slots, a shopping nuisance. At its price the Tandy 1000 is competing directly with the Apple IIe and IIc as well as the Kaypro 2X. For my uses (mostly business, some fun), I confess the Tandy 1000 looks like the better buy.

Tandy makes it a bit hard to attach things not marketed by them to their computers. One way around that is to get Tandy stuff alright, only from the discounter (20% and more) Nocona Electronics, P.O. Box 593, Nocona, TX 76255; 817/825-4027.



The Tandy 1000 is a tidy package with a lot of range for a modest price.

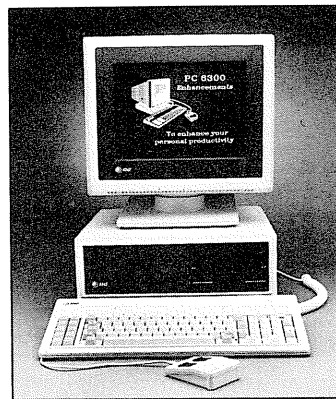
market, somewhat inadvertently, an enormous favor: there is one standard operating system for the whole 16-bit middle of the biz—good old MS-DOS. As a result, some 75% of all software being written these days is targeted at IBM and "IBM-compatible" machines. Most of it is "business" software, and it has become very capable indeed.

Clone 2: faster, more graphic . . .

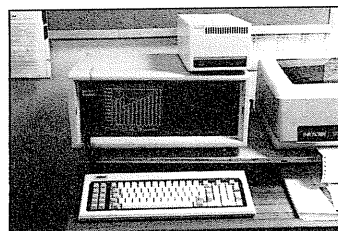
AT&T 6300 ★

\$2810 (2 disk drives); \$4485 (hard disk); AT&T Information Systems, 1 Speedwell Ave., Morristown, NJ 07960; 201/898-2000.

STEWART BRAND: The advantages of the AT&T 6300 are: 1) with the 8086 chip at its heart instead of IBM's 8088, its processing speed is twice as fast; 2) graphics adaptation is included, in quite tasty high resolution (640 x 400 pixels, twice as good as straight IBM); 3) a large and serious company evidently committed to ongoing support of the machine. The disadvantages: 1) possible incompatibility with some programs due to that improved speed and graphics ("But FLIGHT SIMULATOR not only works, you get to O'Hare Airport twice as fast," comments Ken Milburn); 2) the price break is only medium good. The package does include MS-DOS and parallel and serial ports, so you can hook a printer and modem right up, along with a good seven empty slots for additional boards.



With the AT&T 6300 you get giant support from a different giant than IBM.



The Compaq and Compaq Plus (hard disk) are an armload of computer. The Compaq Deskpro is the compleat one-machine office.

In general the crowd of IBM PC "clones" (imitators) offer better performance at often far better price, sometimes at the cost of decreased compatibility with the full range of software developed to the IBM standard. The trick is knowing which clones are most compatible and which clone manufacturers will survive to support their machines next year. These three are our pick for 1985-86.

Clone 3: best . . .

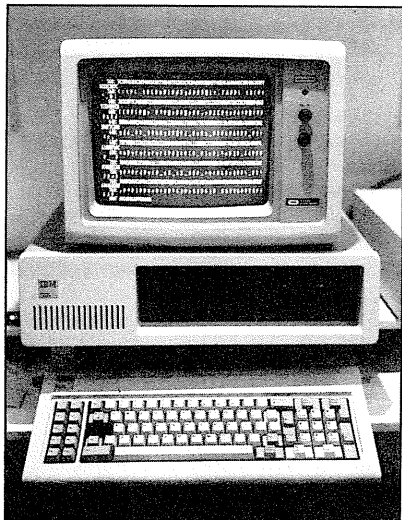
COMPAQ

Compaq: \$2495 (street price \$2000); Compaq Plus: \$3999 (street price \$3200); Compaq Deskpro Model 4: \$5799 (street price \$5000); Compaq Computer Corp., 20555 FM 149, Houston, TX 77070; 800/231-0900 or, in TX, 713/370-0670.

STEWART BRAND: Compaq is always half a step behind IBM in time, half a step ahead in quality. The company has the most successful line of computers in the business—zero fumbles so far; no other major company can claim that. The reputation comes from good reliability of product and service and marketing, and outstanding IBM-compatibility, greater even than IBM's at times (IBM tends to lose compatibility between its own generations for a time; Compaq, half a step behind, doesn't).

The two machines that made Compaq's reputation are "transportable"—they have a handle and they close up into a plausible 26-pound suitcase; not something you'd want to run for a plane with, but easily luggable out to the car from home or office. Interestingly, this makes them more useful in a busy office; people easily cart a Compaq from desk to desk, whereas big desktop computers are *turf*—no trespassing. Both the Compaq and Compaq Plus include MS-DOS and graphics and parallel port and a built-in 9-inch monochrome monitor; the Plus adds a built-in 10 megabyte hard disk that travels surprisingly well.

The proven prize of the Compaq line is the Deskpro Model 4, a desktop computer with a wealth of speed, memory, and storage. Speed comes from the 8086 chip, but that doesn't reduce compatibility—if you happen to be running a program that requires the slower clock speed of the IBM PC, there's a toggle to halve the speed so it feels at home. Memory on the Model 4 is 640K, the maximum usable for most applications. And storage is unique—Deskpro was the first desktop to have built-in tape cartridge backup for its 10-megabyte hard disk. This is a prodigious convenience and safety feature. Since it only takes 20 minutes to back up the entire hard disk in one automatic sequence, you're more likely to do it, and you avert the catastrophe of losing your whole datafile to a hard disk crash one black day.



"If you're spending your own money on a computer, shop around for the best value. If you're spending your company's money, buy IBM."

—George Morrow

What follows is not the corporate approach, it's the intensely personal approach. The IBM PC is by now a humble beast, but with the right accoutrements it can be truly formidable. (With the wrong accoutrements, it is merely expensive.)

More power, less cost...

ENHANCING THE IBM PC

RICHARD DALTON and CHARLES SPEZZANO: IBM keeps announcing new personal computers and it's never going to end, folks. It's a lot like the horsepower race Detroit pushed during the fifties—constant increases in "power" without regard for utility or cost. Still, there's a lot to gain from enhancing a standard PC. It all costs money, though, so it's best to spend some time thinking about what will benefit you most. Otherwise it's just junk food for your MasterCard.

First, a look at the ways to enhance your PC hardware. These include:

1. Expanding the PC's memory and/or the ports that allow you to hook up devices like modems, plotters, and printers;
2. Adding a "hard" disk for more storage and faster access to data;
3. Exchanging the PC's clunky keyboard;
4. Improving the quality of the monitor (and support electronics) you have to stare at all day;
5. Cranking up the internal speed with a processor replacement; and
6. Swapping the PC's weak-kneed power supply to handle this added stuff.

Expanding memory and ports

It used to be that 256K was a lot of memory, but programs keep getting bigger and users more ambitious. A number of PC owners have boosted their computer memory to the 640K maximum that the PC DOS operating system allows.

Part of this upgrading is due to the rapidly declining price of boards and memory chips. Building to 256K you can do with chips; beyond 256K you have to buy a memory expansion

board. Most brands are much the same, so you should look for a lengthy warranty (at least a year), a vendor you trust, and good documentation—one of the real differentiating features with memory boards.

A relatively better value comes from memory boards with added capabilities; so-called "multi-function" boards. These add a chronograph (clock) to show the current time and date, and one or more "ports." At this point, you have to think about what you're liable to add to the PC before committing to a purchase. Many display boards—the ones that feed information to your screen—include a parallel port, normally used to attach a printer. The serial port usually connects to a modem for telecommunications. A game port is a way to hang a joystick on a PC. If you don't play games or plan to communicate or if you already have a printer connection, the seemingly better value of a multi-function board may not offer anything more than a lower priced, memory-only board.

How much memory is enough? Memory chips have gotten so cheap, this is a less critical question. A basic memory board will cost \$175-300; a multi-function board about \$100 more. Each 64K you add to the memory board can cost as little as \$10-15 if you insert the chips yourself. If you buy the board with the chips already in it, you'll pay an extra \$20-40 per 64K. This equals a range of about \$250-550 to get your PC up to 640K, depending on whether you want other ports and if you're willing to become a computer do-it-yourselfer.

Adding a hard disk

Nothing will make your system speed up as much as a hard disk that can store at least 10 megabytes. Period. Hard disks run much faster than floppies as you switch from program to program, access files, or sort a data base, and you also escape the time-consuming process of locating and shuffling floppy disks.

We've seen 10MB disks advertised for as little as \$500 from mail order houses, and while you can get stung, most hard disks on the market are made by a small number of vendors with fairly similar characteristics. That's not to say that there aren't differences in speed and reliability, just that the average PC owner won't notice them.

Improving the PC's keyboard

The slowest component in your system is you. PCs spend most of their time waiting for you to hit the next key. Anything that speeds up the process will dramatically increase the work you and your PC can accomplish.

The standard IBM keyboard has an overly firm, metallic feel to it and many of the keys seem oddly placed to the average user. There are many alternative keyboards available in the \$100-200 price range, but the \$400 WICO SmartBoard is a true standout. Before you choke on that price, consider what it can do. It's about the same size as IBM's original and has a better "feel," especially for touch typists. The most prominent addition, though, is a trackball on the right-hand side, which works just like the cursor control "arrow" keys only much faster and more smoothly. Editing text or changing numbers on a spreadsheet is a breeze as the cursor flies around the screen, moved by the direction of your fingertips on the trackball.

SmartBoard has its own memory that can be used to store keyboard "macros" (strings of text or commands up to 126 characters long that are attached to the 10 function keys) and you can re-assign the positions of any two keys. Add to that a BASIC programmer's or Dvorak keyboard configuration that are invoked by single keystrokes, and you've got a productive new companion for your digits that's worth the seemingly high cost.

Monitors and display boards

What your eyes work with is a display board (generating text and graphics) and a monitor screen. What you get may include headaches and chronic eyestrain if you make the wrong choice. There are dozens of display boards on the market and an even larger herd of monitors. If your primary aim is graphics, check out the suggestions on pages 123-124. For the rest of us, who need a comfortable way to view numbers and text, these are the recommendations:

- If money is the prime concern, get a Hercules Graphics Card and a monochrome monitor—a "TTL" type rather than a composite, if you can afford the \$50-100 price difference. Monochrome will provide you with grey-scale graphics and sharp looking text. Most monitor makers offer amber or green screens, further easing the eyestrain problem. The color choice is up to your own preference. There's no real evidence that one is "better" than the other.
- If you want the advantages of full color, the choice gets tougher. Standard color graphics on the PC are punishing for anyone who has to do a lot of work with characters. A superior and admittedly expensive answer is a Taxan 440 monitor coupled to the BoB board made by Emulex/Persyst. BoB stands for "best of both," providing text slightly sharper than even monochrome (and in any of 16 color combinations) and full compatibility with standard color graphics. The list price for this combination is a non-trivial \$1395, but some of the sting can be removed buying through discounters who will sell you both for as little as \$900—still a large chunk of cash.

Cranking up the PC's internal processing power

This appears as the last option because for most people, it's the least cost-effective way to improve a PC. PCs and their XT cousins use an Intel 8088 processor to shovel data around inside. PC users who are plugged in a couple of hours a day will notice programs are moving along faster, but they won't save more than a few seconds daily by replacing the 8088 processor with a faster model. However, those who spend most of their time grinding out information may find the \$700-2500 added costs worthwhile.

That's the fallacy built into the IBM PC AT and all the other "faster" computers coming on the market: the internal processing rate of a computer is the smallest factor in what actually gets done. A secondary disadvantage is found in software. The AT's 80286 is from the same processor "family" as the 8088, but there are enough differences to make it compatible with only about 75% of the software written for the standard PC.

Of the many "speed-up" boards on the market, the Orchid PCturbo is the best choice. It adds an Intel 80186 processor that will improve processing speeds 2-3 times vs. the 8088,

yet remains compatible with almost all software since you can switch back to the humble old 8088 whenever it's needed. Most speed-up boards require instead that you remove and replace your 8088. Basic cost is \$895, and you'll get up to around \$1200 if you add a full load of memory chips. You can cut about \$200 off those figures by shopping around.

Power to the PC people

IBM underestimated the need for electric power when they built the PC. Its 63.5 watt power supply isn't sufficient if you start adding a bunch of goodies. Fortunately, replacement power supplies in the 130-135 watt range cost only \$100 to \$175 (\$100 more if you walk into your local computer retail store and ask them to boost the power). You should look for a power supply that is an exact replacement for the original—that means the same size with screw holes in the same places. Beyond that, it's an easy session with a screwdriver to double the PC's power source.

It's a recommended step if you decide to add a hard disk or use up all your available slots with add-on boards. Cheap insurance against fading power that can cause either intermittent or wholesale loss of data.

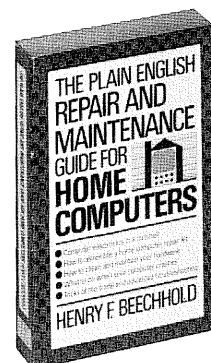
Summary

Most of these recommendations apply to IBM PC "clones" as well. Space doesn't permit us to say which ones work with each type of computer. Check with your dealer if you want to try any of these enhancements on your IBM-compatible.

Overall, we're impressed by the enhancement strategy vs. the "buy the newest and fastest" approach. You're familiar with the PC, so why go through the steep learning curve a new machine generally requires? The issue of software compatibility is another nagging consideration. You already own a substantial piece of computing gear which you can make more productive as the need arises, usually at much lower cost than with a new system.

WICO Smartboard: WICO Corporation, 6400 West Gross Point Rd., Niles, IL 60648; 312/647-7500 • **Hercules Graphics Card:** \$499; Hercules Computer Technology, 2550 Ninth St., Suite 210, Berkeley, CA 94710; 415/540-6000 • **Taxan 440 monitor:** \$800; Taxan Corp., 18005 Cortney Ct., City of Industry, CA 91748; 818/810-2490 • **BoB board:** \$595; Emulex/Persyst, 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626; 800/368-5393 • **PCturbo board:** \$895; Orchid Technology, Inc., 47790 Westinghouse Dr., Fremont, CA 94539; 415/490-8586.

For fiddling with your hardware, get the cheerfully excellent The Plain English Repair and Maintenance Guide for Home Computers (Henry F. Beechhold; 1984; 265 pp.; \$14.45; Simon & Schuster, Attn: Mail Order, 1230 Avenue of the Americas, New York, NY 10020; 800/223-2348; or COMPUTER LITERACY.) Detecting a problem in your mysterious computer and fixing it is a coming-of-age, a departure from helplessness.



Still dazzling . . .

MACINTOSH

\$2795 (street price \$2395), 512K; external disk drive, \$495 (street price \$325); Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.

STEWART BRAND: As sports cars and racing cars have frequently led the way in auto design, Apple's Macintosh has been the trend setter for two years on how a computer and its software should interact with the user. Thanks to its ingenuity and market success, most Mac innovations—a "mouse" for driving the cursor around on the screen, "windows" for displaying various applications at once, "icons" for indicating a tool or function with a picture instead of words—all are now standard tools of the trade.

The Macintosh is a picture box; that's why it's so easy to understand and so dramatic to work with. Everything is handled graphically on the "bit-mapped" high-resolution black-on-white screen. The Mac's problem is that it's underpowered and undersized for its task, because driving a bit-mapped screen takes quantities of memory and storage. Therefore we recommend at minimum the 512K ("Fat") Mac, and a second disk drive. Better still, get a 10-megabyte hard disk HyperDrive built in (\$2195 [for 512K Mac]; General Computer Co., 215 First St., Cambridge, MA 02142; 800/422-0101 or, in MA, 617/492-5500). Also get utilities such as SWITCHER (p. 115) that help speed access between programs.

Hang out for a while with a Mac before buying. Get past the dazzle and see if the limited keyboard (no function keys, no cursor keys) delights or frustrates you, watch the screen and see if its size suits you and whether the bright screen has a tiring flicker. Steven Levy: "The Mac screen you complain about is one of the joys of my working life. Having talked to lots of people about it, I conclude that the sensitivity to Mac flicker is an individual trait aggravated by lighting conditions."

If those matters seem manageable, and you're not primarily after heavy duty word and number crunching, the Macintosh is a sweet package with elegant design at every step, from the crystal-clear manuals to the clever cable attachments.

The next generation for business . . .

AT&T UNIX PC

\$6095 (with 20-megabyte hard disk); \$5495 (with 10-megabyte hard disk); AT&T Information Systems, 1 Speedwell Ave., Morristown, NJ 07960; 201/898-2000.

STEWART BRAND: The UNIX PC this year is in the position the Macintosh was last year—a complete computing package with a whole new impressive operating system, new *kinds* of uses promised, and not much software available yet but supposedly a lot coming. Our favorable judgment is more a guess and hope, as with the Mac last year, because the UNIX PC world of experience is still only half arrived, and it'll take a year to arrive fully.

Where the Mac is a picture box, the UNIX PC is a communication box.

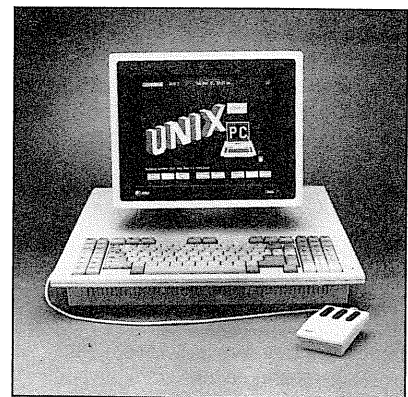
The UNIX PC uses pictures—three-button mouse, bit mapped high resolution monochrome screen (720 x 348 pixels)—but that's primarily to ease the managing of the



The most lovable computer on the market, the Macintosh also requires a certain amount of forgiveness.

UNIX operating system, which is known to be a tangle of arcana when you try to manage it directly by commands. Included with the system is an internal 300/1200 baud modem, serial and parallel ports, clock/calendar, its own electronic mail software, and *three* phone jacks, encouraging simultaneous voice and data transmission. Elaborate, nicely designed software automates, connects, and records telecommunicating and regular phone calling. You can have work interrupted by a phone call, handle the call in a window (taking notes, logging time, etc.), then return to the interrupted work; next time you call that person, notes from the previous conversation will automatically be displayed. This machine is a phone junky's wet dream.

UNIX specializes in connecting—in handling "multi-user, multi-tasking." That means your machine can be doing a number of functions at once, and if you hook up with colleagues, UNIX will manage all that adroitly. UNIX also specializes in not specializing; once software is written for UNIX, it's easy to port around to other manufacturer's machines; this should help it become a standard rapidly, and it's greatly encouraging to software developers. The cost of all this is that UNIX is bulky—it wants large quantities of memory and storage. The 512K memory and 10-megabyte hard disk of the "basic" UNIX PC is too little.



AT&T's UNIX PC brings minicomputer software and power to the desktop.

★ MEANS: NEW TO 2.0 EDITION

Hard disks and printers and the pain of peripherals . . .

OTHER HARDWARE

STEWART BRAND: It's only a matter of time before you get a hard disk if you're computing at all regularly. Your files accumulate, the programs you're using accumulate, your floppy storage gets confused, the price of discount hard disks comes down another increment, your brother-in-law who got a hard disk won't shut up about its wonders. Soon the question is not whether, but which one.

RICHARD DALTON: Overall there are mostly good units on the market; some slightly slower or faster but no big deal. Go for price (some are as low as \$500), warranty, and most of all someone who'll stand behind the product if it crumps out. Once it's installed, commit only non-critical stuff (or back-up religiously) for the first couple months. If it's going to fail in a major way, it probably will in that time frame. Also, buy a two-disk-drive system (half-heights) and either put the hard disk in the other slot or get an external unit. That way, if your hard disk fails, you get to continue operating in a graceful way until repairs are over.

Hard disk buyers soon discover that 10 megabytes of storage (or 20 or 30) fills up at an alarming rate. For Macintosh and MS-DOS machines, enter the Bernoulli Box from Iomega (\$3695 [street price \$3140], two disk drives; \$2695 [street price \$2290], one disk drive; Iomega Corp., 1821 West 4000 South, Roy, UT 84067; 801/778-1000.) It houses two 10-megabyte cartridges that can be removed and replaced to store endless quantities of programs and files. Even better, you solve the ever-present back-up problem simply, by writing the contents of one cartridge to the other in less than five minutes. The unlimited capacity of floppies with the speed and size of hard disks. And dead reliable. It's expensive and bulky, otherwise it's *the* best way to store information I've seen. The cartridges can cost as little as \$50 by mail order, and that's cheap if you consider each one stores almost 30 floppies. If I had to choose between my Golden Retriever and my Bernoulli Box, it would be a toss-up.

STEWART BRAND: A great book on this topic is **More Than You Ever Wanted to Know About Hard Disks for Your IBM PC** (Robert E. Brown; 1985; 84 pp.; \$27 (CA residents add 6.5% sales tax); Landmark Software, 1142 Pomegranate Court, Sunnyvale, CA 94087; 408/733-4032; or COMPUTER LITERACY). A great hard disk utility program for MS-DOS machines is 1DIR (p. 172).

Selecting and then living with printers are two of the great agonies of personal computing. There are too many printers, all different, all finicky. There are almost no professional evaluators of printers, but we found one in Charles Stevenson, head programmer and chief of printer configuration at MicroPro, makers of WORDSTAR.

CHARLES STEVENSON: Among dot matrix printers the recently announced IBM Proprinter is now the one to beat, with its near letter-quality print, front feed for letterhead and envelopes, downloadable fonts, and \$549 list price. It's relatively fast and it's made in the U.S. (IBM, Information Systems Group, 900 King St., Rye Brook, NY 10573; 800/447-4700). The street price for many small dot matrix printers is in the \$300 range now. They're almost disposable—cheaper to replace than fix. Always test *the exact model* of the printer with the software you're going to use it with before buying.

BARBARA ROBERTSON: The \$495 ThinkJet from Hewlett-Packard is a delightful printer—fast, quiet, and portable (8" x 11½" x 3½", 6 pounds). Instead of mechanical printheads and ribbons, it uses a small disposable ink-filled cartridge (\$10) that slides into a tray at the front of the machine. It paints characters on the paper by spraying ink through several tiny holes in the printhead. It's fast: 150 cps (characters per second), 12 pitch. Bold and underlining don't slow it down. Print quality is excellent. Not perfect letter quality, but the lines are much finer than dot matrix—and they're always the same. You'll never see faint characters from tired ribbons. I think it's worth every penny for the peace and quiet alone. Clean thumbs and portability are bonuses. (ThinkJet; \$495; Hewlett-Packard, 1020 N.E. Circle Blvd., Corvallis, OR 97330; 800/367-4772.)

RICHARD DALTON: The new Brother 2024L dot matrix has a 24-wire print head that can produce draft text at 160 cps and very near letter-quality at a flying 80 cps. The letter quality is good enough even for my

fussy publisher, and I get options for 10 or 12 pitch and a really elegant proportional font. The ribbon re-inks itself continuously, giving it a life many times as long as most printer ribbons. (\$1295; Brother International Corp., 8 Corporate Place, Piscataway, NJ 08854; 201/981-0300).

CHARLES STEVENSON: In the lower speed, letter-quality printer range it's a toss-up. I'd go with the Brother HR-15 or the Silver Reed EXP-500. Speeds are 12 to 23 characters per second. Both can handle Diablo escape sequences, which means that if "Diablo" is a printer choice in your word processor, you simply select it; no further configuration is necessary. (Brother HR-15; \$599 [street price \$360]; Brother International Corp., 8 Corporate Place, Piscataway, NJ 08854; 201/981-0300 • Silver-Reed EXP-500; \$599; Silver-Reed America, Inc., 19600 S. Vermont Ave., Torrance, CA 90502; 800/874-4885 or, in CA, 213/516-7008.)

STEWART BRAND: I think the notion of "letter-quality" printers is about as deep as "wood-quality" station wagons. Most letter-quality printers are expensive, thudding monsters, and they can't even do graphics, where all the action is with computers. Charles Stevenson advises not paying more than \$500 for any letter quality printer, because laser printers are on the way to replacing them. Between the Hewlett-Packard LaserJet and the Apple LaserWriter he greatly prefers the Apple.

PAUL FREIBERGER: Compare the LaserWriter's resolution of 300 dots per inch to the 80 dots per inch of Apple's standard Macintosh printer, the ImageWriter. At first glance LaserWriter documents appear to be typeset, though the resolution of professional typesetting machines is around 2000 dots per inch. The advantage of a laser printer over a typesetter is that you can use it in your office. In addition, it will print graphs and charts beautifully.

The LaserWriter contains 1.5 megabytes of RAM, 20 times as much as Hewlett-Packard's LaserJet and enough to print a full page of graphics in its high resolution. The enormous memory also accounts for its speed—up to eight pages of text a minute. Built into the LaserWriter are 13 different font styles, including common ones such as Times Roman and Helvetica. With AppleTalk (\$650), Apple's answer to office networking, it is possible to connect 30 computers to one LaserWriter. That puts the \$6995 price tag (plus \$99 to replace the toner cartridge after 2000-3000 pages) in a different light. (LaserWriter; \$6995 [street price \$6300] • ImageWriter; \$595 [street price \$500]; Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696).

STEWART BRAND: Watch out for the cables that link printers and other pieces of your hardware; they vary invisibly and critically. Don't leave the store with equipment that isn't operationally cabled to each other. If your office deals with much variety, invest in a Smart Cable, which adapts to whatever it's connecting. It costs the equivalent of three stupid cables. (Smart Cable 817 RM [male] or 817 RF [female]; \$90; Smart Cable 821 [includes both male and female connectors on both ends]; \$175; IQ Technologies, 11811 N.E. First St., Suite 308, Bellevue, WA 98005; 800/232-8324 or, in WA, 206/451-0232).

<p><u>SPECIAL PRINTING CAPABIL</u></p> <p>Boldface, Double Strike, Strikeout, Overprint (off)</p> <p>SUPERScript</p> <p>SUBScript</p> <p>1.</p>	<p>Dot-addressable graphics 96 x 96 dots/inch 96 vertical x 192 ho</p> <p>Four print pitches Compressed (142 characters/line)</p> <p>Normal (80 c Expanded co Expand</p> <p>3.</p>	<p>Print quality from four printers. 1) IBM Proprinter, dot matrix; 2) Brother HR25, letter quality, slow; 3) Hewlett-Packard ThinkJet, better than most dot matrix, but requires special coated paper for best results; 4) Apple ImageWriter, rich graphics, fine dot matrix.</p>
<p>1.</p>	<p><u>SPECIAL PF</u></p> <p>Boldface, Strikeout, Overpri SUPERScript</p> <p>SUBScript and any combination</p> <p>2.</p>	<p>MacWrite and Image Writer have more printing capabilities</p> <p>-- fonts to select -- Plain, bold, <i>italic</i>, underline, outline, shadow or <u>all at once</u>, 5 type</p> <p>4.</p>

BUYING

STEWART BRAND: It comes down to how you value your time. If you take the time to search out primo suppliers, you'll save certainly hundreds, maybe thousands of dollars. If life crowds you already and you have the dough, buy what you want over the closest counter and get all the service you can with it.

The strategies of buying in the next few pages (retail stores, discount mail order, public domain) go from expensive easiest to cheap hardest, and from least educational to most educational. Once you know the computer(s) you're interested in, the most effective single move you can make is to go to a User's Group for that machine in your area (computer stores can guide you to them), and listen and inquire. Along with the good information, you get relief—the group knows more than you could find out in weeks. And they'll be there when you get the machine home and find that your problems haven't gone away yet.

By and large you'll buy hardware at hardware places (thousands of dollars), software (and magazines) at software places (hundreds of dollars), and books at regular book stores—or mail order from *COMPUTER LITERACY* (p. 201). It's a fragmented, volatile market; that's part of the fun of shopping in it.

First you shop for the store . . .

BUYING AT STORES

STEVEN LEVY: The first and often the best place to look for software is in a retail store, either one specializing in software or your plain old neighborhood computer store. With a nearby store, not only can you switch faulty disks within minutes after you get home and find them not working, but you can use your phone to pester the clerk who so kindly served you. No long distance charges.

Too many stores, though, give inadequate service. The definitive example for me is the salesclerk who refused to leave his *MISSILE COMMAND* game when my mate and I tried to get his attention so we could spend \$10,000 at his store buying two computers. With that kind of attention to big-ticket buyers, is it any wonder that people who merely want *software* are doomed to nonperson status at many computer stores?

Yet you should persist in finding a store that will listen to your needs, open packages of software for you, run the software on its machines, let you play with the software. Such a place more likely specializes in software than hardware, but if the place you bought your computer does not give you that kind of service, you probably bought your computer at the wrong place.

Is the clerk a jerk? Establishing a relationship with someone in the store can be a satisfying, fruitful experience. Some stores, of course, are not geared to this type of contact. Big-volume outlets, like New York City's well-known 47th Street Photo, trade off service for discounts that compete with the cheapest mail-order outlets. Yet even salespeople at 47th Street Photo, once you finish waiting in line to talk to them, will offer quick, knowledgeable advice. Stores like these are easily found by the

If you're using the computer for business, even if you don't succeed financially, it's a significant tax write-off. In 1985 the tax break became more restrictive and complicated. Consult your tax adviser. While you're at it, check out software like *TAX PREPARER* (p. 104), *PERSONAL TAX PLANNING* (p. 104), and *MANAGING YOUR MONEY* (p. 96).

Thieves love computers. Insurance costs on the order of \$50-75 for \$5,000 of stuff, with \$100 deductible—worth it. Organizing Domain Editor Tony Fanning, who had two computers stolen, has this advice. "You add an attachment to your homeowner's policy; if you do work at home, it's cheaper to get it as a business attachment. The AAA also apparently insures computers. Get insurance for 'replacement value.' Take photographs of the equipment and make copies of the receipts and give all that to the company. Be sure to inform them when you add to the system—send the receipts, etc. When you're robbed or burned or whatever, press hard on the company, but don't pad your loss estimates (surprise them). You have to get written replacement value estimates from stores, and the company will check them. They'll take out the deductible and 10% per year for depreciation, and you're back in business. Three times and they cancel. I'm getting one of those lock-down devices."

large ads they buy in the local paper, with prices in the range of those offered in mail-order ads.

By perusing newspaper ads you might also find one for a store near you that seems to emphasize not only price, but desirable choices of machines or software applications. Another giveaway of a service-oriented store is mention of classes in using computers and popular programs. Often, fellow users will point you to a store where fair price meets conscientious customer support; some clever store owners have managed to be the default choice for software purchase by entire users' groups, just by paying attention to what people need and being around to answer questions and deal with problems. This is the kind of store where you might find your computer Godfather, and I suggest you persist until you find one or rule out all the possibilities in your area.

The guy you most want to cultivate is the store owner—he is the one most likely to be around when you drop in next week. The turnover at those places is incredible. If not the owner, settle for a manager. Don't give up on clerks, but it seems that once clerks reach an acceptable level of competence, they find a better job at a higher (better paying) rung in the computer field. Your best alternative might be a high school kid working in the store—freshmen especially, since they're not going anywhere for a while. Most often these kids got the job by hanging around the place and making it clear they knew more than anyone working there. They seem to have an endless curiosity about any problems you might encounter, and will devote marathon lengths of time to see something through to its solution. This is especially helpful in those seemingly trivial, ultimately baffling tasks like choosing the proper cable to connect your computer and your printer—a task which has the potential for disaster if you aren't in contact with a person who's done it before.

Make sure your store contact listens to you. Make sure you see software run—on your particular configuration—before you take it home. (If you have a very weird configuration, you might see the software run on something else and leave with a promise to immediately exchange it if it doesn't work—or perhaps make a phone appointment for your Godfather to talk you through the steps necessary to get the software running.) Make sure that the store can come up with several alternative packages to choose from and can explain the relative advantages of each. A good test would be an application that you already know: Can they explain *why* the three-hundred dollar word processor is worth three times the hundred-dollar program—for the needs you have described? If the program you're shopping for is a complicated one, find out how much help they're willing to give. Again, the store might give classes. If not, make damn sure the guy who sells you the program at least knows how to work it. At the very least, he should be willing to spend some time to understand how you might install the program on your system.

The price you pay. The prices of software that we cite in this catalog are list prices, which only rarely are the cheapest available. You can often get sizable discounts by comparison pricing. It goes without saying that you should do this with hardware as well as software (almost everything I'm saying about software applies to computer buying at stores). A guide to

the current discount prices on popular machines is the "Street Price Guide" found in the magazine **Creative Computing**. To find the rock-bottom levels in software, check out the prices in big mail-order houses like 800-SOFTWARE or PC Network (below). (You can find their ads in magazines like **Byte** and **PC World**.) Then go to the store and see the software, feel it, get it explained to you—and find out what the store charges for it. Almost always it will be somewhat more than the mail-order house. Ten, even twenty percent discount isn't a big deal, but it can be up to fifty percent—*i.e.*, hundreds of dollars. In that case, see "Discount Mail Order," below.

The differential lies in the store overhead and support, some of which you've already consumed by taking up space and time by your browsing. Once you've spent time at the store going through programs and have made your choice, are you morally committed to buy at that store? Maybe, maybe not—your wallet and your conscience should decide. But you can also look at it this way—what kind of morons would spend an hour with you looking at spreadsheets, bid you goodbye when you say you'll "think about it," and two weeks (and no purchase) later, spend *another* hour with you looking at database programs?

If you want the support, you gotta support the store.

If you know what you want . . . DISCOUNT MAIL ORDER

STEWART BRAND: They say 40% of software buying is done with mail-order outfits. I'm surprised it isn't more. For a mass market these goods are costleeee. Is fingering the stuff in a store worth thousands of dollars?

You almost always wind up shopping by phone anyway, to see who has what you're looking for, to see who has the best prices—might as well try some of these 800 numbers. Often they'll have what the retail stores don't. Jim Stockford has been collecting experience, reports, and gossip on the subject for two years. It looks to me like the only advantage of buying retail locally is for the savvy and support of the dealer, right Jim?

JAMES STOCKFORD: Wrong. Mail order suppliers are in as good a position to provide support as your local retailers. They sell to

a regional or national customer base and typically have a much broader selection of merchandise than any retailer could hope to stock in a storefront. Margins are low, but volume provides enough surplus to pay for a good staff. In fact, every good mail-order house has one or more technicians on the payroll who thoroughly understand the products the supplier stocks.

You can often get better information and advice over the phone from a qualified technician at a mail-order house than you can from a salesperson at a retail store. And if you take their advice and buy a product that is wrong for you, a good supplier exchanges it or refunds your money. The trick is to find a good supplier.

We have tried to give you a good start with recommendations culled from the networks, from reader response to our first edition of the **Whole Earth Software Catalog**, and from our experiences. The painful part of this job is that there are so many good suppliers we couldn't list them all.

Highly praised; IBM PC compatible computers, MS-DOS and CP/M software . . .

WCB

14 West Third Street, Suite 4, Santa Rosa, CA 95401; 707/575-9472.

JAMES STOCKFORD: Best source for IBM PC compatible computers, peripheral devices, software for MS-DOS, CP/M, and Apple with Z-80 card. No other mail-order supplier has been praised so highly by so many people, including retailers. They have been known to refuse a sale when they thought the customer would have trouble. As a general hardware and software supplier there is none better.

IBM, MS-DOS, and most CP/M software . . .

800-SOFTWARE

940 Dwight Way, Berkeley, CA 94710; 800/227-4587 or, in CA, 415/644-3611.

JAMES STOCKFORD: I lightly panned their service in the first issue of the **Whole Earth Software Review**, but the mail brought strong support. I checked them out again, and I agree—their service *is* very good. Their newsletter is of high quality, and they are willing to research your needs pretty well for a big company. I give them high marks. Their National Accounts program offers special discounts and assistance in software selection to large institutions. (Suggested by Betty Corbin.)

Low prices on a membership plan . . .

PC NETWORK ★

320 West Ohio, Chicago, IL 60610; 800/621-SAVE or, in Illinois, 312/280-0002.

JAMES STOCKFORD: PC Network offers several membership plans, from an \$8 per year "basic" to a \$45 per year "VIP." Their catalog is huge, and all members get terrific prices on hardware and software, including the IBM PC, the Apple II, and the Macintosh. They allow returns and offer advice and technical support. Higher cost memberships let you rent software to try before buying and offer occasional special discounts not available to basic members.

Commodore 64 . . .

A B COMPUTERS

252 Bethlehem Pike, Colmar, PA 18915;
215/822-7727.

JAMES STOCKFORD: Hardware and software for C-64, some Apple II and MS-DOS. Excellent technical support, low repair charges. If you have a problem with a product, they will exchange it or return your money. (Suggested by Milton Sandy.)

Peripheral hardware and software for TRS-80 and CP/M machines, emphasis on CAD, good for neophytes and special needs . . .

TOTAL ACCESS

P.O. Box 790276, Dallas, TX 75379; 800/527-3582 or, in TX, 214/337-4346.

JAMES STOCKFORD: This small shop mainly sells hardware peripherals and accessories such as printers, disk drives, cables, monitors, and so forth. Specialists in TRS-80 equipment, they also supply standard software products for all TRS-80 and many CP/M machines. Good telephone help before and after you order. Check with them if you have unusual needs.

Hacker fodder . . .

MONARCHY ENGINEERING, INC.

380 Swift Avenue, Unit 21, South San Francisco, CA 94080; 415/873-3055.

JAMES STOCKFORD: Lots of chips at great prices. RAM in all sizes, logic and linear chips, PROM and EPROM chips, disk drives—these guys are Japanese-parts specialists with real good stuff, cheap. A great source for repair shops, consultants, and hackers.

Market value of used micros . . .

COMPUTER CLASSIFIED BLUEBOOK

\$70/yr (4 issues); P.O. Box 3395, Reno, NV 89501; 702/322-8811.

JAMES STOCKFORD: What's a used computer worth? This 130-page quarterly combs the want ads across the nation and compiles the results. Listings are given for the common configuration of each of 500 different micros and 300 different printers. No advertising.

Software for social scientists and others . . .

NCSU

\$24/yr individuals; \$40/yr libraries (4 issues); Social Science Microcomputer Review, P.O. Box 8101, Raleigh, NC 27695; 919/737-3607 or 919/737-2488.

JAMES STOCKFORD: The folks at North Carolina State University offer mail order software and a quarterly magazine. Software is imaginative (play the role of a journalist in a Watergate Simulation), useful (statistics, database, Management Style Assessment) and never exceeds \$30. The price includes technical phone support from 8 a.m. to 5 p.m. Eastern time. The **Social Science Microcomputer Review** is a helpful guide to hardware and social-science-related software: poli sci, sociology, government, public policy, etc.

Great deals on Apple hardware/software for members . . .

APPLE PUGETSOUND PROGRAM LIBRARY EXCHANGE

290 SW 43rd St., Renton, WA 98055; 206/251-5222.

MARK COHEN: The Apple Puget Sound Program Library Exchange (A.P.P.L.E.) user's group has become a major hardware and software supplier to Apple II owners all over the world. To take advantage of the substantial discounts, you must become a member—dues are \$26 per year with a \$23 one-time initiation fee—but you get a monthly magazine, product catalog, and access to hotlines throughout the U.S., in Europe, and on The Source for free programming help from experienced, competent programmers.

A.P.P.L.E. has been tireless in their support of the Apple II; pledges to the contrary notwithstanding, they have given sparse coverage to the Mac.

All ads, lots of ads . . .

THE COMPUTER HOT LINE

\$59/yr 1st class or \$28/yr 3rd class (weekly); \$18/yr 3rd class (monthly); Hot Line, Inc., P.O. Box 1373, Fort Dodge, IA 50501; 800/247-2000; in Iowa, 800/362-2171; in Canada 518/955-1500.

JAMES STOCKFORD: The ads are the news. Big ads, little ads, microcomputers, mainframes, everything in between—ads for obsolete computers, electronic scrap, printed circuit board repair, used Apples, used VAXs—it's a trip through a techno-bazaar. (No charge for basic, small classified ads, \$5 for longer ones.)

	List	Sale
Hercules® Graphics Card	\$499	\$319
Color Card	\$245	\$169
Microsoft® Mouse	\$195	\$139
Word	\$375	\$239
Multiplan	\$195	\$129
Pascal Compiler	\$300	\$199
Fortran	\$350	\$229
C Compiler	\$395	\$249
Software Publishing® pfs Report	\$125	\$ 75
pfs File	\$140	\$ 85
pfs Graph	\$140	\$ 85
pfs Write	\$140	\$ 85
pfs Plan	\$140	\$ 85

Typical price breaks from a mail-order supplier, in this case Diamond Software, advertising in the May 28, 1985, PC. On p. 61 of this book we suggest using the top word processor MICROSOFT WORD and its indispensable mouse with the Hercules Graphics Card to get a high resolution screen with 43 lines of text instead of the usual 25 on the IBM PC. List prices for the software, mouse and card total \$1069, plus sales tax if you buy locally. From this mail-order supplier you could get the same stuff for \$697, saving \$372, and no sales tax. Much larger discounts, to more than 50%, are common.

TRS-80 hardware and software . . .

THE ALTERNATE SOURCE

704 North Pennsylvania Avenue, Lansing, MI 48906; 517/482-8270.

JAMES STOCKFORD: Low prices on commercially available software for most of the Radio Shack TRS-DOS machines, some peripheral equipment (disk drives, printers, cables, interface cards, and CRT tubes), and a healthy sampling of their own software. They publish a newsletter and will develop software on a custom basis. Customer support and return policy is excellent.

Their line includes hardware and software for CP/M and MS-DOS machines. For users of the "less-compatible" MS-DOS machines, such as Sanyo or Leading Edge, they will try to find answers to questions—very valuable.

New and used . . .

TELECOM JOBS/TELECOM GEAR

Free, monthly; 12 West 21st St., New York, NY 10010; 212/681-8215. To place an ad: 80 Second Street Pike, Southampton, PA 18866; 215/355-2886.

JAMES STOCKFORD: New and used hardware and liveware—telephones, interface boards, computers for sale, jobs wanted or available—for telecommunicating technicians, engineers, sales reps.

Dysan diskettes, add-on boards for Apples, technical expertise . . .

CALIFORNIA DIGITAL

P.O. Box 3097B, Torrance, CA 90503; 800/421-5041 or, in CA, 213/217-0500.

JONATHAN SACHS: California Digital is one of the few mail-order companies offering Dysan diskettes. Their prices are below list and they ship immediately.

JAMES STOCKFORD: In addition to having good disk prices, this hardware supplier (printers, disk drives, memory chips, add-on boards for Apple II machines, and diskettes) does such a thorough evaluation of hardware they have become a supply source and reference for equipment manufacturers themselves. Their support and return policies are excellent. They will adjust most ass-backward customer installations at no charge and will always repair or replace any defects at no charge. Most warranties are for 90 days.

Macintosh, Apple II, IBM software . . .

STRICTLY SOFTWARE

P.O. Box 338, Granville, OH 43023; 614/587-2938.

JAMES STOCKFORD: Low prices, excellent advice (you're invited to call their technicians and ask questions) and service. They accept returns on most packages within 30 days. (Suggested by John Bryon.)

Beat the system . . .

HOW TO GET FREE SOFTWARE

ALFRED GLOSSBRENNER: What's the best kept secret in the microworld? It's hard to say, but the existence of vast reservoirs of free, "public domain" software has to rank right up there with the unannounced products currently being developed in the backrooms at Apple and IBM. Most people aren't aware of it, but there are literally thousands of public domain (or "PD") programs available for virtually every brand of personal computer.

There are games, graphics, and music programs . . . word processing, database management, and personal finance . . . inventory, accounting, and educational software . . . VISICALC "templates" and dBASE II command files . . . plus scores of handy utility programs. All of them free—if you know where to look. You'll find some of the best sources described below. But first, some quick answers to some quick questions.

Where Does Free Software Come From?

Though not yet widely recognized as such, there can be no doubt that the disk drive is the new printing press and the floppy

HOW TO IDENTIFY GOOD MAIL ORDER SUPPLIERS

Check old magazines to see that an advertising supplier has been around for long enough to be stable. Call them up and ask questions: How long have they been in business, what do they carry, how do they handle returns, can they provide technical help? Place a few inexpensive orders at first. The process takes a while, but, as with anyone, you have to get to know them to develop a relationship. Use your credit card, so if calamity strikes you can ask the bank to reverse the charge made to your card. With a little search, you will find wonderful people running excellent supply services. When you find them, tell us about them, and we'll help spread the word. Consider subscribing to **Computerwhat?** Well informed and easy to read, this four to six page newsletter reviews and recommends new products and mail order sources; often includes helpful software tips. When my copy gets to my desk, I stop everything and read it. —James Stockford

Computerwhat?, \$12/year. Corbin Consultants, Inc., 1111 Richmond Ave., Suite 150, Houston, TX 77082; 713/781-7070.

Kaypro only . . .

THE COMPUTER SHOPPE

Village Center, P.O. Box 617, Great Falls, VA 22066; 703/759-6800.

PHIL GAREY: They publish a small catalog filled mainly with software titles and some hardware for Kaypro owners. They don't accept credit cards, but will ship C.O.D. If you have problems, they will exchange the product or refund your money.

Computer supplies . . .

LYBEN COMPUTER SYSTEMS

1050 E. Maple Rd., Troy, MI 48083; 313/589-3440.

MICHAEL GILIBERTO: Lyben is terrific for supplies: disks, paper, printer stands, and so on. Disks are competitively priced and there are frequent specials. They have a broad line of cables, switch boxes, and connectors. Shipping costs \$2.50/order except for large cartons of paper. My orders come fast.

disk the new medium. For an investment of as little as \$500, *anyone* can write and "publish" a computer program. And from the beginning of the micro era in the mid 1970s, that's exactly what computer owners have been doing. Typically, a person will write a program and contribute it to his or her local computer users' group, along with a signed statement that officially places the work in the public domain. That means that it can be copied and distributed freely.

Is the Free Stuff Any Good?

Yes. Some free programs are on a par with the very best commercial software. PC-WRITE (p. 59), a word processing program for the IBM PC, PCjr, and compatibles, is a case in point. Written by Bob Wallace, the architect of Microsoft Pascal, PC-WRITE can execute a search and replace up to five times faster than a leading program listing at \$500, and I personally find it much easier to use. There is a 70-page manual (with index) on the disk for you to print out.

You can obtain a copy from one of the sources cited below. Or you can simply send \$10 to Quicksoft, Mr. Wallace's firm, at 219 First N. #224, Seattle, WA 98109. If you like, you can place a telephone order and charge it to your Visa or MasterCard. Call 206/282-0452.

(continued on p. 26)

(continued from p. 25)

Naturally, not every public domain program is outstanding. With thousands—and in some cases *tens of thousands*—of programs, how could it be otherwise? You may not find all the whistles and bells you would like, and error-trapping can be a problem. But often you can add these features yourself. In fact, there is no better way to learn BASIC, assembler, FORTH, or Pascal than to start with the raw material of a public domain program.

In addition, almost all the public domain collections associated with each brand of computer contain utility programs that often have no commercial counterpart. Yet they can make using your micro so much easier that you won't be able to live without them. For example, a program called WASH presents a disk directory one file at a time. As each filename appears, you have the option of deleting, re-naming, or copying the file to another drive. WASH can be found in both the CP/M and IBM public domain, but similar utilities are available for most other computers (see pp. 172-174).

Where to Get it: Points of Access

Users' Groups

Computer clubs and users' groups have traditionally been the primary collection and distribution points for public domain software. That's still true today, but many other sources have recently begun to appear.

If you belong to a local users' group, the "Software Librarian" is the person to see about getting copies of the programs in the group's free software library. If you've yet to join a group, contact your computer dealer for information about groups in your area. But don't worry if there isn't a group where you live. Many users' groups accept remote members and make their free software collections available by mail. The cost of membership ranges from \$10 to \$25 a year and usually includes a subscription to a monthly newsletter or magazine. Disks packed with free software are usually available for about \$6, including the disk, disk mailer, and postage.

If you have an extra \$28, I strongly advise using it to pay the annual membership dues for The Boston Computer Society (BCS). BCS is the world's premier computer users' group. There is simply nothing else like it, and with more than 12,000 members worldwide, it offers an excellent way to plug into the users' group network. More to the point, BCS serves as an umbrella for more than 35 special interest groups (SIGs) focusing on everything from Apples to Artificial Intelligence to Kaypros, Osbornes, IBMs, and UNIX. Virtually all of these SIGs maintain free software collections. For more information contact: The Boston Computer Society, One Center Plaza, Boston, MA 02108, or phone 617/367-8080 between 9:30 a.m. and 5:30 p.m., Eastern Time.

Non-Users'-Group Sources

There are also a growing number of non-users'-group sources. Though it isn't always the case, these companies often offer public domain software on a "value added" basis. The "value" may consist of testing and debugging or adding additional features to the software. Or it may consist of preparing "collections" of PD programs designed for a particular

application. Disks containing nothing but games or nothing but financial programs may be offered, for example. The cost per disk is usually slightly more than you would pay when ordering from a users' group. But since few users' groups classify their software by application, you might have to order several users' group disks to obtain all of the programs you want.

The American Software Publishing Company (ASPC) is a good example of non-users'-group source. Sheryl Nutting, the firm's president, estimates that ASPC has more than 10,000 public domain programs for Apple, Atari, Commodore, IBM, Texas Instruments, Timex, and TRS-80 computers. The software is available on tape or disk and the average cost is between 20 and 95 cents per program. For more information, contact the firm at: P.O. Box 57221, Washington, D.C. 20037 or phone 202/887-5834.

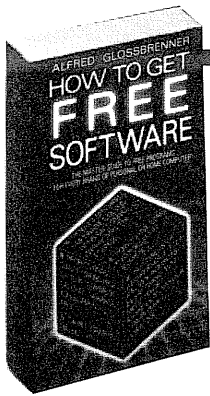
The Apple Avocation Alliance (1803 Warren Avenue, Cheyenne, WY 82001) offers over 185 disks of Apple software, including Apple CP/M and Pascal, at a cost of \$3 per disk (\$2.55 if you order ten or more) plus \$2 shipping and handling. This mail-order firm offers very good deals on hardware, commercial software, and supplies. The PD programs are listed at the back of the 150-page catalog. To obtain a copy, send \$2 (\$3 for shipment overseas) or phone 307/632-8561 between 8 a.m. and 5 p.m., Mountain Time, for more information. MasterCard and Visa accepted.

You'll find inventory, checkbook balancing, and personal investment programs on Disk 044, a database management program on Disk 047, and communications and related programs on Disk 075. But if you're going to order only two or three disks, I suggest Disk 020 (SPARKEE), Disk 229 (ONE-KEY DOS), and Eamon Master 01. SPARKEE is a color graphics program that produces a different dynamic design each time you hit a key on your keyboard. ONE-KEY DOS makes Apple DOS 3.3 much easier to use. And the Eamon disk (there are over 40 of them in all) will intrigue any fan of ADVENTURE (see p. 40).

Commodore owners should consider contacting Public Domain, Inc., at 5025 S. Rangeline Road, West Milton, OH 45383, for a free catalog of free programs for the C-64, VIC-20, PET, and SX-64. Run by Bill Munch and George Ewing, this company specializes in "best of" PD collections. Programs are available on both tape and disk. The cost is \$10, postage included, regardless of medium. Phone 513/698-5638; Visa and MasterCard.

There are many excellent programs in these collections, but one is so outstanding that it deserves special mention. It's called MONOPLE 64, and you'll find it on Disk C2. The program creates the Monopoly game board on your color TV, rolls the on-screen dice, moves your token, serves as the "banker," and keeps track of all your buy/sell transactions. I guarantee that if you have a C-64, you and a friend will spend hours playing this game. The same disk contains POKER (five-card stud), OTHELLO (like the board game), a logic game, a temperature conversion program, a bar graph generating program, and 20 other programs.

If you own an IBM or compatible, I suggest contacting the PC Software Interest Group (PC/SIG) at 1030 East Duane, Suite J, Sunnyvale, CA 94086. This firm offers a 110-page catalog of over 135 disks of free IBM software. The catalog is \$5.95, postage included, and disks sell for \$6 each. (California residents, add 6.5% sales tax.) Visa and MasterCard are accepted, so you can order by phone if you like. Call 408/730-9291.



HOW TO GET FREE SOFTWARE

How to Get Free Software; Alfred Glossbrenner; 1984; \$14.95; St. Martin's Press, 175 Fifth Avenue, New York, NY 10010; 212/674-5151; or COMPUTER LITERACY.

STEWART BRAND: No one we know has a more comprehensive knowledge of software than Alfred Glossbrenner. His *How to Buy Software* (p. 6) and *The Complete Handbook of Personal Computer Communications* (p. 139) are the best of their kind. If you find what he's written here useful, you will want his new book, *How to Get Free Software*, which truly has chapter and verse on the subject. The major problem with public domain programs is finding out about them and finding where to get them. He takes care of both. (The minor problems are dealing with

the sheer volume of choices and working without manuals.)

From *How to Get Free Software*:

The most important thing to remember is that a large percentage of free software sources are volunteer organizations. Although many of them will surprise you with how quickly they fill your request, you cannot necessarily expect the same rapid response a commercial firm may provide.

Headed by Richard Petersen, this is one of the best-organized, most professionally run sources of free software in the entire public domain. In the not too distant future, it may very well become *the* source of free IBM software. There are simply too many excellent free programs to mention. Send for the catalog. You'll think you've died and gone to free software heaven.

CP/M users should consider contacting Elliam Associates at 24000 Bessemer Street, Woodland Hills, CA 91367. Phone: 213/348-4278 (evenings from 7:00 on; weekends anytime.) Bill Roch, the firm's president, offers virtually all the programs found in the huge libraries of CP/M users' groups. But unlike most users' groups, he can supply them in over 40 different floppy disk formats (excluding Apple and Commodore). Prices range from about \$12 to \$20 per collection, depending on the capacity of your disk format and the number of floppies required. Sending for the free catalog is an excellent way to get started.

Free CP/M programs of special note include BIZMASTER, a complete business software package occupying six single-sided eight-inch disks that formerly sold for \$160 but is now in the public domain; DIMS—"Dan's Information Management System"—a file manager by Dan Dugan (at least one major magazine has used DIMS to keep track of its authors, articles, and other information); ED (a full-screen word processor); READ (displays 24 lines of a file at a time and prompts you to hit ENTER for more); RECOVER or UNERA ("unerases" erased files); and XDIR (an "extended directory" utility that alphabetizes and presents disk files in three columns). The most famous free CP/M program of all is MODEM7 (p. 150), a communications program by Ward Christensen that has had a major influence on commercial communications software.

Free Software Online

Speaking of communications, you should know that it is possible to obtain a large percentage of the free software available for your machine over the telephone. If your computer is equipped for online communications you can dial a free BBS (Bulletin Board System) or RCPM (Remote CP/M) system and "download" programs directly into your machine. The only other thing you need is a list of phone numbers, and you can obtain them from many computer magazines. Or you can subscribe to the "On Line Computer Telephone Directory" (\$9.95/year; \$15.95 for overseas shipment). The 400 to 500 phone numbers in this publication are tested and updated quarterly. Contact: OLCTD, P.O. Box 10005, Kansas City, MO 64111-9990. You might also consider **Plumb**, a "best bets" BBS newsletter published by Ric Manning (STQ007; 72715, 210).

The cost is \$26.50 (8 issues). Back issues are available at \$5 each, or eight for \$24. Contact **Plumb**, Riverside Data, Inc., P.O. Box 300, Harrods Creek, KY 40027. Voice line: (502) 228-3820. Note that both the OLCTD and **Plumb** are available electronically on NewsNet (p. 145).

You will also find huge collections of free software on the CompuServe Information Service (CIS), and on The Source (see p. 140 for rates).

If you subscribe to The Source, you'll find a host of Apple programs (including Macintosh software)—follow the menus to User Publishing. The free software on CompuServe can be found in the database sections of the more than 60 SIGs on the system. Many of these Special Interest Groups are devoted to a particular brand of computer. Because the documentation you receive may not explain how to use a CIS SIG, you may never know about all the free software unless you do the following:

1. Type GO PCS1 at any CIS exclamation prompt. This will take you to the Personal Computing Section.
2. Follow the menus until you get to "Groups and Clubs," then choose the SIG you want.
3. At your first opportunity upon entering the SIG, type XA0 at the prompt, or enter the menu item for "Data Libraries."
4. That will take you to the XA0 database within the SIG. Once there, enter XA at the next prompt to produce a list of all available databases.
5. Choose a database and enter S/DES/KEY: followed by the keyword you would like to search for when scanning ("s") a program's description ("DES"). You might try BASIC for starters.
6. When you see a description that looks interesting, you can download the program itself by entering TYP followed by the filename at the next prompt. For machine language files, key in dow and follow the resulting instructions for using XMODEM or some other error-checking protocol.

Conclusion

There are also many other excellent users' group and non-users' group sources, but the information provided here will get you off to a good start. Once you enter the world of free software, you may never look back. Indeed, there may be no reason to, since the chances are you'll find that nearly everything you need is available for free.

PLAYING

Steven Levy, Domain Editor

STEVEN LEVY: There are by and large two kinds of computer owners: those who bought computers to play games and those who lie about it. The fact is that computers are almost by nature game machines. Even business applications, done correctly, become gamelike in their execution and manipulation, and it is the rarest of computerists who doesn't sneak a shoot-'em-up or an adventure onto the machine when the boss (or the superego) isn't watching. Not running games on your computer is like refusing to take your Ferrari out of first gear.

Literally thousands of games are available for computers, and most of them are mindless diversions. I don't object to mindless diversions now and then, and I include a few of the most relentlessly stupefying ones in my selection. But many computer games are much more: challenging brain-puzzlers that extend your problem-solving abilities, elaborate simulations that make you master of tiny universes, imaginative flights of fantasy that encourage you to create a persona within the machine, and tests of your own creative powers that secretly give you lessons on how the world works. All in the guise of play.

I make no claim that the games reviewed here are the definitive best of all those available. Games are not like word processors, where you choose the best you can find and use it. They're more like books, where you get involved for a while—sometimes to Proustian lengths—and then read another. Every game treated here, however, is great in its way. I found out about each one by asking people what games they really love to play. Sometimes I followed up by asking the suggestors to write about those games. Other times I liked the game so much I wrote about it myself. (You'll notice this happened a lot.)

The ideal game is fairly easy to get started on, but "deep" enough to give you new rewards as you keep playing. (The term "deep" here is borrowed from Trip Hawkins of Electronic Arts, a

company that publishes some deep games.) The ideal game uses the computer fully but unobtrusively, and never feels like a chore. It makes you want to quit your job and play it all day, at least until you get sick of it. You don't get sick of great games quickly.

I categorize computer games under five loose headings.

Strategy games—there are two kinds of these. The first are simulations, notably those that re-create conflicts (the computer has modified the board-based war game). Then there are the pure *game* games—not translated-to-code chess but creations that owe their existence to the computer. I'm particularly inclined to this genre, since it is not only the most innovative, but also the one that promises the most mind-bending future developments.

Sports and noncomputer games take advantage of the abilities of the machine to make familiar games into something entirely new, either by providing electronic playmates or by making things so easy you wonder why you put up with the original game before the computer came along. The sports games in this category beat the old board games all to hell when it comes to sports simulations.

In **action games** hand/eye coordination and quick reflexes are more important than the knowledge gained from a lifetime of study. Sometimes the action—and, yes, the violence—can be therapeutic. Often, though, action games are derivative, and their shallowness makes their \$30 pricetags outrageous. I tried for a selection of the most absorbing, the ones with some elements of thought, the most graphically stunning, and the most slyly seductive of the bunch, including a couple of programs that give you a turn at designing games yourself.

Adventure games exist only on the computer. They employ the logical branching patterns of the computer to pose elaborate puzzles. Almost all adventures, whether they are limited to text or are illustrated with colorful pictures, involve some sort of quest, with you giving instructions to the machine, usually in the

WHY THIS SECTION COMES FIRST

STEWART BRAND: In our lives play precedes work. Play is a kind of pretend working where mistakes count but don't count. You lose points, maybe, and pride, but not livelihood, so you freely make mistakes, and you freely learn. For a growing majority of personal computer users—kids naturally, adults if they're smart—the first use of these machines is to play with them.

You're starting at the top. No programs push the limits of technique and design ingenuity of personal computers as thoroughly as games. No programs are as clever, as kind, as blatant, in reaching out to the user and compelling involvement. In the world of software development, computer games are invariably invoked as the ideal in "self-evident" program design. Elements that you will find in business application programs years from now are evolving in bright colors before your eyes in software like PINBALL



Steven Levy

CONSTRUCTION SET (p. 36)
and CHOPLIFTER! (p. 35).

Steven Levy loves playing computer games. His research for his book **Hackers** (reviewed on p. 174) gives him perspective on the place of games at the cutting edge of computer artistry. His writing for **Rolling Stone** and **Popular Computing** gives him perspective on their place in Current Events.

Computer games are treated in the press these days like popular films or TV or music, but something deeper is going on. Those aren't sports; this is. Those are for spectators; this isn't.

form of two-word commands ("Go east" or "Enter transporter"). This allows you to move through dozens of "rooms" on the way to slaying the dragon or finding the murderer. Frequently, you'll get stuck at a seeming impasse and find yourself making a long-distance call to an adventure publisher's hot line.

Role-playing games are not just variations on adventure games: They are the closest thing we have to truly interactive novels. Role-playing games, to quote documentation from one publisher, are those "in which the player assumes the identity of a character within the fantasy world of the game itself. Such a character is usually formed by assigning random values to special characteristics such as strength, intelligence, luck, or charisma. These characteristics in turn determine the capability of the character in combat, negotiation, and encounters with other beings." As you proceed, the value of the traits grows, making the characters more powerful. The games sometimes take hundreds of hours to play, and players develop intensely personal relationships with the characters they have developed. It's weird, but people have reported deep grief when some Orc of the Ninth Level wipes out a character after months of dungeon combat and questing. These are less games than ways of life for devoted addicts, yet the proliferation of computers has made this addiction far from uncommon.

Shopping

When looking for games, try to see the program actually running in the store. Check out reviews in such magazines as **Family Computing** (p. 11) and **Creative Computing**, or in periodicals and books dedicated to your machine. (The Book Company's series called **The Book of Apple [Commodore 64, IBM] Software** is excellent. Arrays, Inc./The Book Company, 11223 South Hindry Ave., Los Angeles, CA 90045; 213/410-9466; or COMPUTER LITERACY.) Usually the games on the bestseller list compiled by **Billboard** magazine or the Softsel distributor (some stores post the lists) will give you value.

Hardware

I concentrate on five machines. The Apple II family because it is the Apple. The Atari computer because with its exceptional graphics and sound it is the quintessential game machine, with the biggest selection. The Commodore 64 because of its popularity and power. And the IBM PC because a lot of you have one, and the game publishers have not neglected it (as they have the ill-fated PCjr). Those of you with IBM clones may or may not find that these games run on your machines; test them first. The fifth computer, new this year, is the Macintosh, a wonderful game machine despite its lack of color display. For those of you who own Kaypros, Morrrows, and Osbornes and are kicking yourselves because you didn't know that Broderbund did not publish a CP/M CHOPLIFTER!, I've tried to do the best I can, but you have only yourselves to blame for the meager selection. Only a few games for the Tandy TRS series appear, because (1) it's not a good game computer and (2) Tandy's restrictive attitude towards third-party software developers has limited the selection. I've generally ignored the (already obsolete) machines which do little more than play games, like the VIC-20 and TI-99.

Almost all the games reviewed are easily available from their publishers, but for games that are not (as in the case of public domain games and games available only on online services), the access section tells you where to find them. Often a game will come in versions for more than one machine; if play varies considerably from one version to the next, we mention it. The exception is when games run on the less powerful VIC 20 and TI machines; in those cases you can assume inferior play, unless we specify otherwise.

One final word: Wherever possible I've included the names of the game designers. The people who devise these delicious and edifying entertainments are artists and deserve recognition. Though I curse them when their creations draw my computer personae into dire and fatal fantasy catastrophe, I salute them here.

Game Magazines

STEVEN LEVY: The great computer game shakeout in the past two years has shaken out some great computer game magazines, including two we recommended last year. Fortunately, a new incarnation of one we didn't mention has taken up some of the slack: **Computer Entertainment** (formerly **Electronic Games**) is a slick, four-color magazine that combines behind-the-scene profiles of the gaming world and savvy previews of new hardware with a slew of reviews from knowledgeable people, largely the best survivors from the out-of-business magazines of the past few years.

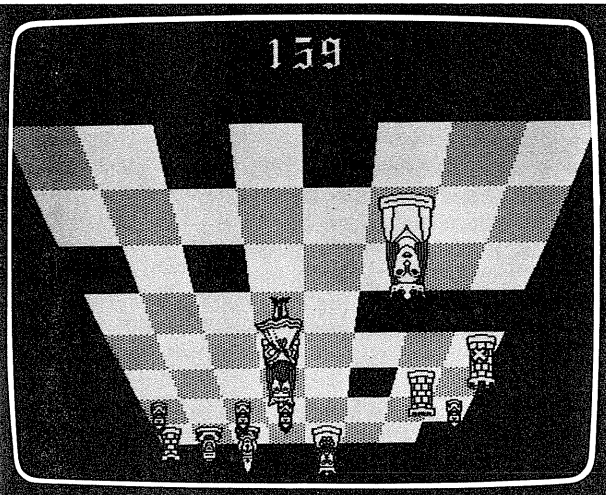
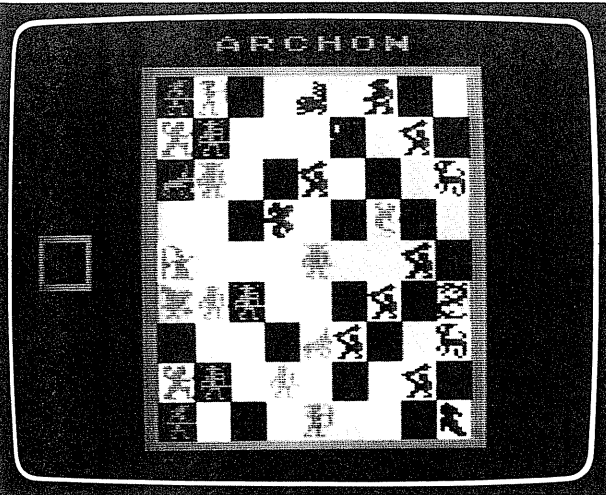
One magazine that did survive, and quite handsomely, is the relatively staid **Computer Gaming World**. This highly literate publication eschews flash for substance, and is at its best at long analyses of complex games, including detailed strategies for mastering them. For serious fans of strategy games, the subscription price of **CGW** is an investment in getting more out of some of those monster \$50 simulation games they've been hacking away at.

Computer Gaming World: \$13.50/yr (6 issues); Computer Gaming World, P.O. Box 4566, Anaheim, CA 92803-4566
 • **Computer Entertainment**: \$18/yr (12 issues); Computer Entertainment, P.O. Box 1128, Dover, NJ 07891.



Some of the participants in the recent "Hackers' Conference" join in a multi-player session of **BALLBLAZER** (p. 34). Using special hookups, up to 40 people can team-play this extraterrestrial soccer-style game. Cooperation is essential. At home, **BALLBLAZER** emphasizes individual joystick skills, pitting you against a friend or the computer.

Strategy



Two post-computer chess games . . .

ARCHON

Westfall, Freeman & Reiche; Apple II family; 48K
 • IBM PC compatibles; 64K; \$34.95 • Atari
 400/800/XL series; 48K • Commodore 64; \$22.95;
 joystick; copy-protected? YES;

ARCHON II: ADEPT ★

Westfall, Freeman & Reiche; Apple II family; 48K;
 \$39.95 • Atari 400/800/XL series; 48K •
 Commodore 64; \$32.95; joystick; copy-protected?
 YES;

both from Electronic Arts, 2755 Campus Dr., San
 Mateo, CA 94403; 415/571-7171.

THROUGH THE LOOKING GLASS

Steve Capps; Apple Macintosh; copy-protected?
 YES; \$39.95; Apple Computer, 20525 Mariani
 Ave., Cupertino, CA 95014; 800/538-9696.

STEWART BRAND: Dungeons and Dragons
 meets chess, and I'm addicted. So far the
 computer is more subtle and violent than I
 am, but I'm gaining.

It's a chess-size board, the characters line up
 like chess people, and they move and
 capture, and that's the end of the

*Moving the yellow square at left will pinpoint your
 next move against the forces of darkness in
 ARCHON. If you land on a square occupied by a
 blue piece, you'll be thrust into a fierce, arcade-
 like battle.*

*Click the Macintosh mouse over the smile of the
 Cheshire Cat in THROUGH THE LOOKING GLASS
 and the playing board appears (as here) upside
 down. Oddly enough, some players get better
 scores this way.*

resemblance. The two sides—representing
 the forces of Light and Darkness—have well-
 matched but quite different pieces. (About
 half are female, evenly distributed; this game
 mines a more chthonic vein of myth than
 chess does.) The mage on one side is a
 wizard, on the other a sorceress, each with
 equivalent but different talents of spell
 making, mobility, toughness, and weaponry.
 So it goes, through banshees, Valkyries,
 unicorns, basilisks, goblins, knights,
 archers, golems, trolls, and so on.

In similar fashion, ARCHON II (ADEPT) pits
 the forces of Chaos against the forces of
 Order. By the same authors and publisher as
 ARCHON, the sequel has different creatures,
 different battlegrounds, different strategies,
 same compelling quality of play.

STEVEN LEVY: THROUGH THE LOOKING
 GLASS, the first great Macintosh game, is a
 closer cousin to chess than ARCHON. With
 stunning 3-D animated graphics (you see
 chess pieces, even the cross-shaped cursor,
 get larger as they approach), a chessboard
 appears with pieces styled like Tenniel's
 looking-glass illustrations in Lewis Carroll.
 You pick a chess piece and your blond-haired
 Alice moves like that piece. You'd better move
 her quickly, because everyone on the board
 is after her and will jump her whenever
 possible. You, as Alice, can capture the other
 pieces, but since they move so fast, you gotta
 fake them out. Also, avoid a moving trap-
 door—or trick the others into falling into it.

The mouse movements are easily mastered—
 send the cursor to your next move and click
 (Alice ignores illegal moves). The action is
 so fast here, you don't stop to enjoy the
 delightful albeit Mac-black-and-white
 graphics—you get involved, and get the best
 training ever for those five-second-limit chess
 games that some masters play. I think the
 Mac is going to be a great game machine, and
 THROUGH THE LOOKING GLASS is the first
 proof.

Shooting space ships via modem . . .

MEGAWARS

All machines with modem & CompuServe
 Information Service hookup; available at regular
 CompuServe rates (see table, p. 140);
 CompuServe Information Service, 5000 Arlington
 Centre, P.O. Box 20212, Columbus, OH 43220;
 800/848-8199 or, in OH, 614/457-0802.

STEVEN LEVY: No single event in computer
 gaming has given me a bigger rush than my
 first MEGAWARS kill. I was sitting at a
 computer in Palo Alto connected by modem
 to the CompuServe host computer in
 Columbus, piloting a spaceship called Wolf.
 I was in the service of the Empire, locked in
 eternal battle with the Colonists (the usual
 epic scenario—I think computer games are
 single-handedly restoring myth to a central
 place in the hearts of young America). To put
 it bluntly, I destroyed the Colonist ship

Levant. Who the pilot was, I'll never know. A
 twelve-year-old in Georgia? A grandmother in
 Walla Walla? But that's interactive
 telegaming, and I think it's a wave of the
 future.

MEGAWARS is a variant of the old Star Trek
 computer game, where you moved across
 various sectors of a galaxy seeking to blow up
 unfriendly enemies while annexing the
 universe. This multiplayer CompuServe
 incarnation is complicated, and I didn't even
 attempt it until I had sent for the 38-page
 manual. (Like most CompuServe manuals
 that should have been sent to you in the first
 place, this is available at an extra cost via
 CompuServe's "Feedback" service.) After
 studying how to scan, move around, and
 confront my enemy, I logged on, ready to join
 the cosmic struggle, individual battles of
 which had been continuing for more than a
 year.

Since MEGAWARS requires you to join one of
 two sides eternally at odds, you automatically
 have partners, and they can communicate to
 you through "radio." It's a thrill to hear from
 real-life allies. Though the modem-received
 graphics are limited, I felt I was soaring. And
 when, after a few sessions, I could finally
 control the commands well enough to shoot
 down an enemy, I was ecstatic, though later I
 got wistful, wondering if I'd made some
 stranger feel really bad. There was obviously
 no way to take him or her out for a drink later
 to prove it was all in good fun.

Still, late at night when your friends are
 asleep, you can count on some MEGAWARS
 action on CompuServe (though at normal
 online rates it can get costly). Since you get
 "promoted" and get more powerful ships as
 you accumulate points, you have incentive to
 keep going. But even without that, the
 MEGAWARS lure is strong.

Deceptively simple, infinitely deep . . .**LIFE**

John Conway; Apple II family • IBM PC compatibles • CP/M (5¼"); \$10 per disk; copy-protected? NO; Public Domain Software Copying Co., 33 Gold Street, #13, New York, NY 10038; 212/732-2565; IBM version (\$6/disk plus \$4/order for shipping) also available from PC Software Interest Group, 1030 East Duane, Suite J, Sunnyvale, CA 94086; 408/730-9291; Also available on SOFTWARE GOLDEN OLDIES, VOL. 1 (including ADVENTURE, ELIZA, and PONG); IBM PC and compatibles; PCjr; 64K • Apple II family; 64K • Commodore 64; \$29.95; copy-protected? YES; Software Country; 270 N. Canon Dr., #1297, Beverly Hills, CA 90210; 800/245-2057 or, in CA, 800/245-2056.

STEVEN LEVY: In the November 1970 *Scientific American*, Martin Gardner introduced LIFE, a simulation conceived by British philosopher John Conway. It fired the imaginations of logicians, gamesters, and poetic mathematicians all over the world, but none were so excited as the first computer hackers, who could fully explore the mysteries suggested by what I consider the deepest of all computer games.

The rules to LIFE are elementary. Picture a grid. Each square is a "cell." Each turn of the game—called a "generation"—determines a cell's fate: A living cell bordering on two or three living neighbors survives. With fewer neighbors, a cell dies of isolation. With more, it's fatally stifled by overpopulation. A dead cell bordering on exactly three living cells is "born" and becomes a live cell.

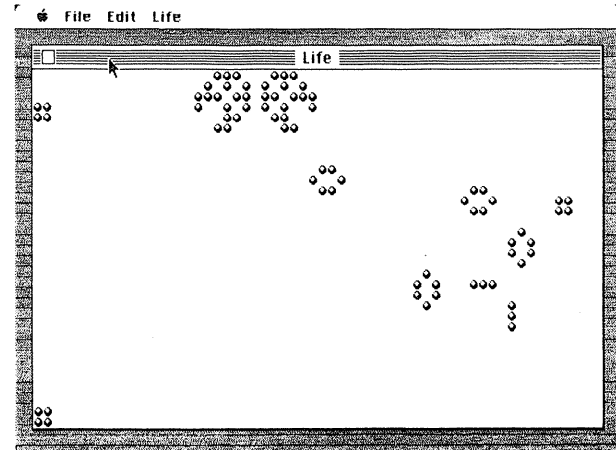
LIFE works on many levels. On the simplest, it is fun to set up a pattern—a "colony" of LIFE cells—and move along generation by

generation to see what happens. The patterns are often hypnotically beautiful until the almost inevitable end: a stable "still life," a loop where a colony "pulses" between two patterns, or a blank dead screen. The exceptions are the rare self-replicating patterns.

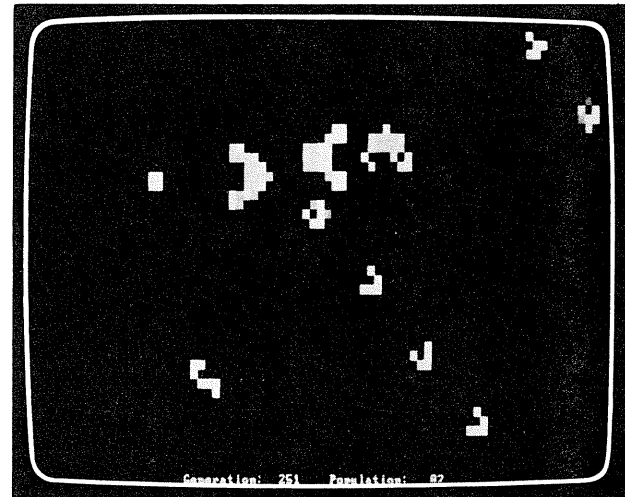
One of the most fascinating hours of my life was spent before the computer screen of LIFE master and canonical hacker R. William Gosper, discoverer of the notorious "Glider Gun" (a deathless LIFE colony that snakes through the universe spitting off offspring). We raced through billions of generations of intricate patterns. Gosper says he "hacks LIFE" because it's one of the few remaining places where mathematical discoveries can be made. For those of us who are not world-class mathematicians, LIFE is still edifying, putting us viscerally in contact with the hauntingly beautiful nexus of logic and vision.

Gosper uses an intricate LIFE program fixed to run on the \$60,000 Symbolics LISP machine, but versions of LIFE run on virtually every microcomputer. You can find a BASIC program for LIFE in many books. Among the fastest and most widely available of microcomputer LIFEs is the slick Macintosh version written by Bill "MacPaint" Atkinson; almost every Mac users' group has it, and it's also downloadable from CompuServe (p. 144) for free (in the MAUG special interest group).

Fully-formed Glider Gun shooting gliders off to lower right. The "eater" at lower left consumes gliders as they re-enter the screen to prevent them from corrupting the gun. From Software Country's adaptation of William Poundstone's LIFE program.



This life colony has reached a stable state where neither degeneration nor regeneration is occurring. On the computer screen, parts of this population are actually oscillating between two different shapes.

**Battle of the micro ships . . .****OLD IRONSIDES**

Richard Hefter & Jack Rice; Apple II family; 48K; paddles or keyboard; one disk drive; color recommended; \$39.95; copy-protected? YES; Weekly Reader Family Software, Xerox Education Publications, 245 Long Hill Rd., Middletown, CT 06457; 800/852-5000 or, in NJ, 203/347-7251.

BROADSIDES

Wayne Garris; Apple II family; 48K • Apple III • Atari (all machines); 48K; paddle recommended; \$39.95; copy-protected? YES; Strategic Simulations, Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043; 415/964-1353.

STEWART BRAND: Qualifications to review these games, sir: I have read the entire Horatio Hornblower series of novels twice; I own a sailing vessel (sadly under-equipped with cannon); I know enough not to spit to windward, sir. I take great glee in these games.

Both of them reek of the salt, gunpowder, and blood of naval warfare of the eighteenth and

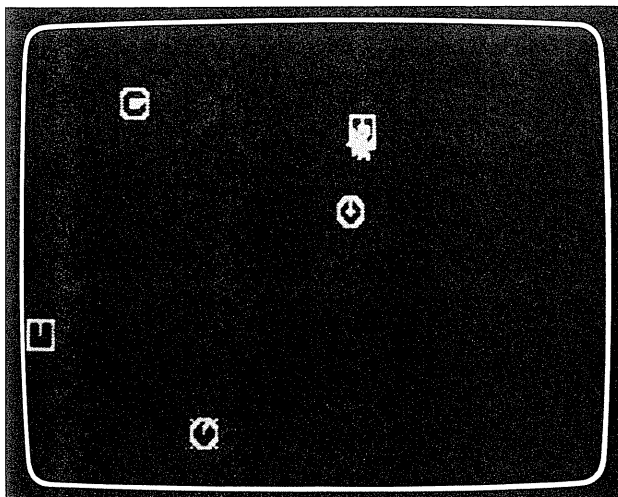
nineteenth centuries—single-ship encounters of historic British, American, and French vessels. The BROADSIDES manual goes on to instruct you in how to design your own ships and capabilities, and the program will fight them accordingly. Electronic ship in a bottle.

Unlike many simulation games, these two play happily as action games. They pass the shout test: the aarrgh!s and oh no!s are more often within than at the game.

The two make a nice sequence. OLD IRONSIDES is the easier, faster, more engaging one, and it also sucks you into the fantasy quicker with its poster painting of battle, its "logbook" manual, its salty graphics and lettering on the screen. It is strictly for two players and works better with paddles than keyboard (so does BROADSIDES). Play involves a plausible, manageable, but challenging array of considerations—wind direction, powder availability, cannon damage, sail damage, ramming versus broadside attack, and so on. You can—unrealistically but interestingly—sail off the screen "into the fog" and cleverly navigate by compass to fire from there.

BROADSIDES goes far deeper. You have more commands, including speed, aiming (at sails or hull, at various ranges), kinds of shot, etc. There is a richer blur of play considerations viewed onscreen—wind speed (in knots) and wind direction, hull damage, crew losses, current speed, maximum speed available, distance to enemy, etc. And there are many more options of play—solitaire or two-player, level of complexity, and ship-design options. Also, a second phase of battle takes place when you grind your ships together and board the enemy. The screen switches to the two decks, and success becomes a matter of swordplay and sniper fire. It's more abstract and less satisfying than the cannon stuff; still, a fair amount of action is available, including cutting the grappling lines that hold the ships together.

OLD IRONSIDES you can try in a store to see if you like it; BROADSIDES takes longer to set up. OLD IRONSIDES is easier for younger players, visitors, or quick games. BROADSIDES tends to longer games and will probably have a longer play life in the house. Jolly tars will want both.



The gladiator arena of ROBOTWAR, where your personal creation does battle, either with a computer opponent or a robot programmed by a friend or (more likely) enemy. Once the battle starts, you helplessly watch your progeny's travail—it's the first computer game to make you feel like a trainer at a cockfight.

Teaching your computer to fight . . .

ROBOTWAR

Silas Warner; Apple II family; 48K; \$39.95; copy-protected? YES; MUSE Software, 347 N. Charles St., Baltimore, MD 21201; 301/659-7212.

FORTRESS

Patty Denbrook & Jim Templeman; Apple II family; 48K • Atari 400/800/XL series; 40K • Commodore 64; \$34.95; copy-protected? YES; Strategic Simulations, Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043; 415/964-1353.

RUSSELL SIPE: For years many fans of board war games and other detailed strategy games suffered a major obstacle to playing their beloved games: a lack of opponents. Then came the microcomputer—someone who plays *when* you want to play, *where* you want to play, and doesn't blow smoke in your face! But a computer makes a lousy opponent. Since it is not human, victory and defeat leave you with a distinctly antiseptic feeling.

But ROBOTWAR and FORTRESS have the best of both worlds. They permit human versus computer or human versus human competition at the keyboard, and they also permit humans geographically separated to fight it out tooth and nail.

In both, you can design a "player" that can be sent, on disk, to other gamers who can pit

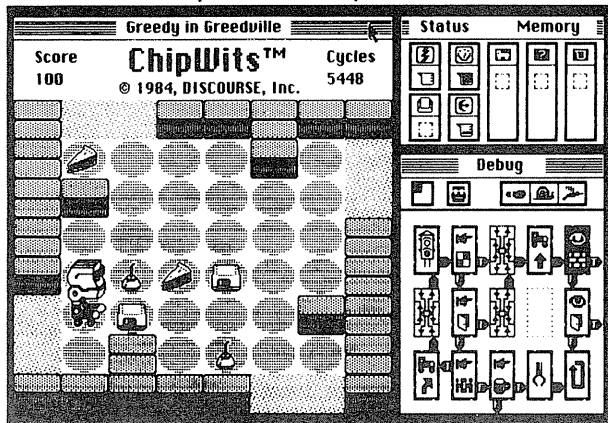
their creations against yours. In both cases the procedure involves "programming" a "player" who performs in the game according to the wisdom and insights you put in. In other words, these games allow you to train your army, fighter, team, and the rest.

ROBOTWAR players program "robots" to fight on a hi-res battlefield against other programmed "robots." The programming language looks familiar to anyone with even a rudimentary understanding of computer programming. Since the robot's "onboard computer" contains 34 registers to control location, direction, speed, damage checking, tracking, and so on, developing a true "contender" can take weeks.

The magazine I edit, **Computer Gaming World** (p. 29), sponsors an annual ROBOTWAR tournament. Contestants submit their robot creations on disks and show up for the computer slugfest. Grown men turn into raving maniacs or bowls of Jello in response to the fate of their creations.

FORTRESS is a game in the classic tradition of Go. The object is to build castles in order to control more territory than your opponent at the end of the game. Like many classic games, FORTRESS is easy to learn but requires much study to master. The interesting twist is that you can train a number of computer players to play against you—or other game players. Strategic Simulations, publisher of the game, runs FORTRESS tournaments, and I'm sure other play-by-mail tournaments will pop up in time.

Warehouse Workshop Environments Options



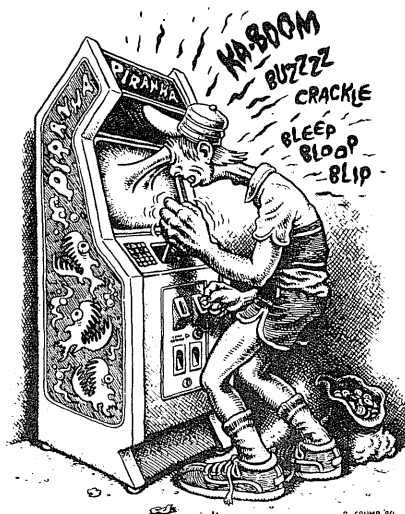
Chipwit Greedy in the environment Greedville. Each oil can he eats gets him 50 points and he gets fuel by eating coffee and pie. The Debug Panel shows each chip as the robot carries out its command.

Build a software robot . . .

CHIPWITS ★

Doug Sharp and Mike Johnson. Copy-protected. Apple II family (64K; mouse, joystick or Koalapad required); \$39.95. Macintosh; \$49.95. BrainPower, Inc., 24009 Ventura Blvd., Suite 250, Calabasas, CA 91302; 818/884-6911; Commodore 64 version (\$27) available from Epyx, Inc., 1043 Kiel Ct., Sunnyvale, CA 94089; 408/745-0700.

STEVEN LEVY: If you want to build your own software robots even more quickly than possible with ROBOTWAR, you might try CHIPWITS, a package which manages to blend frivolity with an "educational" message (as does the excellent ROBOT ODYSSEY, p. 191.) Your robot is a charming fellow with spectacles, sneakers, and a voice that rivals R2D2 in terms of sonic personality; you program him by assembling graphic representations of functions, pasted together so it all makes structural sense. Not terribly flexible, but it allows for plenty of possibilities. The best part, of course, is loosing your creation into the world, which in this case can be any of eight environments, some of which favor destructive robots while others favor cautious robots who sniff for trouble before they spring into action.



Itself seemingly perfect, the computer evokes anxiety about one's own perfectibility. There is pressure from a machine that leaves no one and no other things to blame. It is hard to walk away from the perfect mirror, from the perfect test. It is hard to walk away from a video game on which you could do better next time.

—Sherry Turkle, *The Second Self, Computers and the Human Spirit*

*Stimulating simulation . . .***GATO** ★

Paul Arlton & Ed Dawson. Version 1.2. Copy-protected. IBM PC compatibles (128K; graphics card required, RGB monitor recommended) • Apple IIe (128K)/IIc; \$39.95; Macintosh; \$49.95. Spectrum HoloByte, Inc., 1050 Walnut, Suite 325, Boulder, CO 80302; 800/621-8385, ext. 262.

RICHARD DALTON: The best simulations take you into situations you would never have access to except via a computer. GATO does all that and more, unless you happen, coincidentally, to have been a "GATO"-class submarine commander in WWII. Yes, war-tory haters, GATO puts you in the role of a sub captain prowling the Pacific, and your missions involve the rapacious destruction of the Japanese Imperial Fleet, circa 1943.

Like the famous FLIGHT SIMULATOR program, GATO puts you in control of all your vehicle's resources: fuel, speed, up, down and a few new twists—torpedoes, oxygen and battery power (while submerged), and periscopes.

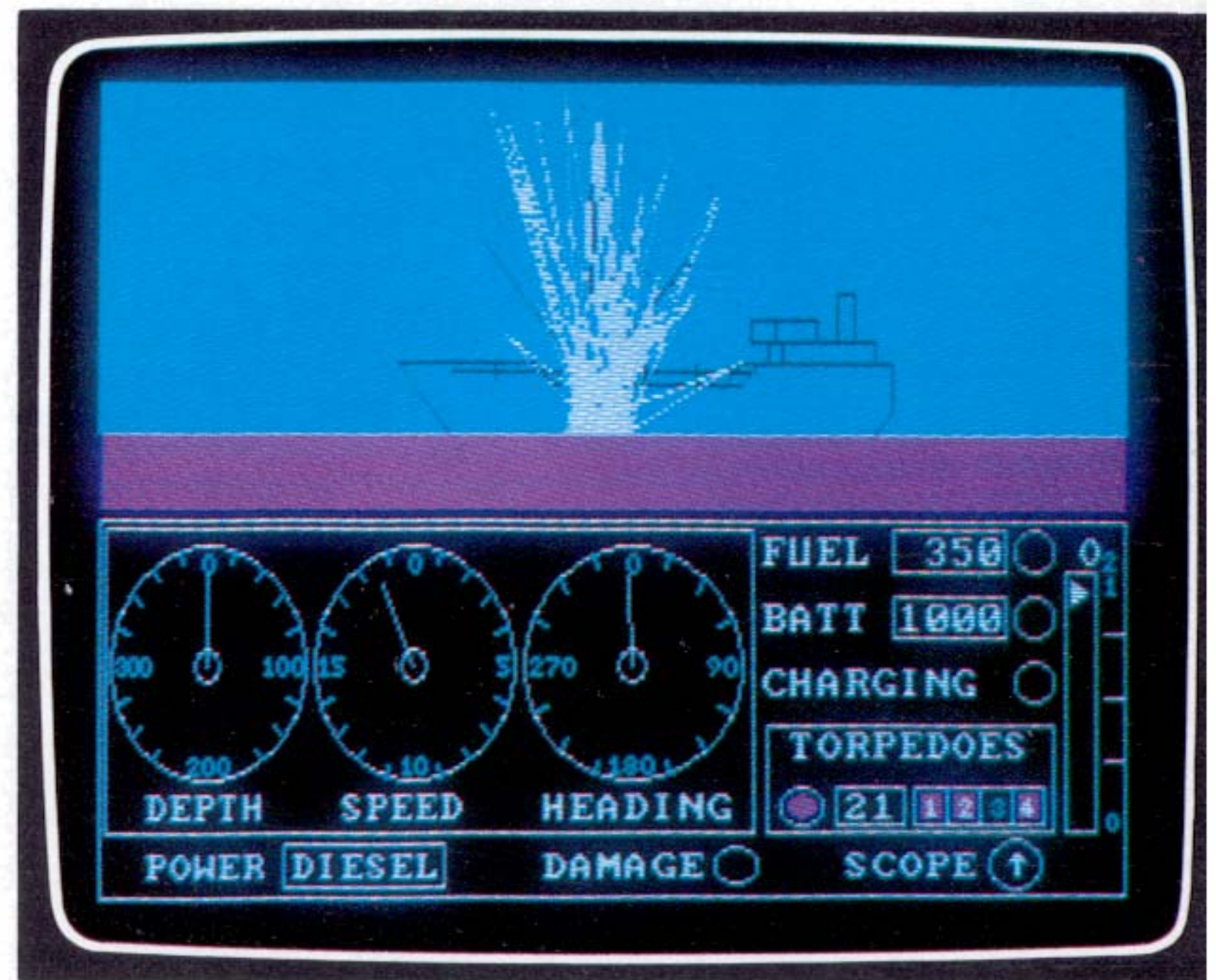
Your mission assignments, by the way, reach you through Morse code. For the non-

Morse crowd, you can get to the seventh of ten levels before the program cuts off your text description of the assignments from "Comsubpack." After that it's all dits and dahs.

The experience is adrenalin-stimulating, but in an abstract way. You get more kicks out of the swelling Captain's Log of sinkings than from the actual denouement of a clunky freighter, even if its twisty evasions end in a colorful explosion.

GATO plays extremely well. As you move up the scale of difficulty, the "enemy's" response becomes more sophisticated—able to withstand more than one torpedo before sinking; capable of clever maneuvers they couldn't make before; moving at higher speed requiring a more subtle approach on your part (clue: destroyers are suckers for a head-on approach; difficult any other way).

I heartily endorse GATO for every corporate computer drone. It will wipe out morning malaise if you kick it up on your screen, first shot each a.m. Then trundle on to the accounts receivable or whatever, with energy derived from a truly taxing simulation of the unfortunately real world.



GATO is a truly taxing submarine simulation game for Apple and IBM PC computers. As commander of a "Gato"-class sub, circa 1943, you must master your vessel's realistic resources as well as the nuances of navigation and tactics to take your toll of the Japanese Imperial Fleet.

*The pilot's point of view . . .***FLIGHT SIMULATOR**

Bruce Artwick; IBM PC compatibles; 64K • IBM PCjr; 128K; one disk drive; color graphics adapter; \$50; copy-protected? NO; Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004; 800/426-9400 or, in WA, 206/828-8080.

FLIGHT SIMULATOR II

Bruce Artwick; Apple II family; 48K (64K recommended) • Atari; 48K • Commodore 64; joystick recommended; \$50 (limited feature version on cassette for Commodore; \$39.95); copy-protected? YES; SubLOGIC Corp., 713 Edgebrook Dr., Champaign, IL 61820; 217/359-8482.

DICK FUGETT: As the only instrument-rated pilot on the premises, I was chosen to check out FLIGHT SIMULATOR, but despite my ratings I wound up bending more aluminum (simulated) than any ten student pilots ever did. Being new to the IBM PC was part of the problem—success is based on keyboard skills as well as flying ability. But after a few sessions I could get in the air more often than into Lake Michigan. I discovered that hitting P (pause) freezes the action, letting me grab the manual and plan a proper response before returning to the drama. I'm quite sure that such a feature made standard on airplanes would be highly popular with pilots.

A split screen shows an instrument panel below and a view out the cockpit window above. The cockpit view can be in any direction, a nice feature but considerably limited by poor screen resolution. Don't expect anything more than a vague resemblance to passing scenery. If you have a monochrome monitor, don't expect *anything*—color display is mandatory here.

Of course, the most basic aspect of instrument flying is the "scan," that unnatural habit of continually shifting both the eyeballs and attention to cover all the instruments. Narrowing your focus to the artificial horizon and keeping the wings level is quite satisfying, but if you neglect air speed until you've passed redline, as the wings peel off the fuselage in the last dive you'll ever make, you'll be wishing you'd scanned better.

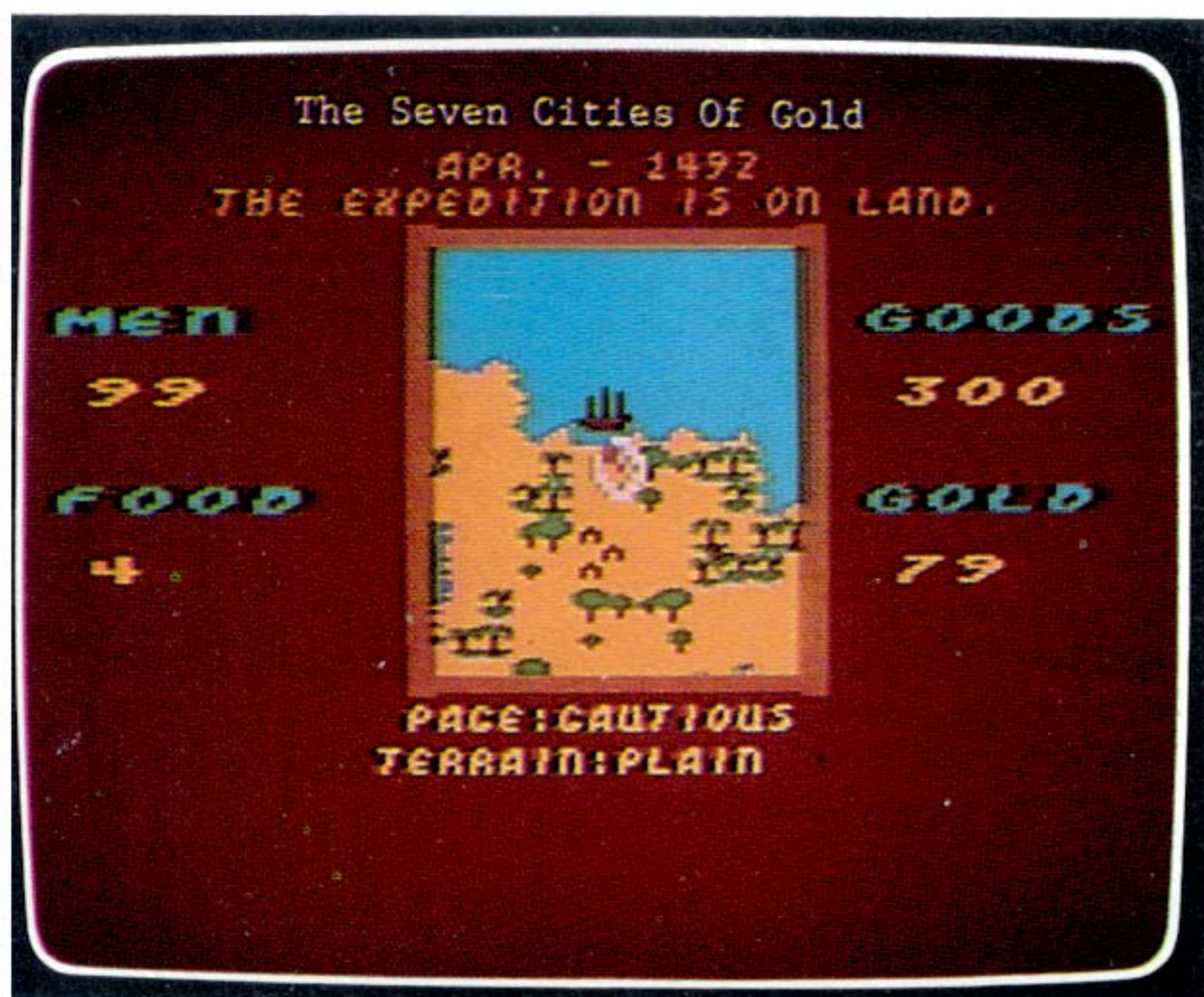
This program is by no means just a "game"; it could definitely aid in pilot training. From the navigational challenges of cross-country flight to IFR approaches, all with a choice of difficulty levels, there's plenty of juice here. Call it a \$50 Link trainer and capitalize on the learning potential available.

STEVEN LEVY: I tried FLIGHT SIMULATOR II (by the same author) on the Apple, and was pleased by the same things Fugett liked, but as someone who is not flight rated, for



Here, in the Apple version from SubLOGIC, you'll soon be worrying about how to land this thing.

instruments or anything else, it took me an intolerably long time to figure out what in hell to do. Still, the program's obviously a super value, as its huge popularity indicates.



Ninety-nine men set out, with four weeks worth of food, to explore this hunk of New World here and villages to the southwest. When they get to the villages, they will have to use caution and savvy to deal with the residents—and then again, they might initiate a massacre. All to find those SEVEN CITIES OF GOLD. The best way to learn about Columbus is to be Columbus.

Colonizing new worlds, past and future . . .

M.U.L.E.

Ozark Softscape Designs; Atari 400/800/XL series; 48K • Commodore 64; joystick; color monitor; \$22.95; copy-protected? YES; Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403; 415/571-7171.

THE SEVEN CITIES OF GOLD

Ozark Softscape Designs; Apple II family; 48K • IBM PC/PCjr; 128K; \$39.95 • Atari 400/800/XL series; 48K • Commodore 64; \$32.95; joystick (optional on IBM); color monitor; copy-protected? YES; Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403; 415/571-7171.

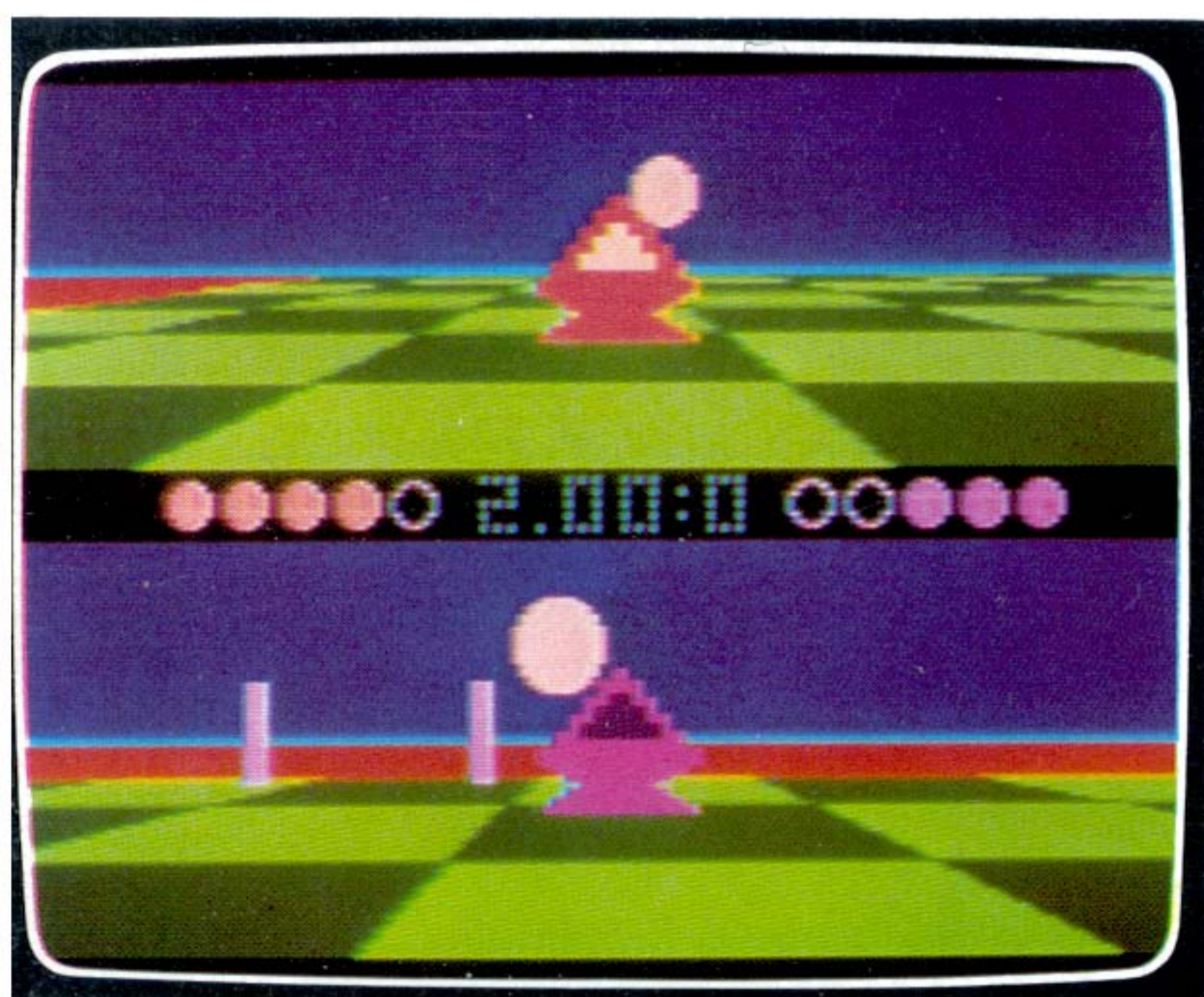
BRADLEY MCKEE: In M.U.L.E., you and up to three other players choose the kind of alien you are (all very creative) and try to colonize a planet. The goal is to develop land and start your own business, producing either food, energy, Smithore, or valuable Crystite. Trouble is, you have to buy stubborn M.U.L.E.s (Multiple Use Labor Elements, natch) and pull them to your property to develop it.

The planet's currency is dollars; you can get 'em by gambling in the pub, buying or selling land, trading products in an auction (action-packed, as your opponents bid), and a few other things. Each turn, windfalls and calamities occur, appropriate to the interstellar-colonist scenario. This multiplayer game (playing it alone is a relative bore) is the first computer stab at the cutthroat, good-

time madness of Monopoly, and I think it's the best game since SPACE INVADERS.

STEVEN LEVY: Ozark Softscape's sequel to M.U.L.E. is called THE SEVEN CITIES OF GOLD, but it might better be called "Conquistador Simulation." This is the best blend of computer role playing, fun, and real history I've seen—its fascinating documentation contains a bibliography listing twelve history books. (Why isn't this review in the Learning section? Because I saw SEVEN CITIES first, and its ability to go either way shows that great software, thank God, makes taxonomies ridiculous.) Anyway, you're Columbus, Magellan, whoever, and you set off in your ships to explore the New World, or, if you like, an imaginary but realistically generated Western Hemisphere. Cross the ocean (watch out for storms), and get your first big rush when you spot land. A new world!

The heart of the game is how you colonize—when you find a village on this uncharted continent or island, the screen picture changes from a map to a soldier representing your party. Natives surround you, and the way you behave (you control your party with intuitive joystick movements) determines their response—are these friendly folk who want to trade? Will movement set them to attack? The dynamic is only more absorbing because it's a consciously accurate replication of what the Spanish explorers really *felt* like going in there.



The same combination of fantasy and pulp-inspired action that George Lucas brought to his Star Wars trilogy is embodied in BALLBLAZER, conceived and well-executed by Lucasfilm programmers.

Buzz-blasting in force fields . . .

BALLBLAZER ★

Lucasfilm Games Division. Copy-protected. \$29-\$39. Atari. Joystick required. Epyx, Inc., 1043 Kiel Ct., Sunnyvale, CA 94089; 408/745-0700.

STEVEN LEVY: What we have here is some sort of interstellar two-player soccer, played at a high speed and higher adrenaline output. Best way to do it is against a friend—strategy gets psychological, and someone else is there to acknowledge your best tricks. In absence of that, the computer provides ample competition, from sluggish Droid One to just-about-unbeatable Droid Nine.

I earned my stripes against Droid One, who was a tough opponent until I learned the intuitive movements necessary to master the skills of "dribbling" with a force-field, discerning when a "roto-snap" turned me toward my goal, and most important of all, monitoring both my point of view (on the top of the colorful split-screen display) and that of my nemesis (on the bottom half of the screen). Using the regulation three-minute game, I occasionally had to stop to wipe the sweat off my joystick. Beginning with Droid Three, I couldn't afford to take my hand off

the stick for a second—that bugger would steal the ball from me and be racing down the scrolling field towards my goal like one of those Scyllica venom hunters described in the rather offbeat documentation.

Speaking of which, I must say that the instruction booklet, every bit as cleverly written as any you might find, did not neglect to give copious tips on the very things that concerned me as I tried to move up a notch or two in skill—things like pulling off angle shots, "buzz-blasting" the ball from my opponent, and, most satisfying of all, pulling back when the goal is in sight in order to shoot a long-range goal good for three points (like the three-point shot in basketball).

Something that the Lucasfilm people have worked out with BALLBLAZER is not available in this implementation, but worth mentioning. Using a system that averages the inputs from as many as forty joysticks, the game can be played by large numbers of warriors. As many of us learned during a long session at the Hackers' Conference (see photo on p. 29), teamwork was essential. When I got the game home, though, it was strictly in-your-face (or in this instance, in-your-Rotofoil) pyrotechnics, and just as much fun.

The classic helicopter hostage rescue . . .

CHOPLIFTER!

Dan Gorlin; Apple II family; 48K • Atari; 48K • Commodore 64; cartridge or disk; joystick required; \$34.95 (disk version); \$45 (Atari cartridge); \$39.95 (Commodore 64 cartridge); copy-protected? YES; Broderbund Software, Inc., 17 Paul Dr., San Rafael, CA 94903; 415/479-1170.

STEVEN LEVY: The rarest of computer-game creatures—an action-packed hand/eye coordination extravaganza with a plot organically tied to the process of play. The seductive demo mode tells the story: you command a helicopter crossing enemy borders to rescue hostages. Obviously, you have to land to pick up the little fellows, who plaintively wave to you as you hover above them; just as obviously you have to avoid or shoot down the assortment of tanks, jet fighters, and killer satellites defending enemy territory.

Since you gain points only for hostages saved, your priorities are clear—lose as few hostages as possible. Don't engage in bloodlust. Just get those innocent people out of there! True, there is no "negotiation mode" to obviate the need for violence, but CHOPLIFTER! provides a much less vile scenario than 90 percent of its competitors.

Although CHOPLIFTER! is hard to beat, it is simple to learn. Your first "sortie" across the border is easy, with subsequent ones growing progressively harder. The graphics are sharp and full of neat detail (though I'm not sure why the ground is pink). I've heard complaints that this hugely popular game is not much of a challenge to the extremely skilled arcader, and it *is* austere compared with some pyrotechnic wonders. But because the game constantly reinforces the life-saving role you're placed in, it's never boring.



The rescuing helicopter in CHOPLIFTER! must not only take out that tank, but make sure your bombs or its rockets don't kill one of those cute li'l hostages. The burning fire in front of the barracks is indicative of the mindblowing detail in this Broderbund classic.

An addicting, quiet massacre . . .

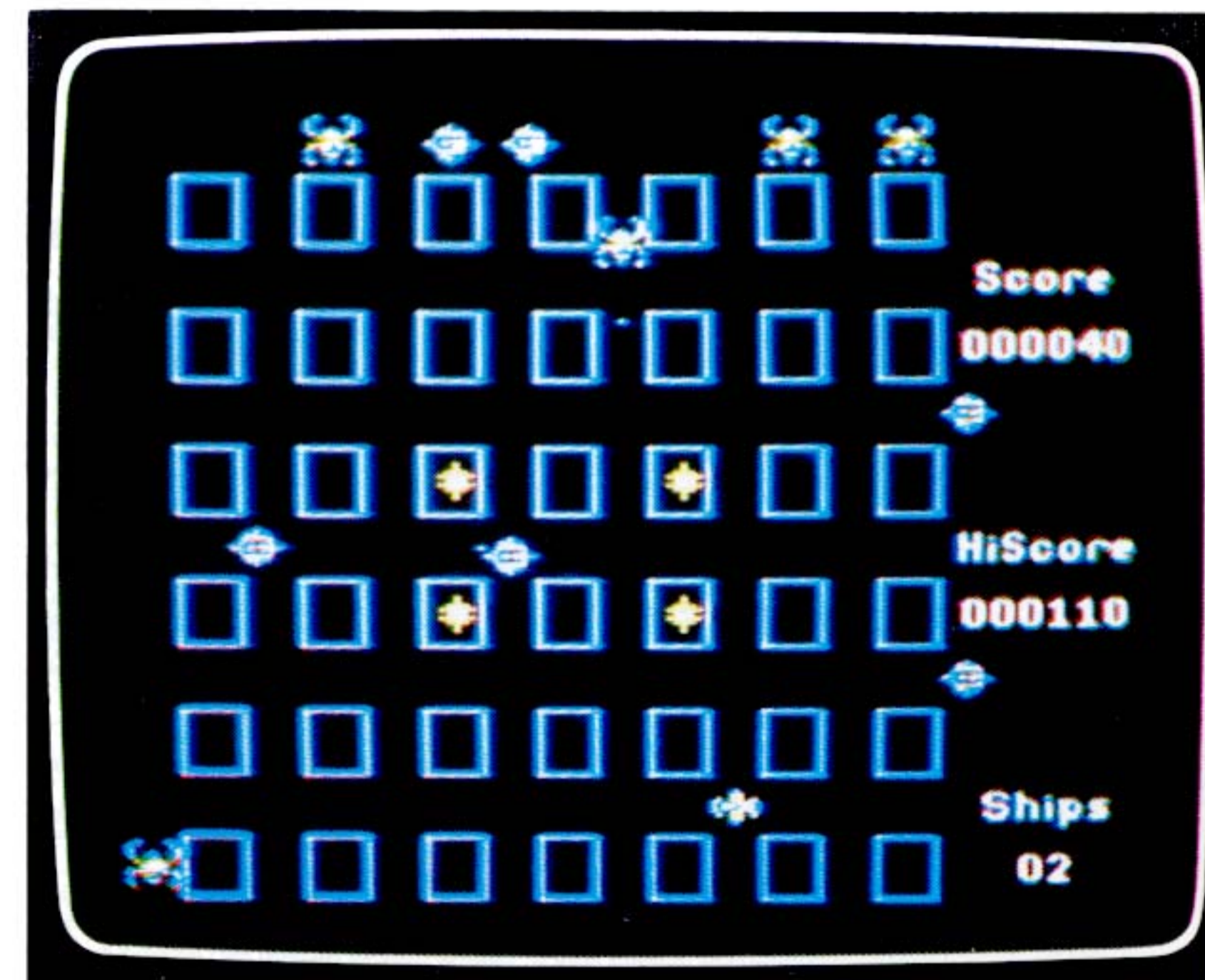
CROSSFIRE

Jay Sullivan; Apple II family; 48K • Atari; 48K • Commodore 64 • IBM PC compatibles; 64K • IBM PCjr • VIC 20; \$29.95; copy-protected? YES; Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614; 209/683-6858.

STEVEN LEVY: The archetypal author of a shoot-'em-up computer game is a wild-eyed eighteen-year-old who machine-guns lines of code like some kamikaze bomber. CROSSFIRE was written by a quiet, contemplative man in his forties, and it shows. What makes CROSSFIRE different is its seductive ability to immerse you in concentration, without the loud explosions or screaming sound effects that a more callow programmer might have inserted. Indeed, this is the quietest massacre you will ever indulge in.

As the defender of an abandoned city consisting of a gridlike layout of streets, you must be on the lookout from all four directions for aliens who can kill you by shooting little pellets or running into you. You must also move around the grid yourself, to avoid those aliens and get more bullets. Like some people I know, you might be tempted to splurge in long CROSSFIRE sessions. How these people do it, I don't know—the game is *hard*, and I'd estimate at least an hour's work at it was needed before you could last even a minute in the subtle yet deadly alien attack. But some folks get hooked and make CROSSFIRE a hobby.

CROSSFIRE doesn't look like much? Try moving around the guy on the bottom row—while those other guys are coming at you from all four directions.



Faster than PAC-MAN . . .

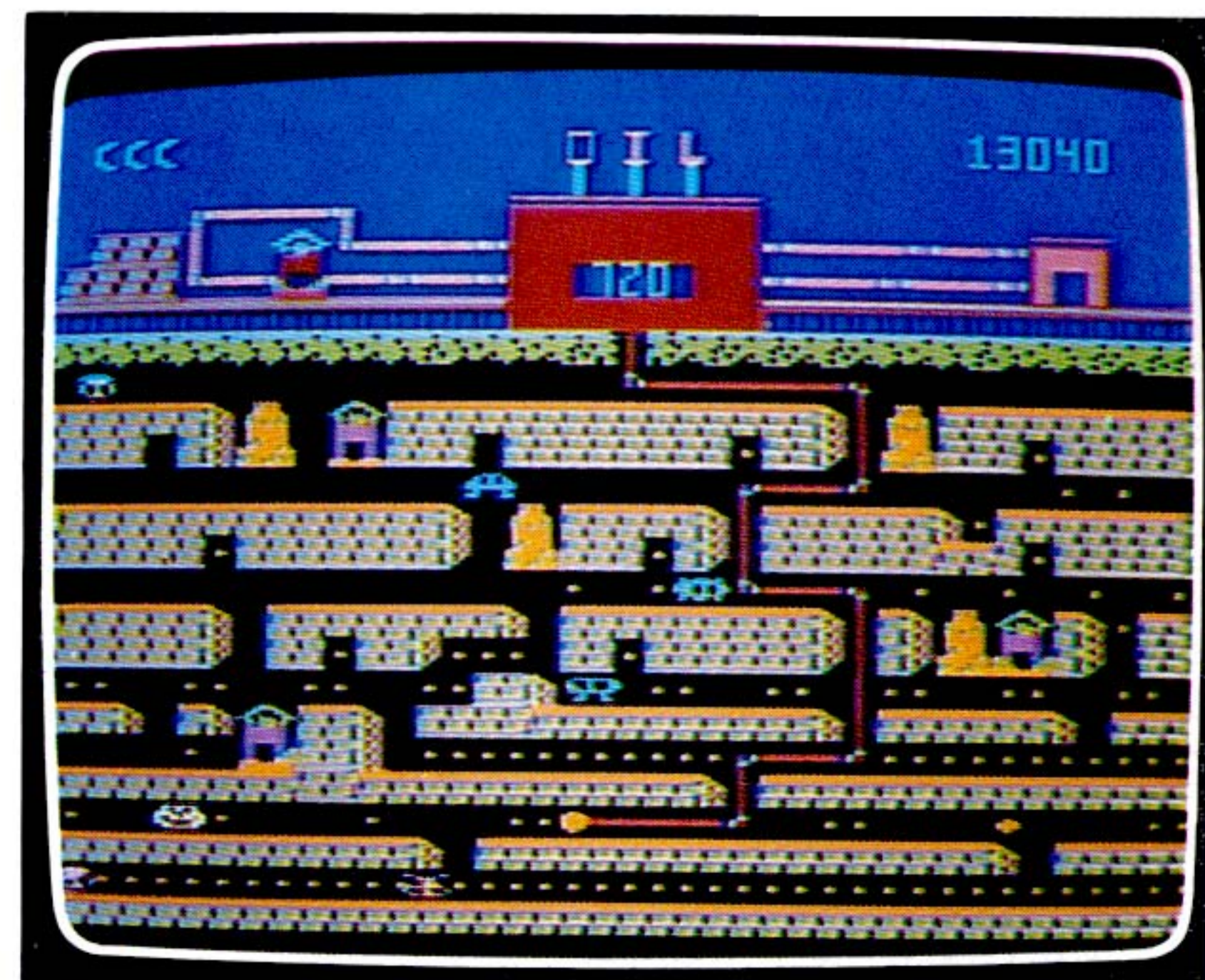
OIL'S WELL

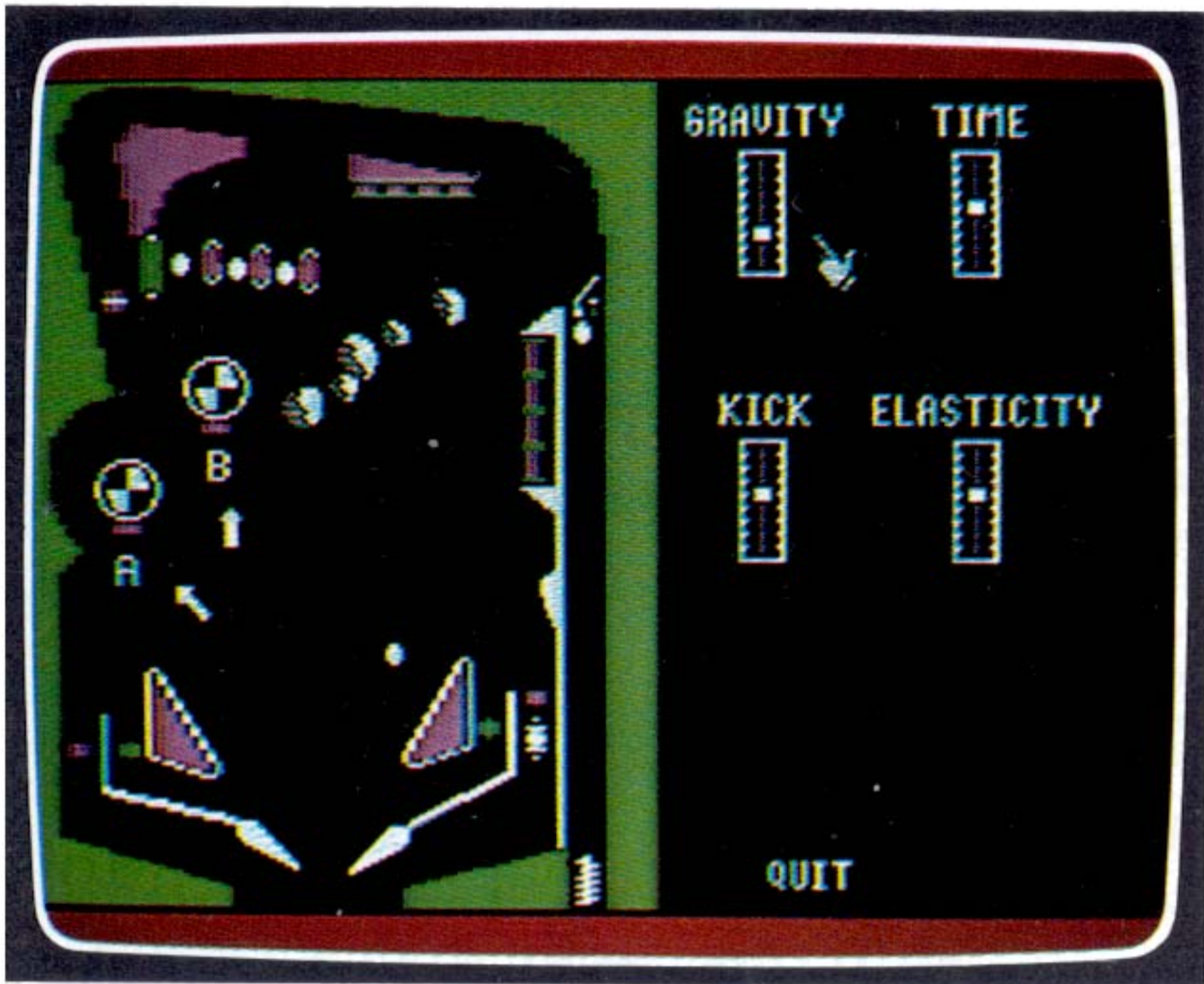
Thomas Mitchell; Apple II family; 48K; \$29.95 • Atari; 48K • Commodore 64; \$19.95 • IBM PC compatibles; 64K • IBM PCjr; \$29.95 (\$34.95 for cartridge); copy-protected? YES; Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614; 209/683-6858.

RANDI HACKER and GEORGE KOPP: OIL'S WELL is a highly addictive game combining PAC-MAN action with the features of an automatically retractable vacuum cleaner

cord. Object: to slice out an underground maze with this Roto-Rooter-type device without letting the odd creatures who inhabit the maze drive over you. Only way to avoid them is to retract like a strand of spaghetti eaten by an unmannerly person (you do this by pressing the joystick button). Eight mazes, each tougher than the one before. You need joystick dexterity and nerves of steel.

The pipeline is far down in this OIL'S WELL game, but if the player doesn't watch it, that blue "oozie" on the third row down will hit the pipe and ruin everything. Solution? Press that joystick button, and fast!





In **PINBALL CONSTRUCTION SET** that little hand moves things around and gets things done by joystick. Mouse-like. After you build a pinball machine like the one on the left, you can exercise more power by changing gravity itself, as we're about to do here.

A universe of bumpers, flippers, and rollovers . . .

PINBALL CONSTRUCTION SET

Bill Budge; Apple II family • IBM PC compatibles; PCjr; 64K; \$34.95 • Macintosh; \$39.95 • Atari 400/800/XL series; 48K • Commodore 64; \$22.95; joystick (optional on IBM); color monitor; copy-protected? YES; Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403; 415/571-7171.

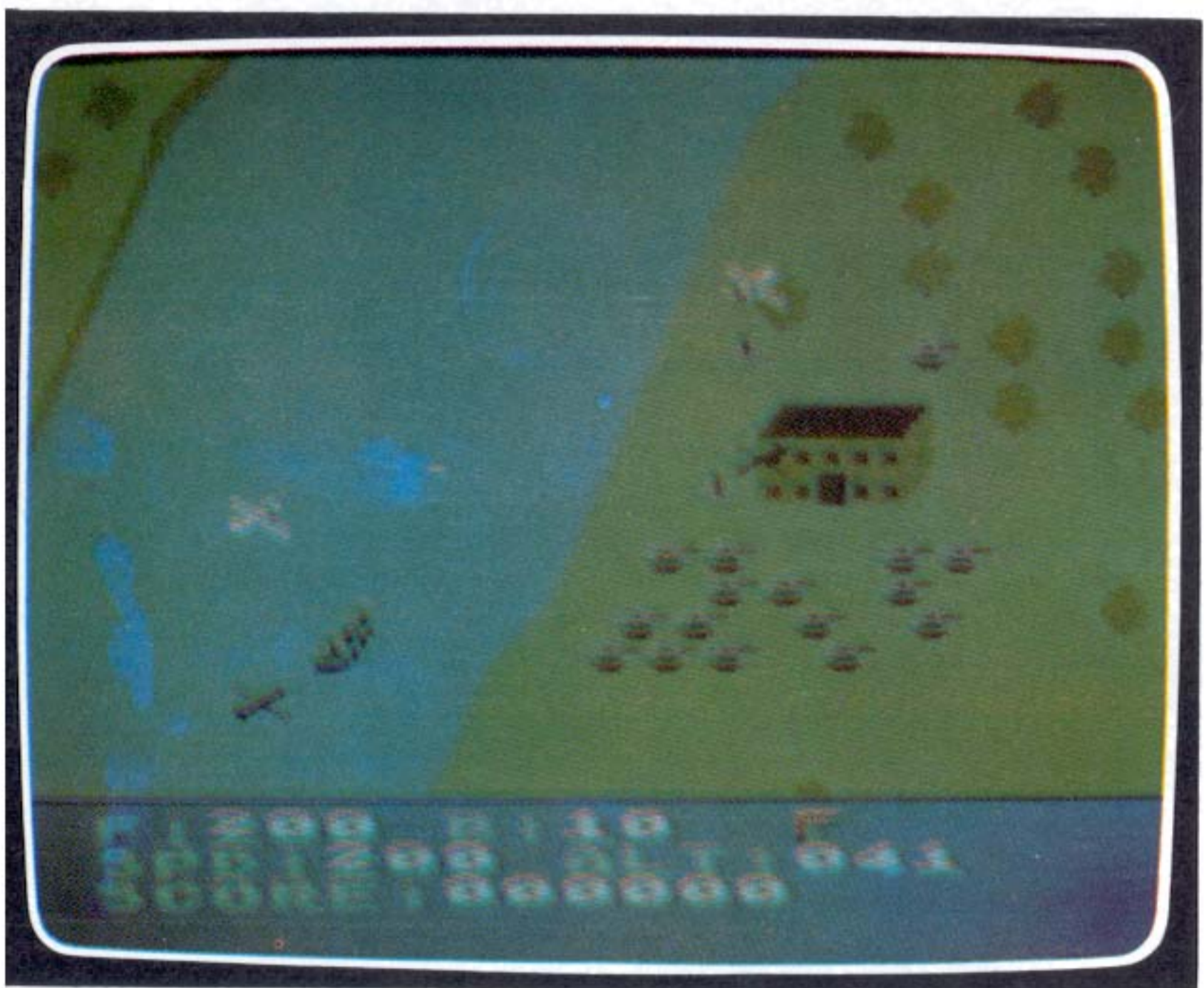
STEVEN LEVY: I've asked a lot of people who are crazy about computers just why it is they are so crazy about computers. They will hem and they will haw, but eventually it gets down to this: A computer makes you God. The only catch is that you have to learn to program before you can take command of the universe, and it takes more than seven days to learn to program.

PINBALL CONSTRUCTION SET makes you God in a few minutes. True, your universe is restricted to making pinball machines. But there is much to learn about pinball

machines. There are series of targets to connect for creating bonuses. There are decoration schemes to consider. There are tactical variations that make subtle differences in play. You find this out as you build a pinball machine, try it out, debug it, make changes, and improve it. This trial-and-error process is something you might want to apply later on, when you learn programming or anything else.

The method by which you build your machine is ridiculously simple—a little "hand" icon, controlled by your joystick, pulls bumpers, flippers, and targets to the pinball field. By pointing to other icons like a paintbrush, a screwdriver, or a little globe, you can add decorations, change the scoring or sound, create new shapes, and actually play your game. Since you are God in this universe, you can even change the pull of gravity to make the ball drop faster.

Everything works. (Well, sometimes a ball will go through a flipper—but who said Bill Budge was God?) Electronic Arts supplies a clear and detailed manual. If you hate pinball machines, you might not like this game. But, then, this program might make you like pinball machines for the first time.



Your ace, on the left, must now choose between bombing the boat (too late for that, probably), going after the plane on the right, or bombing that factory. I'd go for the plane and 100 points.

The definitive WW-I ace game . . .

BLUE MAX

Bob Polin; Atari 400/800/XL series • Commodore 64; joystick; color recommended; \$34.95; copy-protected? YES; Synapse Software, 5221 Central Ave., Suite 200, Richmond, CA 94804; 415/527-7751.

STEVEN LEVY: During the time I was working at the **Whole Earth Software Catalog** headquarters putting together this section, I was surrounded by hundreds of games for various computers. The game I played for pleasure during that time was **BLUE MAX** on the Atari. One afternoon Stewart Brand and I spent three hours taking turns at the throttle of a World War I biplane, shown onscreen from an overhead view with some 3-D perspective (provided by a shadow underneath that gets closer as you get lower). We could have gone longer.

There's a lot going on in this bombing game—much more than in its apparent inspirations, the ultimately boring space

shootout **ZAXXON** (movement and perspective similar) and the repetitive dive-bombing orgy of **RIVER RAID**. Besides bombing bridges and factories (worried about the theoretical people inside? Don't buy this game. And don't pay your taxes), you have to monitor your fuel, altitude, and damage level; watch out for enemy planes and try to shoot them down; avoid anti-aircraft fire; stay alert for and bomb "primary targets"; find friendly airfields to land on (not easy!), refuel, and get repairs.

BLUE MAX is the type of game you master incrementally. There's so much happening in your foray into enemy territory that a perfectly simple error usually trips you up—the kind of error that makes you say "I can avoid that next time," thus ensuring a next time even if it's dinner time.

Blessedly, when you opt for replay, **BLUE MAX** does not force you to endure a drawn-out starting segment with animated titles and peppy theme music. Push the start button and you're off again.

Roger is a fifty-year-old businessman who seeks out video games to achieve the state of mind that he gets into when he skis. He plays a game until that point where "the strategies are part of you," where he feels like an extension of the game or the game is an extension of him. Roger compares the feeling to being in touch with an

unconscious self. "When I play the games I don't think. My fingers think. . . . They say it's mindless, but for me it's liberating. I am in control of the game, but my mind is free. The way I see it, I'm not wasting my quarters. It's cheaper than psychoanalysis."

—Sherry Turkle, **The Second Self, Computers and the Human Spirit**

Freeing the butterflies on 16 levels . . .

BOULDER DASH

Peter Liepa & Chris Gray; Atari; 32K • Commodore 64 • IBM PC and PCjr; joystick required; \$29.95 (disk), \$39.95 (cartridge); copy-protected? YES; First Star Software, Inc., 18 East 41st Street, New York, NY 10017; 800/223-1545 or, in NY, 212/532-4666.

SAM HILT: As Rockford, the subterranean hero of BOULDER DASH, you dig your way down through the dirt and rocks to the place where butterflies are trapped beneath a wall of boulders. When you finally find the way to release them (without killing yourself in the process), you must lure them back to the surface into the bubbling green slime, where they explode on contact and turn into jewels. These you must gather quickly in sufficient quantities to move on to the next level before your time has elapsed.

That's only one of sixteen scenarios, each so different from the others that the word "level" is insufficient to describe them. The documentation calls them "caves." Each one has its own logic and design, and each demands a unique solution to the basic challenge of acquiring gems before your time runs out. Game elements such as boulders, butterflies, amoebas, and explosions recur in various combinations, but the relationships

among them change constantly and keep you guessing. Solutions may require speed and agility, careful observation of the movement patterns of fireflies, or deliberate plans for luring butterflies to their doom under an avalanche of boulders (BOULDER DASH is a disaster for lepidopterists). After an evening of play, you'll find yourself getting out of bed to try that one final strategy that occurred to you just before you drifted off to sleep.

Rockford has just released those butterflies (making their way up the left side of the screen toward the bubbling green slime above them) by tunneling under the boulders that were restricting their movement. He's trying to complete this BOULDER DASH maneuver without getting made into a pancake in the process.



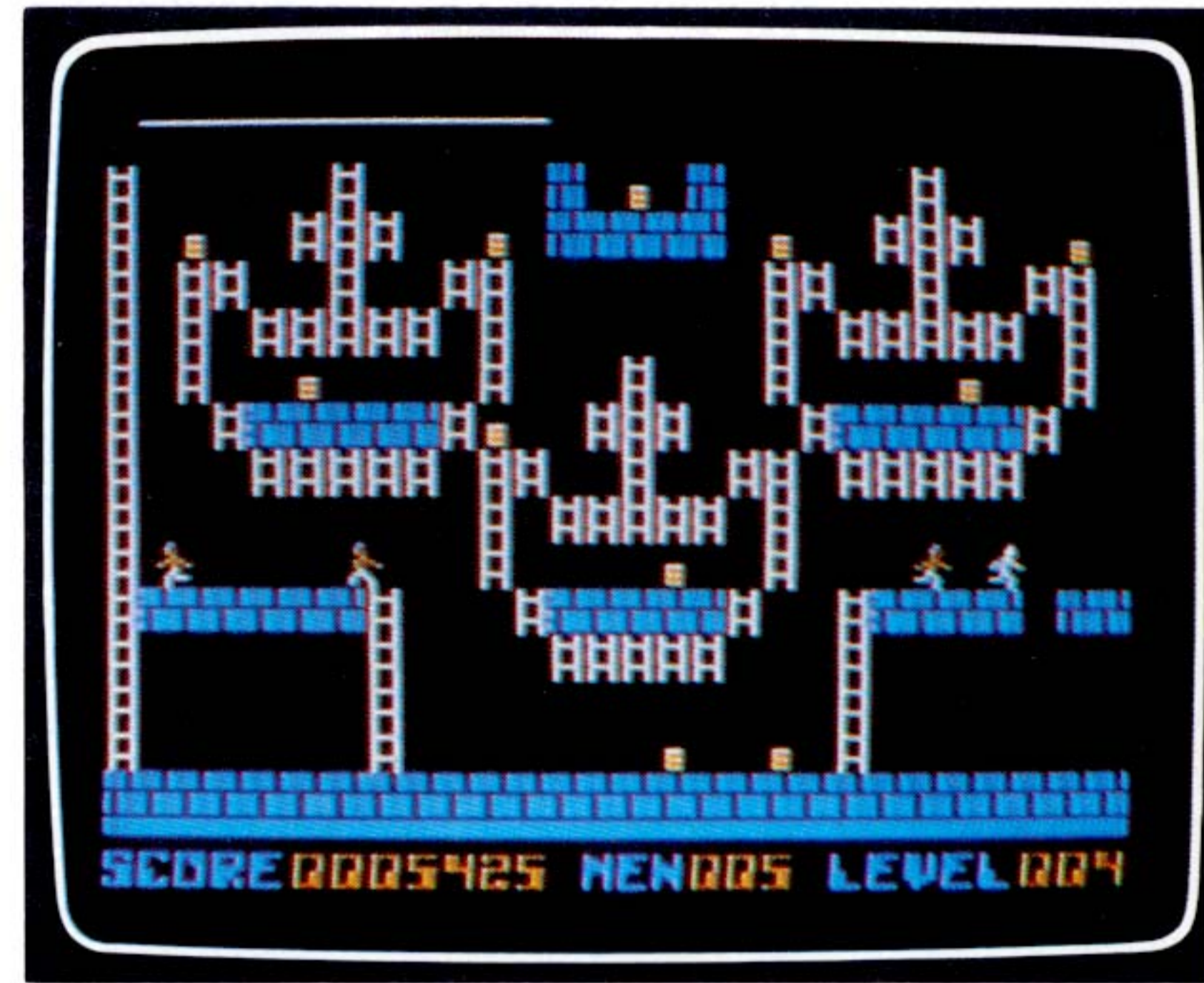
150 craaa-zzy screens . . .

LODE RUNNER

Doug Smith; Apple II family; 48K • Atari; 48K • Commodore 64 (disk or cartridge); joystick (optional on Commodore) • IBM PC compatibles; 64K; color graphics card; \$34.95 (\$39.95 for Commodore 64 cartridge) • Macintosh; \$39.95; copy-protected? YES; Broderbund Software, Inc., 17 Paul Drive, San Rafael, CA 94903; 415/479-1170.

STEVEN LEVY: I'm crazy about LODE RUNNER. It's a game I could play from the first five minutes and still have a great time with after wearing the disk to a frazzle by overuse. It's a "climbing" game, with its ladders, ropes, and leaps, but some of the maneuvers you need to make your stick-figure little man advance to the next of LODE RUNNER's 150 (you read it right—one hundred and fifty) screens actually require . . . brace yourself . . . thought. So, in a sense, each screen is a puzzle that you must solve on the run. Literally on the run, because while your guy is dashing about digging holes with his laser drill, collecting treasures, and dropping from the ceiling, with the computer making weird *beee-yooooo* sounds, a cadre of enemy stick figures in constant Keystone Kop mode are in hot pursuit. If they catch you, you've had it. You can drill holes in the floor for them to fall into and eventually get buried in, but more figures will drop from the sky to replace them. There's hardly a moment's peace here.

Some of the screens are tough to solve. Others you can solve mentally but often screw up on execution. Playing sequentially, there is no way in hell I am going to see the 60th screen, let alone the 150th. (It takes me 20 minutes just to get to Screen 9.) But the game accommodates that complaint. For the weak of resolve and reflex, one command advances the level, another gives you as many men as



Our LODE RUNNER surrogate is outlined in white, in virtual flight from those other fellows. He'll have to climb all over to get the little bundles of gold, then climb on to the next screen. There are 150 screens, and if you get bored with those, design your own.

you want. Using these commands is surely a victimless crime, and they make LODE RUNNER constantly fresh and interesting; there's always a screen you won't have seen yet.

I also have only scratched the surface of the sequel, CHAMPIONSHIP LODE RUNNER (Apple II family • Commodore 64; \$34.95). As the name implies, this version is for people with diplomas in solving the puzzles in its predecessor. Though there are only(!) 50 screens, some are so tough that you might consider buying the optional hint book (sold for \$5). Otherwise you might wind up on the doorstep of the Broderbund company, begging for hints to solve Screen 36.

Finally—a game you can chant to . . .

MOONDUST

Jarron Lanier; Commodore 64; joystick, color; \$19.95; copy-protected? NO; Creative Software, 960 Hamilton Ct., Sunnyvale, CA 94089; 800/331-7990 or, in CA, 800/448-1001.

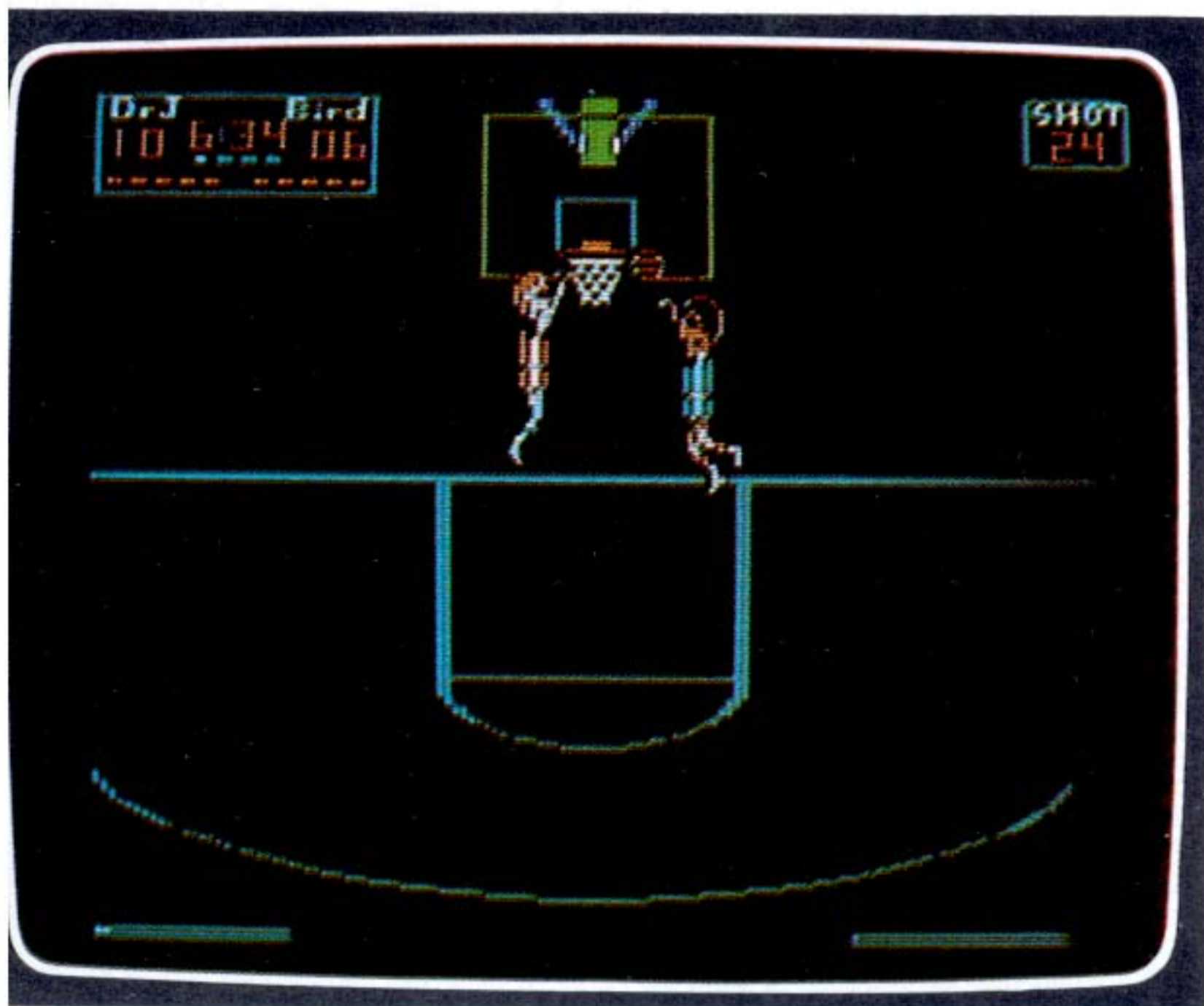
ART KLEINER: If this were still the psychedelic era, every game would be like MOONDUST. The points you score are somehow less important than the patterns and (especially) the music produced by the way you play the game. With the joystick, you manipulate a little white "spacewalker" with a bobbling head. His movement in turn affects, in obscure ways, the flight paths of six colored spaceships. By pressing the joystick button, you drop a little square colored "seed" on the playing field; then you try like hell to influence the spaceships to spread the seed's progeny, the "moondust," out across a shifting, mandala-ish target. The process feels like finger painting with somebody else's fingers. If you inadvertently bump your ship into your spaceman, you get knocked out and have to start over. My only complaint: the individual games end too soon. Restarting disturbs MOONDUST's hypnotic wavelike effect. Unlike other games, MOONDUST doesn't engage your adrenaline; it engages the part of your psyche that seeks to feel at peace.

Sports and Noncomputer Games

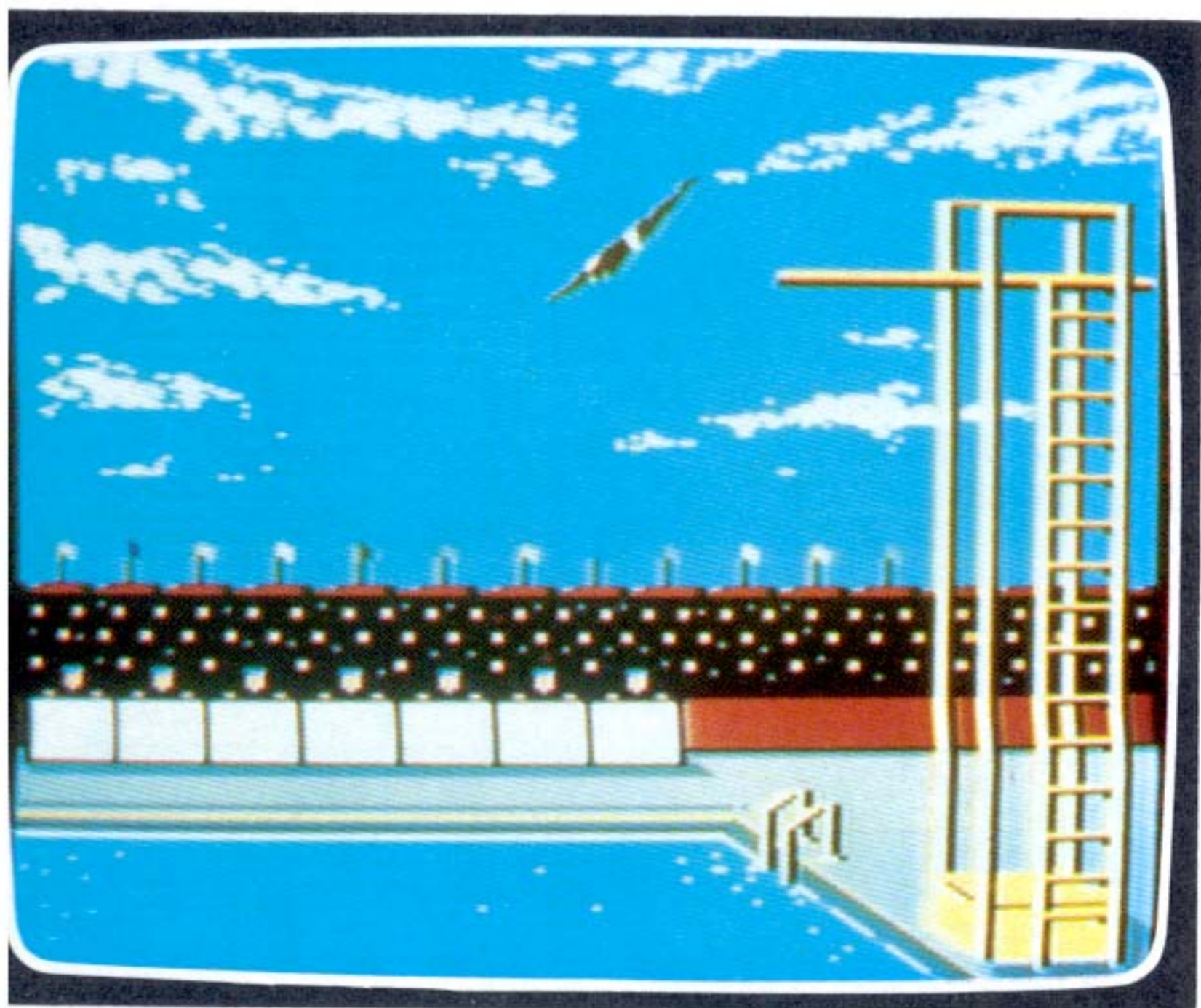
Slam-dunkin' realism, playground pyrotechnics . . .

JULIUS ERVING & LARRY BIRD GO ONE-ON-ONE

Bird, Erving and Hammond; Apple II family; 48K • IBM PC compatibles; 64K; \$39.95 • Atari 400/800/XL series; 48K • Commodore 64; \$32.95; joystick; color monitor; copy-protected? YES; Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403; 800/448-8822 or, in CA, 415/571-7171.



Dr. J and Larry Bird go up for a ONE-ON-ONE rebound. Looks like J's got this one, but generally, Bird (on the left) will outrebound him, just like in real life. On the other hand, J's faster inside. Those "fatigue" lines in the foreground show that both have worked up a good sweat here and should call a time-out to rejuvenate.



A player takes a dive in the spectacular SUMMER GAMES program. Between the time he leaves the board and hits the water, you can use your joystick to create body pyrotechnics that would impress even Greg Louganis.

STEVEN LEVY: My friend Basketball Joe is Sixers all the way and computers none of the way. "Come over," I said, "Doctor J's in a computer game." Say *what?* He came over, I booted, and the graphics were so good I didn't have to hem and haw and tell him the limits of the Apple. Sure, Doctor J and his opponent Larry Bird (white guy from Indiana, can play) look cartoony, but when they perform on the halfcourt, you can believe that they spent some days in the gym with the programmer making sure he got all the right moves. J in particular. "Wo!" said Basketball Joe.

I had been playing an hour a day for about a week, getting good enough to take on the computer on the "varsity" level (second of four) and picky enough to be complaining about the only flaw in the otherwise intuitive joystick control (hit the button to shoot but hit the button *quickly* to turn around—sometimes it doesn't work and you shoot when you don't want to). All in all, I was highly taken with Electronic Arts' conceptual leap: To do the best basketball game on a

computer you don't do a whole basketball game—you take it to an elemental level of one-on-one, in-yo'-face play. With real characteristics of the two best hoopsters around (the computer Bird rebounds and shoots from outside better; the Doc does sky ballet), ONE-ON-ONE is on a level by itself as far as computer sports games go.

As one of maybe ten people in the country with a two-joystick Apple set-up (only in theory can you play two-player with stick and keyboard), I took on Basketball Joe, grudgingly accepting Bird (problem with the two-player game is, someone's got to be Bird). Joe hates computers so much he's usually awful at electronic games, but this time that madman beat me. I believe the reason is that he is a basketball player and I am not—the ultimate endorsement for ONE-ON-ONE.

STEWART BRAND: Levy is too modest to mention that he took on Electronic Arts' president Trip Hawkins in a semipublic bout of ONE-ON-ONE and beat him.

Gold medals, no injuries . . .

SUMMER GAMES ★

Copy-protected. \$39.95 (street \$25). Commodore 64; Atari 400/800/1200/XL; Apple II family. Joystick required. Epyx, Inc., 1043 Kiel Ct., Sunnyvale, CA 94089; 408/745-0700.

STEVEN LEVY: It took me a while to approach SUMMER GAMES. I was sick of Olympiana. But consistent reports that this game was addictively wonderful kept reaching me, especially from the Silicon Valley offices of **Byte** and **Popular Computing** where this program seems to be an obsession among the editorialites. I found the hype justified.

The format is much like a previous computer trailblazer, Microsoft's four-year-old OLYMPIC DECATHLON, in that you are tested in several events. But you see immediately how far software artistry has come in the opening screen of SUMMER GAMES: unlike DECATHLON's stick-figure man, you have a flesh-and-blood, full-color runner setting a torch ablaze in a full arena; a billowing cloud turns into a flock of doves. It sets the scene for the competition, in which up to eight players may choose to represent any of 18 countries in the quest for gold. (After each event, the game plays the national anthem of the winner.) The events are the pole vault, diving, 100-meter run, 400-meter relay, gymnastics, freestyle swim relay, 100-meter swim, and skeet shooting. Complexity varies, but quality of graphics and animation are consistent.

The best is the gymnastic competition. Using the joystick for control, you become a female competitor on a pommel horse. After

a while, you will learn to twist, turn, and straighten up to—if you're good—a firm landing. The little set-step and the calamitous fall resulting from an overly risky or poorly planned jump are astoundingly reminiscent of the scene in Los Angeles when Mary Lou Retton pulled through. Then you hold your breath as the judges hold their cards. It's enough to cancel out ten of Mary Lou's Wheaties commercials.

Rediscovering chess with the computer . . .

SARGON III

Don & Kathe Spracklen; Apple II family; 48K • Commodore 64 • IBM PC compatibles • IBM PCjr • Macintosh; \$49.95; copy-protected? YES; Hayden Software Co., Inc., 600 Suffolk St., Lowell, MA 01854; 800/343-1218, or in Mass., 617/937-0200.

PHILIP ELMER-DEWITT: After I got the (Broderbund) SERPENTINE monkey off my back and before I got hooked on LODE RUNNER (p. 37), I spent a couple of weeks compulsively playing chess with SARGON III, the latest version of Hayden Software's perennial bestseller.

I used to play a lot of chess with an old college chum. He married and moved to Paris. I inherited his chess books but dropped the game. Until I bought this program. It plays at ten levels, from five seconds to hours per move. Also includes chess problems and famous games from the past. It put me right back into that barbaric place, acting out a collective fantasy left intact from the fourteenth century.

★ MEANS: NEW TO 2.0 EDITION

With a twist, SARGON lets you open up its head and peek at its systematic move generator as it tries every possible move at the rate of several dozen per second. Uncanny. Disturbing. Gruesome.

And ultimately it's a real spoiler, 'cause you soon discover that you can get the computer to suggest *your* best move. If it's better than what you had in mind, it's darned hard to ignore. Let that happen a few times and you find yourself watching a machine play with itself in an orgy of digital masturbation.

Whew.

One other thing: My wife didn't say anything at the time, but while I was hooked on SARGON, she seemed to warm up to my Apple—or at least she seemed a bit less cool. When I switched back to LODERUNNER, we were back to square one. Apparently the chess game had the same effect on her that a pipe and tweed jacket have on some impressionable coeds.

Oh, yes. I did manage to beat that dumb computer a couple of times. The program's a sucker for a double pin.

Word maniac's delight . . .

MONTY PLAYS SCRABBLE

Apple II family; 48K; \$39.95 • IBM PC compatibles; 64K; \$39.95 • TRS-80 Model III; 48K; \$34.95; copy-protected? YES; Ritam Corporation, P.O. Box 921, Fairfield, IA 52556; 515/472-8262.

DOUG GARR: One of my favorite Apple programs is MONTY PLAYS SCRABBLE, the computer version of the popular board game by Selchow & Righter. One reason I like it so much is because it is absolutely playable without the (oh, do I hate this word) documentation. I've watched kids who are far too impatient to read directions spend hours at it. They love the fact that they can cheat. If you insist a word is a word, there is nothing the computer can do about it.

You can challenge, but only with a hard-copy dictionary and an arbitrator. I have been challenged many times by MONTY: His image appears on screen; he looks left and right, almost embarrassed to bring up this nasty matter, and suggests that we "check that word." His suspicions have always been confirmed. I've never successfully challenged MONTY, though he supposedly bluffs.

MONTY will play up to three people, and he keeps score, quite honestly, for everyone. The screen display is comprehensive—the board, a tile-point count, and the player's letters on a rack with "rearrange" mode.

It's real Scrabble, and you don't have to swirl the tiles around after every turn.

Strategy and a quick-reflex baseball simulation . . .

COMPUTER BASEBALL

Charles Merrow & Jack Avery; Apple II family; 48K • Apple III • Atari (all machines); 40K with BASIC cartridge • Commodore 64; \$39.95; copy-protected? YES; Strategic Simulations, Inc., 883 Stierlin Rd. Bldg. A-200, Mountain View, CA 94043; 415/964-1353.

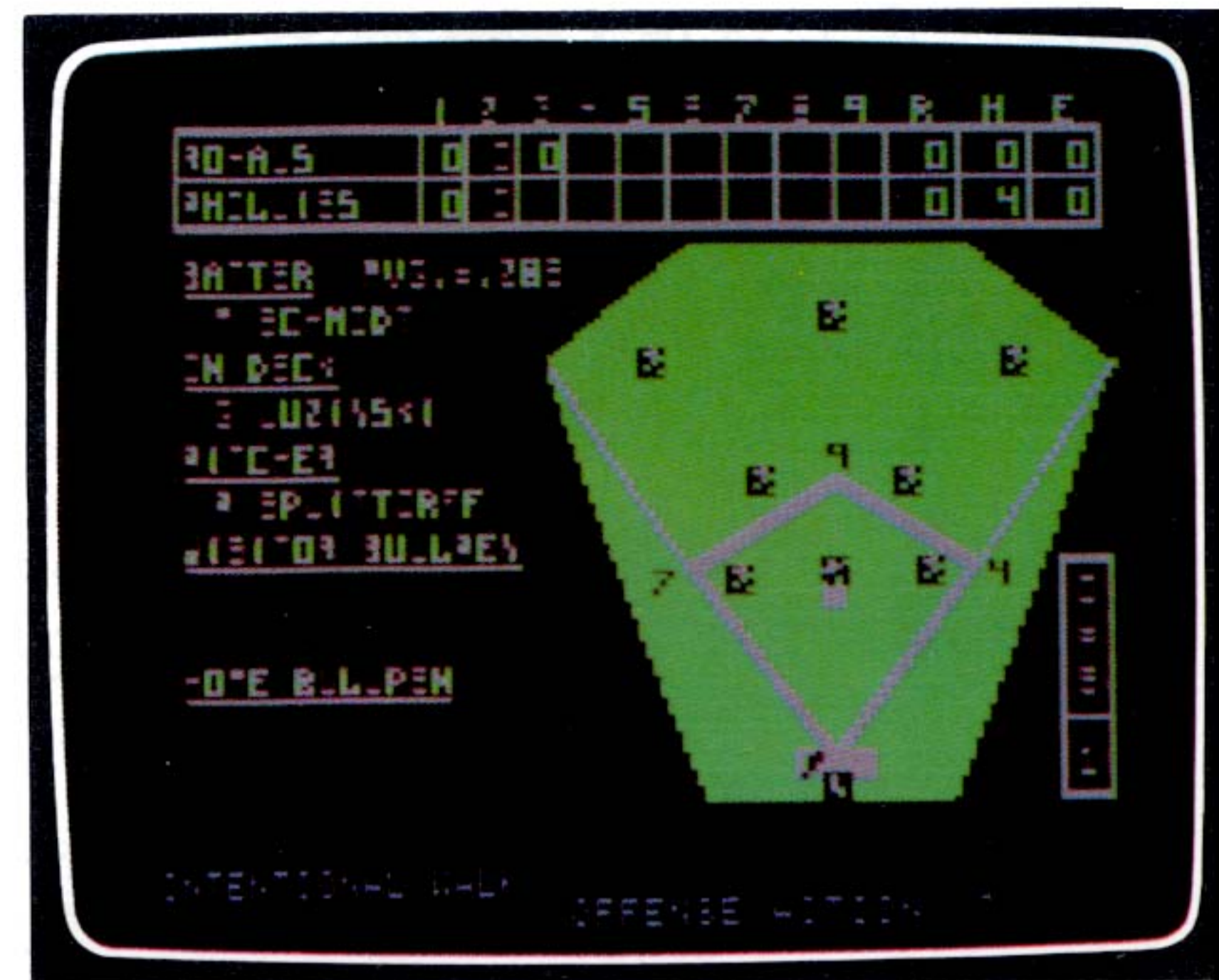
STAR LEAGUE BASEBALL

Apple II family; \$31.95 • Atari; \$29.95 • Commodore 64; \$29.95; joystick • Macintosh; \$34.95; copy-protected? YES; Gamestar, Inc., 1302 State St., Santa Barbara, CA 93101; 805/963-3487.

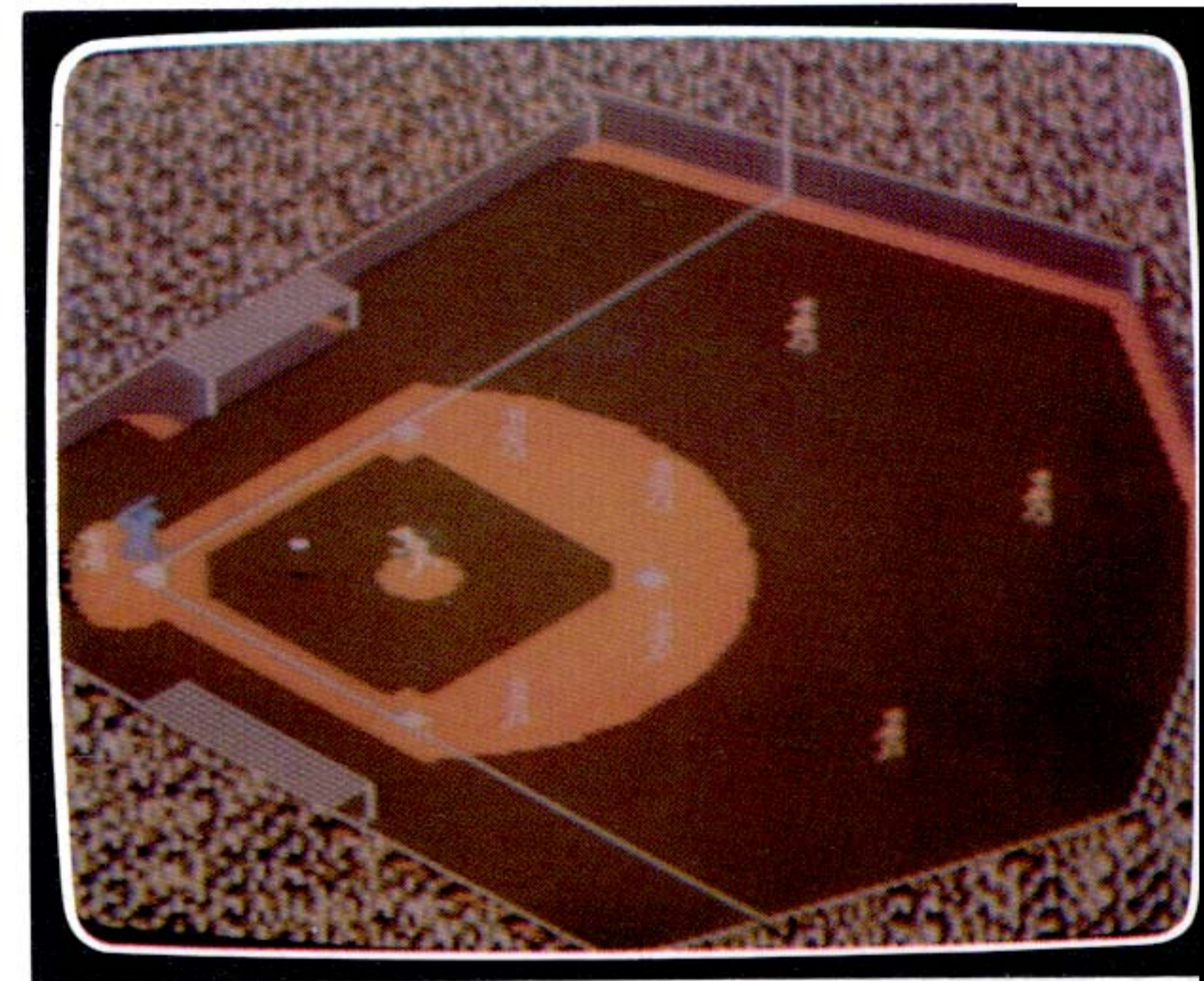
STEVEN LEVY: I always figured that one of the easier translations of games to computers would be one of those replay-the-major-leagues-in-your-own-home systems that I played as a kid. Sure enough, in COMPUTER BASEBALL, the dice and stacks of charts are all on a single floppy disk, a much more pleasurable way to handle things. The graphics aren't much, but I'm happier knowing that the disk space is instead used for strategy features like hit-and-run, warming up a relief pitcher, and even the occasional ejection of a player by the computer umpire.

Like its pre-microchip predecessors, COMPUTER BASEBALL takes into account each ballplayer's batting stats, speed, earned run average, fielding prowess, and other data, so you can be sure when Mike Schmidt comes to bat you've got a good chance to go downtown (unless he's facing Juan Marichal—one of the infinite possibilities here). You can "manage" any of 26 World Series teams, order a disk of last season's real-life teams, or even construct your own, using the formula provided inside. COMPUTER BASEBALL works just as well in either one- or two-player variations (the computer is a fairly good manager), and I had enough strategy decisions (put the infield in? pitch around that slugger?) to keep me interested in all but the most absurd blowouts.

It's a much harder task to replicate the *action* of baseball than to merge strategy with actual game play. The best of the many games attempting this is STAR LEAGUE BASEBALL. The first time I booted it, I got the same delight I feel when first peering at the deliciously green infield of a major league stadium. The graphic representation is that good, as is the music that plays the national anthem and a catchy original number between innings. I think STAR LEAGUE is best as a two-player game—the computer simply doesn't make many mistakes, and I do, especially when fielding. The sparse manual promises that "throwing from base to base will soon be second nature to you," one of the biggest lies of the twentieth century.



In this replay of the 1980 World Series, the Phillies had second and third, one out, in the third inning of a scoreless battle. The COMPUTER BASEBALL manager "Casey" decided to walk Bake McBride and pitch to (gulp) Mike Schmidt (the real-life MVP in that series). Notice that the first and third basemen are playing "in" to cut off the run at the plate, while the shortstop and second baseman are deep enough for a possible double play. Did the strategy work? Yep—Schmidt bounced to short and started a DP.



The STAR LEAGUE BASEBALL stands are perpetually packed with noisemaking fans as the pitcher tries to hurl the ball past you. It'll take you a while to develop your reflexes to the point where you can hit it.

Score after my first game: Computer 73, Levy 1. But I stuck with it, and eventually I could make it competitive, inning by inning if not for a whole game.

The graphics and frills make this one worthwhile, but STAR LEAGUE BASEBALL's right fielder will consistently throw runners out at first on line drives over the infield—a faux pas that COMPUTER BASEBALL would never commit.

Down and dirty . . .

RACING DESTRUCTION SET ★

Rick Koenig & Connie Goldman. Copy-protected. \$32.95 (street \$25). Commodore 64. Joystick required. Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403; 415/571-7171.

FAYE ZUCKERMAN: About half of this two-player smash-'em-up racing game centers on true down-and-dirty car racing. The pace is blazing and, depending on how you set things up, you get hair-raising jumps, ice-slick pavement, narrow racetrack sections, and the ability to thwart your opponent (human or computer) with intense smashing, crashing, tailgating, and even mine-laying. Fast-paced arcade stuff.

You see a split-screen aerial view of the playing field and can track each car's movement along the treacherous racecourse. The joystick control mimics a slot-racing controller. But control only begins there: You can wind down or crank up action by altering gravity—lowest gravity is the moon, one sixth of Earth's, and highest is Jupiter, two and a half times Earth's. You choose any of fifty racetracks (including Monza, Indy, Riverside, Supercross, and my favorite, Variety)—or build your own. Same goes for cars: choose any of five cars, from Formula One to funky dirt bike, or build your own. Consider a destruction car with a 5000-cc engine, the ability to unload oil slicks, and a stockpile of land mines. (Just remember where you planted the mines on earlier laps.) All of this is nicely explained in a readable ten-page instructional. I'm certainly no racing aficionado, but I had no problem with this game—except stopping.



RACING DESTRUCTION SET really becomes fun when you build your own racecourse. That's its other, creative half. In a method similar to that used in **PINBALL CONSTRUCTION SET** (p. 36), you use the joystick to pull sections of track to a makeshift roadway board, insert and adjust jump height, modify track widths, and add hazardous conditions—and make a mega-track with killer jumps, iced-down curves, and narrow, dirt-riddled sections.

Adventure

The first Adventure lives! . . .

ADVENTURE

Don Woods & Will Crowther; 8" CP/M • Apple CP/M • DEC Rainbow • Epson QX-10 • Heath/Zenith • IBM PC compatibles • IBM PCjr • Kaypro 2, IV, 10 • MS-DOS compatibles • Osborne • Xerox 820; \$19.95; copy-protected? YES; The Software Toolworks, 15233 Ventura Boulevard, Suite 1118, Sherman Oaks, CA, 91403; 818/986-4885 • IBM PC compatibles and PCjr; 64K; color adaptor; copy-protected? NO; \$24.95; Norell Data Systems, P.O. Box 70127, 3400 Wilshire Blvd., Los Angeles, CA 90010; 818/502-1103 • Also available on SOFTWARE GOLDEN OLDIES, VOL. 1 (including LIFE, ELIZA, and PONG); IBM PC and compatibles; PCjr; 64K • Apple II family; 64K • Commodore 64; \$29.95; copy-protected? YES; Software Country; 270 N. Canon Dr., #1297, Beverly Hills, CA 90210; 800/245-2057 or, in CA, 800/245-2056 • any computer with 300/1200 baud modem on The Source at normal rates (see table, p. 140).

STEVEN LEVY: The first time is always magical. At least it is for me. It was, classically, on a mainframe computer, and when I saw the now just-about-immortal words, "You are standing at the end of a road . . ." and typed my first command, GO EAST, I was hooked. At that time, the game

was simply called ADVENTURE, because it had not yet become a genre. The act of using a computer was strange to me then, but ADVENTURE was not strange at all. By encouraging me deeper into the Colossal Cavern, by requiring me to light lamps, drive away snakes, avoid murderous dwarves, and get past the troll, ADVENTURE in essence invited me into the computer itself. The further I got, the more I felt I was master of the keyboard attached to the billions of bits in that DEC-20. And the frustrating puzzles were much like some of the dilemmas that awaited me in the world of computing.

The consumer news is that the ORIGINAL ADVENTURE has lost none of its charm in microcomputer translation, even though its complexity and sophistication have been surpassed by some of its hundreds of children (a few of which we talk about on these pages). Knowing that this is the granddaddy of them all gives the concise yet unerringly significant descriptions of its more than 170 "rooms" almost biblical overtones.

Playing adventure games without tackling this one is like being an English major who's never glanced at Shakespeare.

The first microcomputer epic . . .

TIME ZONE

Roberta Williams; Apple II family; 48K; includes six disks; \$100; copy-protected? YES; Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614; 209/683-6858.

KING'S QUEST ★

Ken & Roberta Williams. Copy-protected. \$49.95 (street \$35). Apple IIe (128K)/IIc; IBM PC and compatibles (128K). Sierra On-Line, P.O. Box 485, Coarsegold, CA 93614; IBM PCjr version (\$50) available from IBM, Entry Systems Division, P.O. Box 1328, Boca Raton, FL 33432; 800/447-4700; Tandy 1000 version (\$49.95) available from your local Radio Shack dealer.

ROE ADAMS: TIME ZONE is the greatest adventure game ever written. Its breadth and scope are unsurpassed. We're talking about 39 interlocking scenarios (each one as complex as a complete adventure), and 1500 high-resolution "rooms," filling both sides of six disks. Each scenario takes place in a given place and time, and thousands of years of human history—past, present, and future—are spanned by this labyrinthine quest.

TIME ZONE is for expert-level adventurers only. Sierra On-Line estimates that a skilled player will complete it in about a year. The biggest problem in cracking it is perspective—since the scenarios interlock, everything has to be done in the right order, as with a Chinese ball puzzle, where an erroneous move means failure is guaranteed

(though you might not notice it for thousands of moves). In TIME ZONE, for instance, creating an anachronism—taking an object to a time period that preceded its actual invention—means you lose the object permanently. (You can take a hand mirror back to Cleopatra's time, but not a rifle.)

I solve adventures for a living, but TIME ZONE was my greatest challenge. I started on a Monday and, working for 20 to 22 hours a day (my wife Nan put food in front of me every so often), I finished it in a week. My pile of maps was two inches high. I was so taken with the game that I began "Vault of Ages," a PUBLIC conference on The Source (see PUBLIC review on p. 141) specifically intended as a hint exchange for people tackling this epic among adventures. So far more than 9000 people have accessed the conference.

STEVEN LEVY: While TIME ZONE is Roberta Williams' masterpiece, her latest effort, KING'S QUEST, is not only easier to master but features a real advance—instead of typing in directions, you move the character (a knight named Sir Grahame) by joystick and watch him respond like an animated cartoon figure. The animation is especially effective when you move him into water and he instantly starts swimming. The "world" of this game is smaller than most and some of the puzzles are dippy, but the visual pyrotechnics make it worthwhile, especially for younger adventurers. And the PCjr version is one of the few games maximized for that machine.

Adventuring in the public domain . . .**EAMON**

Donald Brown; Apple II family; \$10/disk; special two-sided floppy disk, \$12; copy-protected? NO; Public Domain Software Copying Co., 33 Gold Street #13, New York, NY 10038; 212/732-2565.

LYNN J. ALFORD: EAMON, a public domain fantasy, is an excellent role-playing system. Like many fantasy games, you give your name (or your favorite alias; mine is Lady Lynn) and the game will give you values for your charisma, hardiness, and agility. Then you're on your own.

There is no winning and losing in EAMON (except for losing your life). Sometimes you

have to accomplish some specific task to leave the adventure, but that is rare. EAMON has lots of treasure, loads of monsters, and even an occasional damsel in distress. Don't attack every monster you meet until you've tried making friends—you might need a friend to help you survive the adventure. EAMON itself is more friendly than many other games of its ilk, because if you give it a command it doesn't know, it will tell you the commands it does know—wonderful to someone who once spent fifteen minutes trying to tell another game to put a raft in the river.

The EAMON system has a master disk, a dungeon-designer disk, and more than forty adventures, each with its own story, some

quite different from the others. I've completed some in a few hours; others take as much as twenty hours. Maybe the toughness varies according to how mean the author felt that day. The dungeon-designer disk contains a complete set of instructions for the beginning adventurer and a program that allows you to examine other dungeons and create new dungeons of your own.

I found EAMON in the library of the Carolina Apple club, copied it, and now make copies for friends. By doing this, I am following the instructions on the opening screen, which urges users to distribute this public domain program as freely as they wish.

Rockin' & rollin' adventure . . .**MINDWHEEL** ★

Pinsky, Hales & Mataga. Not copy-protected. \$40-\$45 (street \$28-\$31). IBM PC (128K); Apple II family; Macintosh; Commodore 64; Atari; Synapse and Broderbund, 17 Paul Dr., San Rafael, CA 94903; 415/479-1170.

STEVEN LEVY: The opening scene of MINDWHEEL is positively mindblowing. There you are, thrust into the consciousness of a dead rock & roll singer, with a frenzied crowd about to engulf you—and you have to piece together information to solve the problem that might lead to world

destruction. Okay, that's standard practice for adventure games, but this one is written by a celebrated poet, Robert Pinsky, who obviously had a great time concocting an outlandish sci-fi plot which, with the aid of the long-awaited Synapse parser, really draws you in. It's especially strong in encouraging interaction with the characters, who really are a vivid and varied lot.

Now, as parsers go, there are problems. For instance, it often tells you to "PRESS ANY KEY" to get more text, and if you press a letter key (like an A or an S), it'll mess up your next input. And since the rules aren't clear on what the program recognizes and

what it doesn't, you'll forever be coming up across cleverly worded messages which translate to "I DON'T UNDERSTAND."

MINDWHEEL has an interesting copy-protection scheme, too. Before you start, it'll ask you to type a "password"—a certain word on a certain line on a certain page of the hardback-book documentation. So if you don't have the documentation, don't bother spinning the MINDWHEEL. If you do, you'll find there are exhilarating moments to be had in MINDWHEEL.

THE BOOK OF ADVENTURE GAMES ★

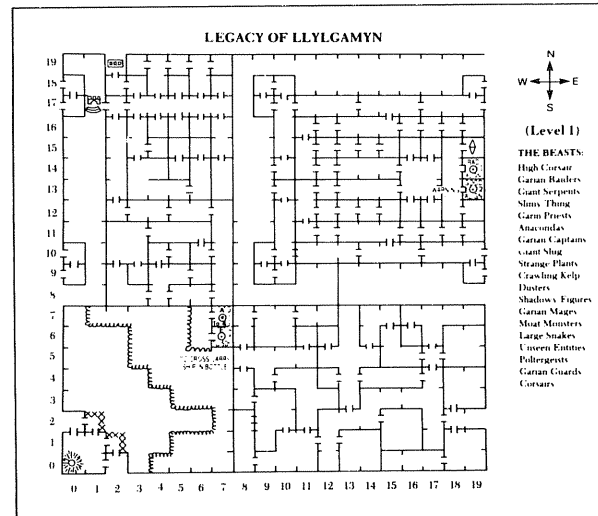
Kim Schuette; 1984; 350 pp.; \$19.95; Arrays, Inc./The Book Division, 11223 So. Hindry Ave., Los Angeles, CA 90045; 800/421-3931 or, in CA, 213/410-9466.

STEVEN LEVY: Some people think that there's something unsavory about seeking help in finishing adventure games. I don't. If you are trapped in a windowless room on the Planet Asparagus without a hint of your means to escape, and weeks of contemplation don't provide any solution, that \$40 adventure game becomes less and less charming. You begin plotting vile revenge against its authors. What you need is a hint.

The Book of Adventure Games gives hints for over 70 of the most popular programs and does it cheaper, and generally more wisely than the other "cheat books" which have preceded it. Best of all are the maps, included for each adventure. Saves a lot of stupid busywork. The maps are kept separate from the hard stuff—the solutions

to the dilemmas. Only if you are miserably stuck should you go to the back of this book to see the hints, which are not as cryptic as the author implies, but are coldly effective. "Move Rock. Get Rock (Need Wagon), Lock Box and Get Key." Best to have someone read you the hint for your particular dilemma, so you won't see the solutions to other puzzles in the game—unfortunately on the same page.

Not only adventure games here, but maps and hints for role-playing games, too. The WIZARDRY (p. 44) and ULTIMA (p. 45) stuff will be worth the price of the book for novices of those quests. And there's a discriminating buyer's guide to help you choose your next Infocom or Sierra or Penguin epic. (Besides solving games, author Kim Schuette rates them.) Schuette dedicates the book to his "computer widow," and I believe that appellation, since only a person chronically addicted to computer adventures could have written this valuable tome. Unfortunately for his "computer widow," a Volume II is promised.



This map of LLYLGAMYN would take hours to compile yourself, but since it's printed in THE BOOK OF ADVENTURE GAMES, you can save yourself a lot of stupid busywork and get on with playing LEGACY OF LLYLGAMYN.

The classiest adventures around . . .

ZORK I, II

Marc Blank and Dave Lebling; ZORK I; Atari & Commodore versions, \$34.95; all other versions, \$39.95. ZORK II; Atari & Commodore versions, \$39.95; all other versions, \$44.95.

PLANETFALL

Steven Meretzky; Atari & Commodore versions, \$34.95; all other versions, \$39.95.

DEADLINE

Marc Blank; Atari & Commodore versions, \$44.95; all other versions, \$49.95.

SUSPECT ★

Dave Lebling; Atari & Commodore versions, \$39.95; all other versions, \$44.95.

HITCHHIKER'S GUIDE TO THE GALAXY ★

Douglas Adams and Steven Meretzky; Atari & Commodore versions, \$34.95; all other versions, \$39.95.

All copy-protected. Available for the Apple II family • Macintosh • Apricot • Atari • Commodore 64 • CP/M (8" disk) • DEC/Rainbow • Epson QX-10 • IBM PC/PCjr • Kaypro II • MS-DOS 2.0 machines • TI 99/4A • TI Professional • TRS-80 Model III; all 48K; Infocom, Inc., 125 Cambridge Park Dr., Cambridge, MA 02140; 800/262-6868; Commodore versions (\$39.95) also available for all (with the exception of PLANETFALL and on the Commodore +4 only for HITCHHIKER'S GUIDE) on Commodore Business Machines, 1200 Wilson Dr., West Chester, PA 19380; 215/431-9100; ZORK I (\$39.95) for the TRS-80 Models III & 4 available at your local Radio Shack dealer.

STEVEN LEVY: The Infocom company was started by people who saw the original ADVENTURE on an MIT computer and respectfully tried to top it with ZORK. Now solely microcomputer-based, Infocom is known as *the* text-adventure company, and deservedly so. All its games accept full-sentence answers, and the prose is written by writers, or people who write like writers (same thing). Infocom seems to be aiming at a literate interactive fiction. Each of its products is top quality, with the most colorful documentation in the business, and each runs on a wide variety of machines.

ROE ADAMS: ZORK II is my favorite, because the quality of the puzzles is superior. Anyone can make a puzzle too contorted to solve—these are puzzles that seem incredibly complicated but in retrospect, after you figure them out, seem ridiculously simple. Once I got stuck at two different places in the game—an impassable ice cavern and a dangerous dragon. Eventually I noticed that when I hit the dragon one time, he ignored me. If I hit him three times, he fried me to death. But if I hit him only twice in a row, he got mad and followed me into the next room. Since I know that the Infocom people do things for a reason, I asked myself, "Where would I have a dragon follow me?" To the ice cavern! Sure enough, when we got there, the dragon saw his reflection in the ice—you know how territorial dragons are—attacked, and melted the ice. The resulting flood drowned him and I'd solved both problems.

RICHARD DALTON: Novice-to-intermediate-level PLANETFALL stars an inept junior officer in the Stellar Patrol who later gets an obtuse robot named Floyd as a sidekick—Floyd doesn't just show up; you have to find and activate him. This game is a good deal more human than the ZORKs, but since you wind up going through the same areas repetitively, the gags can get a bit stale. Balancing this, PLANETFALL's 600-word vocabulary allows you to give some fairly bizarre instructions and still escape the dreaded "I don't understand that word" response. Packaging coup: you get three postcards from the planets you visit to send your friends—for example, the one from Accardi-3 that cites "the exotic anatomical charms of the Gabriilic Hyphenated Woman."

STEVEN LEVY: I'm lousy at reading detective novels; I invariably wind up peeking at the end to see whodunit. Both DEADLINE and SUSPECT are fine antidotes to that. Players have the same limitations and powers as real crime-solvers: armed with limited information and hampered by limited time, they must question suspects, confront them

with evidence, and gradually strip off the layers of deceit and scandal until the real culprit is brought to justice. Despite the posh settings of these scenarios, you'll find both as steamy as **Chinatown**. In DEADLINE, at least, you're only the Detective—in SUSPECT you have the added incentive of being the prime candidate for Murder One. Other programs leave me sighing for powers the computer doesn't have. These two leave me dumbstruck at how much power the programmers have exploited.

JUDITH LUCERO TURCHIN: HITCHHIKER'S was co-written by real-life author Douglas Adams and Steven "PLANETFALL" Meretzky—a partnership that produces a funny, fascinating game. While the setting is familiar to fans of Adams' books, the solutions must be original, and the game is more challenging than the "Standard Level" designation might imply. Cause-and-effect is not as immediately obvious, and the game even *lies* to you at one point. Be assured, Adams' skewed universe is internally consistent; it's just, well . . . skewed.

Expert Adventuring

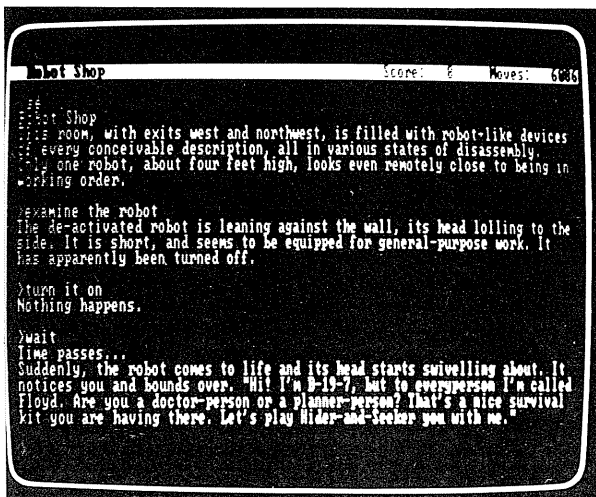
STEVEN LEVY: No one in the world is better at solving adventure or role-playing games than Roe Adams. Companies hire him to play-test games, and on occasion he's embarrassed them by finding the solution to their months-in-creation double-disk monsters in as little as twenty minutes. Here's how he goes about starting an adventure.

ROE ADAMS: Start with novice-level games. After you've solved four or five of those, you'll be ready for the intermediate and eventually the expert levels.

You have to learn how to "balloon-map." This looks something like an organizational chart, with a circle for each place your character can go, and a line leading up to each place he could go from there.

The first time through the game, don't *do* anything. Just go from each direction in each room and mark down what's there. Make sure you don't miss a direction. While it's tempting to try things out, hold back until you've mapped everything out. Then you can go back and open doors—probably with keys you know the location of already.

Keep trying options, save the game on disk often, and exhaust all possibilities. Sooner or later, the solution will become clear.



A magic moment in PLANETFALL: your nebbishy character, after a couple hours of wandering around a deserted planet, finds a friend: a frisky robot named Floyd. The warm relationship you develop with this robotic fellow is indicative of the depth of all the Infocom games.

Bright graphics, punchy parser . . .

THE QUEST

Snell, Toler & Rea; Apple II family • Atari
 • Commodore 64 • IBM PC compatibles; \$34.95
 • Macintosh; \$39.95; copy-protected? YES;
 Penguin Software, 830 4th Ave., P.O. Box 311,
 Geneva, IL 60134; 312/232-1984.

TRANSYLVANIA

Antonio Antiochia. Copy-protected. Apple II
 family; IBM PC and compatibles/PCjr; Atari;
 Commodore 64; \$34.95. Macintosh, \$39.95.
 Penguin Software, 830 4th Ave., P.O. Box 311,
 Geneva, IL 60134; 312/232-1984.

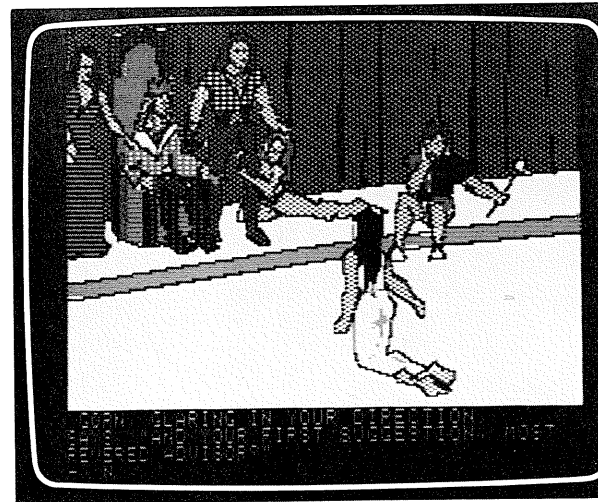
SHAY ADDAMS: Lots of adventures incorporate the word "quest" in their titles, but none can match the sprawling expanse of this "days of yore" scenario, which challenges you to track and slay an elusive dragon. You'll travel down vividly colored country lanes, discover ancient civilizations, combat lizard men, and ogle a scantily clad redhead while solving some clever puzzles.

The twist in this game is that your character is accompanied throughout by a tight-lipped knight-in-arms named Gorn. He has a mind of his own, and sometimes you have to convince him to do things he's not inclined to do.

I usually prefer Infocom's all-text adventures (p. 42) to the picture variety, but Penguin Software's atypically intelligent parser (the part of the program that interprets your typed-in commands) won me over. It accepts complete, even multiple, sentences—most graphic adventures are hampered by two-word parsers that force you to depend on actions like LOOK ROCK. The high-res graphics are equally impressive, some of the most detailed you'll see in such a game. (Apple IIe owners with an extended 80-column card will be enthralled by a double hi-res version offering 560 X 192 resolution graphics.) Access time is brisk, so the 200 various scenes (twice as many as in most similar games I've tried) are quickly splashed across the screen.

Most unusual moment: when you encounter the aforementioned redhead, she drags Gorn into a back room. You see the door slam shut. After a while they reappear. No explanation offered.

STEVEN LEVY: I agree about Penguin's excellent parser and graphics. My favorite Penguin is TRANSYLVANIA, kind of a horror story in which you're chased by goblins and werewolves. The Macintosh version is easiest to play, since it keeps your most recent commands in view and fills in the screen fast.



While setting out on THE QUEST, you visit the King, who's enjoying comfort you won't experience for quite a while. Meanwhile, your companion, Gorn, hooks up with a hot redhead.

Role Playing

Capitalists from outer space . . .

SUNDOG

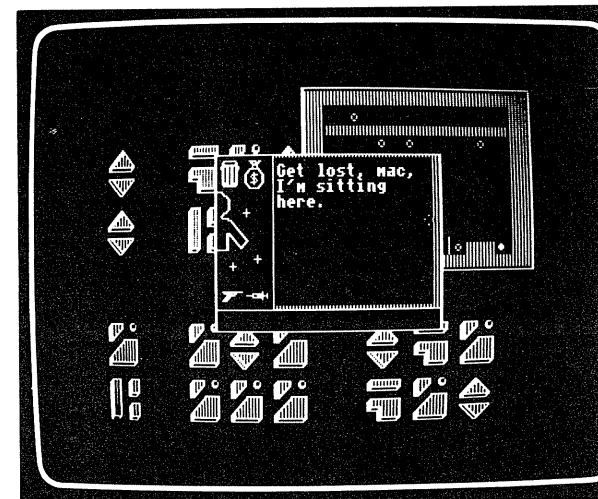
Bruce Webster and Wayne Holder. Version 2.0. Copy-protected. \$39.95 (street \$27). Apple II family. FTL Games, Inc., 7907 Ostrow St., Suite F, San Diego, CA 92111; 619/279-5711.

STEVEN LEVY: Theme: an interplanetary adventure which requires the player to reach his or her quest by going into business. Fortunately, the game is not in the least oppressive about the process, and is utterly fascinating in creating a little world in and of itself.

SUNDOG is a role-playing game—one in which you create your own character—with a twist. It's totally controlled by joystick. For each choice you make, you open little windows—à la the Macintosh computer—which give you options for, for example, defining your character's attributes. And you'd better choose wisely, because as the inheritor of your uncle's aging trader

spaceship you will be going from planet to planet in order to buy goods at auctions and sell them in some other galaxy at a profit. Winning the game requires paying off the debts you're saddled with in the beginning and vindicating the family name. It not only sounds like a movie, it plays like one. At all times, you actually see your character (or a dot that represents him) moving through the spaceship, or the towns he visits on various planets, or through space itself (navigated through cleverly conceived star-map windows). In one case, you leave the spaceship, guide your character through a town, enter a bar, and ask the bartender where someone can buy a gun. The barkeep directs you to a booth and while you're waiting, you see one of the customers drift over to the booth. Then the customer asks you what you might want to pay for this gun. Fascinating.

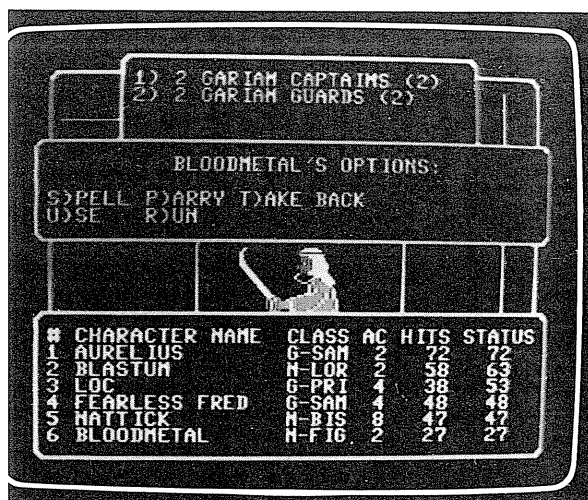
SUNDOG is one of those hours-and-hours games that can make your nights late ones for weeks.



I piloted my SUNDOG spaceship to the planet Glory I and wandered through its spaceport. Eventually I came to a bar that sold "food, drink, or information." SUNDOG's universe contains dozens of other planets; you'll need to visit many of them to fulfill your quest and vindicate the family name.

There is nothing mindless about mastering a video game. The games demand skills that are complex and differentiated. Some of them begin to constitute a socialization into the computer culture: you interact with a program, you learn how to learn what it can do, you get used to assimilating large amounts of information about structure and strategy by interacting with a dynamic screen display. And when one game is mastered, there is thinking about how to generalize strategies to other games. There is learning how to learn.

—Sherry Turkle, *The Second Self, Computers and the Human Spirit*



The third and most advanced WIZARDRY scenario, the LEGACY OF LLYLGAMYN, featuring a windowing, Lisa-like display. Here you see the options available to your party before encountering that fierce looking fellow with the sabre.

What Do You Do When You're at Witt's End?

WIZISYSTEM MANUAL

Mike Nichols; 1984; 100 pp.; Apple version, \$15; IBM or Macintosh version, \$10; also maps, \$5/scenario; Nichols Services, 6901 Buckeye Way, Columbus, GA 31904; 404/323-9227; or COMPUTER LITERACY.

STEVEN LEVY: Role-playing programs like WIZARDRY or ULTIMA are frighteningly complicated, forcing hours of play before you develop a character strong or smart enough to advance to higher levels. The challenge is so tough that a cottage industry has developed to lend support. Most commonly the vendors in this "cheat" industry work out of their homes, selling maps, hint sheets, or floppy disks with programs to "resurrect" slain characters (or, much to the dismay of purists, creating new supercharacters without "earning" the powerful characteristics). I've used some of the programs to create characters, and though they work well I can't recommend them, because the power corrupts—it's not as much fun to build your character when you know you can create a more devastating one in five minutes.

On the other hand, I found one service helpful and fascinating in its own right: Nichols' Services, which publishes aids for those lost in the worlds of WIZARDRY and ULTIMA. Mike Nichols' **Wizisystem** is a passionate rebuttal to the part of the WIZARDRY manual that states the less said about rules and parameters the better. **Wizisystem** says plenty: Nichols has pondered the lessons of his hundreds of hours within the dungeons of the Mad Overlord, and he offers himself as your

Dungeons and Dragons
brilliantly realized . . .

WIZARDRY

PROVING GROUNDS OF THE MAD OVERLORD

Andrew Greenberg & Robert Woodhead; Apple II family • Apple III; \$50 • IBM PC compatibles • IBM PCjr; 64K; \$60; copy-protected? YES; Sir-Tech Software, Inc., 6 Main St., Ogdensburg, NY 13669; 315/393-6633.

KNIGHT OF DIAMONDS

Andrew Greenberg & Robert Woodhead; Apple II family • Apple III; \$34.95; copy-protected? YES; Sir-Tech Software, Inc., 6 Main St., Ogdensburg, NY 13669; 315/393-6633.

LEGACY OF LLYLGAMYN

Andrew Greenberg & Robert Woodhead; Apple II family • Apple III; \$39.95 copy-protected? YES; Sir-Tech Software, Inc., 6 Main St., Ogdensburg, NY 13669; 315/393-6633.

guide in this opinionated, chatty, 100-plus page opus devoted to the three WIZARDRY scenarios. (For MS-DOS and Macintosh users, who so far are limited to the first scenario, Nichols publishes an abbreviated, slightly cheaper version.) It illuminates WIZARDRY without taking any of the fun away.

The same can be said about his more recent ULTISYSTEM (\$15; 83 pages), a compendium of strategy hints and maps for ULTIMA II and III. The most fanatic buffs will want to look at the occasionally published **Wizinews** newsletter (\$10/yr; 4 issues) covering ULTIMA, WIZARDRY, and other fantasy thrillers as well.

From Nichols's **Wizisystem**:

Notes on Character Classes

MAGE (minimum IQ 11, available to new characters). Mages are poor fighters but learn the spells that are most effective in combat. They are very limited as to equipment and can use only those magical items suited to their class and alignment.

From **Ultisystem**:

"Good planning is essential to a successful heist. The following deals specifically with the food caper, but it can be applied to other fiendish plots as well . . . (1) the Guards are ever watchful and come running at the first hint of something fishy; (2) they can run almost twice as fast as you can unless you have a horse; (3) you have to be pretty strong to defeat them; and (4) they are stupid and won't remember you when you next enter their precinct."

WILLIAM MICHAEL BROWN: *The classic.* Sure, this trilogy is adolescent and gory and violent and weird. Just like the *Iliad*. It's also the most enduringly intelligent, even wry, Dungeons and Dragons-style role-playing game around, informed by a deep and sincere love of the fantastic. Like classic literature, the game has something to say about Good and Evil and the Meaning of Life—and since when have you booted a disk that addressed those human topics?

The three distinct games of the trilogy share basic D&D play mechanics: Create a few characters, equip them, and then send them into a multilevel dungeon—there to find better weapons and armor, gold, and other treasures; do battle with monsters; and discover a magic solution to various dangers threatening the kingdom of Llylgamyn.

All three games are linked: you create brand-new characters in PROVING GROUNDS; only survivors can go on to the quests in KNIGHT and LLYLGAMYN. The mechanics of creating and equipping characters are very simple, handled by clear menus. The core of the game is dungeon exploration: As your party moves around the maze, you see it as though you were inside it. Since you can rarely see more than a few steps ahead of the party, making maps is imperative (I usually do this on quadrille paper). Without a map you can get lost in only a few steps and are easy prey to monsters. While you're exploring, subsidiary menus at the side of the 3-D screen keep you posted on your progress. LLYLGAMYN, the most advanced of the trilogy, has a dazzling LISA-like windowing text-and-graphics display.

The dungeons are *fiendishly* designed: pits, traps, teleporting doors, and dark areas that make mapping incredibly hard; witty riddles and puzzles that appear as inscriptions on random walls or glowing in the air; odd statuary and furniture; enchanted swords and cursed rings; even entire individual structures, such as demon barracks and castles, tucked away in various corners. You're totally on your own in figuring out what any of it is for. Meanwhile, you've got to cope with more or less constant attacks from hundreds of varieties of marauding monsters. It's best to dip in a little way at first, try to grab some gold and not meet too many monsters; then dash up and rest before beginning again.

Like **Dune** or **Lord of the Rings**, WIZARDRY is a completely imagined, self-contained world. Anybody who buys PROVING GROUNDS may be on the way to a lifelong addiction.

Role-playing quest marked by challenge and whimsy . . .

ULTIMA II

Richard "Lord British" Garriott; Apple II family; 48K • Atari (disk); 48K • Commodore 64 (disk) • IBM PC compatibles; 64K; IBM PCjr • Macintosh; \$60; color recommended; copy-protected? YES; Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614; 209/683-6858.

STEVEN LEVY: I admit to long sessions with ULTIMA II. In contrast to WIZARDRY's first-person perspective, here you get a bird's-eye view of the single character you create to do battle with evil Wizard Minax. But since dungeons are only a small part of your travels—you pass through towns, castles, seas, and outer space—the maplike graphics are just fine (though I would like to be able to turn off the shrill sounds, especially when monsters attack). Don't plan on finishing quickly, and count on lots of surprises and some tough challenges. This is second in a trilogy (ULTIMA I, the sluggish opener, is best left on the shelf) and as the following review implies, author Richard "Lord British" Garriott just gets better.

EXODUS: ULTIMA III

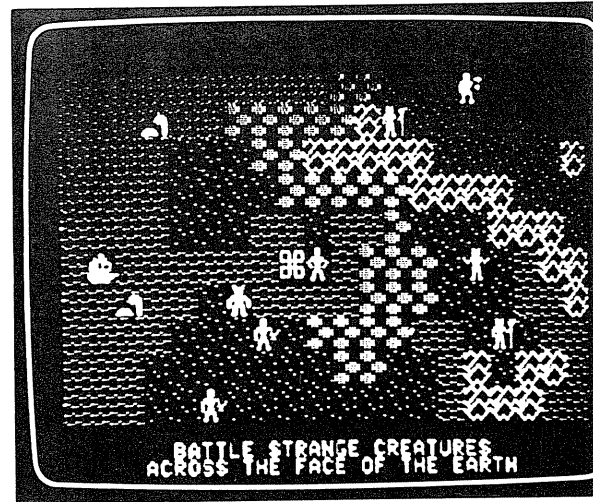
Richard "Lord British" Garriott; Apple II family; 48K; Mockingboard optional • Atari; 48K • Commodore 64 • IBM PC compatibles; PCjr; 64K; color graphics card; \$60; copy-protected? YES; Origin Systems, Inc., 340 Harvey Rd., Manchester, NH 03103; 603/644-3360.

KEVIN STREHLO: EXODUS: ULTIMA III, the latest in Lord British's dense, almost rococo graphic fantasy adventures, expands on the considerable ULTIMA mythology. While your opponents in the first two ULTIMAs were clearly defined, EXODUS remains a mystery until the very end. So much the better. As you begin forming your characters (a party of characters, à la WIZARDRY, whereas previous ULTIMAs allowed you but a solitary gladiator), only one thing is certain: You're in for a long adventure.

EXODUS: ULTIMA III is quite a challenge: Lord British can put you through hell for a single lousy clue. But don't worry: It will begin to make sense eventually—if your characters survive. The game comes with three separate manuals and an unfinished map of Sosario, the fantasy world. The sheer bulk of the information makes it difficult to remember, as the clock of battle ticks away, exactly which command sends, say, a potent ball of lightning down the throats of your enemy. Was it the incantation of Mittar, or one of the supplications from the Liturgy of Truth? Make notes in the player-reference card, so you don't have to thumb through the documentation's medieval-flavored prose while your intrepid band gets pounded by a gaggle of giants.

The dungeons of ULTIMA III are much more interesting than those of the ULTIMAs that preceded it, and III has better graphics too, but its main strength is that it is even tougher to crack. (That's saying a lot—I know an accountant who's been trying to solve ULTIMA II for two years.) Penetrate III's inner sanctum without the proper exotic weapons, and you are but smoldering ash before the great dragons. Pay too little attention to tidal forces, and you'll never find the disappearing city of Dawn. There are many ways to fail, and only one way to win and discover the awful secret of EXODUS. That's why ULTIMA players are so fanatic—they have to be in order to finish the damn games. But even those who never finish seem to come back for more when the next ULTIMA hits the streets.

ULTIMA III gives a colorful graphic display of your party, the surrounding geography, and the assortment of creatures that threaten your continued existence. Here you face off, à la the rumble scene in West Side Story, against a band of murderous Orcs.



A CP/M gem captured by modem . . .

WIZARD'S CASTLE

IBM PC compatibles; \$6/disk plus \$4/order for shipping; copy-protected? NO; PC Software Interest Group, 1030 East Duane, Suite J, Sunnyvale, CA 94086; 408/730-9291 • CP/M, MS-DOS versions; \$10 per disk; Public Domain Software Copying Company, 33 Gold St., New York, NY 10038; 212/732-2565 • Public domain: available on various CP/M BBS by telecomputing; runs on CP/M, requires no extra graphics.

RANDALL ROTHENBERG: When I purchased my Osborne I told friends and family I had but one purpose: mulching words. But in truth, I wanted to play games. Little did I know that CP/M would stand in the way of me and my secret desire. So few games! Nothing much stood between me and my wordsmithing.

Until I discovered telecomputing. Bulletin board systems (see Telecommunicating, pp. 148-149) opened up the game-playing world I'd missed. They also introduced me to a whole new set of frustrations. I'd spend 45 minutes downloading a massive game file, unsqueeze the damn thing, and load it, only to find that the version of BASIC in which it was written was incompatible with Ozzie's MBASIC.

Hence my joy over WIZARD'S CASTLE. I located it on the Technical BBS in Dearborn, Michigan. Although my version was written for the Heath, it runs flawlessly on the Osborne I. In the months I've owned CASTLE, it has provided so many hours of intrigue that I'm embarrassed to give an exact number.

In contrast with those in adventure games, CASTLE's maze is coherent, a cube-shaped three-dimensional fortress. Each time you play, the castle is randomly stocked with several hundred monsters (twelve kinds, from kobold to orc to gargoyle), treasures (eight varieties, each with the power to ward off a different spell), vendors, warps, sinkholes, books, and chests (the latter two items to be opened at the player's peril). The goal of the game is, first, to locate the Runestaff—in the possession of an unknown beast, which unfortunately must be slaughtered before it will relinquish it—and then to use the Runestaff's power to teleport into the (also unknown) room that hides the mysterious Orb of Zot. Oh, yeah: You've also got to get out of the castle alive.

Easier said than done. I won my first game after God knows how many attempts. It took me 1000 moves over three hours of playing time. The chief problem is the constantly shifting attributes of the player's character, which determine whether a player can attack a monster, cast a spell . . . indeed, stay alive. Slip below one point in any of the attributes, and be prepared to cross the Stygian gulf, my friends. In order to increase attribute points, gold must be found, treasures sold, and monsters—each of which guards a cache of some sort—slain. Additional points can be purchased from the sleazy vendors who infest the castle.

CASTLE has one additional attraction: On Technical BBS, it was accompanied by a separate superb documentation file, a rarity for CP/M public domain games. CASTLE's rules explain everything without spoiling the excitement of the unknown. I keep coming back for more. And now I love my Osborne.

WRITING

Stewart Brand, Domain Editor

STEWART BRAND: Said to account for more than 60% of personal computer use, word processing programs are doing to writing what pocket calculators did to figuring. Cue the testimonials:

JUSTIN KAPLAN (biographer): It's sexy, exhilarating, and addictive, as different from a typewriter as flying is from dog paddling. (From *Boston Review*)

CHARLES SPEZZANO: A good word processing program can change your whole attitude toward writing, while pens and paper keep you stuck in your old compulsive habits.

ANONYMOUS: Though not the first priority when businesses buy a computer, word processing becomes the justification for the whole system. (From *Boardroom Reports* and Hillel Segal's *Executive Computing Newsletter*)

MARGE PIERCY (novelist and poet): If I had to give up writing on my computer, I would feel I had returned to scraping letters in cuneiform on clay tablets The writing itself is far more serious than on the typewriter. There is no punishment for revising and revising again Writing on the screen has a fluidity that makes compromise with what you envision silly. (From *Boston Review*)

RICHARD WANDERMAN: Word processing is wonderful, period. It's hard to separate out the wonders of word processing in general from the wonders of a good program.

STEWART BRAND: That last one is our function here. General wonders first, specifics in a minute. There's a hidden greater advantage with writing on computers: you don't just write more fluidly, you *connect* more fluidly. With telecommunications (p. 138), text can flow into and out of your computer in torrents if you let it. The fact that you always have a copy of what you've written lurking on disk leads to all sorts of broadcast behavior, like sending mildly adapted copies of the same letter or article to many audiences instead of just one—either “personalized” informally by hand or in automated profusion with one of the “Merge” features.

Spellers are a blessing. The typos you can't see because you made them and the misspellings you can't see because you think they're right are fish in a barrel for the implacable software dictionaries. One of my favorites, WORD PROOF (p. 62), will offer synonyms when you're stuck for a better word—and even insert it for you. More subtle are the style checkers like PUNCTUATION + STYLE (p. 62) that will flag your awkwardnesses and clichés and suggest an improved usage. Outline programs, like THINKTANK (p. 92) and FRAMEWORK (p. 110), can accelerate the organization of your thoughts.

If there is a problem with writing programs, it is that we become too absorbed . . .

ALFRED LEE: I really do believe I go into something like a trance. When my wife intrudes to ask my opinion about buying a lamp, I just can't handle the weight of her other world unless I get up and turn my back on the screen.

ROBERT COWAN: I would not have been able to finish my 750-page book in 5.5 months without my word processing hardware, but the quality “seems” lower. I just can't put my finger on it. I know with my word processing I'm working “smarter, not harder.” But what is it I have lost? What is it I have gained? The answer is right at the tip of my fingers . . . Did I almost state it earlier? I can't remember . . . The words have scrolled off the top of the screen and are being held deep within the crystal memory of a device I cannot understand.

STEWART BRAND: Writing is so extremely personal that people become identified with their word processing program and will brook no objectivity about it. Most people are still using the first writing program they learned. It's the native language of their fingers and all their files have sworn allegiance to its format.

STEVEN LEVY: I compare using a word processor to living with somebody. You go into it with all kinds of enthusiasms, and things are wonderful. Then, you see other word processors promising more. More features, friendlier style. The question is, is it worth tossing over a relationship in which you've invested months for a word-transpose toggle, an indexing function you'll use maybe twice, and a split-screen capability? A choice of a word processor is a major life-decision, and no one can afford (in terms of time, money, or emotional capital) to play the field.

STEWART BRAND: The bad news is, there's some 300 word processing programs out there; the good news is, with that many competing ferociously, the best are pretty good. We've been winnowing for a year. As usual, winnowing is done in part with biases. We're biased against programs that make writing and editing take place in different “modes,” because it's too easy to lose track of what mode you're in, do the wrong thing, and then have to backtrack—that eliminated SELECT and moved BANK STREET WRITER (p. 184) to Learning. We're biased against programs that make formatting (preparing for printing) be a big, separate deal—that eliminated EDIX/WORDIX and PERFECT WRITER and hurt PC-WRITE (p. 59). We're biased toward “what-you-see-is-what-you-get” programs, where bold is bold on the screen, justified is justified, there's not a lot of command or format clutter, and page breaks are shown dramatically.

We're biased against slowness in all its forms—that eliminated VALDOCS and THE LEADING EDGE (if you can destructively backspace or overtype faster than the machine, you're bound to lose stuff and have to replace it) as well as SAMNA III (stops and goes to disk for even petty errands) and IBM's PC WRITER and DISPLAYWRITE2 (laborious menu sequences for everything). All of the programs recommended here are fast.

Our major criterion is that a program *wear well*. That the constant stuff goes easy—starting up, going in and out of files, printing, moving blocks of text, deleting words and sentences, knowing where you are in the document, being reminded of a rarely used command. Popular programs like MULTIMATE and EASYWRITER II lost out by being just a bit less smooth or reliable or potent than the competition we're recommending.

In a few cases now, good word processing capabilities are turning up inside other programs. The most exemplary is the integrated program ENABLE (pp. 50 and 109).

Though this section, like the others, has been updated with a fine-gauge sieve, there's few major changes from last year. I'd love to think that's just because our judgment held up so well. It did, but the stronger reason has to do with the market. Popular writing programs each become a virtual dialect of English; they hang on and on, adapting quickly or slowly to new machine capabilities, new popular features, new fads. We favor the ones that do that. A new version number every few months is a sign the makers are serious, and it means your writing program will continue to improve for years. (However, lots of version numbers at the beginning means the original release was infested with bugs, a sign the maker was careless or greedy.)

Machines come and go. Good software lingers. The word processor market has settled down. You can shop with confidence.

Hardware. So what do you look for in hardware for writing? Three things: longevity, feel, and power. Is the manufacturer going to be around next year? How does the keyboard feel to your typing fingers, how does the screen feel to your midnight eyes? Does your machine have plenty of memory and storage and machine speed, or can they be improved later?

All the best word processors are in the IBM family. Macintosh after two years still hasn't challenged that (for good reason: it's a picture processor, words treated as pictures gain glamor but lose efficiency). But if feel outweighs power for you, and the Mac's high-resolution black-on-white screen and severely simple keyboard appeal to your bod, or you have use for wonderfully decorative writing, then get it. But get all the extras—512K memory, second disk drive or hard disk, SWITCHER (p. 115), and anything else that adds oomph.

The Kaypro and Morrow are great bargains, but the top CP/M-80 writing program, WORDSTAR, is pretty clumsy, though powerful. Word processors on the Apple IIe and IIc like WORD JUGGLER and APPLEWORKS are newer and more adroit than anything on CP/M. On the Commodore 64 you get speed (SKIWRITER II) or power (OMNIWRITER), not both. That's why it's cheap.

Suit your software to your hardware. HOMEWORD, a good program for the occasional writer, is wasted on an MS-DOS machine; you're better off with VOLKSWRITER DELUXE. Behemoth writing programs like WORDSTAR 2000 and MICROSOFT WORD flourish better with hard disks and better still with the greater machine velocity of an IBM AT or clone, or add-on boards that supercharge the PC-equivalent machine.

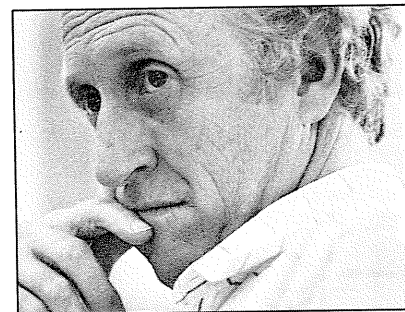
Telecommunicating. The use of word processing programs in conjunction with telecommunicating is bound to increase for the next few years, which will make the present situation worse (then hopefully better): most writing programs don't telecommunicate very well. It's awkward to "upload" files to the network, awkward to "download" to your word processor. Of the programs we recommend, only PC-WRITE and VOLKSWRITER DELUXE are gifted telecommunicators. The rest need fiddling. Charlie Spezzano did the research on this one. Here's what he found . . .

On most programs the way to prepare a document for telecommunicating is "print to file"—the document is sent to disk as if it were being sent to the printer. This cleans it of formatting peculiarities but retains the line length you want. Then with your terminal program (CROSSTALK, MITE, SMARTCOM II, etc.) you upload that file to the network.

Downloading a file is a different nuisance. Here you must strip the line ends of the carriage-return-and-line-feeds that come with the file, but without collapsing all the paragraph breaks. A way to do that is with the search-and-replace function. Have the program replace all the double-carriage-returns (the paragraph breaks) with *. Then replace all the single carriage returns with nothing. Then replace all those *s with double-carriage returns. Now your writing program has taken control of line length.

TRUTH THROUGH ARGUMENT

STEWART BRAND: Forgive the self-introduction. My perspective on the tools reviewed here is primarily that of an editor (16 years), secondarily a hack writer, thirdly an office-sharer. I don't have secretarial experience at all—the day-long dealing with other people's words in rigorously standard formats—and the section needs it. What is well represented is the experience of running small professional offices, thanks to psychiatrist Charles Spezzano who has spent more time than I, weeks to months often, immersed in each of the leading word processors, sifting and sifting toward this section. On an EIES teleconference (p. 147) a good forty voices have been debating fiercely about these programs for over two years, 1200 comments last I noticed, some of them reproduced here. The evaluating of word processors is an eternal debate; please join it.



Stewart Brand

Matt Herron

So to telecommunicate files to and from your word processor, you need either PC-WRITE or VOLKSWRITER DELUXE, or a program that can search-and-replace carriage-returns and can print to file, or a program that has its own telecommunicating sibling (PFS:WRITE has PFS:ACCESS, WORD JUGGLER has TERMINUS), such as they are. They are so-so.

Apparently automatic reformatting and easy telecommunicating don't mix. (PC-WRITE and VOLKSWRITER DELUXE don't auto-reformat, don't reshape their paragraphs around changes you make until you ask them to; all the others we recommend do. Except WORDSTAR 3.3, which uploads handily, downloads messily. Now you know why we call this whole subject "The Shame of Word Processing".)

Fixing the major source of word processing errors and slowness . . .

TYPING TUTOR III

Kriya Systems, Inc.; Apple II family • IBM PC and compatibles; 128K; \$49.95 • Macintosh; \$59.95 • Commodore 64; \$39.95; copy-protected? NO; Simon & Schuster, Electronic Publishing Group, 1230 Avenue of the Americas, New York, NY 10020; 212/245-6400.

STEWART BRAND: This most miraculous of programs enables the machine to train you to use the machine at your optimum capability. There's no more fundamental computer skill than keyboard dexterity. With it, you can operate at program speed; without it, you're always fighting your way through your fingers to the work.

TYPING TUTOR III does for typers what the aerobics books did for runners—quantify the process, take it one part at a time, and constantly reward the budding athlete with distinct progress. Better still, this program

analyzes your performance in microscopic detail (thousandths of a second) and lets you know instantly how you're doing, so you adjust and improve without even thinking about it—Skinnerian reinforcement at its best.

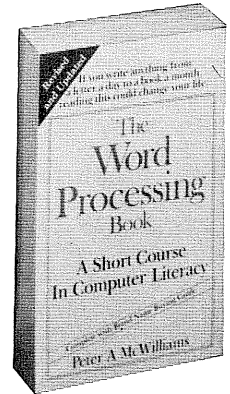
Starting with the "home row" keys the program gives you a quick drill, reports your speed in words-per-minute (WPM) and number of errors, and on to the next lesson. It begins with a 20 WPM threshold; as soon as you master a letter at that speed, it gives you different letters; letters you're not fast with are repeated until you master them. You can stop any time, and the program will remember where you left off and what your skills are till next time (it will do that for a number of students simultaneously). You can get a graph any time that shows your proficiency with the various characters and also your detailed improvement (or decay) since last time you checked the chart. Whenever drill gets old you can go play Letter Invaders and zap incoming letters and letter combinations—the game picks up on your skill level and constantly challenges it. That's amazing. Why don't more games do that?

Training choices within TYPING TUTOR III include Alphabet Keys, Number Keys, Words Test, Numbers Test, Full Keyboard Test, Standard Speed Test (handy for employers), and a customization utility. The manual is simple and inviting. Since the program runs on nearly everything, it could be used in a computer store to help decide which machine and keyboard best suit you.

Of the dozens of typing programs available, this is still the top. The closest market competitor is MASTERTYPE, which is more gaudy, more fun, less instructive, and copy protected (TYPING TUTOR III isn't). On the TRS-80 Model 100 there's a neat typing program, with game, called TUTOR+ (copy-protected? NO; cassette; \$50; Portable Computer Support Group, 11035 Harry Hines Blvd., Suite 207, Dallas TX 75229, 214/351-0564).

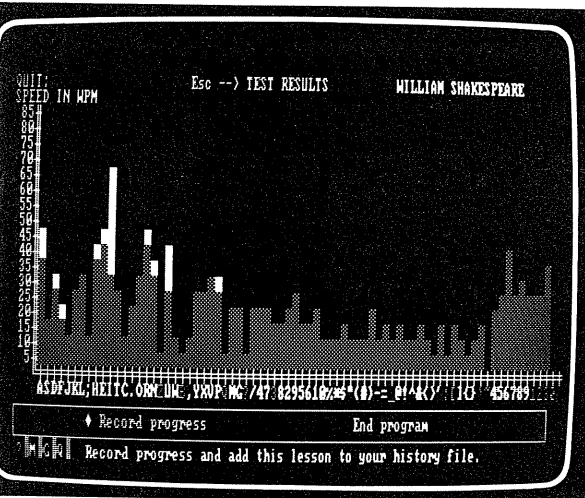
Cheery, solid . . .

THE WORD PROCESSING BOOK



The Word Processing Book (A Short Course in Computer Literacy); Peter McWilliams; revised edition, 1984; 299 pp.; \$12.95; Quantum Press, Doubleday & Co., Inc., 501 Franklin Avenue, Garden City, NY 11530; 516/294-4400; or COMPUTER LITERACY.

STEWART BRAND: The most congenial of introductions to the wonders as well as intricacies of word processing is Peter McWilliams' classic, updated and expanded in Fall '84. He's entertaining, instructive, and quite usefully judgmental about products. Though we're collaborators and friends with Peter, his shopping perspective is enough different from ours to be worth checking. If someone you know is considering word processing, this book can be an invaluable guide and encouragement.



The graph in TYPING TUTOR III shows every detail of how you're doing on the various characters (bottom row) in Words Per Minute, including improvement in performance since the last chart—it's usually dramatic.

EXPLANATION OF FEATURES ON THE COMPARATIVE CHART ON NEXT PAGE (REASONS NOT TO BUY)

STEWART BRAND: Matrix diagrams like on the next two pages are common in computer magazines—it's one of the few ways they can compare software products without offending advertisers. This one aims to be more useful. It leaves out the common stuff that all our recommended programs do—wordwrap, justification, search & replace, hard disk compatible, etc.—and concentrates on their differences. The differences are selected to be the most important ones—“important” meaning that the absence of a certain feature may make the program useless to certain users (footnotes, decimal aligning) or may greatly reduce the ease-of-use for certain intensities of word processing (split screen, “undo” command, macros). Beware of buying a program with more features than you need; they'll only hinder and distract you. On the other hand, it's interesting to have a program that still invites exploration months after you've begun using it.

I threw in three all-in-ones—APPLEWORKS (p. 108), ENABLE (p. 109), FRAMEWORK (p. 110)—to compare their integrated word processors to the specialized ones in this section.

CHARLES SPEZZANO: I divide the field of word processors into:

- **Lightweight**—strictly correspondence and memos;
- **Middleweight**—frequent writing of letters and reports or articles, but no need for advanced features like automatic footnotes or split-screens, no very long documents (over twenty-five pages);
- **Heavyweight**—a full complement of advanced features that will take you through articles and complex (varying formats) reports all the way up to books.

STEWART BRAND: Roughly from light to heavyweight, certainly from left to right . . . **Recommended to run on** . . . The machines that make the program worthy. **Not copy protected** For the user, copy protection is a nuisance, reducing adaptability of the program in your working situation.

Minimum memory required/maximum memory useable The minimum tells if it'll run on your machine; the maximum tells if it'll take full advantage of your expensive acres of RAM.

Useable lines on screen A critical matter for many; tunnel vision is the major restriction of computer writing; few available lines for writing makes it worse. **Maximum file size (double-spaced pages)** Estimated at 250 words per page (about 1.6K); if you do long documents and the program has short files, it better link files for printing. **Spellchecks easily with** . . . Some have their own proprietary spellers; some are comfortable with good generic ones (see p. 62).

Telecommunicates easily with . . . Same deal; if you telecommunicate much it is a major consideration, making PC-WRITE and VOLKSWRITER DELUXE and XYWRITE II+ stand out (see pp. 138-157). **Useable for programming** A surprising number of people use their word processor for writing code as well as text. **Supports hard disk directories** . . . A word processor without this sub-filing capability is wasted on a hard disk.

“Undo” command available It means you can replace text you've deleted either inadvertently or because you wanted to see what the copy looked like without it; a boon. **Automatic reformatting** The text adjusts immediately around any changes you make instead of requiring you to request the adjustment; another boon. **On-screen page breaks/page numbers** If you're at all oriented to the printed document this becomes quite important; also an easy way to find your place in the text. **Split screen** Permits simultaneous viewing and editing of two or more documents or parts of documents; critical if you're blending texts; irrelevant otherwise. **Can print direct from memory** Handy for short-document people like me who don't want to have to save to disk (there goes speed and disk space) just to print out something ephemeral. **Continuously saves text/automatically backs up files** Disaster insurance; I thought both were a mild nuisance until both saved hours of otherwise lost work; “continuously saves” periodically sips your text onto disk (with a tiny work pause, on some you can set the periodicity); “automatically backs up” keeps the previous draft on disk just in case—halves the available disk storage. **Macros available** Keyboard enhancers like PROKEY and SMARTKEY (p. 174) within the program that enable you to take shortcuts by putting routine text or routine command sequences under keys that you assign. **Mouse compatible** If you drive your cursor around the screen a lot, especially for editing, a mouse is fast, but it takes half your fingers off the keyboard.

Links files for printing Long files can get unwieldy, so it's better (and safer) to break them up; linking means a sequence of files can be printed out as one long document, with page numbers printed appropriately. **Merge capability** Personalized form letters usually; a monumental convenience; “conditional merge” permits automatic selectivity like “send to everybody in this list except the Californians”; at some point of volume you're better off with a full-scale file manager program like PFS:FILE (p. 80). **Page width possible** Especially if you're working with spreadsheets this can be crucial; otherwise irrelevant. **Decimal alignment/math capability** If you're doing columns of dollar figures, this'll make them line up; math is pocket-calculator level, usually less convenient than one. **Footnote capability** A major chore made easier; some offer the choice of end-of-text or same-page for placement. **Multicolumn formatting/whole columns may be moved** Handy for newsletters, reports and such; moving a column can be like Rubik's cube if the program doesn't help. **Can edit while printing/proportional printing** Lets you force ahead writing while you're printing; proportional printing spaces *i*'s more narrowly than *m*'s, so the result looks typeset; pretty.

Bolding, underlining, flush right, and centering are all simple to use: just press the bold, underline, flush right or center key, type and it will be bolded, underlined, flush right or centered.

This is an example of **true proportional spacing**. In proportional spacing the capital W is wider than the small i. Each print thimble or wheel has a slightly different character width and placement (a character might be a bit to the left or right when compared with other characters).

	Product	Recommended On	NOT Copy-Protected	Minimum Memory Required	Maximum Memory Useable	Useable Lines On Screen	Max. File Size (Double Spaced Pages)	Spellchecks Easily With . . .	Telecommunicates Easily With . . .	Useable for Programming	Supports Hard Disk Subdirectories	"Undo" Command Available	Automatic Reformatting
LIGHTWEIGHT	HOMEWORD 2.4: Apple, Commodore 1.0: Atari 2.0: IBM \$50-\$70, p. 52	Commodore 64, Atari 800, Apple II family, IBM PC, PCjr		48K Apple, Atari; 128K IBM	48K Atari, 128K Apple (w/extended memory), virtual memory IBM	15: can be 24 on IBM	12-35 Apple, 3 Atari, 5 Commodore, IBM-disk is limit	HOMEWORD SPELLER, 28,000 to 45,000 words-\$35-\$50; SENSIBLE SPELLER, 80,000 words-\$125	requires adding carriage returns		✓ (Apple & IBM)	✓ -"Undo" buffer, 2K maximum 3K on IIe	✓
	SKIWRITER II \$50 p. 52	Commodore 64		64K	64K	24		Any Commodore spellchecker	✓-Built-in	✓			✓
	MACWRITE 4.5, \$195 p. 54	Macintosh	✓	128K	512K	22 maximum (dependent on font size)	240	HAYDEN SPELLER, 20,000 words-\$80; MAC-SPELL-RIGHT, 40,000 words-\$89*	MAC-TERMINAL \$100 MAC-TEP (Public Domain)			✓-can flick back and forth	✓
	PFS:WRITE A: Apple; B: IBM p. 54	Apple IIe, IIc-\$125 IBM PC/PCjr-\$140		64K Apple 128K IBM	64K Apple 128K IBM	22	32 Apple 60 IBM	PFS:PROOF, 100,000 words-\$95	With "Print to Disk" Function		✓		✓
MIDDLEWEIGHT	ATARIWRITER \$40 p. 53	Atari 800XL, 1200		16-64K	64K	24	20	ATARI PROOFREADER, 36,000 words-\$50				✓	✓
	OMNIWRITER \$35, p. 52	Commodore 64		64K	64K	23	23	✓-30,000 words					✓
	WORD JUGGLER 2.8, \$189 p. 55	Apple II, IIe		64K IIe 128K IIc	128K	23	disk is limit	✓-LEXICHECK, 50,000 words	✓-Terminus		✓	✓	✓
	PC-WRITE 2.5, \$10; \$75 full reg. p. 59	IBM PC, PCjr	✓	128K	192K	24	40	WORD PROOF, 125,000 words-\$40	Anything	✓	✓		
	VOLKSWRITER DELUXE 2.2, \$295 p. 58	IBM PC	✓	128K	640K	24: 43 w/IBM Enhanced Graphics Card	disk is limit	WORD PROOF, 125,000 words-\$40 THE WORD PLUS, 45,000 words-\$150	Anything	✓	✓		
	WORDSTAR 3.3, \$350 p. 56	CP/M-80 CP/M-86 MS-DOS	✓	56K CP/M-80, 128K CP/M-86, 128K MS-DOS	256K	14-22	disk is limit	CORRECTSTAR, 65,000 words (MS-DOS only)-\$145; THE WORD PLUS, 45,000 words-\$150	requires reformatting incoming text	✓			
	NEWWORD 2.14: MS-DOS, \$249 2.16: CP/M, \$100 p. 56	CP/M MS-DOS	✓	56K CP/M 96K MS-DOS	256K	17-25	disk is limit	THE WORD PLUS, 45,000 words-\$150	requires reformatting incoming text	✓		✓-Limit 100 characters; can be modif. by user	
	MICROSOFT WORD (Macintosh) 1.05, \$195 p. 58	Macintosh		128K	512K	22 maximum (dependent on font size)	disk is limit	HAYDEN SPELLER, 20,000 words-\$80; THE-RIGHT-WORD, 40,000 words-\$89*	any Mac telecommunications program		✓	✓	✓
	APPLEWORKS 1.2, \$250 p. 113	Apple IIe, IIc	✓	64K	128K	20	56	SENSIBLE SPELLER, 80,000 words-\$125; MEGAWORKS, 40,000 words-\$125	APPLE ACCESS II-\$75 or other Apple terminal programs	✓	✓		✓
	ENABLE 1.0, \$695 p. 109	IBM PC	✓	256K	Depends on features	23	disk is limit	Any ASCII spell checker	✓-Built-in		✓		✓
FRAMEWORK 1.1, \$695 p. 110	IBM PC		384K	640K	21 IBM; 29 AT&T 6300	disk is limit		✓	✓		✓	✓	
HEAVYWEIGHT	WORDSTAR 2000 PLUS 1.01, \$595 p. 57	IBM PC	✓	256K PC; 320K PC AT	320K	23	disk is limit	✓-65,000 words	✓-Built-in	✓	✓	✓	✓
	XYWRITE II + \$300 p. 61	IBM PC	✓	192K	640K	22	disk is limit	WORD PROOF, 125,000 words-\$40	requires reformatting of incoming text	✓	✓		✓
	WORDPERFECT 4.0, \$495 p. 60	IBM PC	✓	192K	256K	24	disk is limit	✓-100,000 words	requires reformatting of incoming text	✓	✓		✓
	MICROSOFT WORD (MS-DOS) 2.0, \$475** p. 60	IBM PC		256K	320K	19; 39 with Hercules Card	disk is limit	✓-80,000 words	requires reformatting of incoming text	✓	✓	✓	✓

*Includes \$50 rebate towards purchase of Microsoft Mouse.

Red indicates integrated program.

**MAC-SPELL-RIGHT and THE-RIGHT-WORD: Assimilation, Inc., 485 Alberto Way, Los Gatos, CA 95030; 800/622-5464 or, in CA, 800/421-0243.

(REASONS NOT TO BUY)

On-Screen Page Breaks/ Page Numbers	Split Screen	Can Print Direct from Memory	Continually Saves Text	Auto-matically Backs Up Files	Macros Available	Mouse Compatible	Links Files For Printing	Merge Capabil-ity	Page Width Possible	Decimal Alignment/ Math Capability	Footnote Capabil-ity	Multi-Column Formatting	Whole Columns May Be Moved	Can Edit While Printing	Proportional Printing
✓/✓		✓		✓			✓	HOMEWORD FILER (IBM-\$100, Apple-\$70)	132 columns						
✓/✓		✓							132 columns						✓
✓/✓		✓				✓-requires mouse		MEGA-MERGE-\$125*	116 columns max. (dependent on font size & style)	✓/✓ built-in calculator	✓		✓		✓
✓/✓		✓					✓	PFS-FILE-Apple-\$125 IBM-\$140	78 columns	✓/			✓		
Both in "Preview Mode" only		✓					✓		132 columns			✓			✓
✓/✓		✓					✓	✓	240 columns		✓	✓	✓		
✓/✓		✓					✓	✓-condi-tional merge	254 columns						
✓/✓			✓-op-tional	✓-op-tional	✓	✓-MOUSE SYSTEMS; MICRO-SOFT MOUSE	✓	✓	255 columns	✓/	✓				
✓/✓		✓		✓-sup-pressible			✓	✓	250 columns			✓	✓	✓-with DOS 2.0	✓
✓/✓				✓-sup-pressible		✓-MOUSE SYSTEMS; MICRO-SOFT MOUSE	Only with MAIL-MERGE-\$99	MAIL-MERGE-\$99 if purchased separately	999 columns	✓/	FOOTNOTE \$99 Digital Marketing, 2363 Boulevard Circle #8, Walnut Creek, CA 94595 (415) 947-1000	✓	✓-Awk-wardly	✓	
✓/✓				✓-sup-pressible	✓-On IBM		✓	✓-condi-tional merge	254 columns	✓/	FOOTNOTE \$99				
✓	✓	✓		✓-op-tional		✓	✓	✓	116 columns max. (dependent on font size & style)	✓/	✓	✓			✓
✓/✓-only when you ask for them		✓	✓-op-tional					MEGA-WORKS-\$125; APPLEWORKS MAILING PROGRAM-\$30 +	192 columns	✓/✓-in spreadsheet					✓
✓/✓	✓	✓			✓			✓	160 columns	✓/✓	✓	✓	✓	✓	✓
	✓	✓			✓	✓-MOUSE SYSTEMS; MICRO-SOFT MOUSE	✓	✓	255 columns	✓/✓-in spreadsheet				✓	
✓/✓	✓			✓	✓		✓	✓	256 columns	✓/✓	✓	✓	✓	✓	✓
"Review Mode" Only/✓	✓	✓		✓-op-tional	✓	Mouse patch avail-able upon request	✓	✓	255 columns	✓/✓	✓	✓	✓	✓	
✓/✓		✓		✓-op-tional	✓		✓	✓-sorter extra \$95	132 columns	✓/✓	✓	✓	✓	✓	✓
✓/✓	✓-horizon-tal & vertical	✓	✓	✓	Format & Text, Yes; Com-mand, No	✓-de-signed for mouse	✓	✓-condi-tional merge	250 columns	✓/	✓	✓		✓	✓

*MEGAMERGE: Megahaus, 5703 Oberlin Dr., San Diego, CA 92121; 619/450-1230.

+ APPLEWORKS MAILING PROGRAM: Int'l. Apple Core, 908 George St., Santa Clara, CA 95054; 408/727-7652.

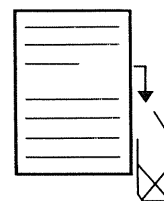
Icons make it easy to learn, easy to remember . . .

HOMEWORD

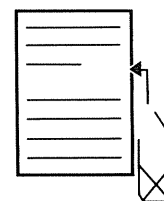
Tom Kain; version 2.4; Apple II family • version 2.0; IBM PC and compatibles; IBM PCjr; 128K; \$69.95 • version 2.4; Commodore 64 • Atari 800/800XL; \$49.95; copy-protected? YES; Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614; 209/683-6858 • IBM PC, PCjr; DOS 2.1; 128K; copy-protected? YES; \$75; IBM Entry Systems Division, P.O. Box 1328, Boca Raton, FL 33432; 800/447-4700.

STEWART BRAND: The most volatile part of the word processing market is the so-called "low end"—low-cost programs on low-cost machines for kids and beginners. Broderbund's BANK STREET WRITER ruled the roost in 1983 and is still loved by some. (Scarola defends it on p. 184 in Learning, where it may be defensible. The program was written for teaching writing—first you write, then you change modes and you edit. Being forced to work in two modes I find perpetually confusing.) In 1984 HOMEWORD took over. It costs the same, does more, does it easier, and, thanks to its use of graphics, it's easier to catch on to and to pick up again when you've been away from it for awhile.

The low-end programs may be cheap, but they're far from weak. HOMEWORD, like the others here, does wordwrap (you don't need to hit CARRIAGE RETURN at the end of a line, or even notice where the ends of lines are), does bold, underlined, and centered text, permits easy moves of blocks of text (as well as block delete and block copy), numbers your pages in sequence if you want, and automatically reformats your text around any changes you make (which is more than VOLKSWRITER DELUXE or WORDSTAR can manage). In addition it has an "Undo" command for bringing back deleted text, automatically backs up files (so you always



Erase text



Insert erased text

HOMEWORD's graphics make the program unique. When you're writing, images on the bottom of the screen show the amount of working memory left, the amount of disk storage left, and a "sketch" of each whole page as it will appear when it's printed—like a living miniature of your work. I found myself fascinated with it; no other program has such a thing.

Best on the Commodore . . .

OMNIWRITER

Kevin Lacy; Commodore 64; copy-protected? YES; \$34.95; Hesware, 390 Swift Ave., #14, South San Francisco, CA 94080; 415/871-0570, ext. 100.

STEWART BRAND: At present this is the dean of Commodore 64 word-processing programs, one you can do serious writing with. Why EASY SCRIPT from Commodore and PAPER CLIP from Batteries Included continue to sell for the Commodore 64 baffles me. They can't even manage to end lines on the screen without breaking words in the middle. At a similar price OMNIWRITER outclasses them both and includes a merge capability and a decent 30,000-word spelling checker (bless it, it'll tell you the number of words in your document).

In addition to its basic good sense OMNIWRITER is full of politenesses and clevernesses. Polite: a cue card which fits around your function keys; a good command reference card; choice of colors on the screen for text and background, easily changed to match your mood or the room's light; the file directory viewable even while you're writing. Clever: you can toggle quickly between 40-column width and 80-column (both have large letters—with the 80 you scroll sideways along the long lines) and you can write in both; tap "home," cursor goes to top of the screen, tap it again, goes to top of document; page breaks and page numbers are shown on the screen, and you can go to any page by its number. The up-to-23-page files can be linked for printing long documents. The program will blend in material from MICROSOFT MULTIPLAN (p. 70) and can go to 240 columns wide.

Fast, easy, and telecommunicates on the Commodore . . .

SKIWRITER II

Ken Skier; Commodore 64; \$49.95; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 800/624-0023 or, in NJ, 800/624-0024.

ART KLEINER: Since SKIWRITER comes on a cartridge you plug into the back of your computer, it's fast and roomy. You can fit more than 20 double-spaced pages of text into a single document. It's designed for easy telecommunicating. It handles with aplomb the normally arduous task of saving files to the Commodore disk drive.

No comparable package on any computer writes and telecommunicates for as low a price, except maybe the Radio Shack Model 100 (p. 16), and you can't play games or make music with the Model 100 when your work is done. OMNIWRITER has a speller and merge capability, but SKIWRITER has a better manual and is much easier to start with and use. I'd choose SKIWRITER.

have the previous version of a document if, God forbid, you lose the current one), and links files for printing (which is fortunate, since files are limited in size depending on your computer. For checking spelling there's HOMEWORD SPELLER (30,000 words, \$35-\$50, depending upon machine) or SENSIBLE SPELLER (80,000 words, \$125, p. 63).

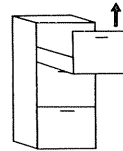
HOMEWORD's major drawback is that only 15 lines of text are displayed at a time, because of all the screen space given to the icons, and because each format command in the text takes up an additional line. That is partly compensated by the page-sketch (see photo), and also by ready access to a screen-width full-80-column display of text as it will appear when printed (may or may not be legible in detail, depending on your system; you do all your writing in 40-column width, nice for those whose minds are young or whose eyes are old).

Another apparent drawback is that once you know your way around the icon commands, they get cumbersome. It takes nine keystrokes to move a block of text, for example. Fortunately HOMEWORD has a set of control-key commands (and a good reference card) that short-cut most

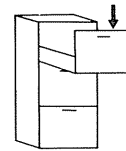
functions—a block move takes five keystrokes that way. On the IBMs you can suppress the icons entirely and get a full 24 useable writing lines on the screen.

Invitingly simple to enter, HOMEWORD becomes more sophisticated as you do, which is one of our measures of an outstanding program. The manual is good, and there's an audio cassette to talk you through your first session (always a delicate time).

When you're messing with what you've written on HOMEWORD, a different set of images—called icons—are on the bottom of the screen. They become commands when you point the cursor at them. The basic menu includes "print," "edit," "file," "layout," "customize," and "disk utilities." Those lead to 28 other icon commands, each labeled with a word indicating its function. A good beginner's program should provide constant and easy rewards for using it, and it should always leave you certain about how to back out of a corner you wander into. HOMEWORD does both.



Get document



Save document

Best on Atari . . .

ATARIWRITER

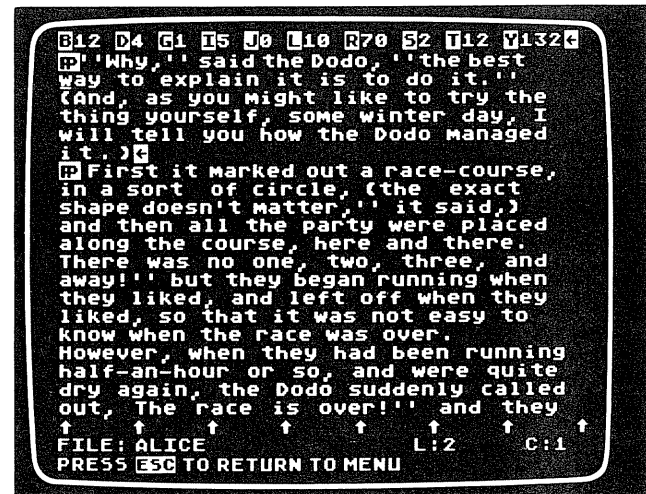
All Atari home computers; copy-protected? YES; \$39.95; Atari Corporation, P.O. Box 3427, Sunnyvale, CA 94088-3427; 408/745-4851.

STEWART BRAND: Like OMNIWRITER, ATARIWRITER is the kind of program that amazes old word-processing hands with the range of its abilities on a humble machine. It has no significant competition on the Atari. While not as fully capable as OMNIWRITER on the Commodore 64, it has some features that OMNIWRITER doesn't—an excellent manual, an "undo" command, and easy capability for proportional printing and double-wide printing. Notable limitations are the absence of bold lettering and the absence of overtyping as a way to change text (delete and insert is the only choice—my preference anyway). In "preview mode" 80 columns of text can be scanned across, but you can't edit without returning to 40 columns.

Educator Edna Mitchell runs an office at Mills College, Oakland, California, with ATARIWRITER.

EDNA MITCHELL: I had been struggling alone for many months to master WORDSTAR and had not yet become confident enough to trust any important or hurried writing to that program. Of course I knew how powerful it was, but it couldn't do it for me with the time pressures I live under daily. With ATARIWRITER I was delighted with the ease of producing material with different print types, justified margins, sub- or superscripts, underlining, and columns. I quickly learned to chain files, to reformat for printing, to move text and merge files and search for strings. I learned the hard way to watch for the limits of free memory in the Atari.

ATARIWRITER gets the user into the program instantly with a mini-overview—learn a little bit immediately and add the complex features later. It is this feature which enabled me to teach the process to my students and to others on my staff very quickly. I haven't yet given it to my secretary because I don't want to give up the computer and printer to her full-time use. Once one successfully begins to use a word processor it is inconceivable to be without it. It does not reduce the amount of paperwork I do; instead it increases it by making the production of words so easy and attractive.



Clean . . .

PFS:WRITE

Apple IIe/IIc; \$125 • PC/MS-DOS machines; 128K; \$140; 80-column screen required; copy-protected? YES;

PFS:PROOF

IBM PC/XT • MS-DOS machines; 128K; 2 disk drives; copy-protected? YES; \$95;

both from Software Publishing Corp., 1901 Landings Drive, Mountain View, CA 94043; 415/962-0191.

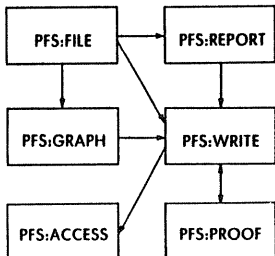
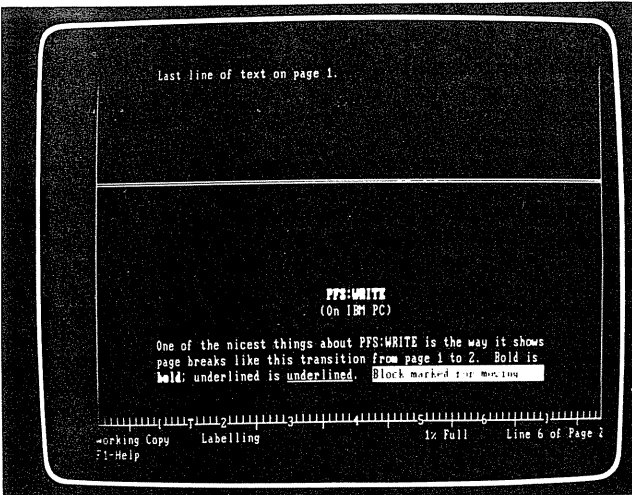
STEWART BRAND: The enormous popularity of this program is well earned. It is living proof that for many of us, having lots of options in a program is not a feature, it's a bug. Keep it simple, right in the middle of what's most needed, and let the rest go by. I wish PFS:WRITE ran on my Kaypro—nearly all of my writing is short reviews and letters and is much better suited for PFS:WRITE than NEWWORD or PERFECT WRITER.

CHARLES SPEZZANO: PFS:WRITE is the obvious lightweight choice for someone who writes letters and nothing else. It is even more self-evident and easier to learn than VOLKSWRITER, has all the standard features plus automatic reformatting, and even takes the address out of a letter and automatically centers it on an envelope.

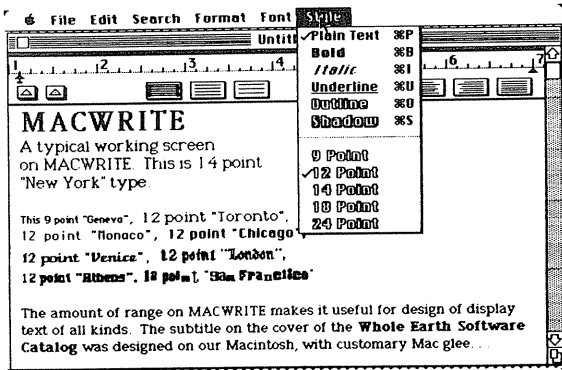
It is not, however, a flexible program. I once spoke to one of the men who wrote the

program and he basically said that the design and the popularity of the program revolve around the fact that it offers few choices, therefore requires few decisions. For example, although it is mostly a "what you see is what will print" program, if you force a page break, the screen no longer accurately reflects the page and line you are on. In fact, no real changes can be made within a document to deviate from the overall format you have chosen for that document. You cannot even temporarily change the left margin to indent a paragraph. The right margin cannot be pushed beyond column 80. If you create a header or footer, you get it on every page, including page one, whether you want it there or not, and the headers and footers all are centered. They cannot be flush left or right.

STEWART BRAND: That's fine with me. I'm much more concerned with words than format. I'd rather have a fiddle-free program that gets politely out of my way. An example of this program's built-in courtesy: I tried to save a document to a disk that had not been formatted for PFS files; halfway into the save the program stopped, told me the problem, and asked if it should format the data disk for me; when I said yes, it quickly formatted the disk, went ahead and saved the file on it, and returned me to the document, swift and pretty. Most programs would stop and ruin your day with a problem like that. There's even a feature in the Search function that tells you the number of words in your document—no other word processor that I know of does that within the program.



An advantage of PFS:WRITE is that it blends with a family of equally simple and effective programs—PFS:FILE (p. 80), PFS:REPORT (p. 81), PFS:GRAPH, PFS:ACCESS (p. 151), and its own 100,000 word speller, PFS:PROOF.



This MACWRITE screen was printed out on the ImageWriter printer using the Macintosh print-screen facility.

A revolution in word processing graphics . . .

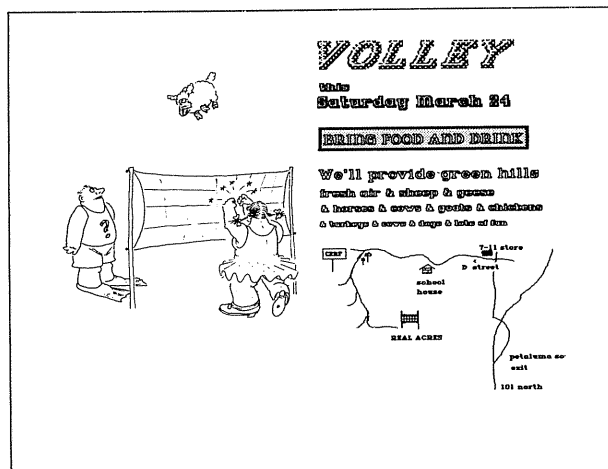
MACWRITE

Encore Systems; Macintosh; 128K; currently bundled with computer; copy-protected? NO; Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.

STEWART BRAND: MACWRITE came bundled with the original Macintoshes to showcase the machine's astonishing graphic talents. In our office it was put to immediate work generating all posted memos, often combined with droll images from MACPAINT (p. 127). A

typical MACWRITE letter is one I got from a reader of our magazine **CoEvolution**: whenever he mentioned the magazine, he wrote it large type, italic, bold, outlined and shadowed—a fair approximation of our logo; we were so charmed he got extra-attentive service.

Later incarnations of MACWRITE have added a disk-using capability that permits long documents along with a nice page indicator. It's still a good basic word processor and memo maker for the machine, but for serious power you'll want MICROSOFT WORD (p. 60). HAYDEN SPELLER (p. 63) supports both.



Typical office use of MACWRITE. The map was done with MACPAINT. The drawing by James Donnelly was not.

Best on the Apple IIe and IIc . . .

WORD JUGGLER

Tim Gill; Version 2.8; Apple IIe; ProDOS; 64K; \$189 • Apple III; SOS; 128K; \$229 • Apple IIc; ProDOS; 128K; \$189; copy-protected? YES;

LEXICHECK

Tim Gill; Apple IIe; ProDOS; 128K; 80-column screen • Apple III; SOS; 128K • Apple IIc; ProDOS; 128K; copy-protected? NO; Included with WORD JUGGLER;

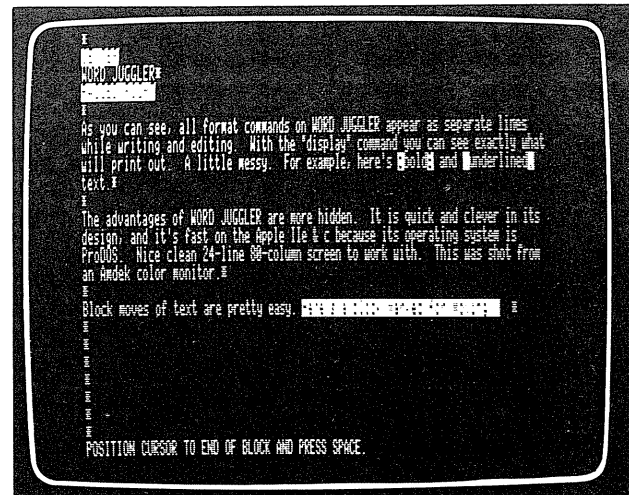
both from Quark, Inc., 2525 W. Evans, Suite 220, Denver, CO 80219; 800/543-7711.

STEWART BRAND: One of the *handiest* programs I've seen, WORD JUGGLER, well translated from its origins on the bigger Apple III, has beat out APPLE WRITER IIe as the leading word processor on the IIe and IIc. It's probably at its best at either enhancing or replacing a secretary, since it specializes in handling correspondence adroitly—it has a full “conditional merge” capability for tailoring form letters, and its envelope addressing dexterity is second only to PFS:WRITE's.

Unlike many older programs on the Apples, WORD JUGGLER is quick—it was the very first product to take advantage of Apple's new

operating system, ProDOS. Getting to and from disk, printer, current working document, and preview mode is always intuitively easy and fast. There is even a single command that converts your Apple to an expensive typewriter, where you type directly on the printer. And a single command prints a document direct from memory. With the program come 19 command-marked keys to unobtrusively replace ones on your Apple keyboard—a great help. I give WORD JUGGLER high points for transparency—you see the work, not it.

The included speller LEXICHECK deserves separate comment. Version 2.0 is a major improvement over previous incarnations. You can now look up words *while you're writing* to see if they're right. The dictionary will highlight the questionable word, suggest correct alternatives, and install any one you like for you. When checking a whole document (which can be done without having to store on disk first) LEXICHECK also tells you the number of words in the document. Among the 50,000 words, I was bemused to find “fuck,” which is still missing from many printed dictionaries. The words seem to be assembled as word parts, so you can get some anomalies. When I asked the speller to look up “wifing,” it said it was a valid word and offered as valid alternatives “wiling,” “wiping,” “wiring,” and “wising.” Oh well.



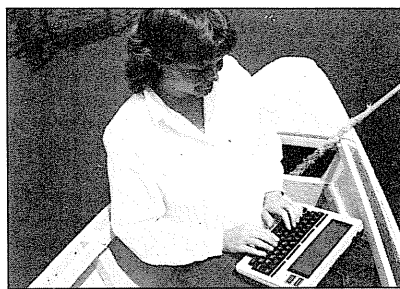
That LEXICHECK is included helps make WORD JUGGLER an exceptional bargain.

Also compatibly from Quark come TERMINUS (\$89), a telecommunicator, and CATALYST IIe (\$149), which makes the Apple IIe and IIc work happily with a hard disk. WORD JUGGLER is supposed to be comfortable with files from PFS:FILE (p. 80).

Write anywhere, even print . . .

RADIO SHACK MODEL 100

\$399 (8K model); \$499 (24K model); 8K RAM expansion modules, \$120 per kit (capacity to 32K); Radio Shack, 1700 One Tandy Center, Ft. Worth, TX 76102; 817/390-3700; or contact your local Radio Shack dealer.



WRITEROM

Version 1.0; TRS-80 Model 100; \$149.95; Portable Computer Support Group, 11035 Harry Hines Blvd., #207, Dallas, TX 75229; 214/351-0564.

STEWART BRAND: The truly portable computers, called lap computers or notebook computers, usually have simple word processors wired into them—good introductory programs that are completely sufficient for many uses. The first to dominate and still the low-rent leader is Radio Shack's 100, with a fine word processor on board. (See p. 16 for more

information on the machine.) For telecommunicating, for notetaking, for first-draft writing it's outstanding. Beyond that . . .

JIM STOCKFORD: Radio Shack's built-in word processor is a terrific communicating tool except that it doesn't print worth a damn, beyond the crudest memo quality. WRITEROM has all the features of every text formatter I've seen, with functions I've never seen before. It formats pages using WORDSTAR dot commands or function keys. It lets you center vertically as well as horizontally, indent or “undent” (print the first line of a paragraph out into the left margin). It's got a mail merge feature, you can substitute keystrokes for character strings, telecommunicate from within the program, store TELEX log-on sequences, and invoke a picture of your printed file, with character, word, and page count. You can interrupt printing, type directly, then resume printing. It introduces a line feed with carriage return if you wish. Since it comes as a ROM chip it uses no additional RAM memory.

LAPSTAR

Randy Moore; TRS-80 Model 100; 16K or greater; not copy-protected; \$74.95; CISS Corp., P.O. Box 27855, St. Louis, MO 63146; 314/432-1361.

WOODY LISWOOD: Well, Bunky, have you wished that WORDSTAR were ported to the Model 100? You say that the WORDSTAR control key sequences have been burned into

your psyche over years of use? Has the Model 100 and its 40 column width screen been causing you to invert your eyeballs trying to envision how your masterpiece will appear as 55 character columns on your printer? Well, your headaches are over. First, LAPSTAR converts the 40 column by 8 line Model 100 screen into a 60 column by 10 line screen. Second, LAPSTAR contains all but one of those control code sequences you grew to love using WORDSTAR. (What's missing? LAPSTAR does not have a CONTROL-S to back up one character. Instead, a CONTROL-H or a BACKSPACE will do the trick.)

There are 320 characters normally displayed on the Model 100 screen. LAPSTAR, by using smaller characters, displays up to 600 characters. That is a 87.5% improvement in the number of characters shown, quite adequate for my eyesight.

LAPSTAR takes about 4K of memory. It is not good in the printing department. A print order allows you to set the width of the column and the length of the page and that's it. If you need fancy formatting, you will need to use something like WRITEROM to add those codes to your file.

It's a fantastic program. I wish I'd had it from the minute I purchased my Model 100. If you do mostly text work, then LAPSTAR and the MODEL 100 are a better buy than the Model 200. Why spend \$500 to get only 40 more characters on the screen?

The old standard, now controversial . . .

WORDSTAR

Version 3.3; CP/M-80 machines; 56K • CP/M-86 machines; 128K • version 3.31; PC/MS-DOS machines; 128K; \$350 • IBM PCjr; \$195; copy-protected? NO; MicroPro International Corp., 33 San Pablo Ave., San Rafael, CA 94903; 415/499-1200.

Better, cheaper . . .

NEWORD

Newstar Software, Inc.; version 2.16; CP/M-80 machines; 56K; \$100; • version 2.16; PC/MS-DOS machines; 96K; \$249; copy-protected? NO; Rocky Mountain Software Systems, 1280-C Newell Ave., Suite 147, Walnut Creek, CA 94596; 800/832-2244 or, in CA, 800/732-2311.

STEWART BRAND: You go into a computer or software store and ask about word-processing software. The clerk asks what you plan to use it for, listens closely to your description of your needs, and then

recommends WORDSTAR. Most of the time that's the wrong answer.

Compared to other writing programs WORDSTAR is expensive, limited, slow, and difficult. Its major attraction is that there's so much of it out there—over a million copies sold, they say, millions more copied. Indeed it runs on nearly everything, even portables like the Hewlett-Packard 110 (p. 71), and a fair number of other programs try to blend with its peculiarities. Its minor attraction is that it's a friendly program, well co-evolved with its users over these many years (six or so).

Two years ago a couple of renegades from MicroPro made a WORDSTAR clone called NEWWORD that removes many of the objections while keeping the same commands and file format. It's not expensive, less limited, even more friendly, and blends everywhere that WORDSTAR blends, but it is still as slow to use and difficult to learn as the original. It runs only on CP/M and IBM compatibles. What are NEWWORD's improvements over WORDSTAR? NEWWORD includes a conditional merge capability, whereas it costs \$99 extra to get MAILMERGE with WORDSTAR. NEWWORD has an "undo" key (a major advantage, to my mind), document protection, search by page number, access to all user areas on hard disk, more helpful help messages, better printer support, nice micro justification, and a handier installation and tailoring procedure. On computers with graphics, like IBM and the new Kaypros, bold is bold on the screen and underline is underlined instead of "Sunderlined" S.

What does WORDSTAR have over NEWWORD? Not much—it can edit while printing (spooling), and it works a trifle more easily with columns, including moving whole columns. MicroPro's worthy new speller CORRECTSTAR (65,000 words, IBM compatible only, \$145) doesn't work with NEWWORD.

One of the kindest attentions to detail in WORDSTAR (and NEWWORD) is the help screens. Many of them show up only when you start a command and pause in uncertainty. They can be set to four different levels of helpfulness (or lack of interference). Likewise, anytime you want to do something with files, the program automatically shows you the current directory of what's already on the data disk.

There is a potent remedy for the slowness of WORDSTAR and NEWWORD, which is caused by the programs constantly "going to disk" to get one thing or another. Install a "RAM disk" and load the program on it. Since it is an electronic circuit board emulating a disk, everything happens at electronic speed, faster even than with a hard disk. ("The improvement in response time is so dramatic that many people will not

use WORDSTAR any other way."—Alfred Glossbrenner.) Costs a couple hundred dollars. Worth it.

In some reaches of the WORDSTAR empire it's still the best word processor available. I'd recommend WORDSTAR on Apple II and II+ (with CP/M card, \$139-\$345) and on the Radio Shack TRS-80. That's a lot of machines.

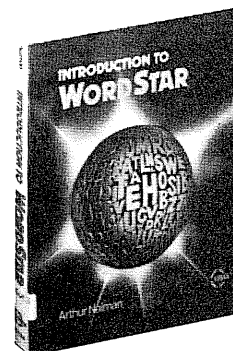
If you've got one of those, get WORDSTAR. If you're moving among many different kinds of machines, learn WORDSTAR. If your close colleagues have WORDSTAR on IBM or CP/M (that's my situation), get NEWWORD, so you can share advice and files. If you're word-processing to your own standard on IBM, get one of the programs on the next four pages. They'll work better for you.

ARTHUR NAIMAN: In my estimation, WORDSTAR is one of the most poorly designed word-processing programs ever written—a huge, elaborate farrago of klugy patches, sort of like a Rube Goldberg machine gone berserk. All kinds of basic functions require disk access, thereby making the program fantastically slow (which it is even where disk access isn't involved; for example, its method of sending text to the printer is so clumsy that sometimes the printer has to wait for the computer!).

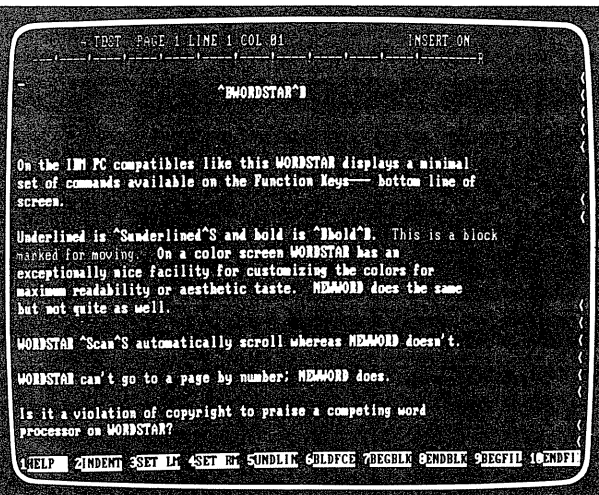
PETER McWILLIAMS: Do the readers of *Introduction to WordStar* know how its author feels about that program? My, my, my. It's like seeing Jerry Falwell marching in a gay liberation parade: refreshing, but surprising nonetheless.

By the way, your book is my favorite. Everyone in my office learned from it.

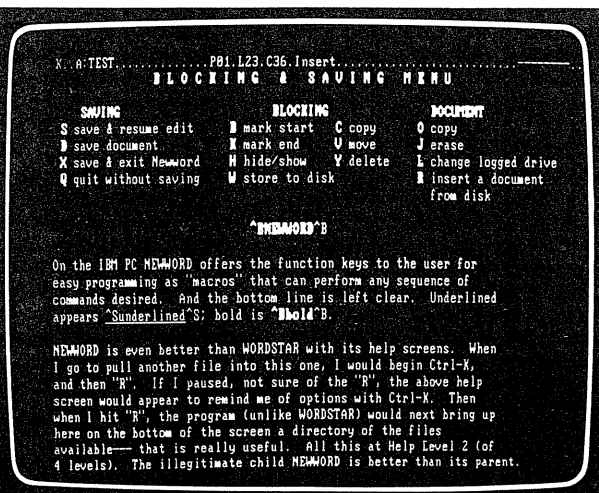
ARTHUR NAIMAN: Thanks for your kind words. My editor at SYBEX does indeed know how I feel about WORDSTAR; in fact, one of my requirements before signing the contract was that I wouldn't have to use WORDSTAR to write the book.



WORDSTAR is complicated enough to need a book to get you into it comfortably. Naiman's *Introduction to WordStar* is the best. (2nd edition, 1983; 208 pp.; \$16.95; SYBEX Computer Books, 2344 Sixth Street, Berkeley, CA 94710; 415/848-8233; or COMPUTER LITERACY.)



Above, WORDSTAR 3.3; below, NEWWORD the clone. "The illegitimate child is better than its parent."



Huge, wise, sloooow . . .

WORDSTAR 2000 PLUS ★

Version 1.01; IBM PC/XT and compatibles; 256K; IBM PC AT; 320K; hard disk recommended; copy-protected? NO; \$595 (\$350 to update from WORDSTAR); street price, \$325; MicroPro International Corp., 33 San Pablo Ave., San Rafael, CA 94903; 415/499-1200.

STEWART BRAND: This tremendously ambitious word processing program is MicroPro's attempt to improve on WORDSTAR. As an improvement, it's first rate. Excellent manuals this time. Happily it is not copy-protected, so using it with hard disk is convenient.

It's a big car with all the options. Luxurious, but expensive; safe, but ponderous. This is not a program worth going half hog on, so we're skipping the 5-disk version (WORDSTAR 2000, \$495 list; \$295 street) and mixed-mindedly recommending the 6-disk WORDSTAR 2000 PLUS. On that "Advanced Features" 6th disk is a not-very-good telecommunications feature called TelMerge, an impressive mailing list handler called MailList, and StarIndex, which does elaborate indexes and contents.

WOODY LISWOOD: If you use floppy disks, you will never be happy with WORDSTAR 2000 PLUS. A monster program, with its integrated features it requires close to two megabytes on a ten-megabyte hard disk just to exist. It seems to have every feature which everyone complained was lacking in WORDSTAR. It operates through a set of menus and submenus which are not quite as confusing as the old WORDSTAR. The same friendly cursor control commands but that is about it for continuity.

Significant improvements are: better printer controls; spelling check from within the document for a word, paragraph or whole document; undelete last deletion; work with any subdirectory; delete word, sentence, paragraph, or to either line end; mathematics within defined blocks; sorts within defined blocks; proportional printing; on-screen highlighting of special features like boldface and underline (no italic); macros both for text and commands; and continuous reformatting of the screen.

But it's slow. Try loading a 20-page file and send the cursor to the end of the file. Go out and have some coffee.

Because of my wife's experience getting out four letters easily with no previous word processing experience and nothing but on-screen help I want to recommend it for everyone. I don't like the speed, but it does everything I need. For example, one thing I do is load a database into WORDSTAR 2000 in the unformatted mode and then use CORRECTSTAR to check for spelling problems. That, for me, is fantastic, since I generate 100K databases from sources which always, always, contain typos. This way I can correct in one pass, rather than

list, edit, then go record by record to find the problems. Has saved me literally hours and days of time.

CHARLES SPEZZANO: I looked in vain for a way to delete backwards word by word. How could that have slipped by the designers? It is one of the most common editing maneuvers. And why does MicroPro dictate a right margin of 65 or less when preparing messages for electronic mail services? MCI and the others work best when fed close to 80 characters per line.

On the positive side, it is easy to grasp the command structure and move around the menus, much easier than getting started with MICROSOFT WORD. The problem with that logic, however, is that WORDSTAR 2000 is clearly a heavyweight word processor that requires some study time if you intend to use all the features you would bother paying that kind of money for in the first place. I would rather struggle with MICROSOFT

WORD or live with WORDPERFECT's semi-automatic reformatting rather than doom myself to the endless frustration of waiting for GODOT 2000.

STEWART BRAND: WORDSTAR 2000 supports 108 printers! It has one of the sharpest of spellers in CORRECTSTAR (included)—65,000 words, the ability to suggest correct words that sound like what you've misspelled, and the enormous convenience of doing the correcting while you're writing. But it's slowness is an aggravation that accumulates. (Reportedly the speed problem is greatly improved on the IBM AT and clones.) We recommend WORDSTAR 2000 PLUS only if its considerable features outweigh speed for you and you're working with a hard disk.

This page exercises every talent of the WORDSTAR 2000—quite a show which includes different type faces, overstruck letters, and calculations on the fly.

A screenshot of a document interface in WORDSTAR 2000, enclosed in a dashed border. On the left, a vertical column of circles indicates the cursor's position. On the right, another vertical column of circles indicates the line's position. Various text elements are present, each with a callout arrow pointing to a keyboard shortcut. The document content includes:

- Header: Annual Sale
- Section: LETTER-PERFECT PRINT SHOP (underlined)
- Text: It's time once again for stocking up on business cards, memo pads, printed stationery, and other custom-labeled business supplies. This year we are offering a 10% discount on all orders of \$25.00 or more.
- Text: Here are some samples of typefaces you can request:
- Text: Our service is fast, reliable, and accurate. (The words "OUR SERVICE IS FAST, RELIABLE, AND ACCURATE." are shown in a different font.)
- Text: You can select paper in any of these colors: Antique white, Lemon yellow, Pale blue, Rose!
- Text: LIMITED OFFER, WHILE SUPPLY LASTS ... (left margin)
- Text: Bond paper in pale blue or yellow. 1¢ per sheet with letterhead! (right margin)
- Text: HURRY AND TAKE ADVANTAGE OF THIS SPECIAL OFFER! (double underline)
- Table:

1000 business cards	\$19.95
2 dozen memo pads	\$11.95
2000 sheets, letterhead paper	\$19.95
2000 envelopes.	\$39.95
- Text: Total \$91.80 (plus 6% tax)
- Text: NOTICE OF POLICY CHANGE
- Text: Beginning June 1, we will change our payment terms from net 60 days to net 30 days.
- Text: 1 Sale ends August 1, 1985

The most elegant middleweight on IBM . . .

VOLKSWRITER DELUXE

Camilo Wilson; version 2.2; PC/MS-DOS; 128K; 2 disk drives required; copy-protected? NO; \$295; Lifetree Software, Inc., 411 Pacific St., Monterey, CA 93940; 408/373-4718.

What characterizes VOLKSWRITER DELUXE is its maximal use of the IBM PC's ten function keys. Taking them straight and combined with "Ctrl," "Shift," and "Alt," you've got 40 commands that do nearly everything, and one of them (F1) calls up a help screen with the full roster anytime. Makes for adept left little and ring fingers.

STEWART BRAND: For quick learning and easy remembering, with strength enough for occasional professional use, nothing beats VOLKSWRITER DELUXE. It's more capable than PFS:WRITE (p. 54), faster than WORDSTAR/NEWORD (p. 56). Its clean ASCII files let you use the best of the spellers and synonym finders—IBM's WORD PROOF (p. 62)—and it telecommunicates like a breeze.

CHARLES SPEZZANO: Small business owners and professionals who do their own correspondence will love VW DELUXE's ability to have you up and running in an hour, as well as the built-in and easy-to-use text merge feature. They will also appreciate the most self-evident editing, formatting, and printing procedures on the market. Students cannot go wrong with VW DELUXE. Anybody who needs foreign-language characters in their text doesn't have many other choices (WORDPERFECT is one, p. 60). A secretary

Tops on the Mac . . .

MICROSOFT WORD (Macintosh version) ★

Version 1.05; Macintosh; 2nd disk drive recommended; copy-protected? YES; \$195; Microsoft Corporation, 10700 Northup Way, Box 97200, Bellevue, WA 98009; 206/828-8080.

STEVEN LEVY: Macintoshing is fun, but a severe test of patience. For a year, I waited for a heavier-duty word processor than MACWRITE. I finally got it—WORD. It gives me what I need: unlimited document size (a couple hundred pages on floppy, more on hard disk), multiple document handling, easy centering, wide margins, cursor control from keyboard, and lots of specialty features like quick footnoting and mail merging. Contrary to advance reputation, it's fast enough to satisfy a quick typist (though not speedy enough to delight—lightning typists still will watch some passages appear in spurts). You can write a book with WORD, and I intend to.

Now, WORD has its problems. The copy protection scheme, requiring you to provide the original disk each time you boot, is onerous. It lacks some features, like the new MACWRITE's page-number-inside-scroll-bar (which I love), and has a wholly unsatisfactory "repagination" scheme that requires a long wait to find the answer to the very reasonable question: "What page am I on?" Its cursor control commands are rather

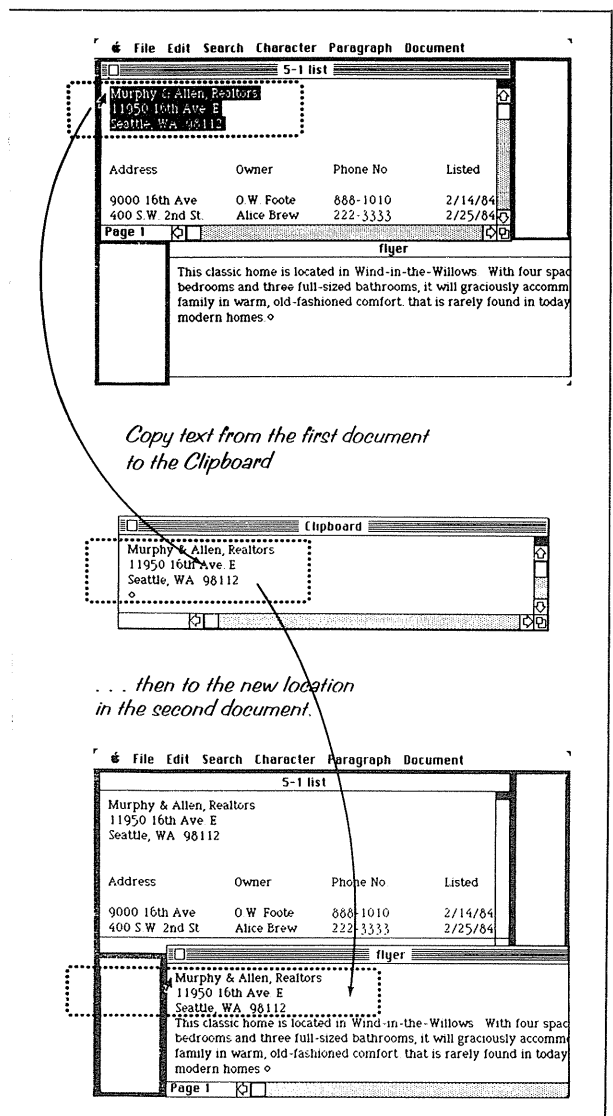
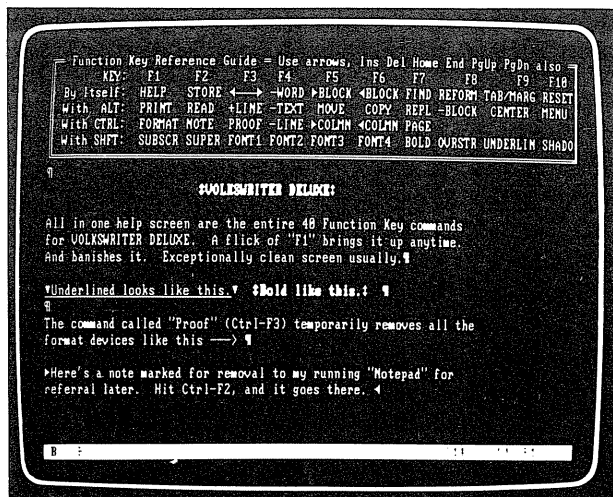
On the Macintosh, WORD takes advantage of the machine's Clipboard to move material between documents, and it can show up to four documents in separate windows on the screen. You may move text very efficiently within a document using the mouse, but not between documents (you can mouse text between windows with the MS-DOS version of WORD; see p. 60). This illustration is from WORD's pretty-good manual.

arcane, but I guess I will learn them once I break myself of this odd habit I got from MACWRITE of using the mouse all the time. It has none of the famous "style sheets" that give so much power to WORD on the MS-DOS machines (p. 60).

But consider: I needed no documentation to instantly get almost all of WORD's considerable power. Knowing Macintosh and using the generous online help was enough. When I finally got to the manual, I learned a few shortcuts, like how to select text from the keyboard, and that progression seems to me to be the ideal way to go deeper into a program. (A week after I got the program, I deleted the 37K "help" file from the disk.) Also, since WORD is so well integrated into the Mac world, it is a snap to use it in conjunction with almost any other Mac program, be it graphic, spreadsheet, or terminal. (Using the "TEXT" option, WORD telecommunicates handily; and WORD translates your old MACWRITE files into WORD files.)

I found WORD more than usable with the 128K machine and external disk drive, though a Fat Mac (512K) and RAMdisk gives you more speed, as well as SWITCHER (p. 115) capability. The bottom line is that WORD's release means that I can now get the things I love from Macintosh—fonts, screen resolution, amiable interface, integration, etc.—without making a painful sacrifice in word-processing power. And the street price of around \$120 is a hell of a bargain.

★ MEANS: NEW TO 2.0 EDITION



will be disappointed with it (too limited). An academic will prefer the footnoting capability of WORDPERFECT, XYWRITE II+, or MICROSOFT WORD (p. 60).

STEWART BRAND: VOLKSWRITER DELUXE doesn't link files for printing, presumably because it doesn't need to—it can handle files up to a million bytes (1000K) "in case anyone wanted to write a sequel to **War and Peace** without any chapter breaks" (Spezzano). That doesn't affect the snap with which it flicks from screen to screen, but it does slow down the cursor a bit and makes loading and saving files a little slower. Another uncommon feature is the "notepad," which lets you quickly store thoughts, phone numbers, notes in a separate file that accumulates while you write.

Limitations. Reformatting of text you've messed with is by command rather than automatic; no split screen; no "undo"

command; no macros. For many this may be part of the program's attraction. It is straight ahead, straight tasty vanilla.

With version 2.2 the program acquired even more speed and the ability to display 43 lines on the screen instead of the customary 24, if used with an enhanced graphics adapter card. (You can also get an extremely graphic version called VOLKSWRITER SCIENTIFIC—\$495; street \$325—which gives all manner of special symbols for math and science writing. You get Roman and Greek alphabets, two type sizes, sundry math symbols, chemical bond symbols, etc. in high resolution on screen and on printer in both draft and high quality mode.)

VOLKSWRITER DELUXE wins with its ability to fit in—on nearly any IBM-style machine, with nearly any user, with nearly any program. Also check out PC-WRITE (this page) for similar qualities.

STANDARD VOLKSWRITER KEYBOARD ARRANGEMENT

When you use the ALT key in combination with each of the following keys, you get:

1	2	3	4	5	6	7	8	9	
â	ê	î	ô	û	£	Þ	f	¥	
Q	W	E	R	T	Y	U	I	O	P
á	é	í	ó	ú	ÿ	ç	Ç	ñ	Ñ
A	S	D	F	G	H	J	K	L	
à	è	ì	ò	ù	Ä	É	Ö	Ü	
Z	X	C	V	B	N	M			
ä	ë	ï	ö	ü	ì	í			

Born free . . .

PC-WRITE

Bob Wallace; version 2.5; IBM PC compatibles; PCjr; 128K; copy-protected? NO; \$10—shareware, \$75—full registration, (\$25—commission to registered users who have had others register from their shareware); Quicksoft, 219 First Ave. North #224, Seattle, WA 98109; 206/282-0452.

STEWART BRAND: This is one of the greatest bargains and one of the most interesting programs in the **Catalog**. Its outstanding abilities as a text editor have been less reported than its marvelous distribution system, so we'll do the newsworthy access first and then get to the meat. You can pick up PC-WRITE free at your local user group or get it direct from the author for ten bucks. The manual is on the disk—print it out and you're in business. If you like the program enough to register with the author and pay a grateful \$75, you really are in business. Copy your PC-WRITE freely to your friends; if any of them decide to register the copy and pay \$75 to the author, you get a \$25 commission back from him for each one. Besides the down-home business opportunity that goes with registration, you also get a bound copy of the manual, the next updated version (a significant value), and telephone support.

By cutting out all the middle people Bob Wallace is doing well by doing good. It's a bargain to you, a healthy income to him, and the program is the most rapidly evolving I've seen in the marketplace. He doesn't have to worry about competing with his inventory, because there isn't any, and there's no marketing and distributing people to cut him off from the satisfactions and dissatisfactions of his customers. The version 2.5 I'm looking at has come a great

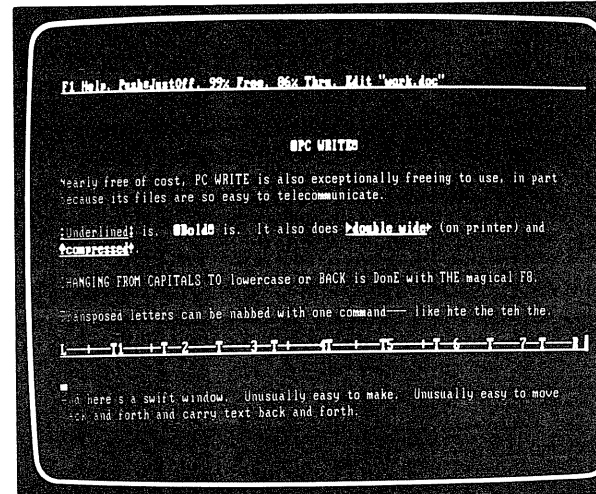
distance from what I saw a year ago. In that year the program has acquired good on-screen page breaks, footnoting, decimal tabbing, the ability to reformat a whole file at once, and merge capability.

PC-WRITE is chock with good features like word-delete-left (with an intuitively correct CTRL-backspace), move by paragraph forward and back, character transpose, change capitals, a "bookmark" place marker, and the niftiest split screen alive. Bold and underline look that way on the screen, and if you've got color it's brightly tailorable. There's "undo" and macros and truly useful help screens. But its greatest strength is its blazing speed. It can load and save files, scroll, and search and replace faster than anybody.

The only major drawback with PC-WRITE is that you can't print direct from memory, because you have to go to a different part of the program to print a file. This makes the program less desirable for short document use, though I notice that many of us at Whole Earth use the program in preference to the hundreds of others we have around, and we do mostly short documents. Here's why I use it so much.

PC-WRITE has the purest ASCII files anywhere, so it blends sweetly with almost anything—speller (WORD PROOF would be my choice), telecommunicator, whatever. Combine it with other public domain programs like Jim Button's PC-FILE (p. 82) and Andrew Fluegelman's PC-TALK (p. 152), and you can travel a high-quality lowroad for practically nothing on the PC compatibles.

Radical.



Giving software away is a lot of fun. You get great letters and great phone calls, people are very appreciative, and they give you some great ideas. At the same time, with PC-WRITE we'll gross about \$225,000 this year.

—Bob Wallace

The Word-Processing Heavyweights

CHARLES SPEZZANO: WORDPERFECT for heavyweight word processing in the

Clean and powerful . . .

WORDPERFECT

Ashton & Bastian; Version 3.0; IBM PC/XT compatibles • IBM PCjr • MS-DOS machines; 128K • Tandy 2000; 256K; copy-protected? NO, except Tandy 2000; \$495; Satellite Software International, 288 West Center St., Drem, UT 84057; 800/321-4566.

executive suite or professional office. XYWRITE II+ for professional writers or professionals who write every day and will not mind a few days' break-in period in return for blinding speed. MICROSOFT WORD if you want the mouse or like a menu-driven rather than

a command-driven program.

STEWART BRAND: I would put it: MICROSOFT WORD if you want industrial-strength editing, formatting, and merging capability along with exceptional ease of learning.

MIN S. YEE: WORDPERFECT was designed for the serious writer/editor/secretary/wordsmith who wants it all—and then some. Its features include extraordinary cursor control, macro definition, footnoting, mail merge (no additional cost), document assembly, hyphenation, end-of-page demarcation, extended Greek, math, and foreign character set, true proportional spacing, control of orphans and widows (bits of text left lonely at the tops or bottoms of pages), password security, user-definable defaults, dual document editing, a 100,000 word spelling checker (no extra cost) and a basic math package.

do and functions much more smoothly than either one of them. Short letters can be centered vertically on a page. At the other end of the spectrum there is no limit on the size of document that WORDPERFECT handles easily. Reports with math and columns in them are created without any difficulty (they are almost impossible to work with using VOLKSWRITER DELUXE [p. 58] or WORDSTAR). The built-in speller and sorter makes WORDPERFECT a complete package for a one-person office with needs for record keeping and word processing, and a powerful component in a small business office with more demanding needs.

Editing functions are command-driven while formatting and file management commands are driven by menu. The "help" mode is so useful and clearly written that it can only be compared with the help screens in 1-2-3 (p. 68). Not only that, but when you want to call the folks at Satellite Software International for personal help, you can rest assured they will be there, cheery and willing. They'll even call you back.

STEWART BRAND: With all that it's capable of, I'm impressed by WORDPERFECT's look of spareness. Sometimes it feels crippled to me, but crippled smart. Its major limitations are lack of an "undo" command, not quite automatic reformatting, and absence of split-screen capability. It partly makes up for that by offering two buffers you can jog between. The most recent version (4.0) offers intriguing improvements—phonetic speller, automatic backup while writing, better manual, date insertion, outline numbering. It's easier to learn than PC-WRITE or XYWRITE II+, harder than VOLKSWRITER or MICROSOFT WORD.

CHARLES SPEZZANO: This program has the personality I find most interesting and pleasant. WORDPERFECT does everything WORDSTAR 3.3 (p. 56) or MULTIMATE can

A new standard . . .

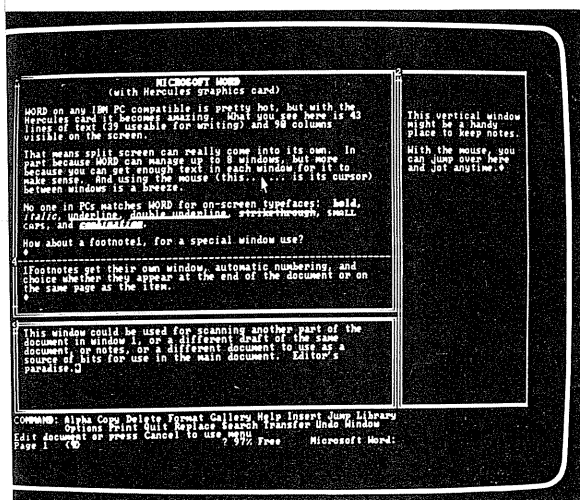
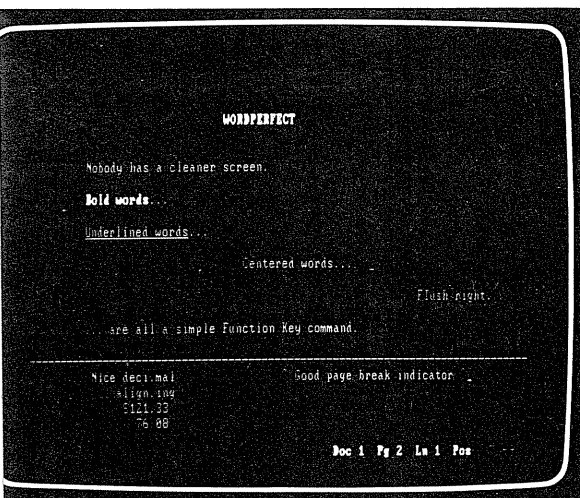
MICROSOFT WORD

Version 2.0; IBM PC/XT/AT and compatibles; PCjr; 256K; two disk drives or hard disk required; \$375 (includes \$50 rebate coupon for either of Microsoft's mice); works better with Hercules Graphics Card; copy-protected? YES; Microsoft Corp., 10700 Northup Way, Box 97200, Bellevue, WA 98009; 206/828-8080.

STEWART BRAND: What WORD has going for it: the greatest supermarket of word-processing features on personal computers, design from the ground up for fullest use of its mouse, easy-to-use menu-command structure (still good without the mouse), ahead-of-the-art support of printer hardware, direct linkage to the next generations of computers, the most formidable of publishers (who developed the very operating system the IBM PC family runs on), and a bargain, especially with the mouse.

math, indexing and password security, but adds: an "undo" command of particular cleverness (you can see what it's holding), up to eight windows, the enormous acceleration of editing that goes with an adept mouse, "Style Sheets" that preserve arrays of formatting commands as ornamental as you like, a juicier macro facility (called "Glossary"—for text, not commands), elaborate conditional merge, continuous saving of text (Spezzano scorned that one because of the slight pause when it happens—until he turned off his machine without saving, one hurried evening, and the pauses paid off), automatic backup of files, support of 64 fonts on printers (my God), and on-screen display of bold, underline, double underline, italic, super- and subscript, strikethrough (for contracts), and my favorite, small caps.

Typically, programs with a lot of muscle are muscle-bound (SAMNA III and WORDMARC come to mind)—cumbersome, crowded, self-hindering. WORD is surprisingly light on its feet, quick and inviting to dance with. The complexities are kept relatively out of your way until you want them. Things you use all



Harsh, fast . . .

XYWRITE II +

IBM PC/XT compatibles • TI Professional; 96K; copy-protected? NO; \$300; XyQuest, Inc., P.O. Box 372, Bedford, MA 01730; 617/275-4439.

CHARLES SPEZZANO: XYWRITE II + traces its roots to ATEX, a company whose word-processing systems can be found in many high pressure newsrooms, and that's the flavor of the program. It babies you about as much as Perry White babies Clark Kent. There are no menus, the manual is mediocre, and the help screens are really just lists of the 150 commands.

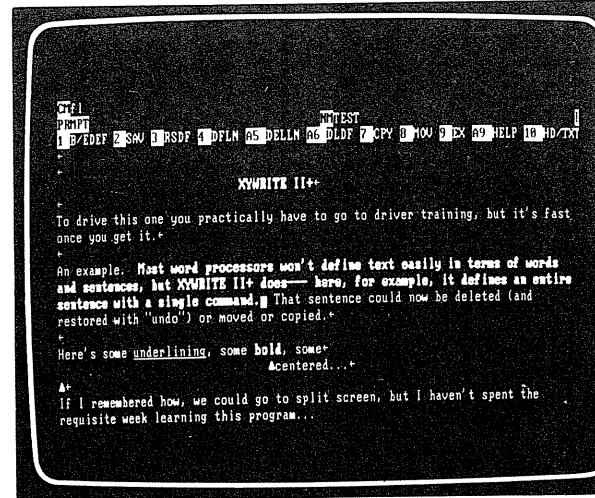
XYWRITE II + is the most purely command-oriented PC writing tool on the market. That means once you get the hang of it, which really doesn't take long, you can fly. No mode changes are required to delete or move a sentence or a paragraph, just a quick series of commands. Most such editing commands are implemented with the function keys, in combination with the CTRL, ALT, and SHIFT keys. Many of the non-function key commands are mnemonics, like "AU" for Automatic Uppercasing of the character that immediately follows a period, question mark, or exclamation point. [SB: I find "AU" a slightly terrifying convenience, like wordwrap—leads to addiction and atrophy.] Like Dorothy Parker, who once said she changed seven words for every five she wrote, I erase a lot when I write. With XYWRITE II + I have the fastest, most comprehensive deleting system I have seen anywhere, allowing immediate removal of a character, the word the cursor is under, the previous word, all text to the end of the line,

all the text on the line, a sentence, or a paragraph. After any of these deletions, it instantly reformats your text.

XYWRITE II + also executes block moves as fast as or faster than any other word processor I have seen. There are a variety of ways to quickly mark a block, after which you can do almost anything imaginable to it, including storing it as a macro. Columns are handled just as easily. You can search forward or backward from the cursor, recognizing capitals or not, as you wish, and wildcards are allowed in a search string. Files are in pure ASCII.

The format of a document can be changed as often as you like by entering margin, line-spacing, or justification commands. You have to use a review command to see your text with footnotes (XYWRITE II + numbers these automatically and places them at the bottom of the right page or at the end of the document) and full justification on screen. The program offers three different kinds of screen splits—horizontal, vertical, and alternating.

XYWRITE II + 's extra features include a four-function math program, as well as the ability to generate an index or a table of contents—these may require some editing before final printing to avoid duplicated entries. You can remap the keyboard with PROKEY-like (p. 174) precision, and there appears to be a ready-made Dvorak keyboard available on the master disk. The program runs "around" DOS. You can jump from your current document to a DOS prompt instantaneously, run the word-count program from THE WORD PLUS package (p. 62), then exit back to where



you were in the document in a flash. There will be plenty of room on your working disk for your favorite spell checker, since XYWRITE II + 's files only take up about 75K, with no overlays to slow things down.

At \$300 XYWRITE II + is a great buy. If there was a contest between equally experienced users with different word processors, I wouldn't want to bet money against the person on XYWRITE II + being the first to finish writing, editing, and printing a document of any kind. That must be some sort of a bottom-line endorsement.

the time are simple and accessible. The 2.0 version has an included spelling checker of 80,000 words (accessible while you're writing), an excellent manual and online tutorial finally, and if the 3-line command menu hinders the bottom of your screen, there's an option to hide it till needed. I've tried 'em all; I use WORD (with mouse, with hard disk). It's the extreme mouse capability—greater even than on the Mac—that decides it for me.

Drawbacks. WORD is copy-protected, groan, a nuisance, though it does function on hard disk without requiring the tedium of using a key disk. On-screen page breaks and numbers are muddy (you have to update them).

WORD in a straight floppy disk environment can be slow, but a number of hardware enhancements will supercharge it for you. The mouse, of course. A RAM disk (\$230 and up), 192K minimum, can accelerate the speed of the program, same as with WORDSTAR/NEWWORD.

A hard disk does almost as well. Spezzano: "Using a PCTurbo board from Orchid Technology (\$895, 128K; \$985, 256K; Orchid Technology, Inc., 47790 Westinghouse Dr., Fremont, CA 94539; 415/490-8586) transforms WORD from a casual jogger to a world class sprinter." With the Hercules Graphics Card you can get 90 columns by 43 lines (39 writeable) on the screen (see illustration). With an Apple LaserWriter (p. 21) or a Hewlett-Packard LaserJet Printer (\$3495), you get spectacular, publication-quality typesetting. WORD also supports the Enhanced Graphics Adaptor and monitors, yielding lovely high resolution color.

As WORDSTAR was the link between the 8-bit world of CP/M, Apple II, and Radio Shack TRS-80 and the 16-bit world of IBM and MS-DOS, now WORD is the link between the MS-DOS 16-biters and the oncoming 32-bit realm of Macintosh and AT&T's UNIX PC. WORD on the Macintosh (p. 58) is slower and more limited (no Style Sheets, no included speller) than on MS-DOS.

With Microsoft Word, you can change page layouts as often as every page. You can mix **typefaces**, even with right and left justification, as frequently as you want.

With MICROSOFT WORD and a laser printer such as Apple's LaserWriter or Hewlett-Packard's LaserJet, you can do your own high-quality typesetting. It could revolutionize the business, because the savings of time, money, errors and aggravation can be enormous for the self-publisher.

Writer's helpers . . . Spellers, Etc.

STEWART BRAND: Nothing eases the central labor of writing. "*Tria digit scribit, totus corpul laborat,*" complained a medieval scribe ("three fingers write but the whole body labors.") But the mind-numbing

janitorial periphery of writing can be eased considerably by the cheery robots of the craft—spelling checkers, style checkers, word counters, outliners, keyboard enhancers, and text databases.

Best for spelling and synonyms on IBM . . .

WORD PROOF II

William Modlin and David Glickman; IBM PC/XT/AT/Portable; PCjr; 128K; second disk drive required for synonym finder function; copy-protected? NO; \$39.95; IBM, Entry Systems Division, P.O. Box 1328, Boca Raton, FL 33432; 800/447-4700.

STEWART BRAND: Interesting that this best of spelling checkers also has the best price, and from an unexpected publisher, IBM itself. The attractions are many. In a field where number of words in the dictionary is critical, WORD PROOF has a whopping 125,000. It's exceptionally easy to use. The bonus of synonym-checking is worth twice the price of the program. And WORD PROOF does its own rudimentary word processing, so you can finish doctoring a document with the program and print right out.

You pull up a text file (created with your regular word processor) and ask WORD PROOF to spell-check it—all done with simple menu commands. Your text is displayed, and if there's any word the program has doubts about, it stops and highlights the word. You can ask for a windowed list of possible correct

spellings, cursor to one you like, and it'll instantly replace the incorrect one in the text, while the program goes on to the next word it doesn't recognize. You can get the same service by placing the cursor on any word in your text and asking (F3) about it. Likewise, put in the Synonyms disk, cursor to a word, punch F4, and you get a list of closely related words; indicate the one you like, it's instantly inserted, and on you go; I find this miraculous (supernatural, fabulous). No other spellers do it.

Most misspellings are actually typos. Spelling checkers catch both. What they can't catch is words disguised as other words—"than" or "the" instead of "then," for example.

WORD PROOF doesn't work with all word processors. Of the ones we recommend on the IBM, WORD PROOF works beautifully with HOMEWORD, PC-WRITE, VOLKSWRITER DELUXE, and XYWRITE II+; it works only in ASCII or DOS file mode with WORDSTAR/NEWORD, WORD PERFECT, and MICROSOFT WORD; and it works not at all with PFS:WRITE.

Part of WORD PROOF's beauty is that it windows into your document, highlighting the questioned word so you can see the problem in context. It works that way both for spelling and for synonym-finding.

OK, WORD PROOF, find these. Loquacious, standoff, spanner (British?), elevator, cranky, contumely, grandiloquent, Phil, palliative, frazzle, earthenware, effervescent, di, oblique, immeasurably, imperturbable.

synonym
synonyms
synonymy
synonymic
synonyms
syndromes
synergy

noxious, concoction,
cious, irreligious,
t, usable,
ubescens, seditious,
uey, rhythmical...

Use the cursor to select a word
Press ← to replace word in text
Press Esc to resume editing

Bottom of File

8:SPELL [-= 45] 9 49 Replace

Ubiquitous . . .

THE WORD PLUS

Wayne Holder; version 1.21; CP/M-80 and CP/M-86 machines • PC/MS-DOS machines; 64K; copy-protected? NO; \$150;

PUNCTUATION + STYLE

Wayne Holder; version 1.21; CP/M-80 and CP/M-86 machines • PC/MS-DOS machines; 64K; 2 disk drives recommended; copy-protected? NO; \$125;

both from Oasis Systems, 7907 Ostrow St., San Diego, CA 92111; 619/279-5711.

CHARLES SPEZZANO: THE WORD PLUS is a thing of beauty: simple, fast, accurate. The "Plus" part refers to a smorgasbord of writing aid programs that come with the spelling checker, including a tool for automatically hyphenating words, programs that help you solve crossword puzzles and jumbled word games, a general purpose word-counting utility, a program that locates and marks homonyms ("there," "their," "they're") in your text so you can decide if

you used the write (rite, right) one, and a tool that keeps track of how many times each word appears in your document. Word count is indispensable.

The spell check program is a masterpiece. It is small enough to fit on the same disk with my WORDSTAR or VOLKSWRITER programs, so I do not have to change disks to use it. Despite this, it has a 45,000 word dictionary, and it's faster than most—1½ minutes to check a 1500-word file.

STEWART BRAND: THE WORD PLUS works much like WORD PROOF, except it's slower and feels a little more laborious. You have to ask it to show context of a questioned word, and it only shows a line, which often isn't enough for comfort. Of the word processing programs we've recommended, THE WORD PLUS works with WORDSTAR/NEWORD (CP/M or IBM), PERFECT WRITER, PC-WRITE, VOLKSWRITER DELUXE, XYWRITE II+, and MICROSOFT WORD.

CHARLES SPEZZANO: PUNCTUATION + STYLE is by the same author. The

PUNCTUATION part catches errors in punctuation and other inaccuracies, such as incorrect abbreviations, missing capitals at the beginning of sentences, repeated words (Paris in the the Spring), mixed upper and lower case letters (THE—it has a hell of a time with software names like WordStar and DesQ), unclosed parentheses, and misused numbers. The STYLE part has a list of phrases that are commonly misused in writing— clichés and phrases which are "awkward, erroneous, folksy, muddy, pompous, redundant, or wordy." Wayne Holder understands good writing and helps you achieve it.

STEWART BRAND: I have a feeling that word processing is encouraging sloppy writing, because it is so damned easy. This program is an antidote, embarrassing sometimes, but bracing. I don't think I've generated a single document over 200 words that didn't benefit from Holder's attention. If I now said something [necessitated] something, Holder would put brackets around it and suggest "required."

Other Spellers

STEWART BRAND: Other spellers. WORDSTAR has a companion, CORRECTSTAR, 65,000 words, \$195 (from MicroPro, p. 56), only on 16-bit machines like IBM, not 8-bit CP/M, doesn't work with NEWWORD. Its special talent is finding words by sound. Woody Liswood: "That means you can type in the word as it sounds while you are typing and let CORRECTSTAR find the correct spelling for you later. It also reformats the file for you as it goes along, so you don't have to go back and do it later."

On Apple II+, IIe, IIc the popular speller is SENSIBLE SPELLER, 80,000 words, \$125 (Sensible Software, Inc., 210 S. Woodward, Suite 229, Birmingham, MI 48011; 313/258-5566). It's good, but of our recommended word processors on the Apple, it only works with APPLEWORKS and HOMEWORD, not with PFS: WRITE or WORD JUGGLER.

On the Macintosh the speller for both MACWRITE and MICROSOFT WORD is HAYDEN SPELLER, only 20,000 words (\$79.95; Hayden Software Co., 600 Suffolk St., Lowell, MA 01853; 800/343-1218 or, in MA, 617/937-0200).

And now for something completely different (that revels in differences) . . .

JONATHAN SACHS: People who work with large, frequently revised documents often must keep track of the changes they make. For example, a writer may have to prepare a

summary of all the significant changes in a new edition of a manual. Or an editor may want to know what a writer has changed between two drafts of a manuscript. For these tasks COMPARE II can be a major time saver. Many features add to its usefulness. It can write the summary of changes to a file. It can display the changed parts of the two files one after the other or side by side, or it can reproduce one file with "change bars" in the left margin to indicate where the other file differs. Available for CP/M-80, CP/M-86, PC DOS and MS-DOS, \$145 (Solution Technology, Inc., 1900 N.W. Corporate Blvd., Suite 400, Boca Raton, FL 33431; 305/997-7226).

STEWART BRAND: If you like shortcuts you will love keyboard enhancers like PROKEY 3.0 and SMARTKEY (both p. 174). Nothing so tailors your machine and your software to your own work habits. Anything repetitive in your routine—sets of words, sequences of commands, or both—can be tucked under a single key and gleefully evoked by just touching it. Feels like money in the bank every time.

Creative use of outlining, for many of us only a grim memory from 7th Grade, is making a big comeback on computers, thanks to THINKTANK (p. 92). An all-in-one has been built around the outline idea, with a capable word processor as well as database and spreadsheet included—FRAMEWORK (p. 110). For general mucking about in your text files in supremely organized fashion, check out the databases that Tony Fanning calls "garbage bags"—DATAFAX (p. 91) and SUPERFILE (p. 91).

Finding the better word . . .

WORD FINDER ★

Most PC/MS-DOS machines • Most CP/M machines; 30K; copy-protected? NO; \$79.95 (special introductory offer); Writing Consultants, 300 Main St., East Rochester, NY 14445; 800/828-6293 or, in NY, 716/377-0130.

STEWART BRAND: Here's an improvement on the synonym-finder in WORD PROOF; you can use it *while you're writing*. You load WORD FINDER before you load your regular word processor (PFS:WRITE, MULTIMATE, WORDSTAR 3.3, WORDSTAR 2000, WORD PERFECT, or MICROSOFT WORD—and perhaps others; phone them). Commence writing. When your eyes start searching the ceiling for a better word, hit the proper command and a window will appear with a list of synonyms for the word the cursor is on. Pick the alternate word you prefer, hit RETURN, and the new one goes in, even with correct capitalization intact. A boon for those of us with word tics ("spiffy" used to describe everything from a wallet to a philosophy). It might help thought—what *are* you getting at with that sentence? Soon we'll have word randomizers to further stimulate thought.

Customize your writing tool . . .

IMPROVE YOUR WRITING WITH WORD PROCESSING ★

Improve Your Writing with Word Processing, David F. and Virginia Noble; 1984; 416 pp.; \$12.95; Que Corporation, 7999 Knue Rd., Indianapolis, IN 46250; 800/428-5331 or, in IN, 317/842-7162; or COMPUTER LITERACY.

CHARLES SPEZZANO: Many of us approach word processing as spectators. The programmers have set up the editing procedures. We press the buttons and watch the magic. Most word processors, however, can be customized into more of a glove fit with each writer's style through the use of keyboard macros, a series of frequently used keystrokes that are entered once and then executed when needed by pressing one or two keys.

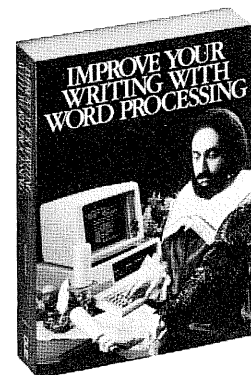
The Nobles take this little time-saving trick, popularized by such keyboard changing programs as PROKEY and SMARTKEY (p. 174), and extend it into an art form. They supply detailed instructions for creating

macros to move the cursor by sentences; mark and highlight a sentence as a block; semi-automatically reform a paragraph or the whole file; break a paragraph into sentences for easier analysis and revision, and then rebuild the paragraph; transpose two characters or words or sentences; globally remove carriage returns (a great help for telecommunicating files); and more.

In addition to specific instructions for WORDSTAR-PROKEY users, they also devote a chapter to implementing similar systems of macros with PEACHTEXT 5000, SUPER-TEXT, MULTIMATE, SPELLBINDER, SUPERWRITER, ELECTRIC PENCIL, WORDPERFECT, and XYWRITE II+. Sufficiently motivated users of other programs could adapt the procedures to their own word processor since the macros are as much conceptual as technical creatures and can, therefore, move easily from realm to realm.

Like Pirsig with his Zen motorcycle, I am convinced that each word processor has a personality which is not fixed by its creator, but rather can be defined as "the intuitive

sum total" of everything the user knows about it, feels about it, and can do with it. This book lets you redefine a word processor's personality and may, therefore, save a marriage between user and program that is threatened by all the fancy newer packages. In fact, this book starts a genre of its own, the guides to creative (rather than just efficient) word processing. Most writers who have sunk two to five grand in a word processing system will milk their investment more thoroughly with the Nobles' advice at hand.



ANALYZING

Woody Liswood, Domain Editor

WOODY LISWOOD: Analyzing is probably what most of us think of when we think of computers. Why were computers "invented" in the first place? Answer: To manipulate and analyze large amounts of data in short periods of time.

Spreadsheets

The spreadsheet, or "calc" program, has been credited with creating the microcomputer marketplace. Prior to the introduction of VISICALC on the Apple computer in 1979 by Dan Bricklin, Bob Frankston, and Dan Fylstra, most microcomputers were thought of simply as game machines or machines only computer programmers owned and understood. Many folks credit the rise of Apple Computer to its predominant position in the micro world to the fact that VISICALC, when first released, was available only on Apples.

Spreadsheets can help you analyze any data that can be displayed in a row and column format. In addition to using the accountants' tools such as balance sheets, income statements, and profit-and-loss statements, with a calc program you can do regression analysis, correlation, and other statistical functions. You can derive and predict salary costs and merit budgets for home and business. If you think of a single file in a calc program as identical to a single page in a multiple-page report from a database, your micro can duplicate many complicated mainframe computer database reports as a series of identical spreadsheet applications.

The bottom line is this: The uses of spreadsheets keep growing as "limits" are stretched by new programs and new versions of old programs.

BARBARA ROBERTSON: Making the jump from budget charts on paper to, most likely, the same form on a microcomputer takes little imagination, learning, or adjustment, and the advantages are obvious. Typists no longer need a gallon of White-Out to correct a 30-page financial report because a change in one column affected rows of results. Analysts, managers, small-business owners, salespeople, and household budgeters can wonder "What if": . . . I reduced my expenses in July by \$2000? . . . the loan rate were 12.3% amortized over 18 years rather than 13.4% amortized for 12? . . . it takes 56 people 35 hours a week to do the job in 43 working days and I have only 31 available? Plug in the numbers and get instant answers. Playing "What if?" is more fascinating and lively than a lot of computer games.

WOODY LISWOOD: When we started looking for spreadsheets to review and analyze, we came up with more than 35 products during the first go-through, including some public domain programs (pp. 25-27). One fact emerged. Even though they all work and do about the same thing, even though there are more similarities among them than differences, and even though they all generate fierce loyalties in their users, they also differ significantly in style, memory capacity, speed of operation, and data management capabilities. Our recommendations are based on these differences.

Statistics Programs

Looking for statistics programs is not as complicated as looking for spreadsheets. There are fewer of them and they are so specialized that I doubt anyone would want one who did not already have some idea of what to do with them. These programs take data that you enter either directly or from a database or spreadsheet, and then perform various statistical tests to help you answer questions about the data and the relationships within the data. Before you buy a statistics program, read the documentation and sales literature carefully to be sure the program has exactly the capabilities you need.

Stock Market Programs

MATTHEW MCCLURE: Although no one really knows whether any kind of analysis is consistently effective at predicting stock performance, more than a dozen "systems" have one feature or another to recommend them, making them useful to professional investors and occasional dabblers. Most let you use data downloaded from networks (pp. 142-145), which saves lots of data-entry time. And most use only one or two methods of analysis. WINNING ON WALL STREET (p. 77) employs most of the popular methods. Be cautious—none of the methods is foolproof, and although these programs may help you rise above the novice level, they won't turn you into a pro.

Hardware

WOODY LISWOOD: Any time you're working primarily with numbers, you should have a keyboard with a numeric keypad as well as four arrow keys. That means the worst keyboards for calc programs are the ones that come with the IBM PC, the Apple II family, and the Macintosh. On the IBM PC keyboard, the arrow keys are on the number keypad, so you can't use both at once. You have to toggle a separate key to activate either the numbers or the arrows. The Apple II has only left-right, not up-down arrows, and it has no keypad. The Apple IIe and IIc have arrow keys but no keypad. The Macintosh has no arrow keys or keypad (I'm not sure that for real number crunching the mouse is better than arrow keys). A keypad can be purchased separately (\$99) for all the Apples. For the IBM PC, the Key Tronic keyboard (\$255) with separate number pad and arrows would be appropriate.

The amount of RAM memory in your computer determines the maximum size of your spreadsheet (the number of rows, columns, and formulas). How big is your application? If you are contemplating no more than, say, 60 rows by 250 columns, you might like CP/M-based programs on 8-bit (Z-80) computers like the Kaypro 2, 4 or 10, and the Morrow Micro-Decision. However, to me, after a few weeks a spreadsheet of this size seems more like a scratchpad than a full-size calc program. Apple and IBM PC computers both allow larger memories and spreadsheets, but here you run into a different limitation. What good is a 512K spreadsheet in RAM when you can only store 360K on your floppy disk? If you have an Apple III with 256K, you can easily create a spreadsheet that exceeds the 160K available on the disk. When you get to these large-size applications, you need a hard disk drive. You want your storage capability to exceed the maximum size of your model and to hold, together on one logical drive, all the spreadsheets that make up your application.

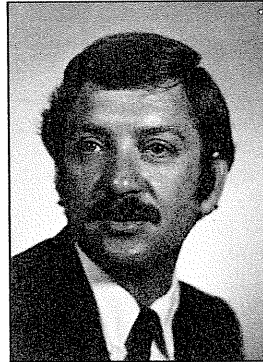
WHAT THE NUMBERS KNOW

STEWART BRAND: Spreadsheet programs have given me this peculiar vision of civilization. What I find new and wonderful about computerized spreadsheets is that you can have a vast array of meaningful numbers, and *all the numbers know about each other*. Change any one of them, and they all adjust immediately. They're positively ecological in that. The same goes for economies. Increasingly, all the numbers in the world know about each other. The value of your stock knows about the amount of change in my pocket as well as the turns of war in the Sudan and the quality of growing seasons in Colombia. The change in my pocket is ever alert to what you're deciding not to buy this week.

Computers are in the thick of that. A study I keep waiting for is a productivity analysis of what personal computers have done for the national economy in the last couple years—without any government intervention or even policy (except the decades of military research that invented the field in the first place—and the defending of patent rights). Some say that half of all IBM PCs, in their hundreds of thousands, are running just 1-2-3. Numbers—clever, quick, knowledgeable—boiling the stupidity out of countless business decisions. Interesting how essential the quickness is. It's 1-2-3's speed that put it on top.

BARBARA ROBERTSON: Woody Liswood has been using spreadsheet programs since the first month VISICALC appeared on the market and he's used nearly every

spreadsheet program that's shown up since. He needs them for his business—a senior consultant with A.S. Hansen, Inc. (Larkspur, CA), he's one of the few "Certified Compensation Professionals" in the country, his specialty being "pay delivery systems" for corporations.



Woody Liswood

With spreadsheet and statistics programs he sets up complicated models for job evaluations, salary planning surveys, regression analysis—and anything else he can think of. Since he recommends different computers and spreadsheet programs for different clients' needs, he has to learn and teach them all. He was a contributing editor for **Apple Orchard** magazine, where his reviews of a wide range of Apple software appeared

monthly, has his own product review magazine on The Source (key in PUBLIC DIRECT 116) (p. 141), writes for **Portable 100**, has written a book, **Human Resources Information Systems, A Micro Computer Approach**, published by Potentials Group, Inc., in Cupertino, California, and teaches a graduate compensation course at Golden Gate University where he's Adjunct Professor.

WHO NEEDS 9000 ROWS?

WOODY LISWOOD: I've picked SUPERCALC3, Release 2, as the current winner of the spreadsheet wars in part because it allows 9999 possible rows of data per worksheet.

Most folks think of spreadsheets only in accounting terms, but there are many more uses for spreadsheets than the typical ones like balance sheets, expense reports, and income statements; and some applications require a large number of rows rather than a large number of columns. Mine do. Multitudes of rows are also necessary for tracking stocks, inventory control—anytime you have a long list of items or many lookup tables.

I use spreadsheet programs to do all the analysis for job evaluation installations. The matrix I use contains several lookup tables, job evaluation information, and often 1000 rows of information relating to 1000 job titles. With a large spreadsheet program, I can have all this information on one worksheet. The worksheet becomes a miniature database system which shows all of the data on the screen as I enter and manipulate it; and the file-management capabilities included with 1-2-3 and SUPERCALC3 let me sort through, find, and rearrange the data even on immense worksheets.

BOOKS

One of the best features of the spreadsheet market is the multitude of books containing instructions and sample worksheet models. There are books about 1-2-3, VISICALC, SUPERCALC, and MULTIPLAN, as well as others. But you really don't need to purchase a book written specifically for your program to get good use from its worksheet models. For example, all the recommended spreadsheet programs use some type of code to indicate a range of cells—say, A1, A2, A3, A4, and A5. In VISICALC you use three dots to simplify the entry (A1 . . . A5); in SUPERCALC, a colon (A1:A5); in 1-2-3, two dots (A1 . A5). Since the logic is similar, you can take examples from a book written for VISICALC and simply substitute the correct codes for the spreadsheet program you're using.

If a book has a model you find interesting, try it. You'll find it better using the tools, techniques, and tips mentioned in these books than spending hours with the program trying to self-discover those same devices.

—Woody Liswood

Spreadsheets

Comparing the Big Three

WOODY LISWOOD: With some nostalgic regret, we have dropped VISICALC, the first microcomputer spreadsheet, from the **Catalog**. VISICALC has been outdistanced and outclassed by the second and third generation spreadsheets. It is still workable, but for serious spreadsheeting there are now better and more flexible products.

When you need big features—a gigantic number of rows, sophisticated math, the ability to use the same program on a variety of machines, integrated graphics, or data management capabilities—you'll want to consider 1-2-3 (p. 68), SUPERCALC3 (p. 67), and MULTIPLAN (p. 70). Many people use more than one spreadsheet program.

Gigantic number of rows, sophisticated math

As far as spreadsheets go, I continue to be impressed with SUPERCALC3. Release 2 now allows 9999 rows per worksheet. SYMPHONY (p. 111), the 1-2-3 "all-in-one" upgrade, has as many, but it's a memory hog—you need about 240K more RAM to run the same size worksheet; 1-2-3 is easier on memory but it's limited to 2080 rows per worksheet. In addition, SUPERCALC3 doesn't store blank cells, which means more RAM memory is available for data—something neither Lotus product can lay claim to. For these reasons and because it isn't copy-protected (unlike 1-2-3), I think it's the best spreadsheet buy for the PC/MS-DOS worlds.

1-2-3 has replaced VISICALC as the spreadsheet standard. It is the most talked-about program today and has the most support in terms of books written about it, and templates that work with it, and even has a magazine devoted to it. I think it's the best spreadsheet program, with the exception of SYMPHONY's spreadsheet, and will recommend it over SUPERCALC3 when 1-2-3 does a better job of memory management—assuming that by then SUPERCALC3 hasn't come up with better features. The race goes on.

Integrated graphics and data management

1-2-3 was the first program to integrate graphics and spreadsheet data; SUPERCALC soon added graphics with a version called SUPERCALC3. Many folks feel that the graphics in SUPERCALC3 are far better than those produced by 1-2-3, and unlike 1-2-3, SUPERCALC3 does not require a graphics board on an IBM PC. The Drawing section (pp. 122-137) has reviews of programs that produce graphics—often better than the graphics integrated within spreadsheet programs—using data from almost any spreadsheet program.

Both SUPERCALC3 and 1-2-3 have some data-management capabilities. This translates into "they can sort and find a specified range of data." If you need data-management capabilities, you should look at an all-in-one or integrated package (see the Managing section, pp. 106-121), or plan to transfer data from a database program to a spreadsheet program (see p. 72).

Ease of use

1-2-3 and MULTIPLAN have a good menu-tree structure, so you don't have to memorize a large number of commands. SUPERCALC runs from a command line (called up by typing a slash), which allows you to get to its functions without paging through a menu. MULTIPLAN on the Mac is as easy as all other Mac software.

If you are using a computer other than an IBM PC (or MS-DOS), you'll be limited to 255 rows in your spreadsheet. However, some programs let you link worksheets, so in effect you can work with more data than the size of one spreadsheet allows. MULTIPLAN (p. 70) shines in its ability to consolidate worksheets.

Using the same program on many machines

If you use more than one machine now, or if you have a low-priced machine and want a spreadsheet that will be available on a higher-priced machine you might buy later, consider SUPERCALC, VISICALC, or MULTIPLAN.

SPREADSHEETS WITHIN INTEGRATED PACKAGES

A number of integrated, all-in-one packages have appeared on the market, most of which include spreadsheet programs. If the spreadsheet portion of an all-in-one is the most important part of the package for you, and you're in the IBM PC world, you should consider ENABLE (p. 109) or SYMPHONY (p. 111), the "all-in-one" upgrade of 1-2-3. In the Apple II world, the best "all-in-one" is APPLEWORKS (p. 108). If you're looking for a spreadsheet program that's part of a family of products that work nicely with one another, consider the SMART (p. 112) series.

VISICALC should stand with the printing press, the steam engine, the harnessing of electricity, the development of immunizing agents for virulent diseases, and with computers in general and the microcomputer specifically as a milestone along the path of progress.

—Al Tommervik, *Softalk*

VISICALC represented a new idea of a way to use a computer and a new way of thinking about the world. Where conventional programming was thought of as a sequence of steps, this new thing was no longer sequential in effect: When you made a change in one place, all other things changed instantly and automatically.

—Ted Nelson

A program should be self-evident. You look at it and you know what to do. Spreadsheets like VISICALC are the classic example. All you need is a crib sheet for commands and you can fumble around nicely.

—Richard Dalton

Now better than ever . . .

SUPERCALC3, RELEASE 2

Version 2.0; IBM PC/XT compatibles; 96K required, 128K recommended • TI Professional; 128K; copy-protected? NO; \$395;

SUPERCALC2

Version 1.0; all CP/M machines; CP/M-80; 48K required, 64K recommended • CP/M-86, PC DOS and MS-DOS machines; 64K required, 128K recommended; copy-protected? NO; \$295;

SUPERCALC

Version 1.12; all CP/M machines; CP/M-80; 48K required, 64K recommended • CP/M-86, PC DOS and MS-DOS machines; 64K required, 128K recommended; copy-protected? NO; \$195;

all from Sorcim/IUS Corp., 2195 Fortune Dr., San Jose, CA 95131; 408/942-1727.

SALLY GOTTLIEB: SUPERCALC users will feel right at home with SUPERCALC3, Sorcim's latest addition to the bewildering array of spreadsheets on the market. It has the same straightforward simplicity as SUPERCALC, plus integrated graphics that make it a worthy competitor of 1-2-3 (p. 68). Spreadsheets created by SUPERCALC, SUPERCALC2, or SUPERCALC3 load and operate with no changes from one version to the other.

The graphics are delightfully easy to use. One keystroke switches from spreadsheet to graph on the screen, so you can see your graph as you build it. Unlike 1-2-3, SUPERCALC3 does not require a graphics board to have this capability on an IBM PC.

The user manual, which contains ten lessons for the beginner, is remarkably good. In general, the program is straightforward and easy to use. Sophisticated users (*i.e.*, programmers-at-heart) will prefer the complexity and elegance of 1-2-3.

WOODY LISWOOD: I have switched my spreadsheet work from 1-2-3 (p. 68) to SUPERCALC3, Release 2, rather than move up to SYMPHONY (p. 111), because of the extra rows (9999) and the way in which SUPERCALC manages memory. Because SUPERCALC3 doesn't store space for unused cells on the worksheet, I can design my worksheets to suit my personality without constraint. Before, always concerned about getting maximum usage from large models, I had to worry about the size of the rectangle and whether the extra memory required for a blank line of unused cells was worth the gain in visual clarity.

Release 2 of SUPERCALC3 has quite good graphics, supports the 8087 math chip (which speeds up calculations) and, like the other versions of SUPERCALC, is not copy-protected. 1-2-3 and SYMPHONY, on the other hand, are copy-protected and require a key disk in drive A to start up the programs. A definite, daily hassle if you frequently use

more than one software program—particularly if you are using a hard disk.

In addition, SUPERCALC3, Release 2, comes with two programs that will make your life much easier. SIDEWAYS (p. 69) prints your worksheet lengthwise across a multitude of sheets of paper. Since it comes configured for SUPERCALC3, you don't have to fool around trying to find the correct variables to use when printing your file to disk. The second program is called SUPER DATA EXCHANGE (SDI). SDI converts files from almost any other database into SUPERCALC3 files, and vice versa; and it translates formulas and data from other spreadsheets into SUPERCALC3 files so you can switch from other spreadsheets and bring your old worksheets along.

If you need a very good spreadsheet and don't want the clutter and nonsense of SYMPHONY, try SUPERCALC3, Release 2. The newly released SUPERCALC3a for the Apple IIc and Enhanced IIe (\$195) has fewer rows than its MS-DOS cousin, but is otherwise quite similar and a very good spreadsheet.

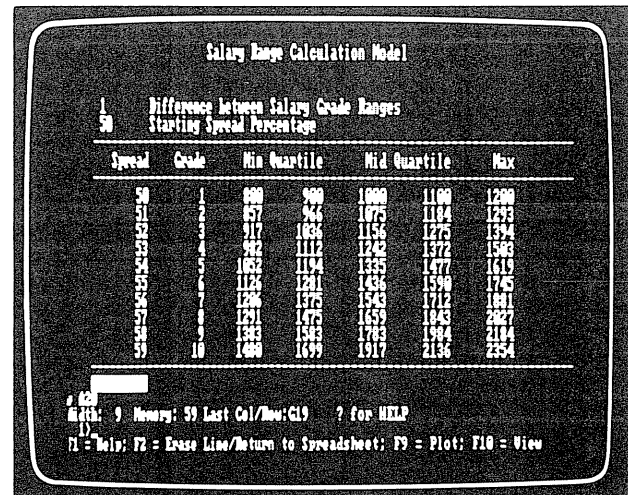
BARBARA ROBERTSON: SUPERCALC's features include ones typically found in spreadsheet programs: automatic recalculation, replication (copies formulas), cell protection, formatting for dollar amounts, whole numbers and scientific notation, and the ability to have two parts of the spreadsheet onscreen at the same time (in windows). Formulas include arithmetic (add, multiply, divide, subtract), exponentiation (raise to a power), and relational operators (equal to, not equal to, less than, greater than, and so on). Also, it lets you combine formulas with conditional expressions (or, and, not, and if). Among the built-in functions are ones that let you calculate absolute value, net present value, averages, counts, exponential value, logarithms, maximum, minimum, sine, cosine, tangents, arctangents, square roots, and pi. It gives you a maximum of 63 columns and 254 rows per worksheet.

SUPERCALC2 has all the features and functions of SUPERCALC plus formatting options for a floating dollar sign, imbedded commas, macro capability, bracketed negative numbers, and zero amounts expressed as blank cells. SUPERCALC2 can sort by column or row, can consolidate total spreadsheets or parts of spreadsheets, and has date and calendar functions.

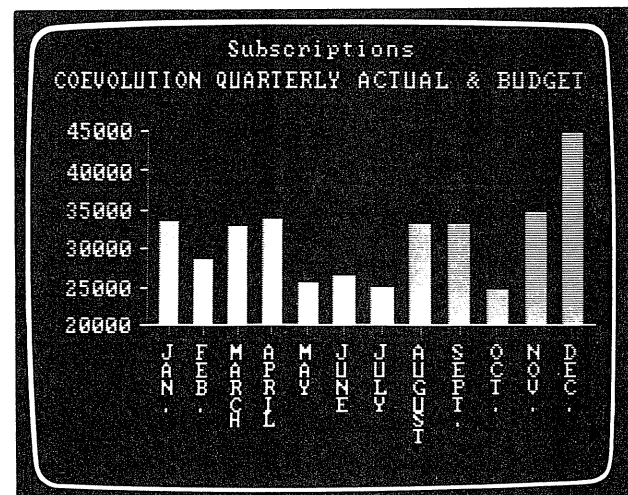
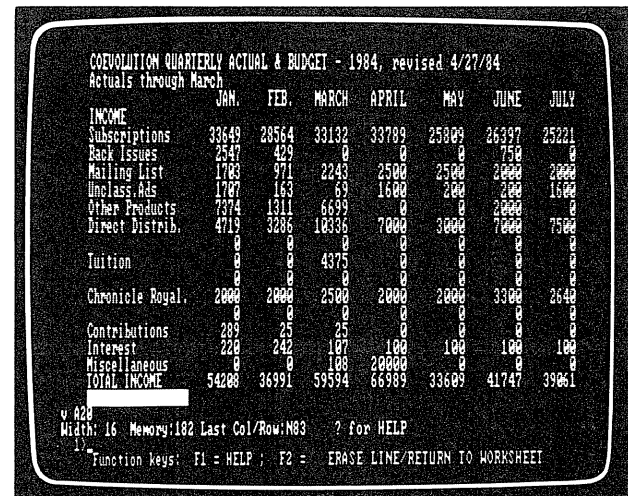
SUPERCALC3 has all the features of SUPERCALC2 plus graphics and data management.

The data management, like that of 1-2-3, means, as Woody says, that it can sort data and find data.

Data entered into a SUPERCALC2 spreadsheet (middle screen) can be easily transferred to SUPERCALC3 when you upgrade. SC3's graphics capabilities allow you to graph one row's performance month by month.



Change one or two numbers, and calculate an entire set of salary ranges for your company. Data is entered in the MidPoint column. Then you select the starting percentage for your range spread as well as the percentage difference between adjacent spreads. SUPERCALC3 does all the rest.



Lots of rows, the premium multifunction package . . .

1-2-3

Version 1A; IBM PC/XT/AT compatibles • IBM PCjr • IBM 3270 PC • MS-DOS machines; 192K; graphics board required for graphics; 2 disk drives or hard disk; \$495; copy-protected? YES; Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 617/253-9150.

SALLY GOTTLIEB: This program hit the top of the best-selling software list shortly after its introduction in late 1982, and stayed there throughout most of 1983 and 1984, with good reason. It was the first spreadsheet program to include graphics capabilities along with many powerful features such as large spreadsheet size, consolidation of spreadsheets, many built-in math functions. It also had a macro feature (so you can type in a series of commands, save them, and then do the whole command sequence again at any time by pressing one key on the keyboard). It's also one of the fastest spreadsheet programs on the market.

The ads bill this program as an "integrated spreadsheet, database and graphics package." Buyer beware! Although 1-2-3's database allows simple sorting and selection, it has no true report generator, data entry or data validation functions. It's a stretch to call this a database. (See the Organizing section for recommended database managers [pp. 85-89].) Likewise, the graphics are crude compared to those of most graphics packages on the market and require a graphics board in the IBM PC.

BARBARA ROBERTSON: For number people, standard IBM PC monochrome monitors have better character resolution than color monitors—but this configuration rarely includes a graphics board. IBM PCs with color monitors do have a graphics board. Compaqs have graphics capability as standard equipment.

SALLY GOTTLIEB: 1-2-3 has a very good online tutorial, which helps ease a beginner into its many features. Although menu-driven, 1-2-3 is a complex program. If you have a secret hankering to be a programmer, you will love the tricks you can play with the macro feature. If you don't, you probably won't find much use for them.

WOODY LISWOOD: I feel that 1-2-3 has one funny anomaly. When moving rows or columns of data, the program writes the new data on top of any found in the new column or row, and the old data is lost. Other programs, when moving data, push aside the old to make room for the new, and preserve both. When you first use 1-2-3, you will make the mistake of moving data without first creating a space. After overwriting some data once, however, you will probably never do it again.

CHRIS WOLF: I have complaints about design features that work against the natural feel. The command menus in 1-2-3 exhibit inconsistent behavior. Sometimes when you complete a command sequence you wind up back in "ready" mode; other times you drop back one, two or three menu levels; still other times you stay exactly where you are and must quit explicitly to complete the sequence. Some menus have no "quit" option, so you have to press the escape key to go back one level. This is especially confusing for beginners.

Any error that occurs in "command" mode drops you back to "ready" mode, and you have to go back through the menu tree to where you were to complete what you wanted to do—especially annoying if you simply make a typo in a cell, range, or file name where any decent program would tell you it was an error and let you try again. This is really rude behavior from a \$500 package.

The graphing feature in 1-2-3 is quite nice, but it just makes me wish it were better. The biggest problem is the program's inability to draw dotted or dashed lines.

DICK YORK: The thing that's missing from most financial statements is cash flow projections. With 1-2-3, I can do cash flow projections of the type usually only affordable by large corporations. These projections tell me what to expect; they also inspire confidence in potential lenders concerned with "ability to repay." This is particularly important when sources of income are complicated.

I use graphs a great deal to look at relationships. I often don't even print them, but find the ability to simplify information valuable. Putting our consolidated cash receipts in the form of a pie chart shows sources of income and how the total is derived more clearly than a page full of numbers—lenders can see relationships and interrelationships easily.

I also use 1-2-3 to keep track of cash flow for a portfolio of selected properties, since none of the property-analysis programs I've found will deal with more than one piece of property at a time. I take basic information from our tax returns (my CPA is about to get a modem, so soon, I hope, I won't have to re-enter all the data), then enter debt totals. The spreadsheet model shows rental income, expenses, debt service, and various rates of return evaluations; it produces a cash flow for the entire portfolio. When we're considering buying or selling a piece of property, I add it to (or subtract it from) the spreadsheet and immediately see how the proposed transaction affects the entire portfolio.

The application pictured calculates how much rent I expect to receive from a business that leases a building from me and how much I'll owe on the land I lease from someone else. Since the amount of rent is based on gross receipts, my income and expenses vary from month to month. Using 1-2-3, I discovered what seems to be a very accurate way to predict my cash flow. When I entered monthly receipts over a period of several years, divided each year's totals by each month in the year and looked at the results in a pie chart, I found to my surprise the pie charts for each year looked identical—it turned out that each month's percentage of the annual gross varied by less than a tenth of a percent each year. May 1981 was 9.1%; so were May 1982 and May 1983. With this information I can predict monthly and annual receipts with a fair degree of accuracy.

Of course, as we get further into the year, these projections become more accurate. Meanwhile, I have an ongoing picture of how much rent I'll owe and how much they'll owe me, and I can compare this year's projections to last year's figures to find the percentage of increase or decrease. With this information, I can compare sales per year to the inflation rate and chart the comparisons with a line graph. I also look at how the business is doing compared to the cost-of-living index and gross national product.

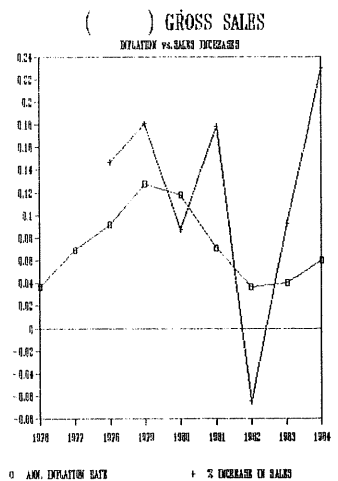
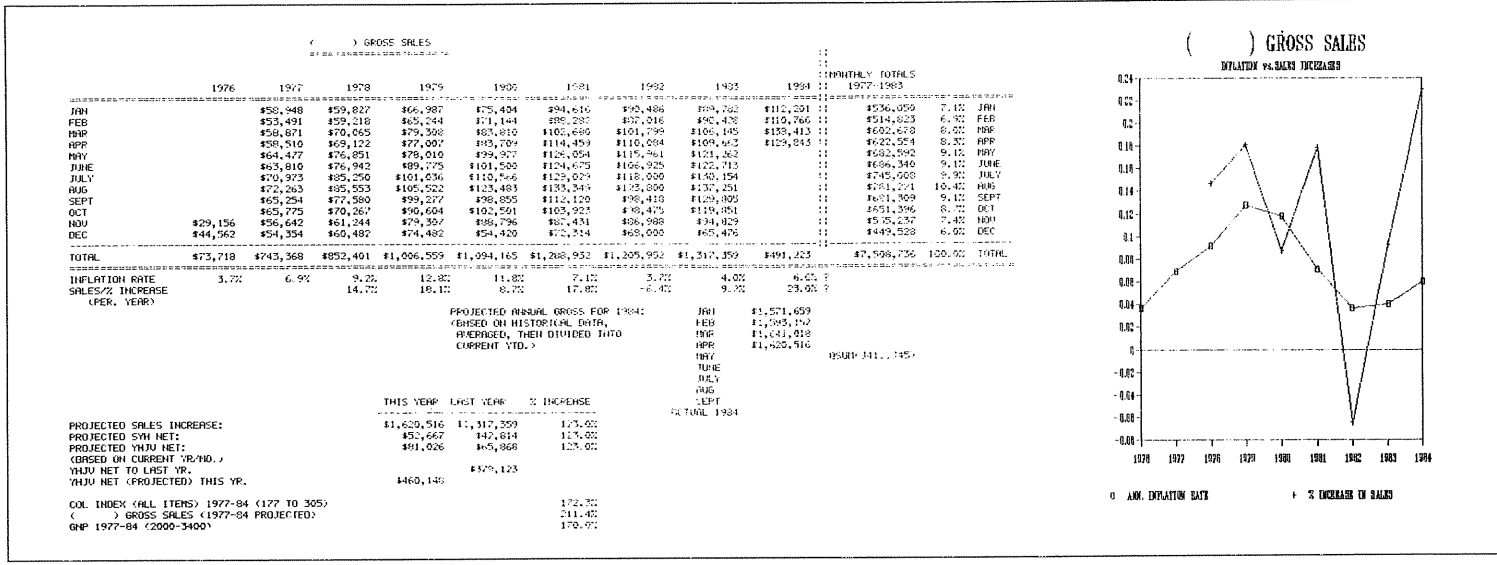
WOODY LISWOOD: Lotus has promised an upgrade to 1-2-3 this fall. The upgrade, they promise, will manage memory more efficiently, support 8087 and 80287 coprocessors and the Intel Above Board's extra memory, give access to DOS from within a program, and be more compatible with SYMPHONY.

MS7: (21) (154-54)/54

1983

			MONTHLY TOTALS			
			1977-1983			
1982	1983	1984				
590,486	589,782	\$112,201	\$536,050	7.1%	JAN	
587,816	590,428	\$110,766	\$514,823	6.9%	FEB	
\$101,799	\$106,145	\$138,413	\$602,678	8.0%	MAR	
\$110,004	\$109,663	\$129,943	\$622,554	8.3%	APR	
\$115,961	\$121,262	\$150,745	\$682,592	9.1%	MAY	
\$106,425	\$122,713		\$686,340	9.1%	JUNE	
\$110,000	\$150,154		\$745,000	9.9%	JULY	
\$123,000	\$137,251		\$701,221	10.4%	AUG	
590,410	\$129,895		\$681,309	9.1%	SEPT	
590,475	\$119,851		\$651,936	8.7%	OCT	
590,900	594,829		\$555,237	7.4%	NOV	
569,000	565,476		\$449,520	6.0%	DEC	
\$1,205,952	\$1,317,359	\$641,960	\$7,588,736	100.0%	TOTAL	
3.7%	4.0%	6.0%				
-3.4%	9.2%	23.7%				

1-2-3 has a versatile spreadsheet with variable column widths. A printout of this cash-flow analysis is on the following page.



DICK YORK: I use *SIDEWAYS* to print the spreadsheet, and it does exactly what its name implies: prints the spreadsheet sideways on continuous form paper, so the spreadsheet can have as many columns as you want. The database for this property has five years of information so far. It's a 20-year lease and I expect to keep adding information for the next 15 years, and keep printing the added columns with no problems. *SIDEWAYS* doesn't print the graph, but I rotate it 270 degrees in 1-2-3 to match the printout.

Easy rider . . .

HARDRUNNER

Version 1.5. Copy-protected. \$39.95. IBM PC/XT/AT and compatibles; IBM PCjr; TI Professional. Nostradamus, 5320 South 900 East, Suite 110, Salt Lake City, UT 84117; 801/261-0769.

WOODY LISWOOD: Copy-protected programs like 1-2-3 that let you load their software onto your hard disk but require that you put a program (or key) disk in Drive A to run the program are a hassle.

HARDRUNNER to the rescue! Put the **HARDRUNNER** disk in drive A, log on to the root directory on the hard disk, and type **HARDRUN**. A few seconds later there is a small 384-byte ".COM" file on your hard disk. Now re-boot and you'll find that your 1-2-3 or SYMPHONY files boot without a disk in Drive A.

HARDRUNNER works fine on my COMPAQ equipped with 640K of memory and an AST board with the Super Driver RAM disk program. And it works with my STB board, but not with the accompanying PCA program. So, if you think you need this program, call the company to be sure it will work with your particular equipment configuration before buying it.

Columns unlimited . . .

SIDEWAYS

Version 2.01; IBM PC compatibles; 64K • Apple II family; 48K • Toshiba • TI Professional and others • IBM, Epson, Okidata, Prism, ProWriter, and most popular dot matrix graphics printers; copy-protected? NO; \$60; Funk Software, Inc., P.O. Box 1290, Cambridge, MA 02238; 617/497-6339.

WOODY LISWOOD: **SIDEWAYS** allows a dot matrix printer to print your spreadsheet or other ASCII text file sideways down multiple sheets of paper. It works quickly and easily and is a must if you are continually trying to print worksheets that are wider than your paper. **SIDEWAYS** eliminates having to do lots of cutting and pasting—and it helps to know as you begin designing a worksheet that you'll be able to print it all in one piece, no matter how many columns wide it is. (You'll be back to cutting and pasting, however, if your worksheet has an enormous number of rows as well. I use it with my Okidata 93 dot matrix printer and am able to print worksheets 100 rows deep.)

Monthly support . . .

LOTUS

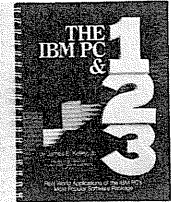
\$18/yr (12 issues) or 6 month free trial subscription to registered owners of Lotus software. Subscriber Services Manager, **LOTUS Magazine**, 55 Cambridge Pkwy., Cambridge, MA 02142; 617/253-9150.

WOODY LISWOOD: **LOTUS**, a magazine for 1-2-3 and SYMPHONY (p. 111) users, is on the market. Published by Lotus itself, it contains good information, lots of advertising for 1-2-3 and SYMPHONY add-ons, and appears to be straight information rather than puff press pabulum. If you use 1-2-3 or SYMPHONY, this will be a welcome addition to your reading habits.

Learning . . .

The IBM PC and 1-2-3

The IBM PC and 1-2-3; James E. Kelley, Jr.; 1983; 306 pp.; \$39.95; Banbury Books, 353 West Lancaster Ave., Wayne, PA 19087; 215/964-9101; or **COMPUTER LITERACY**.



WOODY LISWOOD: I found more tips and lucid explanations about 1-2-3 in this book than I ever expected I could find anywhere. If 1-2-3 drives you crazy with its multitude of commands and its vast potential, this book presents the features, along with samples on a disk of the functions, that are somewhat arcanelly explained in the 1-2-3 documentation. The disk contains, among other things, a project-scheduling template, which shows you how to do critical-path scheduling without having to purchase that type of program. That alone makes this book extremely valuable for the business user. (For other scheduling programs and project-management programs, see *Managing*, pp. 106-121.)

Templates

WOODY LISWOOD: There are multitudes of templates—programs written with 1-2-3 commands for particular applications—available for people who don't have the time to do the programming themselves. OptionWare Incorporated (Bloomfield, CT) makes the best—and probably the most, with more than 50 applications available. I've used and like their Consolidated Manpower and Expenses, Department Budgets, Department Budgets History and Department Budget Projections applications. They're all menu-driven and run in 1-2-3.

70 ANALYZING

Best at consolidating worksheets . . .

MULTIPLAN

Apple II family; 64K; \$95 • Apple III • CP/M-80 (with SoftCard System); 128K; other CP/M-80 machines; 56K • IBM PC compatibles and MS-DOS machines; 64K • Macintosh; 1 disk drive; copy-protected? YES; \$195; Microsoft Corporation, 10700 Northup Way, Box 97200, Bellevue, WA 98009; 206/828-8080.

WOODY LISWOOD: MULTIPLAN is also a close runner-up to 1-2-3 (p. 68). It advertises itself as a second-generation spreadsheet. It is available on almost all machines in almost all operating environments. Like 1-2-3, MULTIPLAN has a well thought-out menu structure, so you don't have to memorize slash commands as in VISICALC or SUPERCALC.

stay in the same row." Such expressions make it very difficult to read logic flows, so you always end up pointing with the cursor rather than typing in the relative location. MULTIPLAN shines, however, in its ability to consolidate worksheets.

MULTIPLAN allows you to use alphabetic names for groups of data. So you might label the "results" column in a worksheet as RESULTS and then build a consolidated worksheet using the RESULTS from ten other worksheets. To do this, you would design the original ten worksheets, then design a consolidated worksheet that instructs MULTIPLAN to place the RESULTS column from each of those other worksheets in the correct column in the consolidated worksheet. What happens if you make changes in, say, three of the original worksheets? Load the consolidated worksheet and it automatically adjusts, using the new data.

There's one "feature" of MULTIPLAN, however, that I find abominable—the way it refers to cell locations. Most other programs designate rows and columns as numbers and letters, so you know when you are in cell A1 (the junction of column A and row 1). So when you are in C1 and want to reference A1, you type A1. In MULTIPLAN, however, you keep track of rows and cells that way, but enter and keep all cell references in relative notation. This means that when you are in C1 and want to refer to A1, you must type C-2 R—translation: "go back two columns and

For the Apple II family . . .

MAGICALC

William Graves; Version 2.165; Apple II family; 48K; copy-protected? YES; \$99.95; ARTSCI, Inc., 5547 Satsuma Ave., North Hollywood, CA 91601; 818/985-2922.

MAGICALC's menu offers Calculate (the spreadsheet program itself), File, Format, and Configuration subsystems, and the option of "Booting the next program." A spreadsheet can hold 16,002 cells (63 columns, 254 rows), although unless you have 512K RAM memory, you can't access all the cells at once.

THE SPREADSHEET

William Graves; Apple II family; 48K • Apple III in emulation mode; copy-protected? NO; \$65 to members only (\$49 membership; \$26/1st year dues, \$23 initiation fee); A.P.P.L.E., 290 S.W. 43rd St., Renton, WA 98055; 206/251-5222.

MAGICALC has thirteen built-in math functions and seven built-in logic functions. It provides "Lookup," minimum and maximum value selection, and the use of "not, or, true, and not available" criteria for displaying values in particular cells. It has two built-in financial functions—Internal Rate of Return and Net Present Value—and no built-in date functions.

IACCALC

William Graves; Apple II family; 48K • Apple III in emulation mode; copy-protected? NO; \$39.95 for members (membership fee: \$30), \$49.95 for non-members; International Apple Core, 908 George St., Santa Clara, CA 95050; 408/727-7652.

In addition to working well with VISICALC, MAGICALC's DIF files can be used by other Apple II programs, such as Apple II business graphics, DB MASTER (p. 83), and PFS:GRAPH, which saves keying data into other programs.

DON SCELLATO: MAGICALC is currently available from three different sources under three different names. The product is the same in all cases, but the price varies significantly. A.P.P.L.E. and International Apple Core have lower prices for paid members of their organizations.

MAGICALC is very similar to the Apple DOS 3.3 version of VISICALC and the original version of VISICALC for the IBM PC.

MAGICALC can use VISICALC models and data files, which means the experienced VISICALC user can easily move from one program to the other without retyping entire models, although a few changes are sometimes required to move formulas from MAGICALC into VISICALC.

It's an excellent spreadsheet program, offering the user more file handling and formatting options than the basic versions of VISICALC. However, MAGICALC has no built-in trigonometric functions; it can't display 70 columns of characters without a video expansion card; nor can it be configured for 80-column display on a number of video expansion cards.

WOODY LISWOOD: MAGICALC, available in a number of incarnations, is the recommended program in the Apple DOS environment. It lacks some of the trigonometric functions of the original VISICALC program. However, for normal use it has most of what you will need as well as the advanced features found in the second-generation programs (variable column widths being the most important).

A salary plan determines the appropriate percentage merit budget for a coming year. Not a lot of work after you have things set up. After you enter the required data, you change the market movement assumption and this MULTIPLAN spreadsheet will tell you the appropriate merit budget needed for that set of employees.

1	2	3	4	5	6	7
Salary Plan						
Salary Grade	Market Line	# of Employees	Current Salary	Market C.R.	New Midpoint	
1	750	10	755	101	825	
2	850	25	825	97	935	
3	950	45	960	101	1045	
4	1050	75	1025	98	1155	
10	1150	83	1140	100	1265	
Anticipated Market Movement			10			
New CompaRatio			90.11			
Total Cost			26736			
Merit Budget Percent			10.98			

COMMAND: Blank Copy Delete Edit Format Goto Help Insert Lock Move Name Options Print Quit Sort Transfer Value Window Xternal Select option or type command letter Risc4 10 96% Free Multiplan: SalPlan

Product	Recommendation	Copy Protected
HOMERWORD	Commodore 64, Atari 800, Apple II, IIC, IIE, IBM PC, PCjr	
MACWRITE	Macintosh	y
PFS WRITE	Apple IIE, IIC - \$125.00 IBM PC/jr - \$140	
ATARI WRITER	Atari 800XL, 1200	

Cindy Craig used MULTIPLAN on the Mac to create a readable draft of the chart on pp. 50-51. She had never used a spreadsheet before.

Portable Spreadsheets

Comes on a chip . . .

LUCID

Version 1.5. Copy-protected. \$149.95. TRS-80 Model 100. Portable Computer Support Group, 11035 Harry Hines Blvd., Suite 207, Dallas, TX 75229; 214/351-0564.

WOODY LISWOOD: Loaded with LUCID, the Model 100 (p. 16) is a serious, portable spreadsheet tool. LUCID is as powerful as any spreadsheet for any microcomputer on the market. The worksheet can be very large—254 rows by 126 columns. LUCID's features include the ability to cut and paste data from one area of the worksheet to another, variable column widths, customized input forms, and bug-free formula manipulation. A utility menu branches to specialized extra programs including ones that sort data and draw graphs. LUCID comes as a chip you install in the bottom of the Model 100, which means it takes up no memory space and is fast.

JAMES STOCKFORD: LUCID ranks right up there with SUPERCALC (p. 67) and 1-2-3 (p. 68). That it can work with text as well as

numbers is terrific. You can use "if-then" statements to find figures for particular situations. Create a table for your Nirvana Oil Company Punch with bottle size and weight of emollients, and LUCID will come back with the number of bottles you have to sell to make your costs, and warn you if your combination exceeds toxicity levels of boola-boola juice.

WOODY LISWOOD: The Tandy Radio Shack Model 200 lap-size computer comes with MULTIPLAN (p. 70) on the machine's ROM ("Read Only Memory") chip, rather than on a plug-in ROM chip like LUCID for the Model 100. Although this version of MULTIPLAN works about the same on the Model 200 as on the larger micros, the Model 200 MULTIPLAN allows only 99 rows. LUCID has more capacity and features than the Model 200 MULTIPLAN, and is limited in comparison only by two Model 100 limitations: the Model 100 has an 8-line screen versus the 200's 16 lines, and the Model 100 can have a maximum memory of 32K RAM versus the 200's 96K. You get a better spreadsheet using LUCID in the Model 100 and the combined price is lower.

The higher-cost spread . . .

HP110 AND 1-2-3

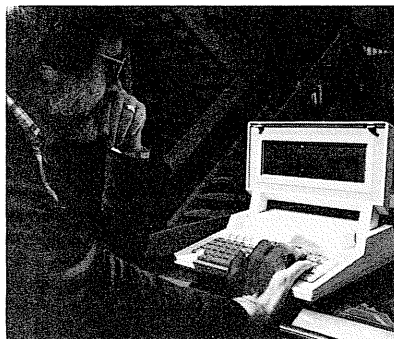
\$2995. Hewlett-Packard, 1020 N.E. Circle Blvd., Corvallis, OR 97330; 800/367-4772.

WOODY LISWOOD: 1-2-3 comes on the HP 110's ROM chip and contains almost all the features 1-2-3 (p. 68) has on the bigger machines. It makes the over-engineered and pricey HP110 a useful spreadsheet machine.

RICHARD DALTON: Think of HP's 9-pound powerhouse as a quantum jump up from the TRS-80 Model 100 (p. 16)—in both price and performance. Cost is \$2,995 and you get a lot more: 16 line x 80 column screen; 272K RAM and 392K ROM memory; built-in modem; sophisticated software and five extra pounds to lug.

That's all fine, but you should have use for the integrated software if the price difference is to make sense. The 110 comes equipped with 1-2-3, MEMO MAKER (a limited writing tool), and TERMINAL, a simple, powerful telecommunications program.

The LCD (Liquid Crystal Display) screen is controversial. Characters are shaded for readability but the screen must be straight in front of you and tilted just right or glare is a problem. Contrast is adjustable over a wide range. At its best viewing point, I still wouldn't want to look at the screen for periods beyond an hour or two.



The HP110, "The Portable," is a classy, solidly constructed spreadsheet machine; however, the price is prohibitive unless you can get a tax break for using the 110 in business.

What we need is to develop a way of discussing computers, and all technologies, from what we might call a "holistic" perspective. The question must not be confined to whether a computer serves your organization well, or whether it spits out perfectly-edited copy. We need to view the computer for the totality of its effects upon society and life on Earth, and to ask questions which will bring forth that picture.

Free for Model 100 owners . . .

MINIVC

TRS-80 Model 100; 24K; free to members of CompuServe's (p. 140) Model 100 SIG (PCS-154); membership in the SIG free to CompuServe members.

WOODY LISWOOD: There are a number of calc programs available for the TRS-80 Model 100 (p. 16). When you compare price to features, however, the winner is the MINIVC program, available as a free public domain program on the TRS-80 Model 100 Special Interest Group (SIG) on the CompuServe Information Service (CIS) network (p. 140). If you are on CIS, you'll find the SIG by typing GO PCS 154 at the main prompt.

The cost is right: \$000.00.

MINIVC has the right features. It is modular in approach, and you do not need to add the code (and can delete the code) for any features you do not need. This is important, for with less code you have more memory available for your spreadsheet.

MINIVC can ABS (absolute value), INT (integer), SQRT (square root), ROUND (round off), SUM (add all or part of a row or column), and AVG (find an average). A second module adds MIN (find the minimum value in a list), MAX (find the maximum value), MOD, FIX, PI, EXP (exponentiate), COS (cosine), LN (natural logarithm), TAN (tangent), SIN (sine), ATAN (arctangent), as well as Boolean operators. You can also replicate both absolute and relative numbers, insert and delete, transfer and edit your data. In other words, MINIVC can do the same sort of things as many of the other calc programs that cost you your hard-earned dollars.

Well, if it is free, what is the problem with it? This is a BASIC program, not a machine-language program, and therefore slower. Also, I would like to have adjustable column widths. Other than that, no problems. It has all the features you might want, considering the limited (32K) memory on the machine. By the time you read this, author Woods Martin (CIS number 70235,232) will probably have added more features.

How do computers affect concentrations of wealth and power? Who gains and who loses because of their existence? Do computers have environmental effects? What are they? What about diversity of culture and thought? The way we work, and who gets to work? What are the effects on what we know and are capable of knowing? What is gained and what is lost?

—Jerry Mander

Costs less than \$60 . . .

PC-CALC

Jim Button. Version 2.0. Not copy-protected. Shareware; \$48 registration fee for disk and manual; updates extra. Buttonware, P.O. Box 5786, Bellevue, WA 98006; 800/528-8866 or, in WA, 206/746-4296.

WOODY LISWOOD: Spreadsheets have arrived at last in the shareware domain. What's shareware? A method of distribution that encourages people to try programs, copy them, give them to friends. If you decide you like the program, then you pay for it, register it, get the printed user's guide, and away you go. PC-CALC is a full-featured spreadsheet with many of the functions you will want to use. The price is right. However, the program is written in BASIC (therefore slow) and has limited size (255 rows). If these limitations don't bother you, if you rarely have need for a spreadsheet, or if you always wondered whether you really wanted to use a spreadsheet, this is a good way to go. I recommend it over PFS:PLAN, another relatively limited but inexpensive spreadsheet from the folks who also sell the popular PFS:FILE (p. 80), because PC-CALC is more fully featured, less expensive and you don't have to pay for it unless you like it.

Spreadsheet Utilities

Consolidating worksheets . . .

MERGEALC

Laurence Chapman; version 3.0; IBM PC/XT compatibles, Wang, TI Professional; 192K; copy-protected; \$125; Micro Decision Systems, Box 1392, Pittsburgh, PA 15230; 412/854-4070.

DON SCCELLATO: This utility program operates on VISICALC, SUPERCALC (all versions), 1-2-3, SYMPHONY, and MULTIPLAN worksheet or template files, allowing the user to add them together, subtract one from another, divide or multiply them by a selected number, and add or subtract a number from them. You can add together all the segments of an activity to provide an overall analysis or generate variance-analysis reports along with percent and time-change reports. Since a worksheet in one file can be divided by a worksheet in another, you can also, for example, get a "percent of total company" analysis report for one segment of a company, or a "percent of total market" analysis for a company.

To use MERGEALC, however, the layouts of all the worksheets and models to be manipulated as a set must be identical. You are working with different versions of identical templates, so the only difference between the templates will be the input data, not the formulas or grid locations of your data.

DATA TRANSFER

WOODY LISWOOD: The spreadsheet is a visual environment where you can perform mathematical, algebraic, and logical operations and see the results of those operations immediately. With a database, you normally work with (and see) one record at a time. To change the relationships between data in a database, to look at all the data, or to edit it requires considerable effort. However, the error-checking capabilities built into many databases (and missing from spreadsheet programs) can be an advantage when you want to ensure accurate data entry.

The best databases give you many options for fancy, formatted, printed reports impossible to produce with a spreadsheet. For example, I use a spreadsheet program to analyze and process salary surveys. Entering the data into a worksheet makes it easy to see each row as it goes by, edit, and look for anomalies. The problem comes when I want to print a report that shows all the information for each job on a page by itself. To do this with a spreadsheet program, I would need a worksheet 2750 rows deep with 50 duplicate sets of headings and formulas. By printing the report with a database I can set up a preformatted page with all the headings on it, and print all the reports quickly with one pass through the data.

Moving data to a spreadsheet for analysis and what-if possibilities, then moving the data from a spreadsheet to the database for reports, gives me the best of both worlds.

—Woody Liswood

Spreadsheet to spreadsheet . . .

CONVERTACALC

Laurence Chapman; version 1.47; IBM PC/XT compatibles, Wang, TI Professional; 256K; copy-protected; \$245; Micro Decision Systems, Box 1392, Pittsburgh, PA 15230; 412/854-4070.

WOODY LISWOOD: CONVERTACALC converts models from one spreadsheet into models used by another, converts formulas and labels, and moves the data, too. Whichever way you want. It works with VISICALC, all versions of SUPERCALC, 1-2-3, SYMPHONY, and MULTIPLAN.

Auditing a spreadsheet model . . .

DOCUCALC

Laurence Chapman; version 5.0; IBM PC/XT compatibles, Wang, TI Professional; 192K; copy-protected; \$95; Micro Decision Systems, Box 1392, Pittsburgh, PA 15230; 412/854-4070.

WOODY LISWOOD: When you create complicated spreadsheets, you need to document your methodology for your own benefit in case you want to change something, and for the benefit of someone who wants to understand the model you created. For documentation purposes, the built-in cell-formula printer routines in the major spreadsheets leave much to be desired. DOCUCALC prints formulas out in row order, in column order, or in a matrix identical to where the formulas are in your worksheet. It also prints reports showing circular references, ranges, and blank cells. Works great. A must-have program for VISICALC, SUPERCALC (any version), 1-2-3, SYMPHONY, or MULTIPLAN users who need to keep track of what is happening.

For more utilities: SIDEWAYS (p. 69) and Programming (pp. 158 to 174).

Spreadsheet to database to spreadsheet to . . .

LOADCALC

Laurence Chapman; version 5.14; IBM PC/XT compatibles, Wang, TI Professional; 192K; copy-protected; \$175; Micro Decision Systems, Box 1392, Pittsburgh, PA 15230; 412/854-4070.

Need to get data into and out of a spreadsheet program and a variety of other formats? LOADCALC converts ASCII text files (no command codes imbedded in the files) into spreadsheet formats; converts spreadsheet files into files that can be used by DBASE II (p. 85), DBASE III (p. 86), and other major databases; and converts spreadsheet files into DIF files that can be used by GRAPHWRITER (p. 129) and CHART MASTER (p. 129). LOADCALC is primarily used to change columnar reports downloaded from mainframes (for example, online databases) into spreadsheet files. However, it can convert any file with delimited values (for example, a line of data with commas between each separate item) into spreadsheet format, and it allows you to enter delimiters. It works with VISICALC, all versions of SUPERCALC, 1-2-3, SYMPHONY, and MULTIPLAN.

When a spreadsheet isn't enough . . .**EQUATE** ★

Alan Reeder and George Olding. Version 1.1. Not copy-protected. \$195 (street \$140). IBM PC/XT/AT and compatibles (128K). Equate Research Group, 5632 East Third St., Tucson, AZ 85711; 602/745-8086.

WOODY LISWOOD: One of the problems with life in the digital world is that solutions to some mathematical problems require formulas that won't work in the slick and easy spreadsheet environments. EQUATE has many of the same functions as a spreadsheet and, in addition, its programming language lets you design formulas and build equations that spreadsheet programs would just burp at.

EQUATE helps you create and solve formulas: You get a few preformatted worksheets and one worksheet that contains most of the constants you might need but can't find or remember. Once you've built an equation, EQUATE will prompt you for missing variables. Solutions are actually printed in a table format that looks indistinguishable from a typical spreadsheet. It's the only program of its kind on the market.

Survey analysis . . .**SOLOMON** ★

Version 3.11. Copy-protected. \$495 (street \$275). IBM PC/XT/AT and compatibles (192K). Hard disk required for full program capabilities. Personnel Software, Inc., 317 Barton Ct., Danville, CA 94526; 415/831-1697.

WOODY LISWOOD: SOLOMON does only one thing—paired comparisons with multiple criteria—and does it very well. You can have up to 20 raters (survey respondents) and 50 items. In addition you can specify partial subsets. And each rater does not have to evaluate each item for the program to work.

Say you have decided to upgrade your employee benefit program, but you have no idea how your employees would respond to new benefits or changes. So you develop a list of current and future benefits. Then you have SOLOMON develop a set of survey questions that you have each of your employees complete.

SOLOMON takes all of the results and ranks the entire set of items according to their importance to employees. You also receive a relative value order, which gives you the magnitude of difference between each item. It's the only program of its kind.

SOLOMON Standard Appraisal Form						Page 1
Organization: Personnel Software Inc.						
Purpose of project: SPREADSHEET EVALUATION						
Appraiser: _____						Date: _____
Criterion: 1 - EASE OF USE						
		>>	>	=	<	<<
1	SUPERCALC3	---	---	---	---	MULTIPLAN
2	MULTIPLAN	---	---	---	---	1-2-3
3	1-2-3	---	---	---	---	SMARTSPREAD
4	SUPERCALC3	---	---	---	---	1-2-3
5	MULTIPLAN	---	---	---	---	SMARTSPREAD
6	SUPERCALC3	---	---	---	---	SMARTSPREAD

Although SOLOMON was designed as a management tool for rating employees, its criteria-ranking capabilities could just as well be used for evaluating products such as software. Program-generated forms such as this one are filled out by up to twenty appraisers, and the data is entered into the program. The result is a ranked list of spreadsheet programs for the criterion "ease of use."

Complex problem solving . . .**TK!SOLVER**

Apple II family; 64K • IBM PC/XT compatibles • MS-DOS machines; 128K; copy-protected? YES; \$399;

TK!SOLVERPACK

Mechanical Engineering, Financial Management, Introductory Science, and Building Design & Construction; runs on same systems as TK!SOLVER; copy-protected? YES; \$100 each;

both from Software Arts, 27 Mica Lane, Wellesley, MA 02181; 617/237-4000.

DON SCELLATO: TK!SOLVER is a useful tool for people who must frequently solve complex mathematical equations, have no desire to write complicated programs in BASIC or another language, and do not want to work within the constraints of electronic spreadsheet programs.

If you are an engineer, architect, statistician, chemist, physicist, navigator, astronomer, or financial or statistical analyst whose job involves the solution of complex formulas and the frequent use of mathematics, TK!SOLVER is a program you should examine. It's extremely easy to learn and use. I would even recommend that high school students

studying science and advanced math look at the program. College math students would find it a useful tool.

It solves complex mathematical problems, creates tables of various parts and results of a formula, and makes rudimentary plots of the data generated. Although the graphics output of the program is adequate for someone working with math, it is not presentation quality.

TK!SOLVER uses a very logical and simple approach to solving problems. You begin by setting up a Rule Sheet—a list of equations or formulas to be solved. As you enter rules, each variable in an equation is automatically transferred to a Variable Sheet. The Variable Sheet is particularly important, since it is used to enter known values in the equations on the Rule Sheet. Equations can be supported by a table of conversion factors or further defined by use of a Unit Sheet (which interlocks with the Rule and Variable Sheets). A Global Sheet can be used to set printing defaults and turn the automatic transfer of variables on or off.

Once you have entered rules and known variables, you can solve for unknown variables in the equations. The "Direct Solver" produces a series of guesses that

lead to a solution by trial and error. You provide the problem to be solved and the first guess at the correct answer. Press the ! key, and the program solves the equation based on the first guess. It then replaces the first guess with the first solution. Press the ! key again, and the process is repeated until the proper solution is reached.

By setting up a List Sheet for repetitive solutions to the same problem, you can make the process happen automatically. The List Sheet describes each list of data required for the solution of a problem, with further subsheets used to define the known elements of each list. The problem can then be solved for each item in the list. If the problem must go further than required on the Rule Sheet, a User Function sheet can be used to define specific functions or numeric relationships.

TK!SOLVER is produced by the same folks who invented VISICALC and uses a similar command structure. The manuals are clear and complete. Optional TK!SOLVERPACKS have equations for solving common problems in particular fields such as introductory science, mechanical engineering, and financial management.

Even does surface plots in 3-D . . .

STATGRAPHICS

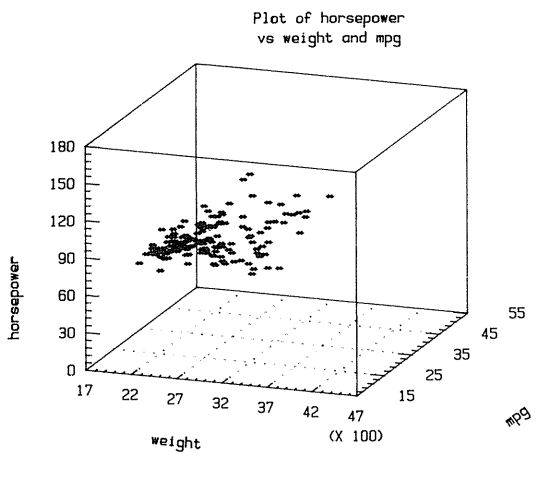
Neil Polhemus. Version 1.0. Not copy-protected. \$695 (street \$475). IBM PC/XT/AT and compatibles (384K; 2 disk drives or hard disk required). STSC, Inc., 2115 East Jefferson St., Rockville, MD 20852; 301/984-5123.

WOODY LISWOOD: STATGRAPHICS has made my day. Finally a complete statistics program with built-in graphics, and it's unprotected at that. STATGRAPHICS is the best statistics package I've found. The graphics and plotting capability can be seen onscreen, printed or plotted.

STATGRAPHICS does the following: smoothing (simple moving average, weighted moving average, polynomial, q-splines, closed q-splines, rate function estimate from counts, and rate function estimates from intervals), time series (horizontal time sequence, vertical time sequence, seasonal subseries, autocorrelation, partial autocorrelation, cross-correlation, simple or seasonal differencing, mean or trend removal, Box-Cox transformation, periodogram, integrated periodogram, data tapering, plotting vs. Fourier frequencies, Box-Jenkins ARIMA modeling, and cross-correlation matrix plotting), categorical analysis (contingency tables, Chi-square, crosstabs, numeric coding of classification factors), multivariate

(matrix creation, variable standardization, correlation matrix, covariance matrix, principal components, factor analysis, factor rotations, cluster analysis, discriminant analysis, canonical correlations, expansion of compressed matrix, star-symbol plots, sun-ray plots, draftsman plots, and casement plots), nonparametric (basic runs test, runs test up and down, runs test above and below median, basic sign test, sign test for location, sign test for paired samples, Wilcoxon signed rank tests, Mann-Whitney-Wilcoxon test, Kendall rank correlation, Spearman rank correlation, Kolmogorov-Smirnov one-sample test, Kolmogorov-Smirnov two-sample test), and there are experimental design sections, sampling sections, quality-control sections, forecasting sections, data-management sections, exploratory data-analysis sections, and distribution-function sections.

STATGRAPHICS is a relatively new program, so I haven't had a chance to work with it as much as the other statistics packages I'm recommending, but so far I've found STATGRAPHICS to be one of the most complete and easy-to-use statistics programs that I have come across. My big complaint about the program is that it's slow. However, the plotting capabilities are superb! They include 3-dimensional graphic and bar charts as well as 3-D surface plots which makes the display and interpretation of statistical data almost easy.



One unique feature of STATGRAPHICS is its ability to display data in three dimensions as seen above in this floating 3-dimensional plot showing gas economy of a selection of cars with differing weights and horsepower.

Best value for Apple II owners . . .

DAISY PROFESSIONAL

Apple II family; DOS 3.3; 48K • Apple III in emulation mode; copy-protected? NO; \$199.95; Rainbow Computing, Inc., 8811 Amigo Ave., Northridge, CA 91324; 818/349-0300.

WOODY LISWOOD: Funny name, you think, for a statistics program. Well, DAISY stands for "Data Analysis and Interactive Statistics." For the money, it's a best-buy among statistics programs.

DAISY's two data-entry routines are among the best I have used with a statistics program. The first is standard with BASIC programs: You define your X and Y variable names, then the program asks you to enter your data one entry at a time. The second option is a calc type of entry model, in which you can enter data in a row-and-column format and use arrow keys to move around—a very, very good feature. In addition, DAISY has full editing capabilities within the matrix of data.

All the features of the program are accessed with four-character codes for more than 100 commands. If you are familiar with statistics, I would rate DAISY as user friendly.

Otherwise, you might have to look up a command or data request in the documentation—or even a statistics textbook—before you are certain that you are responding correctly. Documentation is complete and explains each of the commands in a reasonably lucid style. DAISY's HELP command gives you a list of available commands grouped according to function; INFO gives you a full description. If you enter a command that cannot possibly work, given where you are in the program, DAISY reminds you that if you are unsure of your next move, you can use the HELP and INFO commands to get more information.

DAISY makes use of the extra memory in the Apple IIe and will use various 80-column cards including the Videx Videoterm and Ultraterm boards.

DAISY also does graphics: sequence plots, histograms, scatter plots, semilog on both X and Y axes, and log-log scatter plots. You can save the plots to print with your favorite graphics program (see Drawing, p. 122-137).

What statistical wonders does DAISY perform? Transforms on a column basis: mean, standard deviation, variance, standard error, minimum, maximum, range, sums,

frequency tables, histograms, covariances, correlation, partial correlation, autocorrelation, Spearman rank correlation, Kendall rank correlation, Kendall partial rank correlation, and Kendall coefficient of concordance. It runs tests about mean and about a given value, performs analysis of variance one-way or two-way, analysis of variance for regression, Chi-square, t-test, Cochran Q-test, Mann-Whitney U-test, Friedman two-way analysis of variance, summary statistics, regression coefficients, Durbin-Watson statistics, beta weights, fitted and residual values, and simple or multiple regression. DAISY uses all subsets of possible independent variables, uses all subsets of a given size, goes forward or backward in a stepwise regression, and sweeps a variable in or out of a regression.

Also . . . handles exponents, integers, inverse, natural logs, logs, base 10, absolute values; adds, multiplies, divides, raises to powers, calculates cumulative totals and differences, and can lead or lag the data. DAISY creates new columns of data for the fitted and/or residual values of the regression.



Coping with skewness . . .

SPSS

Version 1.1. Copy-protected. \$795 (street \$550). IBM PC/XT/AT and compatibles with DOS 2.0 or higher (320K and 10MB hard disk required). 8087 coprocessor recommended. SPSS, Inc., 444 N. Michigan Ave., Suite 3000, Chicago, IL 60611; 312/329-3500.

WOODY LISWOOD: If you need a powerful statistics program, then this is it. This microcomputer clone of the mainframe version works well, but, fair warning, SPSS is not for those uninitiated to the statistics priesthood. It assumes you know what you are doing and why. For instance, in the section on multiple regression there are numerous subheadings such as "Coaxing a

Nonlinear Relationship to Linearity" or "Coping with Skewness" or "Stabilizing the Variance." If you feel comfortable with those terms, then the documentation is complete, helpful, and actually fun to read. It's full of sample problems and suggests different approaches to take when working with your data. And it supports KERMIT (p. 156) protocol to talk to a mainframe.

On the other hand, it is copy-protected (you must have a key disk in drive A when you start the program), it doesn't have a curve-fitting routine, and it comes on nine disks that must be loaded and available before you can run the program. The publishers recommend that you dedicate an IBM PC/XT to do nothing but run this program.

Accepts data from many sources . . .

ABSTAT

Version 4.08; IBM PC/XT/AT compatibles or MS-DOS machines; 196K • Version 3.04; CP/M-80 (64K) and CP/M-86 (128K); 2 disk drives or hard disk required; copy-protected? NO; \$395; Anderson Bell Co., P.O. Box 191, Canon City, CO 81212; 303/275-1661.

WOODY LISWOOD: Although this program does not have all of DAISY's features, it has an impressive number, and unlike current versions of DAISY, it runs in the PC/MS-DOS environment as well as in CP/M.

ABSTAT doesn't have curve fitting (see CURVE FITTER, p. 76); you have to determine in advance the maximum number of variables you'll need; you must always use upper-case letters; and the editing capabilities are very weak. But the program works rather well, it's reasonably well designed and easy to use, has enough statistics to solve many problems, and you can transfer your data to it from a multitude of sources. This means you do not have to re-key data already entered into other programs when you want to perform statistical analysis on it.

You select commands via a menu, or, if you know what you want to do, you can avoid the menu by giving direct commands. You can type ? for help at any time; adding a command name gives you information about that command.

With ABSTAT's command file (macro) option, you can use a word processor to create files of commands, name them, and then (if they are all valid ABSTAT commands in the proper order), once you bring your data into ABSTAT and give the program your command file name, the system will run by itself. The command file can turn on your printer and perform all the analysis you might need while you are out drinking coffee with your friends.

What does ABSTAT do? Functions include Create a new file, Fetch an existing file, Edit, Save, Transform the current data set, Add variables from another file, Transform a variable from another file, Append data from another file, Print, Generate random numbers, Sort, Read an ASCII data file, and Read and Write a DBASE II (p. 85) data file.

Statistical commands include one-way and two-way analyses of variance, Chi-square goodness of fit and Chi-square two-way contingency table, correlation coefficients (r) matrix, means, standard deviation, modes, values, frequencies, percent and z-scores, Mann-Whitney U-test, variable pair mean test, population mean test, t test for paired observations, probability commands, simple and multiple linear regressions, Spearman rank correlation matrix, and cross-tabulation.

ABSTAT really worked well on this rank order correlation. ABSTAT finished the entire affair in just under 5 minutes with 45 elements in each set.

```

COMMAND: SRANK
                                     SPEARMAN RANK
                                     *** CORRELATION MATRIX ***

VARIABLES:
1 K          1.00000
2 P          0.965180      1.00000
3 R          0.964069      0.958539      1.00000
4 PT         0.994018      0.978825      0.981867      1.00000
5 GD         0.989396      0.977747      0.983244      0.996776      1.00000
                                     1 K          2 P          3 R          4 PT          5 GD
    
```

Curve Fitting

WOODY LISWOOD: Most of the charting programs designed for on-screen graphics or to drive digital plotters come with built-in statistical functions. These are normally regression functions that will calculate and plot a regression line when you enter in a scattergram. While they're fine programs, we are not reviewing them here because their primary function is graphics, not statistics. CHART MASTER (p. 129) is an example of this type of program.

For lap computers . . .

STATISTICAL CURVE FITTING

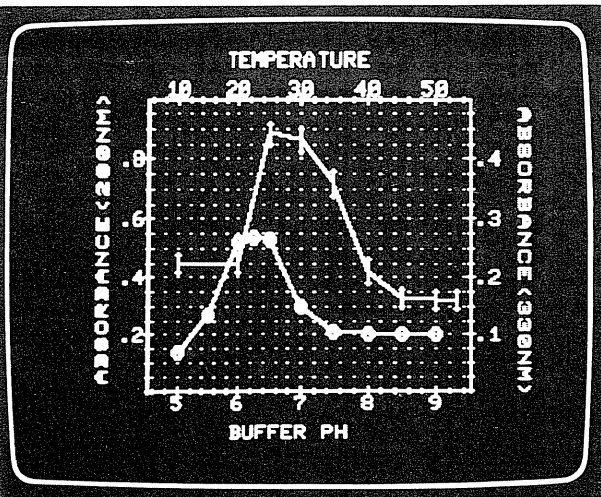
NEC PC-8201A • TRS-80 Model 100; 24K; \$65; copy-protected? NO; McDonald Micro Products, Inc., 17734 Preston Rd., Suite 204, Dallas, TX 75252; 214/380-8100.

WOODY LISWOOD: The best statistical package for these two popular lap computers is STATISTICAL CURVE FITTING. Not only does this program have many of the statistics from the full size microcomputers, it displays a graphic curve that fits on the small screens in a most professional manner.

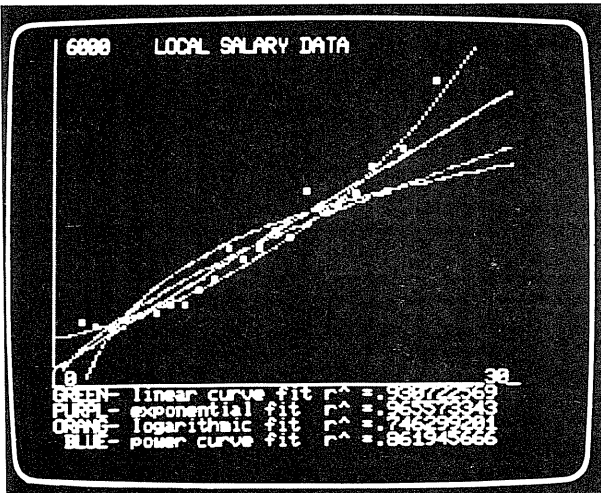
```

COMMAND: BARG
VARIABLE: I K
AT LEAST 13.0000 5 10 15
20
BUT NOT OVER: FREQ 2
+-----+-----+-----+-----+
1.00000 0 00.0 I
2.00000 0 00.0 I
3.00000 0 00.0 I
4.00000 0 00.0 I
5.00000 0 00.0 I
6.00000 0 00.0 I
7.00000 0 00.0 I
8.00000 0 00.0 I
9.00000 0 00.0 I
10.0000 0 00.0 I
11.0000 0 00.0 I
12.0000 0 00.0 I
13.0000 2 0.5 IX
14.0000 6 1.5 IXXX
15.0000 8 2.0 IXXXX
16.0000 11 2.8 IXXXXXX
17.0000 18 4.5 IXXXXXXXXXX
18.0000 29 7.3 IXXXXXXXXXXXXXXXXXX
19.0000 48 17.0 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
20.0000 54 13.5 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
21.0000 46 11.5 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
22.0000 33 8.3 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
23.0000 35 8.8 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
24.0000 30 7.5 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
25.0000 21 5.3 IXXXXXXXXXXXXXXXXXX
26.0000 11 2.8 IXXXXXX
27.0000 11 2.8 IXXXXXX
28.0000 3 0.8 IXX
29.0000 5 1.3 IXXX
30.0000 6 1.5 IXXXX
31.0000 0 00.0 I
32.0000 0 00.0 I
33.0000 2 0.5 IX
+-----+-----+-----+-----+
TOTAL 399 100.0 5 10 15
    
```

ABSTAT constructs bar graphs (above) and plots of the data—not the fancy hi-res plots you might be used to, but they get the point across, and they print with any printer.



CURVE FITTER and **SCIENTIFIC PLOTTER** are two Apple-based programs that work in tandem. Some consider the curves produced by Scientific Plotter to be some of the best available. In addition, you can print these graphics on your dot matrix graphic-capable printer or on selected digital plotters.



REGRESSION ANALYSIS, a free public domain program available from most **APPLE USER GROUPS**, calculates the best fit line for Power, Linear, Exponential, and Log curves. It also graphs your data for you and, if you have the correct dot matrix printer, it will print those graphs for you as well.

Professional, technical . . .

CURVE FITTER

Apple II family; 48K; \$35 • IBM PC/XT/AT/Enhanced PCjr and compatibles; 128K; color/graphics adaptor board; \$95; optional Interface Sensor board; \$495, Apple; \$595, IBM; copy-protected? NO;

SCIENTIFIC PLOTTER

Apple II family; 48K; disk drive; \$25 • IBM PC/XT/AT/PCjr; 128K; color/graphics adaptor board; \$95; optional Interface Sensor board; \$495, Apple; \$595, IBM; copy-protected? NO;

both from Interactive Microware, Inc., P.O. Box 139, State College, PA 16804; 814/238-8294.

WOODY LISWOOD: If you do curve fitting and also need to generate high-resolution plots of your data, then you must—repeat, *must*—have CURVE FITTER and SCIENTIFIC PLOTTER as part of your program library.

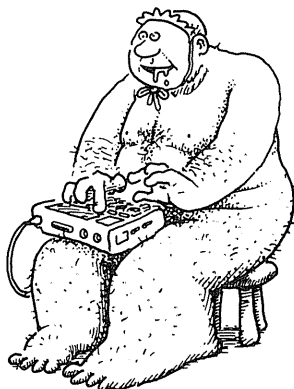
These programs are designed by technical folks to be used by technical folks. Some engineers we talked with felt that these programs were the only “professional” plotting programs on the market.

The price is right, too . . .

REGRESSION ANALYSIS

Apple II family; 48K; shareware; for availability contact San Francisco Apple Core, 1515 Sloat Blvd., Suite 2, San Francisco, CA 94132; 415/566-2342.

WOODY LISWOOD: If all you need to do is curve fitting (determining which type of curve—linear, exponential, logarithmic, or polynomial—best fits a particular data set), the best program is free. That is, if you have an Apple. A program called **REGRESSION ANALYSIS** is (or should be) in the user library of your local Apple User Group. This program takes data sets and produces regression curve fits for linear, exponential, logarithmic, and power curves; graphs those curves singly or together on a screen; and then prints out those screens on a printer.



Regression analysis.

Once you figure out how to use **CURVE FITTER**, the ease of operation and error trapping are superb. I tried to get the program to bomb and couldn't. You can enter data by keyboard, disk, or other means. You can then manipulate the data, transform it, or do almost anything else to it before you generate the curve fit. Along the way you can generate high-resolution plots.

A curve-fitting procedure can contain between 25 and 1000 data points. The program first generates a scatter diagram of the data you entered. Then, after you fit your curve through the data, it lays a dotted line through the scatter diagram. You can save any of the pictures as you go along or use another graphics program to print them on a graphics printer. (I use a Grappler Board with an Epson MX-80 printer.)

Because the program code is not protected, you can modify it to your heart's content. In fact, specific areas of the program are left open so you can put in the data-manipulation techniques you need. I added my own printer-initialization routines so I could print graphics as part of a normal work session without having to save the graphics as pictures first.

SCIENTIFIC PLOTTER accepts data from **CURVE FITTER** with no problems whatsoever, though it's somewhat difficult to use because of its flexibility. You can address any individual pixel on the screen and put anything you want there—special symbols, numbers, lines, dots, and so on. However, once you've learned **SCIENTIFIC PLOTTER**, you'll find you can do quick-and-dirty graphics very quickly. You can even identify end points of the X and Y graphs using game paddles or a joystick. It works and it speeds things up. In fact, command sequences go as fast as or faster than many of the available graphic programs that require almost the same number of responses to give you someone else's version of what you need for your graphic display (and still require you to enter your data into the other programs). **SCIENTIFIC PLOTTER** lets you add five lines (255 characters each) of fancy labels to each graph.

I tested the program by generating 38 separate graphics for related data and then printing and converting them to overhead projector slides that would overlay each other with perfect registration during presentation. It worked fine. The program works better than any graphics program in my library. It only does curves, but it does them well. At the price, I think it is a best buy—if you go in for this sort of thing.

SCIENTIFIC PLOTTER, too, is unprotected, and the authors encourage you to modify it to meet your specific needs. As in **CURVE FITTER**, you have easy entry to BASIC, DOS, and other sections of the program via built-in control sequences. New versions support various digital plotters. You can purchase the special printer disks separately.

James Donnelly

Analyzing the Stock Market

MATTHEW MCCLURE: When I was a securities analyst fifteen years ago, I helped build a regression model to predict the stock market. I was working with some economists at Stanford who explained the Random Walk theory of stock prices—which says essentially that stock prices can't be predicted mathematically—and then proceeded to develop a model that worked. Once we knew what the market as a whole was going to do, we could pick industries that were likely to accelerate rapidly in a bull market, or ones that would be resistant to the weakness of a bear market.

We picked our industries according to "fundamental" considerations, as opposed to "technical" ones. Fundamentals are things like price/earnings ratio, market share, annual sales, dividend yield, debt capital, financial strength, percent return on net worth, and projected growth rates. Technical analysis is

based on the axiom that a trend will continue until it changes; it is concerned with how prices fluctuate in a market, essentially independent of the kind of company or industry being evaluated.

Having chosen industries that looked attractive for the kind of market we expected in the next six or nine months, we would pick companies that looked fundamentally sound. Then we would do some technical analysis—to determine which ones seemed to have the most market potential. We made our money on service charges based on performance, and we consistently outperformed the market.

Now there are tools for personal computers that make this whole process comparatively painless. Anyone who is considering playing the market should consider investing in these programs. They won't give you the edge that the pros on Wall Street have, but they will give you good, valuable methods for making investment decisions.

Fundamentals, for investors . . .

VALUE/SCREEN

Version 2.1; Apple II family; 64K; 2 disk drives; 80-column card recommended; printer recommended • IBM PC/XT/AT and compatibles; 64K; 2 disk drives; parallel printer recommended; monthly plan: \$443/yr (1st year, \$399/yr thereafter); quarterly plan: \$211/yr (1st year, \$162/yr thereafter); both plans refundable; 2-month trial, \$39 (non-refundable); Value Line, Inc., 711 Third Avenue, New York, NY 10017; 212/687-3965, ext. 3496.

MATTHEW MCCLURE: For automating analysis of securities fundamentals, VALUE/SCREEN is excellent. Enter your criteria for selection from the 32 available variables—computer stocks with price/earnings ratios less than 10 and dividend yields greater than 8%, for example—and you'll get a list of stocks that meet them. If the list is too long, refine your criteria further, eliminating those with a low percent return on net worth, for example, and ordering the resulting list by financial strength rating.

VALUE/SCREEN's data is updated monthly on disk; it's not as current as what you could get from Dow Jones News/Retrieval, but it's got a lot more information.

Newsletter for the Money SIG . . .

COMPUTERIZED INVESTING

\$48/year (6 issues), \$24/yr to members; American Association of Individual Investors, 612 North Michigan Avenue, Chicago, IL 60611; 312/280-0170.

MATTHEW MCCLURE: Using a microcomputer to improve your investing skills is a new trick. **Computerized Investing**

Technical, for traders . . .

WINNING ON WALL STREET

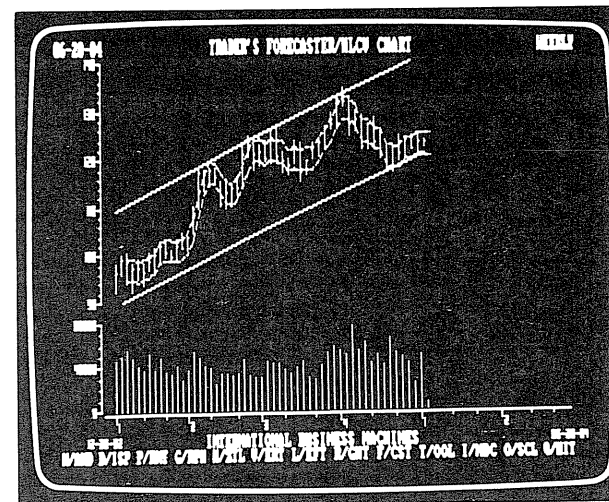
Version 2.0. Apple II + /IIe/IIc and III (emulation mode); 64K; Grappler board and compatible printer; 2 disk drives; Hayes micromodem; copy-protected? NO • IBM PC/XT compatibles; 192K; color/graphics board; 2 disk drives or hard disk; copy-protected? YES; complete package: Apple, \$595; IBM, \$695; separately: Trader's Data Manager: Apple, \$199; IBM, \$249; Trader's Forecaster: Apple, \$249; IBM, \$299; Trader's Accountant: Apple, \$199; IBM, \$249; Summa Technologies, Inc., P.O. Box 2046, Beaverton, OR 97075; 503/644-3212.

MATTHEW MCCLURE: This is the program I would get if I were only getting one. TRADER'S DATA MANAGER lets you automatically download securities information from Dow Jones News/Retrieval (p. 142). Then it will produce a graph of the stock's behavior—the traditional high, low, close, and volume chart (H/L/C/V) or a special chart of an indicator graphed against volume or against another indicator.

It is TRADER'S FORECASTER that makes the package worthwhile, though. In addition to the staid H/L/C/V graph, it also uses such reliable methods as moving average, weighted moving average, exponential smoothing, and least square fit to produce informative graphs. Technical analysis tools include speed resistance lines, trading bands,

on-balance volume, relative strength, and point-and-figure analysis. The Proprietary Matrix Projection Formula uses sophisticated analytical techniques to predict the "next high" and "next low" prices—sell and buy signals, respectively.

With all these tools, the best technique is to try as many as possible. If one gives you a buy or sell signal, get confirmation from another before you act.



WINNING ON WALL STREET draws moving averages and mid-channel support/resistance lines like these for IBM, whose price broke through the support lines (a sell signal). The stock's price went down \$20 after this signal.

is a newsletter for those who can afford to keep up with the latest software for investors, traders and speculators—or can't afford not to. Its reviews are knowledgeable and newslettery. But even better, the Member Software Services let you download software, and point you to good public-domain investment software. Nine subgroups around the country meet to exchange ideas about investment theory and computers.

Commodity traders will be interested in obtaining price data via modem from Commodity Systems, Inc. (CSI, 200 W. Palmetto Park Road, Boca Raton, FL 33432; 800/327-0175 or, in FL, 305/392-8663) and update data files. Participating brokers will pay the CSI fee for their clients. For more on online services for investors, see p. 142.

ORGANIZING

Tony and Robbie Fanning, Domain Editors

TONY AND ROBBIE FANNING: Information bombards us—much more than we care to, or can, sift through and remember. Only ten percent of every ton of paper going by carries interesting information. Five percent of that is useful, and we might want to look at one percent of it again. How do we find that one percent? We organize. We make lists, alphabetize and prioritize them, group similar kinds of information into piles, and throw out the garbage.

To do this, we use mundane organizing tools—pencil and paper, paper clips, forms and questionnaires, little pads of stickum-backed yellow notepaper, 3" by 5" cards, file folders, fluorescent highlighting pens, Rolodex files, notebook section separators, and file cabinets. And we use tricks like outlining, patterning, and shuffling. We grow used to the limitations of our tools and tricks—we know we can't easily store a particular item under several references, or automatically reshuffle a filing system, or quickly make a list of what's in a cabinet drawer.

Organizing programs can help sift information more flexibly. They exchange the familiar paper activities for new formats: lists, files, fields, records, databases, and even "computer

environments." If you find the terms confusing—computer mavens might call your address book a "database"—don't worry. These programs do only a few simple, dumb things. They store away information. They sort it for you. They let you pick out what specifics you want to look up or print out.

You probably already know what you want to do—manipulate a mailing list, organize your research notes, manage a small business—but you don't know which program fits your needs. To help you choose, we divided organizing programs into two rough categories—*little boxes* and *garbage bags*.

Little boxes (called "file managers" if they're simple, "database management systems" [DBMS] if they're complex) are designed to organize structured information that can be arranged so it all looks alike—for example, rows in a table of figures or entries in a phone book.

Within this category we included two "flagship" programs—PFS:FILE and DBASE II—the standards against which we compared the rest of the candidates. If you're unfamiliar with the computer terms used to describe organizing tools, be sure to read these reviews first. Then look at the other reviews to pick a program appropriate to your particular needs.

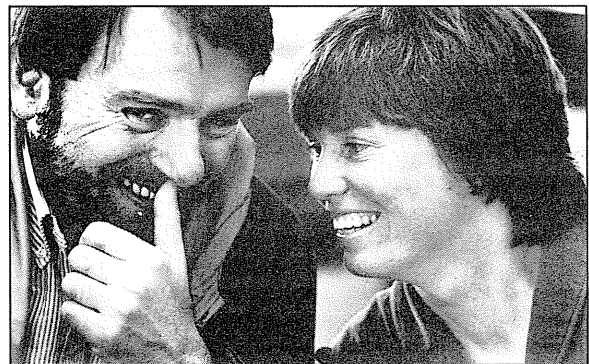
When you shop for this type of organizing program, play the numbers game. Find out the limits of a data-management

DATABASES WILL EITHER BURY YOU OR UNBURY YOU, IF YOU LET THEM

STEWART BRAND: My theory of old age is that people decay and eventually die from having too much stuff to remember. Nephew's wife's mother's name. The percent the IRS is interested in of your rental property depreciation. Dozens of potentially guilt-producing birthdays. When you go to have a new thought, there's no place to put it.

I can't tell yet if personal computers are helping or hindering our beleaguered lifework of Keeping Track. They certainly offer help; they even deliver it. But it may be one of those the-more-you-do-the-more-you-do things. The more the computer is remembering for you, the more you have to remember what it's remembering. Like the illusion of the Paperless Office a couple years ago—electrons were going to replace ink in the workplace. Ha. The busy little electrons helped generate more paper than ever. To good effect? Maybe. Maybe even probably. But people are not, I notice, working less, or agonizing less.

I'll bet next year we'll be reviewing a kind of program that scarcely exists yet—the dedicated database for home and office. MICRO COOKBOOK (p. 196) is headed in that direction. Bird books and tree books and flower books should soon be on software, with fulsome illustrations (videodisc please), the perfect way to "key" down the very subspecies of Mitigated Flycatcher that inhabits your part of the county. Meanwhile all we have is general purpose databases of increasing muscle.



Tony and Robbie Fanning

Tony Fanning has been watching them come on for decades. Now involved in Research & Development planning at Hewlett-Packard (who makes the "Touch Screen" 150 computer and portable 110 [p. 71]), he started with computers 23 years ago programming an insurance company's first plunge into Data Processing. He's been in Silicon Valley since 1969, spent a couple years at SRI International before going to HP. Robbie Fanning edits and publishes a quarterly newsletter for thread-benders called **Open Chain**, on stitchery and such—she uses DBASE II and WORDSTAR to keep it organized. Together they've written eight books on quilting, running, and personal time management.

You may ask what program they used to organize Organizing. They used manila envelopes and 3" by 5" cards in little stacks on the floor. Personal computers can look deep and snaky into your information, but they still have tunnel vision.

program: its maximum number of files per database, records per file, fields per record, characters per field. (We list those statistics for every program recommended here.) Ask yourself, "How long will I keep my computer? How long will I use this program?" If the answer shows that you'll outgrow the program soon, consider alternatives.

We call the second category of organizing programs *garbage bags*. Sometimes called "text organizers," they handle unstructured information of varying sizes, shapes, or types—such as quotations from books or research notes.

More than any other type of program, organizing tools require powerful or expandable computer equipment. A good rule of thumb: if the computer system requires you to use your home TV for display, stick to 3" x 5" cards. It'll be less frustrating. For business use, a mainstream computer—IBM PC/compatible, CP/M, Apple—and two disk drives are musts. Expect soon to find yourself considering a hard disk and extra RAM (memory), especially if you depend on fast look-up capability. If you manage a lot of information, budget a lot of time to learn how to do it right.

Picture Boxes

BARBARA ROBERTSON: On the Macintosh, all the invisible, abstract little boxes suddenly came alive. You can see them on Mac's screen, stretch them, shrink them, and look at the data inside (OVERVUE p. 81, HELIX p. 88).

You can draw arrows between boxes to show relationships (HELIX), put pictures inside them (MICROSOFT FILE), and you can even, for the first time ever on a personal computer, make the little boxes *be* pictures (FILEVISION).

Pictures are the database . . .

FILEVISION

Metcalf, Jacobs and Murray; Version 1.0; \$195 (street price \$99); Macintosh 128K (512K recommended); Copy-protected; Telos Software Products, 3420 Ocean Park Blvd., Santa Monica, CA 90405; 800/554-2469 or, in CA, 800/368-3813.

Number of files permitted per database: 299 (128K); 899 (512K)
Records per file: varies with complexity of graphics
Fields per record: up to 30
Characters per field: 2000

Pictures in a database . . .

MICROSOFT FILE

Version 1.0; \$195 (street price \$115), Macintosh 128K (512K recommended); Copy-protected; Microsoft Corporation, 10700 Northup Way, Box 97200, Bellevue, WA 98009; 800/426-9400 or, in WA, 206/828-8088.

Number of files permitted per database: maximum 64K, limited by disk size.
Records per file: limited by disk size.
Fields per record: 1024
Characters per field: 32,767

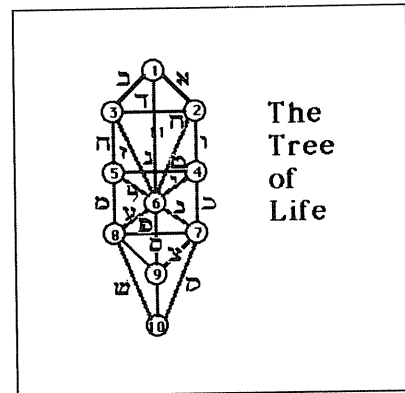
TOM ZITO: The other day, the chief mate of this freighter walked into my stateroom with a problem: we were going to linger in Cadiz, Spain, longer than expected because some containers had been stowed in the wrong positions and needed to be reorganized—or overstowed, as they say in the container ship business. He had a pile of photocopied papers with containers' positions written on them, and I decided to introduce him to FILEVISION. I sketched a rough approximation of the ship on the screen, drew in the container positions, and then created a blank file form with all the

information from his sheets: destination, weight, contents, container number. With a click of the mouse I linked each visual image of a container to its corresponding data file. After that, all the chief mate needed to do was point to a specific container and *zap*, the information he needed to relocate it appeared on the screen. The program could even do simple equations to show, for instance, all the containers not going to Istanbul that weighed less than 40 tons.

MARK COHEN: One of the truly unique programs for the Macintosh, FILEVISION is a graphically-organized file manager. You start creating a file by drawing pictures of the elements. Each element may have text associated with it and be linked to other files of pictures (and associated text). You may have many elements of one "type" and you can graphically highlight all elements of any given type. Considering what it has to do to organize data in this manner, FILEVISION is reasonably fast. It's particularly well-suited for mapping—with FILEVISION, you can zoom in on a portion of a map and get detailed information. Or use the same techniques for teaching and training—you can easily design templates to teach anatomy, chemical structures, or auto mechanics, for example.

JAY KINNEY: FILEVISION is elegantly designed, fun to use, and a plausible though limited database, not just a program to create graphics with extended footnotes. Its limitations are that it allows only 20 custom symbols per picture file; several lines with attached information are often required to draw an outline of an object with any complexity; and it can't incorporate MACPAINT's (p. 127) more sophisticated pictures. Still, there is no equivalent program on the Macintosh or any other personal computer. Hopefully, the long-awaited FILEVISION II will correct these problems.

MARK COHEN: MICROSOFT FILE is recommended for people who want to include pictures in a database organized around words and numbers—something OVERVUE (p. 81) and PFS:FILE (p. 80) can't do. You can, for example, cut and paste floor plan sketches (via Mac's clipboard) from MACPAINT into a database of real estate listings. (Unlike FILEVISION, there are no drawing tools.) FILE is laden with other file managing features—too laden, however. Even on a 512K Mac, the program runs too slow to recommend unless you need the picture-pasting capabilities.



FILEVISION organizes information with pictures. Jay Kinney used it to render the Tree of Life which is a primary diagram of the Jewish mystical teaching called Kabbalah. The Tree of Life's spheres, called Sephiroth, represent various levels of emanation from God and qualities of the divine.

Little Boxes "Beginner's Luck"

TONY AND ROBBIE FANNING: Some simple organizing programs stand out as remarkable values. You may not wish to organize your whole business using them, and you may outgrow them quickly. But they'll introduce you to ideas that will let you master more flexible industrial-strength programs later. Or they might be exactly what you need in themselves. We call the first group of file managers "beginner's luck," because they're easy to use and understand.

Our flagship program: good for beginners, maybe all you need . . .

PFS:FILE

Apple II family; \$125 • Apple III; \$175 • Apple Macintosh; \$175 (bundled with PFS: Report) • Commodore 64; \$80 • DEC Rainbow • HP 150 • IBM PC/XT compatibles • IBM PCjr • TI Professional; \$140 • TRS-80 Models III & 4; \$125 • TRS-80 1000, 1200HD, 2000; \$140 (TRS-80 versions distributed only by Radio Shack); copy-protected? YES; Software Publishing Corp., 1901 Landings Drive, Mountain View, CA 94043; 415/962-8910.

Number of files permitted per database: 1
Records per file: 1000 max (Apple); 2200 max (PC/MS-DOS)
Fields per record: 50-100/page; up to 32 pages/record
Characters per field: 840 (Apple II); 1680 (others)

PETE WENDELL: It does everything I need it to do easily and relatively quickly. And it's so simple that even my boss can use it.

PHILIP ELMER-DEWITT: Give my vote for PFS:FILE. It makes the kind of list-keeping most people do palpably easier. Still sells like hotcakes today after years on the market. I did my wedding on it (chapel seats, lunch plates, gifts, thank you notes—the perfect use for a home database)—and even my wife learned to love the printouts.

TONY AND ROBBIE FANNING: PFS:FILE is one of the simplest organizing programs to learn because bells and whistles were designed out of instead of into it. It's an ideal starter for learning about data management, and in itself it's good for just about anything you could do with paper forms, as long as the job isn't too big. (In fact, its vocabulary is that of familiar paper forms rather than the more common, mind-deadening vocabulary of data processing.) Like forms, PFS:FILE works well when the information being organized is all of the same type: names and addresses, order information for customers, etc. You can make the blanks in its forms any size and fill them with any type of information (numbers, letters, or a combination); thus it can keep track of good-sized but discrete chunks of text, like comments, quotations, or recipes.

The information you type into these forms (one form after another) is stored in a data file that might cover employee information for your little company, gardening books in the university library, customers of your custom sewing business, or (if you were a fat New York detective) a bedding history for your orchids.

Setting up forms in PFS:FILE is so easy that you must remind yourself to design the form carefully, because the blank form controls all the other PFS:FILE functions, such as printing or making changes. For instance, to look up a piece of information on the screen, or print it on paper, you simply fill in the specifications on the same blank form. To ask for all employees earning more than \$1000 a month, type ">1000" in the item "Salary." You can combine conditions to select exactly the records you want. You can look at the information on the screen, print it, or delete it.

PFS:FILE is fairly powerful, but it achieves its simplicity by limiting its capabilities—a standard tradeoff with organizing programs. When searching for forms to update, print, or delete, PFS:FILE has two speeds. The normal speed is sufficient for a small number of forms in your data file, but it slows down when the number gets large. If you will usually search by one item, make it the first item on your form, and the search will go faster because PFS:FILE uses that item as an index to narrow down the range of data it searches through.

PFS:FILE can't use more than one index at a time. Also, it can't use more than one disk for a data file, so the number of forms you can track at once on a floppy-disk system is limited to about a thousand. But you can use the program on a hard disk, which relieves both the speed and capacity problems somewhat.

MARK COHEN: When PFS:FILE and PFS:REPORT moved to the Macintosh, they remained essentially similar to versions for other machines, taking little advantage of Mac's unique capabilities. PFS:FILE on the Macintosh has a larger record size than OVERVUE (p. 81), MICROSOFT FILE (p. 79) or FILEVISION (p. 79), making it good for files with lots of text notes.

BARBARA ROBERTSON: The IBM ASSISTANT SERIES is based on the PFS:SERIES—PFS:FILE is called IBM FILING ASSISTANT and sells for \$149; PFS:REPORT is called IBM REPORTING ASSISTANT and sells for \$129. Why pay the higher prices? (PFS:FILE street price \$89, PFS:REPORT street price \$79) No reason I can think of—unless you want the templates, PFS:SOLUTIONS (no longer available from Software Publishing Corp.): IBM ASSISTANT HOME SOLUTIONS (\$60), ASSISTANT EXECUTIVE SOLUTIONS (\$60), and ACCOUNTING SOLUTIONS (\$80). They all run on the IBM PC/XT/AT and IBM PORTABLE; and require 128K. (IBM Entry Systems Division, Box 1328, Boca Raton, FL 33432; 800/447-4700.)

First you "paint" your PFS:FILE form on the screen . . .

Then you can use it to control lookup, printing, and other functions.

For convenience and calculations . . .

PFS:REPORT

Apple II family • Apple III • Apple Macintosh
 • DEC Rainbow • HP 150 • IBM PC/XT
 compatibles • IBM PCjr • TI Professional; \$125
 • Commodore 64; \$70 • TRS-80 Models III & 4;
 \$100 • TRS-80 1000, 1200HD, 2000; \$140 (TRS-80
 versions distributed only by Radio Shack); copy-
 protected? YES; Software Publishing Corp., 1901
 Landings Drive, Mountain View, CA 94043;
 415/962-8910.

If you outgrow PFS:FILE, you have to learn a new vocabulary to move on to more powerful programs, which usually use data-processing talk.

NAMES FOR OBJECTS

PFS:FILE Talk	DATA PROCESSING Talk
Form design	Database structure
Data file	Database
Form	Record
Page	Screen (of data)
Item	Field
Index	Key field
Report	Output, reports

TONY FANNING: If PFS:FILE fits your needs, you'll probably need the separately sold PFS:REPORT, which increases the kinds of reports (printouts) your data files can produce. PFS:FILE keeps its printout capabilities simple, requiring you to design your form with items in the order you want them printed; if the first item on the form is a zip code and the name is next, that's the order it has to print. It also makes you type in the printout specifications each time, even if they're always the same.

PFS:REPORT can rearrange the items in a printout and save your printing formats for later use. It can also perform calculations like totals, subtotals, averages, and subaverages in a printout—to print a monthly summary of customer activity that averages the dollars spent per customer, for instance. It can group items by a particular characteristic—first the customers who bought your X-widget, then the Y-widget buyers.

EMPLOYEE INFORMATION			
SALARY	NAME	ADDRESS	DEPT
1 400	J STRIBLING	1801 LAWNDALE LOMAS CA 91075	SALES
1 625	J M STONE	33 SPARKS AVE TACOMA CA 92071	MANUFACTURING
1 700	I JONES	45 ELM TIOGA CA 96832	FINANCE
1 850	M K TALENT	202 S ALMA HALLEN CA 91001	MARKETING

MONTHLY SALES STATUS				
TERRITORY	REP	QUOTA	SOLO TO DATE	% QUOTA
EAST	BROWN	200	150	0.75
	JONES A	200	135	0.68
	TAYLOR	175	132	0.75
	AVERAGE TOTAL	191	139	0.72
WEST	JONES J	225	175	0.78
	PARDEE	200	110	0.55
	AVERAGE TOTAL	212	142	0.66
	AVERAGE TOTAL	200	140	0.70
TOTAL		1,000	702	
COUNT	2			

PFS:REPORT can create more complicated printouts than PFS:FILE.

Faster than a speeding cursor . . .

OVERVUE

Version 1.0; Macintosh 128K or 512K; Not copy-protected; \$295; ProVUE Development Corp., 222 22nd St., Huntington Beach, CA, 92648; 714/969-2431.

Number of files permitted per database: limited by disk size.
 Records per file: limited by RAM.
 Fields per record: 64
 Characters per field: 62

CLIFFORD FIGALLO: OVERVUE is simple, clean, and fast—easy data entry, super fast reports. It has its limits—file size can't exceed available memory—but OVERVUE can hold more data on a Mac disk than many if not all other Macintosh data managers.

MARK COHEN: OVERVUE is better suited for list making and number manipulating than for text storage (see PFS:FILE p. 80), but for these functions, it would be difficult for me to recommend OVERVUE too highly. OVERVUE contains an unusually powerful and interesting meld of database, mathematical, and report generating functions. Data files are stored entirely in memory while they are in use, making data retrieval and sorting functions much faster with this program than with FILEVISION (p. 79), MICROSOFT FILE (p. 79) or PFS:FILE, and OVERVUE is the only one in this group that can generate reports that include more than simple tabulations of data.

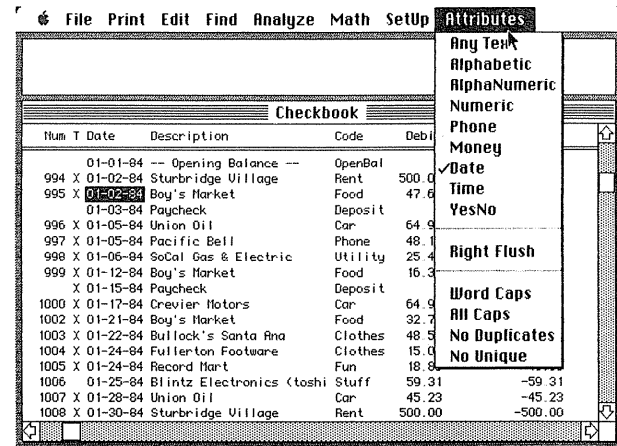
CLIFFORD FIGALLO: You create a file by filling in a form that looks like a spreadsheet. Each row becomes a record whose "columns" are fields for data. For example, a person's first and last names might go in the first two columns, a title in the third, company name in the fourth, etc., on across the row. Column names and widths can be changed (maximum width is 62 characters), added, or deleted at any time. You can use the data in any column as the basis for sorting the file. Simply move the cursor to the zip code column, for example, select the sorting function, and zap, all the rows in the file are lined up in zip code order. Equally fast is the SELECT command. Use it to find all the rows with Des Moines in the city column for example, or all the rows with area codes of 408 and 415.

Columns can be totalled, averaged, and you can have the program calculate running column totals—useful for tracking checkbooks and inventories. OVERVUE even lets you create "macros" that contain a series of commands. Press a button and the macro carries out all the commands automatically.

You can easily move data from OVERVUE to Microsoft CHART (p. 128) or MULTIPLAN (p. 70) and segments of data sheets can be pasted into MACWRITE (p. 54). With Version 2.0, you can move data into OVERVUE from many programs whose files are stored in common spreadsheet and database formats. Thus you can use OVERVUE as a front end

for fast manipulation of otherwise ponderous databases.

MARK COHEN: Version 2.0 promises to be an even better program than 1.0, and an inexpensive (\$20) upgrade for owners of 1.0.



They're just your basic rows and columns, but, boy, can you do a lot with them—and fast. The wide choice of field attributes adds to the flexibility and convenience of file setup in OVERVUE.

Little files on a little computer . . .

COMMODORE 64 FILE MANAGERS ★

KEVIN KELLY: When I got a computer several years ago I had a very specific use in mind: I wanted to run a small mail-order business with it. Its main use would be to track thousands of names and print mailing labels. A complete software virgin, I called up a discount place and ordered the best file manager they had, a \$64 program called F.C.M. My first program! It did the job . . . we eventually managed 10,000 names, far beyond what the software designers had in mind, by clumsily switching disks and swapping files, a constant reminder of the limitations of F.C.M. The program is a mildly mediocre tool that made a fairly hopeless job possible, a little fun, and most importantly, profitable for a team of two. It was so far superior to 10,000 index cards that most of the time I didn't care that it was mediocre.

BARBARA ROBERTSON: Although we would never recommend that anyone wanting to keep a database on a computer buy a Commodore 64, those of you already owning C-64s might want to keep a file or two on your computer, and—although handwriting

or typing index cards might be just as fast—be willing to put up with the C-64 for the lists and mailing labels you can select and print. So, for those of you with C-64s, here are our recommendations.

JOHN SEWARD: If you're going to print a lot of mailing labels and want an inexpensive filer, try F.C.M. if you can live with its limitations: 24 characters per field, 10 fields per record and no more than 132 characters per record. However, it's written in C-64 BASIC, and you can change it if you know BASIC.

PAUL HULSE: THE INDEX FILE is a computer version of 3 x 5 index cards—you can store 200 cards on a disk and sort through them quickly and easily using up to 800 key words. DATABASE MANAGER with REPORT GENERATOR is heftier, allows some arithmetic, and has an excellent manual. It's more flexible than INDEX FILE: you can design larger data entry forms, and print lists or mailing labels that include only the data you select. (A report on your coin collection might list only silver dimes or buffalo nickels.) And you can save the selection criteria to easily print the report again. It's one of the original file managers for the C-64 and still one of the best.

JOHN SEWARD: DATABASE MANAGER has very good label printing features. It doesn't, however, let you sort in reverse order.

PAUL HULSE: SUPERBASE 64 is the most powerful and flexible file manager for the C-64. Records can have text, numbers, calculated results, and date fields, and fields can be linked. With this program you could, for example, keep track of your vacation slides—noting where the pictures were taken, when, which you had reprinted at what cost. It has built-in help screens, sophisticated multiple sorting, matching, and report generation and you can even write a program to run your application or print complex reports.

F.C.M.: Version 1.0. Not copy-protected. (\$50; street \$35); Arrays, Inc./Continental Software, 11223 South Hindry Ave., Los Angeles, CA 90045; 213/410-3977 • **THE INDEX FILE:** public domain; Jeff Bean, 322 Eureka Street, San Francisco, CA 94114; 415/648-7140 • **DATABASE MANAGER with REPORT GENERATOR:** Copy-protected. (\$100; street \$68); Mirage Concepts, 4055 West Shaw, No. 108, Fresno, CA 93711; 800/641-1441 or, in CA, 800/641-1442 • **SUPERBASE:** Copy-protected; (\$100, street \$65); Precision Software, Inc., 3003 Summer St., 4th Floor, Stamford, CT 06905; 203/326-8649.

Count the features and divide by the cost . . .

PC-FILE III

Version 3; IBM PC compatibles; 128K; copy-protected? NO; \$49 contribution for disk and updates; ButtonWare, P.O. Box 5786, Bellevue, WA 98006; 800/528-8866 or, in WA, 206/746-4296.

Number of files permitted per database: 1
Records per file: 10,000
Fields per record: 41
Characters per field: 65

JIM CELONI, S.J.: When I first wanted to catalog my diskettes, I used my text editor, creating a file with a one-line record for each disk. To look up a program, I used the editor's search command; to update the catalog, I edited the file.

When I read about PC-FILE III, I wrote to Jim Button for my free copy; a week later I was so happy with it I sent a contribution. With PC-FILE I could update my file, sort it by any collection of fields, find records matching any specification, and format and print a report about any diskettes. A computer-novice friend of mine, using PC-FILE III, created a name and address file and printed three-across mailing labels the same day.

PC-FILE III is easy. You give commands by pressing a function key or typing the first few characters. Report formatting directions are cryptic but well-documented. The manual, included as a file on the diskette, is excellent: explains everything, defines terms, and gives examples without being condescending.

The program prompts you for new data clearly, though it flags input errors with only a "beep." It can fill in some fields such as date and time automatically. You can retrieve the most recently changed entry or the one just before it. Passwords can keep a file secure. Ten "smart" keys (ALT-0 through ALT-9) can

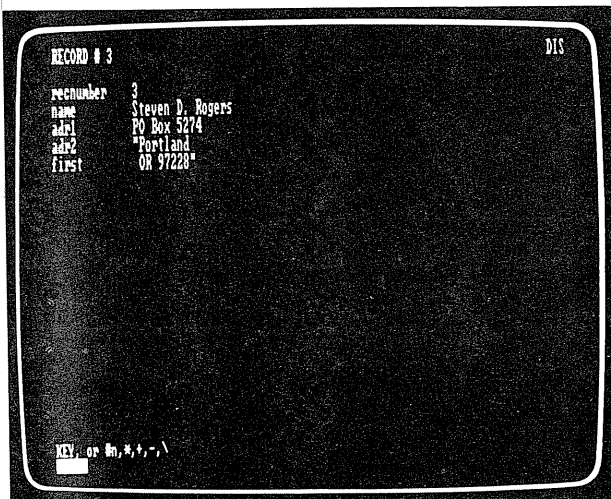
represent up to 75 characters each for speedy data entry or single-keystroke command sequences.

Reports can include totals, other calculations, and text. You can sort fields by more than one characteristic (for example, employee names in alphabetical order within each salary level). You can send reports to a file and save report formats for continual use.

PC-FILE III's data limits are reasonable, since the file must be on one disk drive. If I approached the limits, I'd buy R:BASE (p. 87). PC-FILE III is fast enough; for big files I use a RAM disk. I run it with 128K, a double-sided drive, and an 80-column color display (you can specify foreground and background colors). You can move data between PC-FILE and VISICALC, 1-2-3 (p. 68), MAILMERGE (p. 56), and other programs. It's also compatible with the other two major "shareware" programs—PC-WRITE (p. 59) and PC-TALK (p. 152). When you count the features and divide by the cost you get a very big number.

Programmer Jim Button answered my questions promptly and incorporated suggestions into new versions. I look forward to his planned PC-CALC (p. 72) and PC-GRAPH.

BARBARA ROBERTSON: People using this program tell us that without the complete documentation, for which you must pay \$49, commands to carry out many of the features listed in the manual-on-disk remain elusive at best.



PC-FILE III has features not found on more expensive file managers. This mailing list record was "imported" to PC-FILE III from a MAILMERGE file, putting it in the database without rekeying.

Other File Managers

TONY FANNING: With controls less complicated than a 747 jetliner, you can organize information, select from it, sort it, and print it. Each program in this section is powerful enough for "mid-range" organizing but conceptually simple enough to learn quickly. Remember that what is simple enough to learn quickly may be as quickly outgrown.

For files spread over several disks . . .

DB MASTER

Version 4 Plus; Apple II family; 64K; 2-4 disk drives; copy-protected? NO; \$350; Stoneware, 50 Belvedere St., San Rafael, CA 94901; 415/454-6500.

Number of files permitted per database: 1
Records per file: 5-10 megabytes (50-100 disks)
Fields per record: 100 (1020 characters)
Characters per field: 100

TONY FANNING: This upgrade of a file manager popular in the Apple computer world for years has many convenience features and copious documentation. Like most file managers, DB MASTER allows you only one data file; unlike most, it lets you spread that file across many diskettes. With such a large file, you'll want three or four drives or a hard disk unless you don't mind swapping diskettes constantly. (A hard disk requires a special edition of the program).

You define the data structure with a form that you build on the screen. Later you construct similar forms, called Master Reports, for searching, printing, and updating. Searching is not particularly fast except with the primary index key, which can be a combination of fields. It offers three levels of password protection and it can pull bite-size chunks out of long data entry forms so you can update a few fields without having to press hundreds of carriage returns. This makes DB MASTER 4.0 useful in office situations where one person designs a system and other people use subsets of it.

We recommend DB MASTER on the Apple (see MAGICALC, p. 70). The IBM PC version, called ADVANCED DBMASTER, is much more complex, fulsomely documented, and slow, though it is competently implemented. You can probably do better with R:BASE or another database manager (pp. 85-89).

MARK COHEN: DB MASTER for the Macintosh supports a wide variety of type fonts onscreen (not printed), and is good with financial data. Unfortunately, it can print reports only with each record laid out in rows of one record each.

Slip into a spreadsheet . . .

REFLEX

Version 1.0; IBM PC/XT/AT compatibles; 384K; IBM color graphics or Hercules card; Copy-protected. \$495; Analytica Corporation, 3155 Kearney St., Fremont, CA 94538; 415/490-3670.

Number of files permitted per database: 1
Records per file: 65,000 max; limited by RAM
Fields per record: 128
Characters per field: 254

RUSEL DEMARIA: REFLEX is a file manager the makers of 1-2-3 (p. 68) might have invented. If you want an easy-to-use method of storing data and quickly analyzing, manipulating and viewing that data using pre-programmed spreadsheet and database financial, statistical, and logical functions, consider this unusual program.

Using pull-down menus (no other choice), you can quickly view, analyze and fine tune data in ways that even with complex spreadsheet macros it would take much effort to accomplish. REFLEX also includes sophisticated reporting and classy graphics. You can move the cursor from point to point in an onscreen graph and the associated record will be displayed in a window.

If you are looking for a database that handles huge quantities of data or text, then REFLEX is not what you want, nor can it perform

Unique convenience . . .

CORNERSTONE

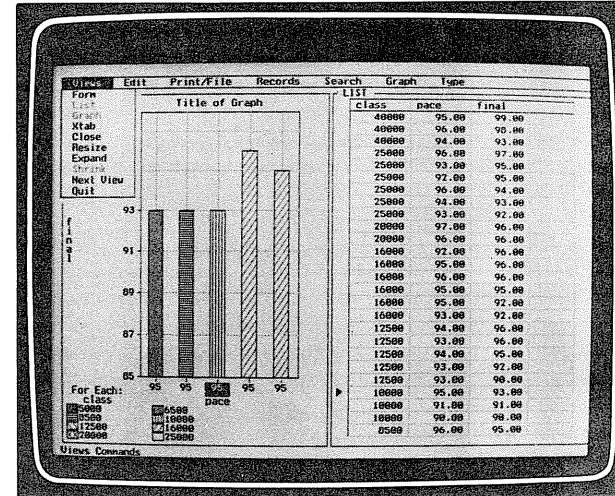
Release 5.1; IBM PC/XT/AT/compatibles; 256K (512K recommended); 2 disk drives or hard disk (recommended); Copy-protected; \$495; Infocom, Inc., 125 Cambridge Park Dr., Cambridge, MA 02140; 617/492-6000.

Number of files permitted per database: 120
Records per file: 32,700
Fields per record: 160
Characters per field: 255

CLIFFORD FIGALLO: From the creators of many popular adventure games comes this unique bigger-than-a-file-manager for the "non-programmer." With capacity for large-scale business applications, CORNERSTONE includes two features not easily implemented on large-scale micro programs such as R:BASE (p. 87) or DBASE (p. 85): an easy-to-use relational data lookup function and the ability to have multiple entries in a single field within a record.

Say you have a customer name and address file, a file with part numbers and prices, and an order entry file that needs to have some of the same customer and parts data entered into it. Call up the order entry file, type enough of the customer's name for CORNERSTONE to find it in the customer file, and the program automatically fills in

massive number crunching on the level of 1-2-3 and other spreadsheets. But REFLEX gives you ways to view data that are unique. Take a look.



With REFLEX, you use simple Mac-like menus to select a graph—scatter, line, cumulative bar, pie or bar (shown). Switching from one to another is quick and easy; scaling options give "zoomed" views. The database (the list in the other window) can be closed for full-screen graphs.

the complete name and the address for you. Same with parts. Fill in the part number and price is automatically entered. Other organizers let you create this capability by writing little programs; CORNERSTONE gives it to you.

Its other outstanding feature, the ability to have multiple entries within one field, makes data entry, searching for data, and reporting much easier. I've been using SMART (p. 89) for our software library database and have many records for Infocom—each listing information about individual Infocom programs (one record for ZORK, another for SUSPECT, etc.). With CORNERSTONE (only recently available), I could have a more efficient design: each record would have one field for publisher (Infocom in this case), and one field for programs. The program field could hold an entire list—I'd simply add new programs to the same record. Then, when I looked up the Infocom record, I'd find all the programs—ZORK, SUSPECT, CORNERSTONE, etc.—listed. With SMART (and most other organizing programs) you have to design and run a report to get this information.

CORNERSTONE's documentation is good, its tutorial very effective. Its two big problems are that its menu structure can be quite confusing until you get used to it, and it takes up a lot of room on a hard disk.

*An organized form
of record keeping and billing . . .*

VERSAFORM

Version 2.1; Apple II family; 64K; copy-protected; \$69 • Version 2.3; Apple II family; 64K; not copy-protected; \$149; supports Corvus, Cider and Profile hard disks • Version 2.7; IBM PC/XT/AT/compatibles; TI Professional; Wang; DEC Rainbow; 128K; not copy-protected; \$69.

VERSAFORM XL

Version 3.21; IBM PC/XT/AT/compatibles; not copy-protected; \$99.

All from Applied Software Technology, 170 Knowles Drive, Los Gatos, CA 95030; 408/370-2662.

Number of files permitted per database: 1 (VERSAFORM); memory dependent, but 10 maximum recommended (VERSAFORM XL)
Records per file: 30,000
Fields per record: 75 (Columnar fields may have up to 99 occurrences)
Characters per field: 78

TONY FANNING: Don't throw away your old paper forms—with VERSAFORM you duplicate them as input screens and report formats. Once set up, people familiar with the paper versions can easily use the electronic versions with little training.

BARBARA ROBERTSON: Both programs let you export data to 1-2-3, WORDSTAR (p. 56), and other programs. VERSAFORM

XL, a somewhat faster program, can also import data that's in ASCII format (no unusual characters or control codes).

THOMAS R. PIPER: If followed literally, without too much thinking or conceptualizing, VERSAFORM can help a variety of businesses do their workaday tasks. For example, a local coal company runs more than \$20 million of its transport tickets each year on forms designed and implemented by a low-paid secretary. They track 45 drivers and 30 trucks going to 25 major vendors.

They weigh each load of coal and store customer names, billing and receiving addresses, truck numbers, driver numbers, gross weights, road taxes, reclamation taxes, sales taxes, discounts, and other shipping information, as well as variable prices of different coal grades. They continue to be amazed and delighted with what they can accomplish.

VERSAFORM's look-up tables and business-form "calculators" work superbly for the coal company's invoicing. Later, the firm uses the reports from the same data files to manage its operations. For example, a "hailed tonnage between repairs" report is a prime indicator for each truck (sort of like reporting on mean time between repairs for computers); a driver's work-history report can be calculated for payroll (since drivers are paid by the load and mileage, not by time or on salary). I wish VERSAFORM'S fields were bigger, but its report generating is nice.

If your business depends on forms for information collection, VERSAFORM will be the quickest way to automate the process. Somewhat clunky and rigid compared to other database managers, but light years faster than manual paper shuffling. VERSAFORM XL is much more flexible—giving you access to multiple files using its built-in programming language. It's a bit more difficult to use than VERSAFORM—you have to understand something about the logic of databases—but still easier than many database programs. Both VERSAFORM and VERSAFORM XL give you columnar fields so that any one field on a record can have lists of items stored within it, as does CORNERSTONE (p. 83).

*Put a filing system
on your lap-sized computer . . .*

DATA +

TRS-80 Model 100; 16K minimum, 32K recommended; also available for Olivetti M-10 as DATA10; copy-protected? NO; \$60;

SORT2 +

TRS-80 Model 100; 16K minimum, 32K recommended; also available for Olivetti M-10 as SORT10; copy-protected? NO; \$29.95;

both from Portable Computer Support Group, Inc., 11035 Harry Hines Blvd. Suite #207, Dallas, TX 75229; 214/351-0564; combined version (DATA/SORT Plus, \$49.95) available at your local Radio Shack dealer.

Number of files permitted per database: 1
Records per file: 60 with 10K; more with more memory or if records are smaller than maximum
Fields per record: 16 max
Characters per field: 249 max

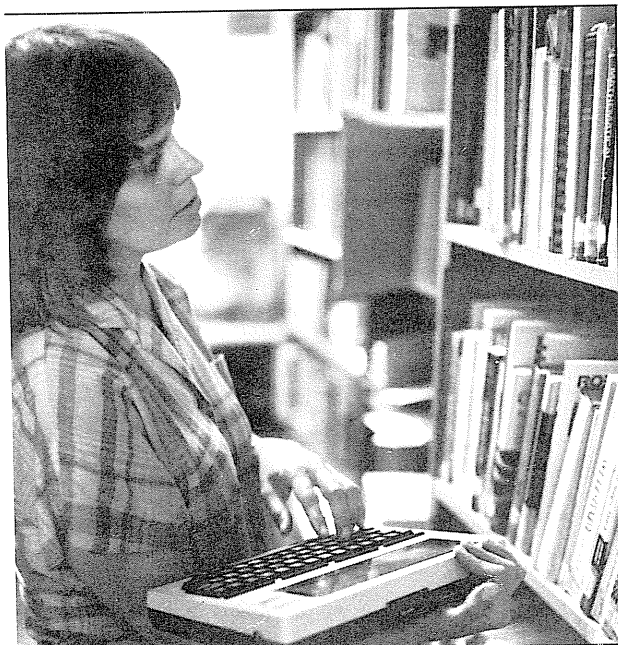
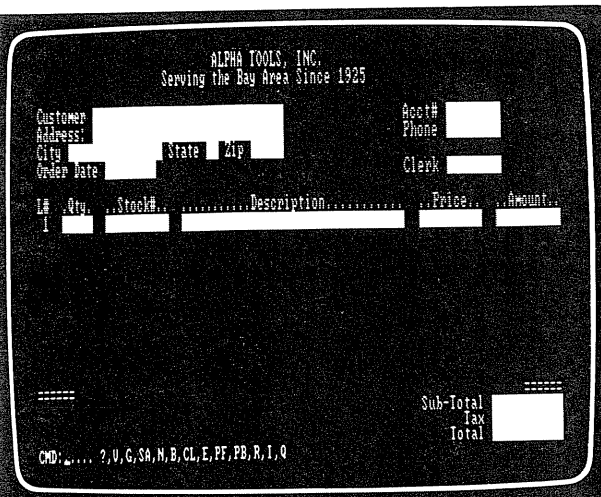
JIM STOCKFORD: A word on the great convenience of filing systems on lap-sized computers: the computer itself can be carried down rows of shelves for the tax-time countdown, or taken to the field or library for data collection. At the worksite you can enter data into fields presented by the screen, and from there on the program does the work.

Isn't that better than walking around with a notebook and returning to the office to key everything in?

So far, these two programs from the Portable Computer Support Group are the best we've seen for the Radio Shack Model 100. DATA + is a standalone filing system that allows you to print labels, listings, and forms; sort records on any of the sixteen fields by alphabetical or numerical order; and incorporate fields into text files. It also has an Add: feature that creates files and reports from unrelated records. With the built-in search features of the Model 100, DATA + is as good as many of the filing programs that run on desktop computers.

If you use DATA + for your work, you should get SORT2 + as well. It sorts DATA + files by any field. It can sort alphabetically (recognizing upper-case letters ahead of lower-case letters if you wish) or by number, and it has an astonishingly low 1K memory requirement.

The manuals are beautifully simple. The factory support is friendly and immediate. Together, DATA + and SORT2 + provide an excellent filing, sorting, and printing tool at an awfully good price.



Doing on-site inventory updating is a natural for the Model 100 and DATA +. In this case, bringing the computer to the application beats bringing the application to the computer.

Bigger Little Boxes: Database Management Systems

TONY FANNING: Database management systems (DBMS) perform all the functions of the file managers and more. But they're not easy. What distinguishes them from file managers? They simultaneously process information from more than one file, and they're often programmable, letting you query them about that information in a variety of ways.

With a database manager, you can store information in several data files and still have access to all the data in all the files, creating new files (or reports) that combine items selected here and there from any of the data files (which are often called "databases" for these more complex programs). The word used (and often misused) to describe this data handling ability is "relational"; it refers to the ability to combine (or "relate") information from different files that are set up in the form of tables. For example, you can combine address information from one file and sales information from another to create an invoice, if customer names are common to both.

Database management systems are direct descendants of the

monster data-processing programs that once lived only on corporate mainframes. They usually require something uncomfortably similar to programming to do their tricks—including getting the information back out of the database. This makes them extremely flexible and adaptable, but often frustrating for nontechnical users. They may exact a long apprenticeship, but if you need flexibility and industrial-strength information management, you'll be glad you have a DBMS.

There are only three choices for beginners when it comes to these serious programs. (1) Decide right now that your organizing job is big and that you ought to devote a large amount of effort (and maybe a large amount of money) to mastering a powerful program. Then go do it. (2) Maybe you aren't cut out to be a computer programmer. Get someone else to set it up for you, and be happy that you can use it. (3) Forget it. You don't need the difficulty that accompanies this kind of complexity.

We're beginning to see new approaches, such as "natural language" add-ons that let you ask for information in English instead of programmer talk. They'll probably make personal computer DBMSs easily useable. We're also beginning to see good database managers included in all-in-one packages. But we're not there yet.

The flagship, against which all others must be measured (batteries not included) . . .

DBASE II

Version 2.4; Apple II family • Apple III • IBM PC/XT/AT compatibles • most CP/M machines • most MS-DOS machines; (contact dealer or Ashton-Tate for specific machine compatibility); copy-protected? NO; \$495; Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230; 800/437-4329, ext. 2341 or, in CO, 303/799-4900, ext. 2341.

Number of files permitted per database: 2
Records per file: 65,535
Fields per record: 32
Characters per field: 254

TONY FANNING: You can't even talk about personal computer databases without mentioning DBASE II. Even satisfied users will tell why it's the most frustrating program in the world: it's so damn useful—but it's slow; it's so hard to figure out how to do what you want—but you can . . . eventually. Despite its limitations, just as with the IBM PC, DBASE became the standard against which we must measure all others, because of the widespread, consistent support that exists for it—it's a marketing success. There's love/hate from everyone who's used it.

Many people who think that "DBASE" is the generic name for any database management system buy it only to find they can't understand it because so much of it is a programming language. Their next step is to take a course; DBASE II courses form a minor industry. There are also about a dozen books

on it so far. And there are outboard programs ("batteries not included") to make it faster where it's slow and easier where it's hard (see "the DBASE family" this page). DBASE II is to database programs as WORDSTAR is to word-processing programs.

Unlike such "free-form" programs as PFS:FILE, DBASE II requires a rigid data structure. You must tell it the name of a field, what kind of data will go into it (text, numeric, or logical), and how many characters the field will occupy. Data entry is reasonably easy (WORDSTAR users will recognize the editing commands), but how do you find the information once it's in? Simpler file managers prompt you or give you a form to fill in. DBASE II gives you a dot. Period. You must type in DBASE II commands just as you would in BASIC. Just as with BASIC, you can string together a series of commands in a file and feed the file to DBASE. But isn't that programming? Right. Flexible if you understand it, frustrating if you don't. Many who have shelled out full dollar for the program never do understand it.

Though DBASE II is a relational database management system, in practice you can only use two files at once. It requires little memory, but sorting is slow, report capabilities are fairly rudimentary, and it requires programming for practically all but the most simple reports. Think long and hard about how you want to interact with DBASE before you buy it. If you don't want "custom" processing, you might want a simpler file manager, or one of the other DBMSs reviewed in this section.

```

CREATE
ENTER FILENAME: COMICS
ENTER RECORD STRUCTURE AS FOLLOWS:
FIELD  NAME TYPE LENGTH DECIMAL PLACES
001  TITLE  C,40
002  ISSUE  C,3
003  MONTH-YEAR  C,5
004  PUBLISHER  C,15
005  STOCK  C,2
006  PRICE-PAID  N,6,2
007  ARTIST  C,20
008  WRITER  C,20
009  CO-WRITER  C,20
010  CHARACTERS  C,50
011  STORY-TITLE  C,40
BAD NAME FIELD
011  STORY-TIT  C,40
012  CONDITION  C,3
013  COMMENTS  C,80
014
INPUT DATA NOW? _
    
```

You must define the structure of your database rigidly before DBASE II can accept data.

(continued from p. 85)

LOUIS JAFFE: PFS:FILE and its REPORT cousin are easy to learn and use (great for teaching beginners) but very limited in total capabilities compared with DBASE. DBASE is a full-fledged, high-level programming language for data manipulation. DBASE programs can be quite cranky to set up and debug, but they make possible all sorts of customized applications. Despite misleading ad campaigns that label it "user friendly," however, DBASE is really best employed by a trained programmer. It's very dependable, having been debugged through several revisions, and there is a large and growing library of DBASE programs, many in the

public domain, which are useable without modification by any computer running DBASE.

JIM WHITESCARVER: It is the only package I've found that does just about every data-conversion task you're likely to need on a micro. Any report you can print to a file can be loaded into DBASE. If your data outgrows your spreadsheet, you can load it into DBASE. You can capture a report on your micro from a remote host and load it easily into a DBASE file. You can reformat it, and use the data with CBASIC, MBASIC, and 1-2-3 if desired. I'd sure like to find a low-cost DBMS that can do even some of the tricks that DBASE does, but I haven't found one yet.

TONY FANNING: Now that DBASE III is with us, the remaining DBASE II bugs may never be fixed.

DBASE II's programming language makes it extremely flexible, but many people will find it difficult to learn.

Movin' on up . . .

DBASE III ★

Version 1.1; Copy-protected; \$695; IBM PC/XT/AT and compatibles; AT&T 6300, 7300; DG/ONE; Tandy 1200; TI Pro-Lite; TI Professional; 256K; Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230; 800/437-4329, ext. 2341 or, in CO, 303/799-4900, ext. 2341.

Number of fields permitted per database: limited only by disk space
Records per file: limited by available disk space
Fields per record: 128
Characters per field: up to 4K bytes per entry

TONY AND ROBBIE FANNING: The Big Noise is DBASE III. It's big and faster'n'hell at

doing all the stuff that DBASE II did slower'n'hell, like sorting and indexing. DBASE III outdoes DBASE II in the numbers game (128 fields to 32, 4000 characters/record to 1000, a billion records to 64K, 10 data files can be open instead of 2, etc.), so that it can manage bigger and more complex databases. It also has a decent online help system that includes prompting as well as quick lookup of all commands.

The main reason for getting DBASE III, just as it was for getting DBASE II, is to develop customized database management applications via its programming language. If you have developed or used DBASE II applications, you can (more or less) automatically convert them to DBASE III and

they'll really wail. DBASE III also includes a QUICKCODE-like screen generator, which makes life a lot simpler for beginners. Some DBASE II commands have been retired and a lot of new ones put in place, but old DBASE II users will find the new kid familiar. And the old annoying DBASE II bugs are gone!—probably to be replaced by new ones . . .

WAYNE CHIN: You can almost forgive DBASE III for being merely what DBASE II should have been when it was converted to 16-bit machines a couple of years ago. But the Ashton-Tate practice of forcing you to use the system diskette (even with a hard-disk system) as a key disk to start DBASE III is almost unbearable for developers.

THE DBASE FAMILY:

QUICKCODE II and III

QUICKCODE II: Version 2.1C; most CP/M machines; 64K • version 2.2; IBM PC/MS-DOS machines; 180K; copy-protected? NO
• QUICKCODE III: IBM PC and compatibles only; copy-protected? YES; \$295; Fox & Geller, Inc., 604 Market St., Elmwood Park, NJ 07407; 201/794-8883.

EVERYMAN'S DATABASE PRIMER

Everyman's Database Primer, Robert Byers; 1982; 295 pp.; \$19.95; Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230; 213/204-5570; or COMPUTER LITERACY.

TONY FANNING: DBASE II is a strange mixture of flexibility and incompleteness. You can program it to do damn near anything, including creating input menus and very complex report programs. But you may not want to take the time or effort to do it. An army of add-on packages now do this for you.

QUICKCODE allows you to "paint" menus and formats on the screen; it then generates DBASE programs that you can use for data input and report output. As with most program generators, the result is slower operation. And it doesn't really remove the need to understand the DBASE language. The cost can be high, too. I know one sad person who paid about \$1000 for DBASE and QUICKCODE so she could generate a menu-driven application that PFS:FILE could easily have handled for \$150.

Books explaining personal computer programs are an industry in themselves; a large subindustry is books explaining DBASE II. The clearest is *Everyman's Database Primer*. It uses DBASE as an extended example while it teaches the basics of data management with simplicity and humor.

```

STORE 0 TO OK
FOR WHILE OK = 0
  IF 'APROMPT' # ' '
    ACCEPT 'APROMPT' TO COMMAND
  ELSE
    ACCEPT TO COMMAND
  ENDF
  STORE !(COMMAND) TO COMMAND
  IF COMMAND = 'QUIT'
    QUIT
  ENDF
  IF LESSON = '1'
    IF COMMAND # CHECK
      ?"You didn't enter:"
      ?" CHECK"
      ?"Please try again."
    LOOP
  ELSE
    STORE 1 TO OK
    SET TALK ON
    @COMMAND
    SET TALK OFF
  LOOP

```

```

QUICKCODE
-----
To Design Your Screen: Q      To Exit: E
-----
SCREEN SELECTION
NEW Name For Your Screen:  N
Get an OLD Screen From Disk:  O
Get a TEXT File From Disk:  T
-----
CUSTOMIZATION
Customize Your Screen Design Commands:  C
Customize Your Screen Settings (widths,lengths,etc.):  S
Turn on the QUICKMENU Menu Generator:  M
Change Your Output Options (see list below):  X
-----
GENERATE dBASE-II PROGRAMS
Generate ALL Programs:  ESC      Generate just one:  G
ADD  DBF  ED  FAN  GET
LO  LBL  OUT  PRG
PRN  RPT  SCR  VAL  WS
-----
CURRENT SCREEN IS:  NAME (AUTO PILOT ON)
ENTER COMMAND

```

QUICKCODE lets you "paint" an entry screen and automatically creates DBASE II programs for entering, searching, printing, and modifying data. This main menu gives you some idea of the program's flexibility.

A faster, more helpful contender . . .

R:BASE 4000

Version 1.15; IBM PC/XT/AT compatibles • HP 150; 256K; \$495 • Burroughs computer; CTOS • NCR computer; BTOS; \$795; copy-protected? YES; Microrim, 3380 146th Pl., S.E., Bellevue, WA 98004; 206/641-6619.

Number of files permitted per database: 40
Records per file: 2.5 billion (limited by file size of operating system)
Fields per database: 400
Characters per field: 1500

WAYNE CHIN: R:BASE is far easier to use than DBASE II. Its help and prompting facilities make life easier for the new user. Querying facilities match those of DBASE II; basic report-generation capabilities and relational operations are better. R:BASE removes the severe limitations that DBASE II puts on the size of a database and the number of records in it, so the user doesn't have to worry about such details.

But DBASE II has one significantly better feature: The user can define command files that can save lots of keystrokes or build fairly sophisticated applications. R:BASE has a command-file capability, but these commands are limited to what can be typed in from the keyboard. DBASE II provides additional constructs such as IF-ELSE, DO-WHILE, and DO-CASE, that allow for flexible programs that respond automatically to some situations.

TONY FANNING: R:BASE selects at about the same speed as DBASE II and sorts better than twelve times faster on unindexed files. R:BASE has a good help facility, a moderately good demo and tutorial, consistent report generation and input screen building (though a little puzzling the first time through), and a very good set of relational operations. R:BASE can prompt you for most commands; it takes some getting used to, but once you grasp the syntax it becomes quite simple and does not get in the way. Although the writers apparently hoped to reach a less sophisticated audience, the documentation is written in language for programmers. For practical use, you'd better have a serious, "industrial strength" job to do, and you'll need a hard disk.

R:BASE interfaces to RIM (a mainframe relational database manager), MULTIPLAN, VISICALC, 1-2-3, WORDSTAR, MAILMERGE, and packages with ASCII files (including DBASE II).

Anything you can do . . .

R:BASE 5000

Version 1.0; \$700; IBM PC/XT/AT/compatibles; 256K; Not copy-protected; Microrim, Inc., 3380 146th Pl. SE, Bellevue, WA 98004; 206/641-6619.

Number of files permitted per database: 40
Records per file: Maximum DOS file size
Fields per record: up to 400
Characters per field: 1500

CLIFFORD FIGALLO: The high-end database leapfrog between Ashton-Tate and Microrim continues with the appearance of R:BASE 5000. R:BASE 4000 was an improvement over DBASE II with a few exceptions; R:BASE 5000 took care of those exceptions and moved a bit ahead of DBASE III by adding strength in both the power and ease-of-use ends.

On the power end, they have added a procedural language with logical functions such as If, Then, Else, and Goto (included in DBASE II, but missing in R:BASE 4000). These plus a built-in compiler (not available in DBASE II or III) make the program especially attractive to turnkey application developers and erode one of DBASE's former advantages over the Microrim product. R:BASE 5000 comes with a custom macro creator and pre-programmed macros including one for posting transactions. Also, the report writer includes many of the EXTENDED REPORT WRITER (\$150) features.

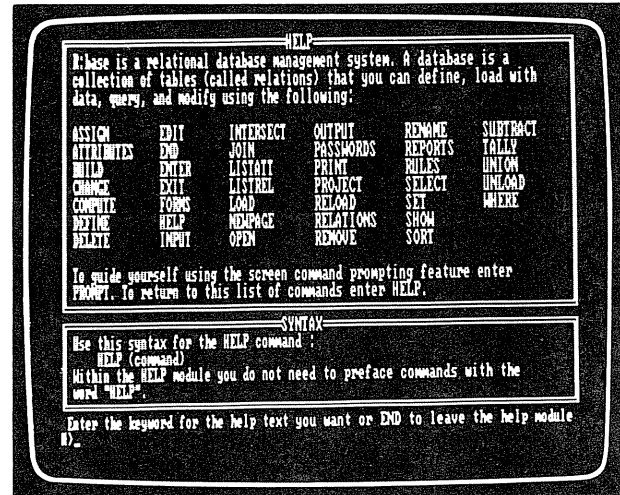
People who don't want to write programs can use the menu-driven Application Express (Apex) which leads you through the steps necessary to create a custom application. Of course Apex isn't as flexible as entering straight commands, but it does give you quick database setup and easy modification—particularly if you're using a trial-and-error method of database construction.

R:BASE 5000 probably won't have as wide a user base as DBASE III which is the easiest upgrade for the enormous number of DBASE II programmers and their applications. But at the same price it includes all the power (plus a compiler) and more convenience. With good marketing and support, it could well take a big bite out of the DBASE market.

R:BASE EXTENDED REPORT WRITER (XRW)

Version 1.2; IBM PC/XT compatibles • HP 150; 256K; • Burroughs computer; CTOS • NCR computer; BTOS; copy-protected? NO; \$150; Microrim, 3380 146th Pl., S.E., Bellevue, WA 98004; 206/641-6619.

WAYNE CHIN: R:BASE XRW adds report-writing capabilities far beyond those provided in the standard package. XRW's user interface is consistent with R:BASE's—menus are used and online help facilities are available upon request. Users do not have to write a program to generate reports, as they must with DBASE II, although some "programming" may be necessary. The body of a report can refer to more than one database; subsets and sorting are allowed; and limited arithmetical computations can be made. The report can be directed to the printer or to the screen.



R:BASE help screens are always just a few keystrokes away. If you aren't sure exactly how an R:BASE command works, it will prompt you through it.

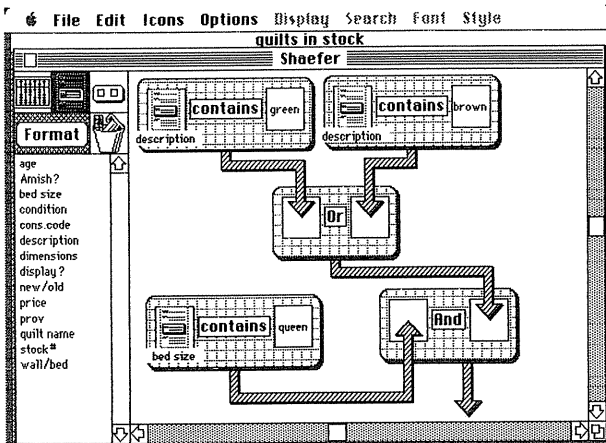
STATEMENT					
02/01/84	RIM FUEL COMPANY 1234 GASOLINE ALLEY BELLEVUE, WA 98001				PAGE 1
FOR:	Norris Aviation Service 1432 Airport Way Renton, WA 98026				
DESCRIPTION	DATE	QUANTITY	PRICE	AMOUNT	
Aviation Fuel	01/13/84	15000 GAL	2.159	\$32,385.00	
Lubricant, 10w-30 M/Oil	01/14/84	180 CASE	24.0	\$4,320.00	
Lubricant, 30W HP	01/17/83	-04 CASE	18.00	-\$72.00	
			Total:	\$36,633.00	
			Tax:	\$2,564.31	
			Previous Balance:	\$1,085.22	
			Amount Due:	\$40,282.53	

Complex tabular reports are XRW's forte.

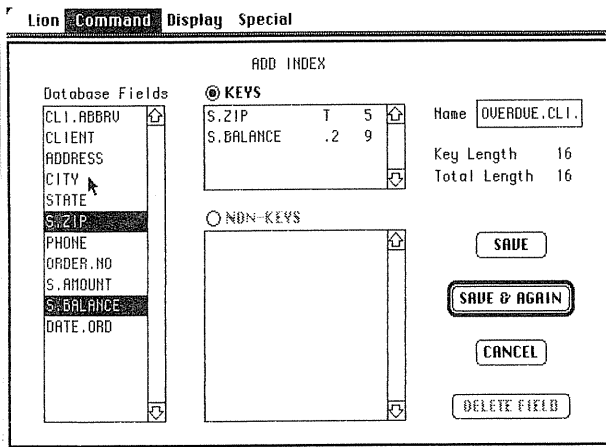
Picture a relational database . . .

HELIX

Version 1.13; \$395; Macintosh (512K); one external disk drive or hard disk; Not copy-protected; Odesta Corp.; 3186 Doolittle Dr.; Northbrook, IL 60062; 800/323-5423 or, in IL, 312/498-5615.



Querying the database, HELIX-style. Translation: Shaefer only orders quilts that are queen-size and are either green or brown. The graphic approach taken here using calculation Tiles makes all the difference between the time-consuming learning curve that would have been necessary to program these myriad functions and an afternoon of experimentation during which most of a user's applications could be mastered.



Creating and deleting indexes in MACLION is easy. Point to the fields you want to use as key fields and click your mouse. The total length cannot exceed 27 characters. The more records you have on the database, the longer MACLION takes to create the index.

CLIFFORD FIGALLO: HELIX is not only a relational database manager (and a good one), it offers tools for loading and extracting information that I only dreamed of up until now—partly because of the program's ingenious implementation of the Macintosh graphics capabilities.

A typical HELIX screen contains a palette area (with icons identifying choices) and a window (onto which you drag chosen items). You create a data entry form (template) by moving boxes from the palette onto the screen. You create a record by typing data into the boxes. The boxes (fields) can stretch to any size and be expanded or shrunk at any time—in HELIX, there are no "field lengths" or "record lengths" or "maximum fields per record."

Data in HELIX is organized by "collections." Collections are made of "relations"—groups of selected (related) fields, forms and indexes. (In one relation you might include names, addresses, phone numbers, social security numbers; a second one would have names, job titles, and current projects; a third might have job title, salary, and social security number). How do you tell HELIX two fields are related? Simply move the boxes onto the relation window.

Collections are created in much the same way. You can load up the window with icons representing relations, templates, selections, and Abacuses and keep on loading while the window auto-scrolls. (Be prepared for a

slowdown in icon selection as the window fills up, however.)

The Abacus is HELIX's most unique and powerful feature. By dragging this icon onto the screen, you can query the database, compare values in fields, cause the program to display messages according to field or calculated values, and put data from one relation into another. In addition, the Abacus gives you 52 calculation icons called Tiles for functions ranging from basic arithmetic to Boolean operators to trigonometric functions to compound interest and annuity rates. Tiles can be chained together (you draw arrows between them on the screen) under one Abacus function and other Abacus functions can be plugged into Calculation Tiles to form nested commands. With HELIX's graphics, you can actually see the nests.

At the moment, HELIX can't include pictures in its database nor exchange data with other programs. (Perhaps in future versions.) Still, HELIX is powerful, fun and easy to use, with error protection that borders on the prescient and user help facilities at every turn. (If you try to carry out inconsistent commands, the program refuses—and politely tells you why.) HELIX even automatically saves data at intervals you select. Since the maximum size of a HELIX collection is limited only by disk space, a hard disk is recommended for most business uses.

Traditional database management . . .

MACLION

Version 3.1; \$379; Macintosh 128K or 512; Copy-protected; Computer Software Designs, Inc., 1904 Wright Circle, Anaheim, CA, 92806; 714/634-9012.

Number of files permitted per database: unlimited
Records per file: unlimited
Fields per record: unlimited
Characters per field: 255

CLIFFORD FIGALLO: MACLION is a full-featured relational database program worthy of hard-disk-sized applications. Unlike HELIX with its visual tools, in MACLION the most noticeable advance over the top-of-the-line MS-DOS-based programs is in the use of pull-down menus and other Macintosh user interface conventions—which contribute to ease of use, but don't strike out in new directions.

Why choose MACLION over HELIX? Two reasons: experienced database program users will find HELIX's visual tools cumbersome, and people who wish to develop their own applications can take advantage of LEO, MACLION's programming development language.

MACLION is a more traditional database manager than HELIX—more like SMART (p. 89), for example—but with several deluxe features. Relations can be "protected" from alteration and MACLION will prevent duplicate entries with a simple menu choice instead of a complex programming command. MACLION can create screen forms that enter data into two relations at the same time. Good data validation and error messages prevent data entry mistakes and a data dictionary maintains data in one place so that a change in a record in one file will also change the data in all associated files. Browsing through records is easy, reports can be created including data from many relations, and query commands can pull data out in many configurations and formats. Fields can be totalled in query or report modes and you can create macro files of commands. MACLION's two biggest problems are that key fields are limited to 27 characters and alphanumeric fields are sorted with all capitals first (ASCII-based sorting) which means you'd get ALPHA before Abacus.

Compared to HELIX, MACLION is a straight but highly competent program.

**Automatic starter,
automatic transmission . . .**

ASAP SIX

IBM PC/XT compatibles; 192K; copy-protected? YES; \$395; ASAP Systems, Inc., 2425 Porter St., Soquel, CA 95073; 408/476-3935.

Number of files permitted per database: no limit
Records per file: 65,534
Fields per record: no limit
Characters per field: 80

CHARLES SPEZZANO: ASAP SIX is the database to choose if you love menus and function keys as a way to drive a program. SIX hardly uses anything else.

If there is an easier user interface in the relational DBMS marketplace, I have not seen it. There are no commands to learn even if you like memorizing things. The program asks you questions when something you try to do is not clear to it, and more often than not, prompts you with a list of possible answers before you have to commit yourself.

There is a menu at the bottom of the screen at all times (similar to MICROSOFT WORD, p. 60) that lists your options at that location within the program. If you get confused, the F1 key displays context sensitive help messages throughout the program.

SIX will automatically create a data entry form using fields you designate, or you can custom design the data entry screen. You can order a number in one field to be posted

automatically to another field—sell two widgets to Mr. Myrtle and two widgets get subtracted from the total number of widgets in inventory. At the same time the total amount of the invoice gets added to Mr. Myrtle's total balance due in a third file. Features like edit masking, range checking, and automatic incrementing of numbers make data entry smooth and accurate.

Once records have been stored, an easy relational query system is available to select, modify, or delete a subset of records through a series of menu options and prompts. Multiple file updates are routine and even spreadsheet-like "what-if" changes can be experimented with.

ASAP SIX is really more geared toward written reports of stored data than it is toward on-screen browsing through, and editing of, data. Reports easily handle totals, counts, and averages and can be up to 232 characters wide. You can sort or select on any field, and the built-in word processor, although rudimentary, is better than those in many relational DBMS packages.

A field is limited to 80 characters, so SIX isn't good for note-taking. But because all the items on any two data entry screens can be married to each other by placing the same indexed field at the top of each, there is really no limit to how many fields you can create per record. The number of files and the number of records and characters per file are also limited only by the amount of space in your system. Practically speaking, though, about 10 to 12 files will be the working limit even in a 640K PC.

Facile browsing . . .

SMART DATA MANAGER

Version 1.0; \$495, street \$336; IBM PC/XT/AT compatibles; 256K; 2 disk drives or hard disk; Not copy-protected; Innovative Software, Inc., 9300 West 110th St., Suite 380, Overland Park, KS 66210; 913/383-1089.

Number of files permitted per database: unlimited
Records per file: 1 million
Fields per record: 255
Characters per field: 1000

CLIFFORD FIGALLO: I switched from R:BASE 4000 (p. 87) to this program for keeping track of the Whole Earth software library. I like it because it saves me from having to think too much about the program. It feeds me menu screens which I've come to know almost by heart, and through which I flip and scan, chaining the command sequences with single keystrokes and assembling frequently-used sequences into Projects which can automatically be set in motion with the Execute command. A User Menu can be written for untrained database operators using the Projects you set up.

The SMART DATA MANAGER is also a very informative program. It can present your

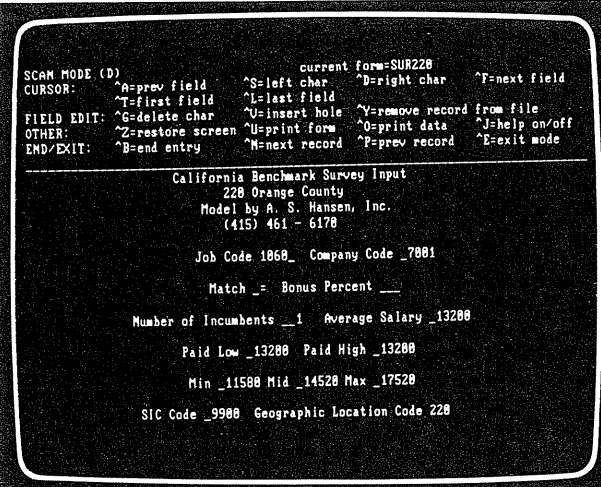
files as row and column tables, let you browse forward and backward through the file, scroll across the screen and browse down any column you wish, jump to given records, zoom in on a chosen record and modify it, and then resume browsing. You can split the screen in two and watch two files interact as you query one and see its associated record appear in the other. SMART handles such relations between files easily. Lookups from one file to another, while not simple to implement, are easy to set up as macros where variables can be entered manually. The Relate command lets you form new files from the relations of two others, and Transactions can be used to post from one file to another for accounting applications.

The SMART DATA MANAGER can operate as a standalone or as part of the SMART SYSTEM (p. 112) including a word processor and a very powerful spreadsheet. I use it alone, and it does the job well.

The SMART DATA MANAGER can load two files at once (in this case, Programs and their Vendors) and automatically look up a program's vendor information. The pop-up window across the bottom of the screen gives you a choice of fields for entering search criteria.

With one function key (F9MODIFY FIELD), ASAP SIX lets you expand any field length on this data entry screen.

This string of commands in edit mode is called a Project. You build a Project in the SMART DATA MANAGER by entering Remember and then entering the series of menu choices to set up your desired screen or function.



Form design and data editing are two strong points of INFOSTAR+. Here is a custom-designed data entry screen with its Wordstar-like editing menu.

If WORDSTAR is your idea of wonderful, you might like this . . .

INFOSTAR +

IBM PC/XT compatibles; 96K • MS-DOS computers including TRS-80 2000, DEC Rainbow, TI Professional; 96K; hard disk recommended; copy-protected? NO; \$295; MicroPro International Corp., 33 San Pablo Ave., San Rafael, CA 94903; 415/499-1200.

**Number of files permitted per database: 255
Records per file: 65,535
Fields per record: 245
Characters per field: 120**

TONY FANNING: INFOSTAR comes from MicroPro, the WORDSTAR (p. 56) people. It can easily move reports to WORDSTAR for editing, and its control-commands are similar to WORDSTAR's (though confusingly not identical). If you have other packages in the -STAR family (like CALCSTAR), you might want it, since data can be transferred among them. Or you might want something cheaper and easier to use.

INFOSTAR's large records, fast sorting, extensive reporting, and data-entry controls may make it attractive to some, particularly in production environments. But its confusing

complexity may turn others away. The creation of databases and sophisticated reports is definitely not for beginners, though once it's set up, novices can use INFOSTAR.

BILL GUNS: My first impression is that any database manager that requires three manuals is daunting. That is also my second, third, and fourth impression.

WOODY LISWOOD: INFOSTAR + has the best report writer available in the micro computer database market. It takes multiple file input and gives multiple file output as well as being able to produce the most complicated reports with ease. The data entry and edit section of the program shows its mini and main-frame design origins with its extreme flexibility and ease of use. It does all this from a menu structure which means a non-programmer like me can produce complicated reports without needing to understand "do whiles" and "end ifs." What is really great is that the entire program runs from a menu structure so all I have to do is respond to questions to get my work done. I would like to have square roots and logs as mathematical functions within the processing module, but so far, I have not yet found a database application which I could not do with INFOSTAR +.

Garbage Bags

TONY FANNING: Much of what we really need to organize—words, notes, ideas—can't be categorized precisely enough to fit into tables or other rigid structures. Nor can we organize them easily with word processors, which are really tools for formatting our words on paper, not for cataloging, saving, searching, and combining them in idea blocks.

But there are programs that manage text in many of the ways that a file manager handles structured data, and there will be many more in the future. These new programs for helping us corral what we really love—our thoughts and ideas—are much more fun to use than the cut-and-dried file managers and DBMSs we might need to organize our businesses.

There are three types of "garbage bags." First are programs like SUPERFILE and DATAFAX, which we might call indexers—they're electronic highlighting pens. They allow you to organize blocks of unstructured information—like long text passages—by marking key words and phrases within them. You can quickly retrieve a whole text item later by knowing only one of the key words or phrases you marked it with. They're especially suited

to academic scholarship, and probably won't satisfy a more general need.

Then there are file managers that can handle blocks of text easily, allowing you to create (almost) free-form screens for entering information. PFS:FILE (p. 80) can do so within its limitation, but freer-form text-file managers let us lay out an entry-screen form and later search for any word or phrase we entered in it.

A few database management systems, like NUTSHELL (p. 93), are designed for organizing text as well as structured data. Because text can be of any length, such a DBMS must permit fields of any (variable) length, and dealing with this complication can slow performance down considerably.

Finally, there are outlining tools, like the remarkable THINKTANK (p. 92) and FRAMEWORK (p. 110). They let you arrange headlines and chunks of text in an outline form, with subordinate headline/text chunks visually "indented" under others. You can then move text easily by moving the headline associated with it—great for brainstorming and rearranging presentations, articles, manuals, and general documents.

Free-form notes, bibliographies . . .

SUPERFILE

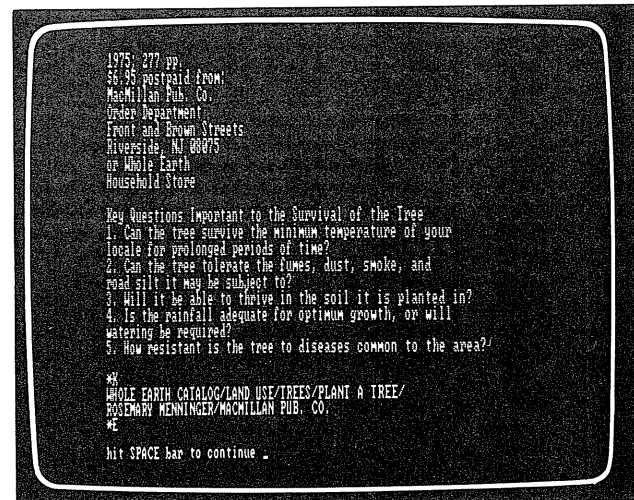
Runs on most MS-DOS (128K) and CP/M (64K) machines; copy-protected? NO; Software Marketing Associates, 4615 W. Bee Caves Rd., Austin, TX 78746; 512/327-2882.

Number of files permitted per database: 100/disk
 Entries per database: 65,000
 Characters per entry: 512,000
 Unique keys per database: 3,000

TONY FANNING: SUPERFILE (and its more expensive big sister, FYI 3000, \$395) lets you index free-form blocks of text created with your word processing program, rather than requiring data that's organized into fields and records. One regrettable limitation is its need to re-index whenever you modify a text block.

However, it can index over more than one diskette, so a group of references can grow to a fair size and still be searchable.

PAUL DECHOW: SUPERFILE is good for managing notes and making bibliographic records. Its biggest improvement in its new version is the automatic re-indexing feature, allowing data from a new file on the data disk to be indexed into an existing database by a quick and easy menu-driven procedure. Other recent improvements include an automatic check of dictionary and index files whenever you start it to make sure these files are intact and in good working order; a utility that appends parts of files to the ends of other files without writing over them; and the ability to keep up to 100 datafiles on single disk (of course, databases can be made up of many disks), which takes advantage of higher-capacity disk systems.



SUPERFILE scans text created by a word-processor for key words and phrases, then sorts and indexes them—as here, in excerpts from books reviewed in Whole Earth Catalog.

Like a highlighter pen . . .

DATAFAX

IBM PC/XT/AT and compatibles (MS-DOS); 128K; \$299 • IBM PC/XT/AT (Pascal); 128K; \$299 • Apple II family and Apple III; 64K; \$249 • Corvus Concept; \$299; copy-protected? NO; All Easy Corporation, Vertical Software Division, P.O. Box 10459, Marina Del Rey, CA 90292; 800/255-3279 or, in CA, 213/827-8500.

Number of files permitted per database: 3000
 Records per file: 255
 Fields per record: limited by screen
 Characters per field: limited by screen

GIL SYSWERDA: DATAFAX (version 2.4a) is one of the most useful programs I have. It absorbs all the little facts I want to remember but don't know how to file. It allows very easy updating, retrieval, format-free data entry, and error recovery. It also comes with a built-in text editor. DATAFAX will not allow a database to span volumes, and volumes cannot span diskettes, but volumes can be as large as 16 megabytes, so if you have a hard disk

The logical organization within DATAFAX is that of a folder. There can be as many folders per database as will fit. Each folder contains pages, of which, again, there can be any number.

Each page contains exactly as much information as will fit on one physical screen. You enter data into pages with a text editor. There are absolutely no format restrictions except those you invent yourself. When you save folders, you save them with associated key words. These key words either come from the text (you point them out to the system) or are arbitrarily entered.

You find folders by specifying key words in logical combinations, and can display, print, or edit them. If the system is used as intended, most folders contain only one page, and that page contains only a few lines. The key words hold things together.

If I read a magazine article (I read a lot) that I think I might want as a reference later, I enter onto one DATAFAX page the source of the article, the topic, and a very brief summary. I then key word it in every possible way. If in the future I want to know what articles (books) I have read about topics X and Y, I can find out in seconds from DATAFAX.

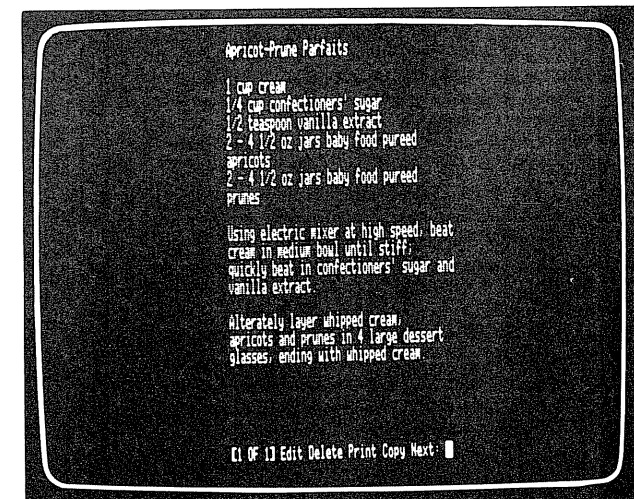
CHARLES SPEZZANO: Record retrieval in DATAFAX is very sophisticated. You create intricate strings of key words connected by "ands" and "ors." You can use ranges and wild cards and nested parentheses for sorting. If you know the key word, you can find a record in two seconds. Key words do not have to be added in a separate step after you create a record. Any word in your text can be easily tagged as soon as you have typed it. All these key words go into a list into which you can also add words not in the record itself.

JAMES V. MCGEE: Using DATAFAX is like writing a note to yourself and highlighting all the words you might use later to retrieve the note. You can start a new database without any prior planning; just load in a disk and start entering and filing data. You can let the structure evolve as your information does.

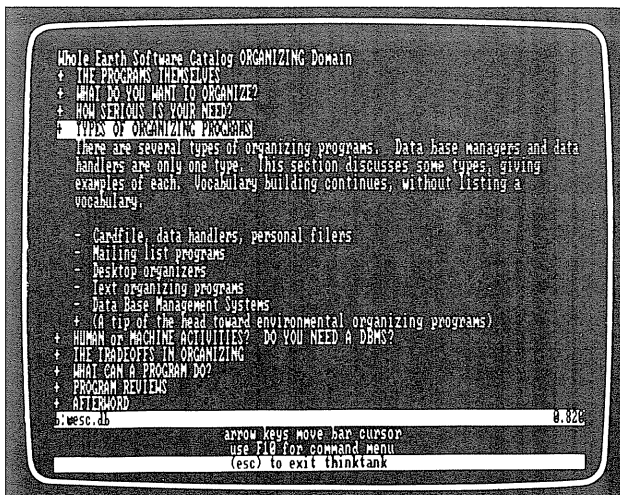
System performance is generally good, but setting up a new disk (which you must do before entering any data) is frustratingly slow.

When I timed it, it took well over five minutes. If you are sufficiently impatient you may never wait to use the program itself. Also, because it runs under the UCSD p-system, DATAFAX uses the disks much more heavily than PC DOS programs, resulting in slower operation.

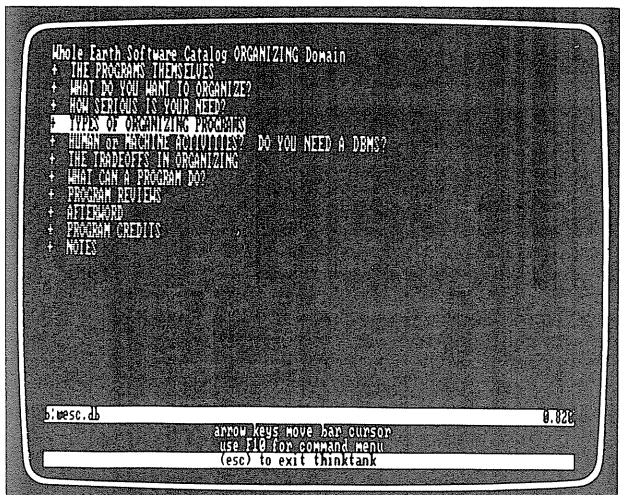
The manuals are extensive and well written in a refreshingly human and personal style. They describe other users' experiences and suggest a variety of clever ways to take advantage of DATAFAX's unusual design philosophy—in enough depth to trigger your own thinking on potential uses.



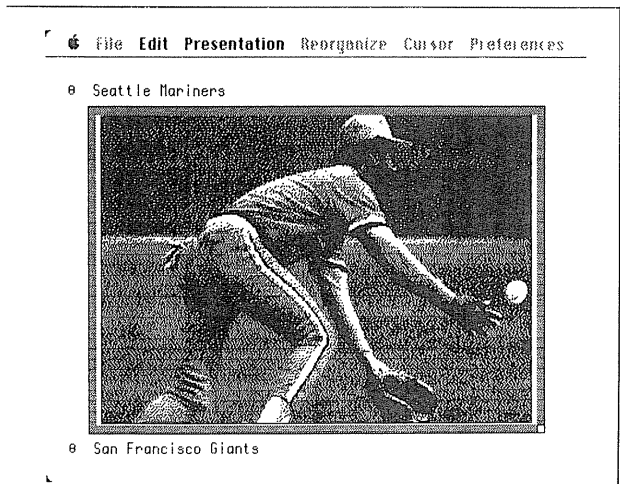
You can enter text into DATAFAX randomly (without fields) and go back later to search for key words—all recipes with "1 cup cream" in this database, for instance. Though it's not shown here, you could highlight individual words for easier sorting later.



You can expand your THINKTANK outline easily by pressing the + key, or . . .



. . . collapse your outline so you can see the big picture.



Using the Macintosh Scrapbook, images can be imported into THINKTANK, organized and presented as an automatic or manually-advanced slide show.

Outlining with both sides of the brain . . .

THINKTANK

Version 2.0; Apple II family; 64K; \$150 • IBM PC/XT/AT compatibles; 256K; \$195 • Version 1.001; Apple Macintosh (THINKTANK 128); \$145 • Version 1.00; Macintosh (MAC 512 THINKTANK); \$245; copy-protected? NO (Apple II); YES (others); Living Videotext, Inc., 2432 Charleston Rd., Mountain View, CA 94043; 415/964-6300.

TONY FANNING: Shortly after I started using full-screen editors (nowadays called "word processors"), I discovered that the way to write with them was to start typing one-liners to prime the pump, then indent some and move them under others. Sort of like making an outline. Then I typed in between the one-liners until I said what I needed to say. Then I agonized and rearranged, using fairly clumsy block moves. Then I edited.

Later I was introduced to "patterning" by Tony Buzan (*Use Both Sides of Your Brain*, E. P. Dutton, 1976). This kind of organizing is topologically equivalent to outlining, and visual to boot. It generated lots of beginnings for me, but I can't write much on a pattern, and recopying the pattern into outline form is a nuisance.

THINKTANK on my IBM PC combines the best of both methods. When I use it, I start with a blank screen with the word HOME at the top. I furiously type one-liners ("headlines") at the screen. These are the basic ideas of the outline I will create, if I already have a good idea of the structure of my ideas. If I don't, and this is where TT really helps, it's stream-of-consciousness outpouring. I think of this as my brainstorming phase.

After a while I notice that some ideas in the headlines are contained in others, and I simply move them under the main ideas using the cursor-control keys. It's as easy as shuffling little bits of paper, but gives me a far greater feeling of a growing structure. Soon I have subordinate ideas neatly indented under other ideas, perhaps to many levels of subordination. It begins to look like an outline.

Every headline followed by subordinate ideas has a + (plus sign) in front of it, and every headline with none has a - (minus sign). If I position the "bar cursor" over one of the plussed headlines and press the minus key, all subordinate material disappears (I can bring it back with a plus). This neatly lines up all my main topics. If one seems out of order I can easily move it. If something's missing I can add it, or drop down a level and promote what was a subordinate idea to mainhood.

At any point I can enter text as "paragraphs" attached to any headline. In fact, I can import whole files of text from outside my "outline." I can move big chunks of ideas around, and I do. When I'm done I can print out, or view, or file the outline to any depth of detail, or the entire document with all text. Neat.

What's it good for? Starting to write. Writer's block. Refining expositions or presentations. Keeping notes that you can use later. Brainstorming. Revenge on your seventh-grade English teacher, who taught you what an outline is, but never taught you how flat-out useful it can be.

PHILIP ELMER-DEWITT: Best use I've found so far: to lay out the stories I write for *Time* magazine. *Time* pieces tend to be highly structured, so it helps to know where you're going before you start. My thoughts, alas, tend to issue forth helter-skelter, bearing little resemblance either to normal human discourse or to the shape of a typical *Time* feature.

So the night before I'm scheduled to write a story, I type my ideas into THINKTANK as they arise. Then I use the program's outlining features to rearrange them, putting the A's with the A's and the B's with the B's. The key ideas tend to bubble to the highest levels of the outline while the supporting details fall to lower levels.

When I'm done, what I've got is a list of key or topic ideas buttressed with my best quotes and anecdotes. Then I write, using the outline as a guide. Even when I forget to refer to the outline, it seems to shape the story. On occasion I've gone back to look at a THINKTANK file I'd forgotten about and found the resemblance between topic ideas and finished *Time* paragraphs uncanny.

Once I used the program to outline a speech. I found I didn't even have to flesh it out on a word processor; simply spoke *ex tempore* from the THINKTANK printout.

I don't think I ever got the hang of outlining back in high school. I tended to lose my structure in the flood of illustrative detail. Now that this program has made outlining something of a game, I'm much more likely to do it. Perhaps that's the key.

CLIFFORD FIGALLO: Well, I thought THINKTANK on the Apple IIe was a clever little program, and I thought THINKTANK on the IBM PC was a great help to the terminally disorganized like myself, but THINKTANK 512 on the Fat Mac is such a fluid method of entering and rearranging thoughts—without even having to think about letting your fingers do the talking—that I'm not sure what the next step can be in hooking up your mind, your hand, your eye and words. You *do* have to type in your ideas. But, once on the screen, with mouse in hand and eye on screen, you can chop, dice, stir, grate, and spread your ideas effortlessly until your word salad looks the way you want it.

Finds anything . . .

NUTSHELL INFORMATION MANAGER

Version 1.29; \$150; IBM PC/XT and compatibles; Not copy-protected; Leading Edge Software Products, Inc., 21 Highland Circle, Needham, MA 02194; 800/343-3436 or, in MA, 617/449-4655.

Number of files permitted per database: limited by disk space
Records per file: limited by disk space
Fields per record: 60,000
Characters per field: 16 million, subject to disk space limitations.

KEN MILBURN: If you do research, keep notes on scraps of paper or 3 x 5 cards, or have to match a product to a client's requirements, you will find NUTSHELL a godsend. Employment agents, real estate salespeople, and librarians should find it indispensable.

In fact, I can't think of anyone who couldn't find several uses (ranging from client-tracking to recipe-keeping) for a package like this. Using the program is almost intuitive so chances are excellent that if you own it you will use it.

KEN MILBURN: You can learn to use NUTSHELL productively in a few minutes. It's so flexible you can stick all kinds of random notes and files into it. Once the information is in there, you can get it back out quickly and easily in any arrangement you desire.

You create a form (used for entry, reports, or both) by typing prompts and field lengths on the screen in any arrangement. If you don't like the results when you've finished, you can move any part of the form to any other place where there's room for it.

Now, suppose you've entered a few hundred records and you want to find only the records that contain specific sets of information. Just move the cursor to the appropriate field, type in as many key words (or selection criteria) as you want, press a couple of buttons and NUTSHELL will find the records.

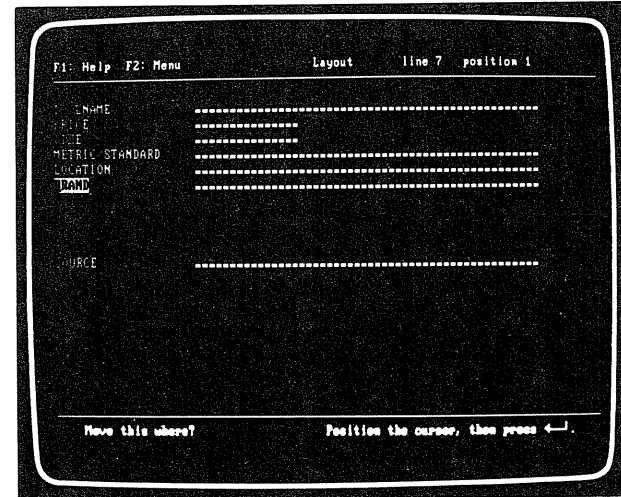
NUTSHELL indexes every single word in the database!

You can have as many entry/report screens as you like for a single database. You can have as many records as your disk will hold, as many fields in the database as you like. Ditto the number of characters in a field. You can do calculated and derived fields using the standard four math functions. Logical operators work on mathematical fields as well as in sorting and finding data. And, NUTSHELL can easily transfer files to and from other programs, so long as they use some form of ASCII text file.

Few things are perfect. NUTSHELL is not designed to handle automatic relationships between multiple data files. The program is not compatible with some "IBM-compatibles" and behaves oddly in a networked environment (PC-Net was tested).

If you have an external hard disk that is not strictly IBM PC/XT compatible, test the program before you buy it. NUTSHELL is unforgiving of modifications to the operating system.

RICHARD DALTON: NUTSHELL is probably the easiest, most self-evident way to create a database I've seen. Not the most feature-laden on the market, but no one I've seen makes it easier to fool around with the structure of a database.



Laying out data entry forms with NUTSHELL begins with a list of data fields from your file. Highlight a field and move the cursor where you want it, then hit RETURN. A file can have an unlimited number of forms with different combinations of fields in each one.

Now here's a good finder . . .

FACTFINDER

Rudi Diezmann; Version 1.0; Copy-protected; Macintosh 128K/512K; \$150; Forethought, Inc., 1973 Landings Dr., Mountain View, CA 94943; 415/961-4720.

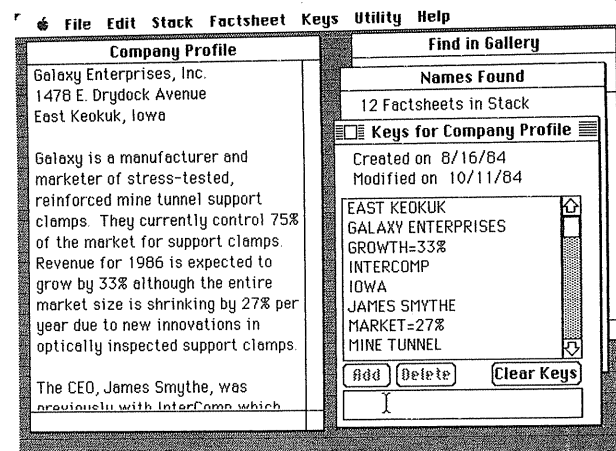
CLIFFORD FIGALLO: If you keep free-form records on separate documents in file folders, and your file folders have become many, and your searches for related documents are becoming a drag because records can only be located according to one search criterion—that being the labels on the file folders themselves—FACTFINDER may be the solution to your problem.

What FACTFINDER does is let you enter data that doesn't lend itself to insertion into a form, and create records that are not easy to categorize. Each record or document is entered as a Factsheet and each Factsheet may be assigned any number of Keywords. A collection of related Factsheets makes up a Stack. Keywords and combinations of Keywords can be used to locate a Factsheet or group of Factsheets. Iterative searches can then be performed on groups of Found Factsheets.

Creating a document as a Factsheet can be done using FACTFINDER's MACWRITE-like editor, or already-created MACWRITE documents can be loaded directly as new Factsheets. Likewise, Factsheets can be unloaded as MACWRITE or MACPAINT documents. Factsheet size and Stack size are memory-related. The maximum length of a Factsheet on a 512K Mac is about 30K. A Stack can be as large as 400K on a Mac disk; 1 megabyte on a hard disk.

FACTFINDER is such a flexible program that its uses may vary widely, from keeping track of phone messages to keeping case files for a law office. A "labels" command prints only the first inch of each selected Factsheet, and the print options are many.

Because of its effective use of the Desktop metaphor and the Macintosh conventions, FACTFINDER is quite a comfortable and natural-feeling program to use. The manual is complete and easy to follow, and I would follow the FACTFINDER suggestion to free up disk space by removing the Help Stack since I never once needed to refer to it.



A FACTFINDER Factsheet and its accompanying windows: Keys, Names Found ("all" or by key combinations), and Find, where search criteria are entered. The Factsheet window can be enlarged to cover the entire screen if needed.

ACCOUNTING

Marsha Mather-Thrift, Domain Editor

MARSHA MATHER-THRIFT: Lots of us have fantasies about gentle-hearted computers that work patiently all night at quarter's end and tax time, efficiently organizing stacks of calculations scribbled down during the course of the year. Although it's true that computers were designed to save enormous amounts of drudgery, it's easy to be taken in by visions of instant invoices and automatically paid bills. The truth, as every computer initiate knows, is not so rosy.

But fantasy has elements of truth, and what's true here is the idea that computers *keep things in place for you*. Busy offices have a way of swallowing important papers—especially client charges and billings that need to get out on time to keep a small business solvent. Good accounting software not only keeps things in place, it saves time in repetitive entry and calculations as well as in locating errors and running calculator tapes. Being able to track expenses, materials, and labor hours is probably more vital for my small firm than it is for a vast corporation like Bechtel. And it's more vital still for the company that maintains an inventory and depends on stocking the goods in greatest demand. Accounting software can save you money, let you know quickly if you're losing money, and help you plan better ways to save in the future.

Yet businesses are as unique as people, so the problem is to choose an accounting system flexible enough to fit individual requirements. A retail farm-equipment business isn't likely to have the same accounting needs as a nonprofit organization or a law office. Even the fellow who builds cabinets to sell at

wholesale prices probably won't share accounting needs with his neighbor who builds half a dozen custom-paneled interiors a year.

Take note: computer-store salespeople, who often present themselves as consultants, are really creatures of the sales trade. Most of them don't understand quite what it is that makes your business unique, and most are unwilling to recommend software they don't happen to sell—a basic flaw in their consulting role.

In this section, we've set out to give you a useful range of accounting packages to mull over. We've left out software that merely duplicates your checkbook or tracks expenses and taxes in a limited way. And we've ignored spreadsheet programs that many people will tell you are complete enough to fill small-business needs. (They aren't. We've covered these in *Analyzing*, pages 64-77, where use value catches up with cost.)

At the most basic level—personal finance—we've included programs (*MANAGING YOUR MONEY*, p. 96, and *DOLLARS AND SENSE*, p. 97) that offer order-loving creatures a chance to organize their financial existence from birth to retirement. For the more complex needs of small business bookkeeping, we've included some inexpensive accounting packages (*BOOKS!*, p. 100, *BPI*, p. 100, and *THE ACCOUNTING PARTNER*, p. 99) which provide most standard functions and reports. We've isolated good tax preparation and planning programs for home and business. Then, for those who require interactive accounting and a variety of special reports, we've taken a look at more sophisticated packages (*PEACHTREE BUSINESS ACCOUNTING*, p. 101, and *EASYBUSINESS*, p. 102) that are well worth the investment for retailers (and others) who depend on inventory control and discount buying to beef up profit margin.

STEWART BRAND: Accounting is so much of the essence, we pretend it isn't by making fun of accountants. To get a realistic sense of how important the matter is to your business or home, imagine that you've had a set of accounting programs working for about six months and you decide it's the wrong set. The extended agony of transition to new accounting software—what Jerry Weinberg calls "out-conversion" on p. 6—is a measure of your dependence. The same is true, of course, of your accounting *people*.

I rank accountants with librarians—unsung heroes and heroines of civilization, worth far more to us all than lawyers, architects, doctors, and others in the glory trades.

BARBARA ROBERTSON: Marsha Mather-Thrift is particularly well-suited to oversee this section. She's currently juggling two careers: researcher and office manager for an international consulting firm, and writer of fiction—short stories and a novel. Occasionally, when she has time, she does free-lance work (like this section of the [nonfiction] **Catalog** or book reviews for the **San Francisco Chronicle**) while managing the finances of her enterprise along with those of her family. With no time for false promises, she brings a critical and cautious eye to programs claiming to whisk accounting problems away.

Marsha realized early that computers would be necessary at the pharmaceutical consulting firm where she works. There a small number of people process tons of information for U.S. and European clients trying to win FDA approval for their formulas. She began automating their office with CompuCorp's dedicated word-processing system and had just begun evaluating accounting programs for the office when I asked her to take on our Accounting domain. (She settled on *BOOKS!*, p. 100.)



Marsha Mather-Thrift

I was astonished when she said she'd give up her fiction-writing hours for a few months and, with six-month-old Caitlin in backpack, take on the project. And delighted . . . she had exactly the perspective I wanted for the section, and lord, can she research and write—important qualities for a domain whose copy deadlines fell in the middle of income tax season.

Matt Herron

Buyer Beware

Treat your search for good business software the way you would an exciting but dangerous safari. Listen to advice from local experts, but keep your mind on your own crucial needs. Here are a few ideas.

English

Every accounting program worth a second glance should have a manual in plain English that doesn't send you searching through volumes for set-up instructions. If you have employees, this is especially crucial, or you'll end up as an unwilling participant in the computer-support business.

Flexibility

Look for flexibility in the areas where you need it most. If your business requires tracking interest on overdue debts, for example, make sure accounts receivable can "age" balances at several different rates. (Most in the upper price range age at 30-60-90 and over 90 days.) If you have extensive accounts payable and can save money by making early payments, make sure your accounting system can provide you with reports that summarize stock on hand, discount payment dates, and vendor payment history. (REALWORLD, p. 103, will do this.) If you bill clients each month for services rendered, check to see that your invoicing will let you tailor a description of services for each individual client job. (BACK TO BASICS, p. 99, does this.) It's also a good idea to go over your needs with your accountant and decide where you stand to gain the most from improved management.

Support

Retail software dealers seldom have the staff to provide helpful follow-up. Make sure before buying any program that you look it over several times, get some references from people who are using it, and find out what back-up you can expect from the manufacturer. (A direct phone call to the company can tell you a lot about what to expect in the way of future support.) Some programs, like CHAMPION (p. 102), are sold in a demo version that will allow you hands-on testing before you buy the whole program. And systems houses (consultants who sell software and hardware) can often provide sales contracts that include staff training, help when you've got a problem, and equipment repair.

Safeguards

Safeguards against loss of data are crucial in accounting, especially in multi-user situations where a single file must be simultaneously shared by two operators. You can run a crude safety test by having two people attempt to access the same file at once.

Some safety features can create complications if your accounting needs are simple. Programs that follow standard accounting practice won't allow you to delete or edit entries. Instead, you must enter reversing entries to correct errors (it's the standard embezzlement-discourager). This is no problem if you are an accountant and can juggle figures in the general ledger, but it can be a serious drawback for less agile users.

Once you've isolated your software candidates, eat, sleep, and work with them until you know exactly what they will and won't do. The highest cost of automating your accounting system lies

in the time it takes to set up your reports and chart of accounts and enter your data. You don't want to do that work twice.

Hardware

A really workable accounting system requires a lot of disk space—in most cases, a hard disk (Corvus is one of the better ones—Profile for the Apple). Putting your accounts on fifteen or sixteen floppies might be an interesting challenge at first, but you can be sure it will be a headache later. For relaxed small businesses, though, floppies may be entirely practical. PEACHTREE BUSINESS ACCOUNTING, p. 101, for example, is designed with this in mind. If you don't yet own a computer system, plan on buying one with as much memory as you can afford. Don't plan on doing anything but the simplest home accounting with less than 128K. Screen resolution and keyboard set-up are also important considerations when working with figures. And nearly every accounting program requires a 132-column printer. Some home finance programs produce acceptable reports on an 80-column printer, but only if it has a compressed print mode.

Remember: Once you've isolated your software candidates, eat, sleep, and live with them until you know exactly what they will and won't do. Focus on areas where you need increased control in your business. If you don't already own a personal computer, find the right software first. Plot out the time good accounting software can actually save you in tracking down figures and producing invoices and checks. Then choose the program that covers those major needs. Make sure you won't have to make radical changes in your accounting system to use it, but be ready to bend a little.

Think about how much you may have to pay your CPA to double check your figures. Make sure the audit trails are good enough so that you can easily follow each item in its travels from entry to postings to reports. It's not a bad idea to keep dual books for the first few months—until you know that your program works the way you hoped it would. The highest cost of automating your accounting system lies in the time it takes to set up your reports, your chart of accounts, and to enter your data. You don't want to do that work twice.

Books and magazines

Books and magazines are still the most useful resources for finding what you want in software.

If you're a beginner, start with **The Personal Computer in Business Book**, by Peter McWilliams (1984; 299 pp.; \$9.95; Quantum Press, Doubleday & Co., Inc., 501 Franklin Avenue, Garden City, NY 11530; 212/953-4490), a good general-purpose introduction. A slightly dated but helpful guide is Nicholas and Sharon Rosa's **Small Computers for the Small Businessman** (1980; 344 pages; \$16.95; dilithium Press, P.O. Box 606, Beaverton, OR 97005-0606; 800/547-1842). Less entertaining, but useful as a detailed how-to manual, is **Micro Accounting: Setting Up Your Books on the Computer**, by Steven E. Yoder and Sherry D. Knight (1984; 240 pp.; \$15.95; Prentice-Hall, Englewood Cliffs, NJ 07632; 201/592-2640). **How to Buy Software** (p. 6) is the best for mapping the software search territory as a whole. Two other useful compendiums are the Datapro/McGraw-Hill **Guide to Microcomputer Accounting Software** (1985; 142 pp.; \$17.50; McGraw-Hill Book Co., 1221 Avenue of the Americas, New York, NY 10020; 212/512-2000) and Amanda Hixson's **A Buyer's Guide to Microcomputer Business Software** (1984; 292 pp.; \$19.95; Addison-Wesley,

One Jacob Way, Reading, MA 01867; 617/944-3700). And for accountants who are ready to plunge into the PC world, three good books are available: **Microcomputers for Accountants** by Theodore Needleman (1983; 186 pages; \$14.95; Prentice-Hall, Englewood Cliffs, NJ 07632; 201/592-2640), **Computers in Accountants' Offices** by Gordon E. Louvau and Marjorie E. Jackson (1983; 132 pages; \$25; Van Nostrand Reinhold, Order Processing, 7625 Empire Dr., Florence, KY 41042; 606/525-6600) and **Computer Applications Guide for Accountants** by Steven S. Weis (1984; 330 pp.; \$17.95; Reston Publishing, 11480 Sunset Hills Rd., Reston, VA 22090; 800/336-0338).

All of these books are available by mail order from COMPUTER LITERACY. For ordering information, see p. 201.

Among magazines, the **Journal of Financial Software and**

Hardware gives a concise easy-to-read look at new financial software for the business-minded. **Business Computer Systems** is one of the best sources for articles on real estate software, general-ledger software, and tax-preparation programs.

Computing for Business regularly runs reviews written by a CPA. Also, be sure to check local user groups and professional organizations for special seminars and demonstrations.

Business Computer Systems: \$40/yr (12 issues) or free to qualified business people; Cahners Publishing Co., Cahners Bldg., 275 Washington St., Newton, MA 02158; 617/964-3030.

• **Computing for Business:** \$24.95/yr (12 issues); MWJ Publishing Group, P.O. Box 1234, Cerritos, CA 90701; 213/408-0999. • **Journal of Financial Software and Hardware:** \$20/yr (6 issues); Microthought Publications, 2811 Wilshire Blvd., Suite 640, Santa Monica, CA 90403.

Personal Finance Programs

Like a monthly financial checkup . . .

MANAGING YOUR MONEY

Version 1.5; IBM PC/XT/AT and compatibles; 128K; color monitor recommended; IBM PCjr (cartridge, 128K; disk, 256K); \$199.95; copy-protected? YES; M.E.C.A., 285 Riverside Ave., Westport, CT 06880; 203/222-1000.

KEN USTON: MANAGING YOUR MONEY is the most comprehensive and easy-to-use home-finance package I've run across. In addition to performing conventional checkbook and budgeting functions, MANAGING YOUR MONEY forecasts cash flow, estimates income taxes, tracks net worth, and calculates gains and losses on investments.

But that's not all. MANAGING YOUR MONEY evaluates family life insurance needs, suggests income tax strategies, prints checks, and calculates rates of return on tax shelters and rental properties.

The programs are designed to be learned without the user's manual. Although other software manufacturers have made this claim, MYM is one of the few packages that totally succeeds.

Better yet, MYM programs are completely integrated. A check you write to the doctor is not only deducted from your checking account balance but is also reflected in your budget, income tax deductions, and net worth.

For insurance planning, MYM calculates your mortality. No armchair advisor, it tells you how much insurance to purchase and makes suggestions about where to purchase it. The tax section estimates income taxes at any time of the year and allows you to do tax planning. The retirement programs factor in such variables as taxable savings, pension plans, IRA and Keogh portfolios, rates of inflation, and your income tax bracket. There's an equally good investment program.

If you, like me, have been thinking, "One of these days I'm going to get my finances in order," MYM might be the program to finally get you going.

STEWART BRAND: I get asked, "What's your favorite program?" Answer: Andrew Tobias's

MANAGING YOUR MONEY, by a mile. No other program is so utterly useful, so well designed, so well written (not the code, which seems fine, but the words on the screen), so humorous, so easy, so exploitive of what a computer does best.

It's a life-brightener, a marriage-saver. Money, as they say, matters. Most of us can keep up with the checkbook, but investments, tax stuff, loans, insurance, all seem to inhabit worlds of their own, from which come a steady supply of bad surprises. This program eliminates all that. All of those "chapters" in the program, in your life, keep track of each other and keep a steady summary of their overall effect on your financial health. For the first time I not only know what's going on, I relish my monthly session with the program, when the actuals take on the imagined (the budget), and I come out ahead or behind in the computer game of life.

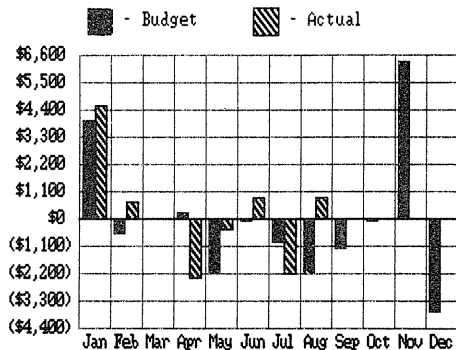
Ken Uston gives the program a rave review, but I don't think it's clear how much better it is than DOLLARS & SENSE, or HOME ACCOUNTANT, or any other program for home application. For the monthly user like me to the daily stock market adept, MANAGING YOUR MONEY combines awesome completeness with ingenious simplicity.

MARSHA MATHER-THRIFT: MANAGING YOUR MONEY is still in a category all by itself. It's a financial consultant that won't leave you with a handful of flaky investments. In keeping with Andy Tobias's philosophy of giving low-key, long-term advice, MECA now offers four customer update plans that include, at the lowest level (free), an 800 HELP number and three-month guaranteed disk replacement, and at the highest (\$49), a yearly update on software and a user newsletter full of Tobias's practical financial advice. The thing that impresses me most about MYM is that the authors publicly admit mistakes when they make them and actually use the program to find out what needs improvement.

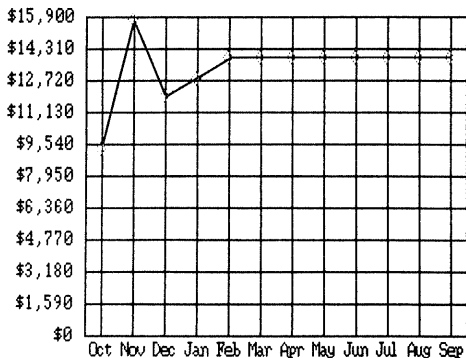
The pity is, MANAGING YOUR MONEY is still only available for IBM, but Apple and Macintosh versions are on the horizon.

MANAGING YOUR MONEY printouts of Stewart Brand's bottom line for 1984—all income versus all expenses, with reality (through August) compared to budget, followed by his predicted cash situation for the following months.

All Categories Netted Budget and Actuals



Budgeted Cash at End of Month



Speed, flexibility, and a great capacity . . .

DOLLARS AND SENSE

Apple II, IIe; 48K; \$100 • Apple IIc; 128K; \$120 • Macintosh; \$150 • IBM PC compatibles; 128K; 2 disk drives; \$180; copy-protected? YES; Monogram, 8295 S. La Cienega Blvd., Inglewood, CA 90301; 213/215-0355.

FRED SALAND (Shoreline Software, San Rafael, CA): After a long and frustrating search for a good home-money manager, I finally found DOLLARS AND SENSE. It isn't good . . . it's great.

This program lets you categorize transactions into 120 different accounts and enter monthly budgets for each one. You can add and rename accounts or delete unused accounts at any time. Transactions can be flagged for tax returns, and a new forecasting module (available as a standalone for the Macintosh and Apple II, but included in the IBM versions) allows for four-year projections useful in tax planning. Even after five months, I had used only 92 accounts, and I'm *compulsive* about detailing my financial affairs.

Speed and capacity are the greatest selling points. DOLLARS AND SENSE is written in Pascal and operates at lightning speed compared with the competition. Moving from menu to menu is fast. Data entry is done by the screenful instead of line by line. Up to 200 entries per disk can be stored on an Apple. You can also correct or add

transactions from previous months at any time. (THE HOME ACCOUNTANT won't let you add transactions after you've closed out a month.) D&S's editing function, which works like that of a word processor, is the best I've seen.

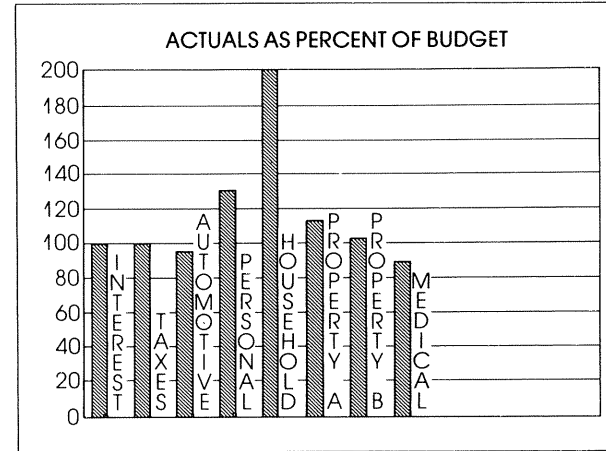
The program was designed to be easy to use, and it's a success. It always displays your options so you can back out of any process gracefully.

A few shortcomings: In printing checks, the payee isn't saved, and repeat payments have to be re-entered. Some users have mentioned that disk drives must be perfectly adjusted in order for transactions to be saved. This might be a result of the operating system or of Monogram's copy-protection scheme.

For personal finances, though, the package is nearly ideal. I haven't said DOLLARS AND SENSE is the simplest program to use, but it's worth the extra effort. For the investment, you get speed, flexibility, and results.

MARSHA MATHER-THRIFT: In the personal finance world, DOLLARS AND SENSE is a star. I don't like doing my books or my taxes, but D&S and the Macintosh made me fall in love with my finances. D&S takes care of averaging my fluctuating writer's income so I can actually make use of a budget, and funnels all the information I choose into one of the best tax planners I've seen. Thanks to the Mac's windows, the screens are super and learning the program is sheer pleasure.

D&S isn't as complete as MANAGING YOUR MONEY, but it's better designed than HOME ACCOUNTANT, faster, and the documentation looks like a million bucks.



Lightning fast and thoroughly useful, DOLLARS AND SENSE surpasses HOME ACCOUNTANT in everything but forecasting and range of machines on which it runs. For home budgeting, choose exotic colors for bar graphs that show at a glance what you spend on household items or your automobile. You may discover, as I did, that those harmless little trips to used-book stores add up.

Versatile, easy to use, and expandable . . .

FINANCIER II

Version 2.10; DEC Rainbow • IBM PC/XT compatibles • TI Professional • MS-DOS 2.0; 192K RAM • Wang; 256K; 2 disk drives or hard disk; copy-protected? NO; \$195; Financial Software, Inc., 3 Kane Industrial Dr., Hudson, MA 01749; 617/568-0374.

FRED SALAND (Shoreline Software, San Rafael, CA): FINANCIER II is a personal and small-business software system for accrual or cash-based double-entry accounting. That means it will work for both lazy and ambitious users who want sophisticated fiscal management. So far, this sounds pretty much like HOME ACCOUNTANT or DOLLARS AND SENSE. But the folks at Financier, Inc., have spent a lot of time designing a program that is versatile, relatively easy to use, and *expandable*. While HOME ACCOUNTANT limits you to 100 categories and D&S to 120, this program can support any number of categories. It goes one step further and permits you to classify each category into current and fixed assets, long- and short-term liabilities, and so on. That's a definite plus in a business setting.

Where does this very sophisticated package fit in? It's more complete than HOME ACCOUNTANT. It's slower than DOLLARS AND SENSE, but does have enhanced tax coding, memo fields, and easy payables and check writing. FINANCIER II probably falls slightly above D&S for usefulness and a few steps below a general-accounting package like PEACHTREE BUSINESS or BPI, since they can be upgraded to full accounting systems as your business grows.

MARSHA MATHER-THRIFT: FINANCIER II has less flash, but a few more refinements than programs like HOME ACCOUNTANT and DOLLARS AND SENSE, including the ability to produce true business-quality reports. It's more expensive than D&S and HA, definitely not easy to use (but there will soon be an 800 number for help), and not terribly fast. Still, it's a good buy if, like doctor and software consultant Fred Saland, you have terrifically complicated personal business. Also of value: it runs on the Wang PC, which has too few good programs designed for it.

ANDREA SHARP: FINANCIER seems too difficult for non-accountants. I found the manual ridiculously confusing to use. I didn't like the data-entry format (there is no verification of data before it is written to file). Although there is flexibility if you can

overcome the manual and entry format, and you can format the printing to your own checks, it is too complex, I feel, for personal business.

BALANCE SHEET FOR YEAR-TO-DATE					
JANUARY TO DECEMBER					
	Yr. Begin	Period End	Difference	Budget	Variance
Current Assets					
CITIBANK-CHECKING	597	1903	1306		
BANK OF BOSTON-CHECK	29	29	0		
BANK OF BOSTON-SAVGS	622	622	0		
POCKET CASH	85	135	50		
STOCKS & BONDS	35000	35100	100		
CITI NATIONAL CD	15000	12900	-2100		
Total Current Assets	51334	50689	-644	0	-644
Fixed Assets					
PROPERTY VALUE	120000	120000	0	0	0
AUTOS	18000	18000	0	0	0
Total Fixed Assets	138000	138000	0	0	0
Other Assets					
MORTGAGE-TAX	0	2300	2300	2300	-0
PAYROLL WITHHOLDINGS	0	17499	17499	15000	1999
Total Other Assets	0	17499	17499	17300	1999
Total Assets	189334	206188	16854	17300	-446
Current Liab					
CREDIT CARD - VISA	-606	-280	325		
AMERICAN EXPRESS	-110	-222	-112		
Total Current Liab	-715	-502	213	0	213
Long-Term Liab					
MORTGAGE-PRINCIPAL	-80000	-79000	1000	1000	0
AUTO LOAN - BMW	-10000	-8566	1334	3333	0
Total Long-Term Liab	-90000	-85666	4334	4333	0

A double-entry bookkeeping system is a must for producing business balance sheets your bank will accept. FINANCIER II is the one personal finance program that offers low price, a complete accounting package, and business quality reports.

*A home-finance manager
with reports for every occasion . . .*

HOME ACCOUNTANT

Apple II family; 48K (Expanded version for IIe & IIc; ProDOS; 128K) • Macintosh • Atari 800/XL; 48K • Commodore 64 • IBM PC/XT/AT compatibles; 128K; IBM PCjr; copy-protected? Varies with computer; \$75-\$100; Arrays, Inc./Continental Software, 11223 S. Hindry Ave., Los Angeles, CA 90045; 213/410-3977.

** THE HOME ACCOUNTANT **

V. X.XX

MAIN MENU

1. TRANSACTIONS
2. GRAPHS
3. PRINTED REPORTS
4. PRINT CHECKS/ACTIVITY REPORT
5. BUDGET
6. EXTEND DATA DISK
7. START NEW YEAR
8. HARDWARE/START NEW SYSTEM
9. EXIT

ENTER SELECTION (1-9)

HOME ACCOUNTANT is a household word—at least in the electronic cottage. It runs on more machines than any finance program in its price range and offers a no-frills set of graphs and reports. HOME ACCOUNTANT PLUS, the IBM version, has a forecast module that teaches the tricky art of future budget planning. If you do nothing more than predict returns on a savings account, you'll still find HOME ACCOUNTANT's orderly thinking a godsend.

ROBERT D. KOLB (Micro Support, Sausalito, CA): My accounting needs are rather simple, because I have only one checking and one savings account. But having spent hours sorting through boxes of receipts and past bank statements, I was delighted to find a software product to help organize my financial mess. Oh sure, I always know my current balance or whether I've paid my electric bill, but whenever I have to review past payments, I have to do a couple of hours of tedious work.

It took me about 60 minutes to set up HOME ACCOUNTANT, from formatting disks to entering checkbook records. This included reading through the documentation, which is not quite as easy as it should be for novices.

Since I had never really taken the time to set up a budget, I decided to try it. Then I got so ambitious that I created two credit card accounts and an expense account.

HA can handle up to five accounts with a maximum of 100 categories each. Searching for transactions is simple and painless. You can search by date, check number, payee, amount, budget category, memo, or any combination for any period.

There are plenty of reports, including budget and net worth. Also, you can print comparative income and balance sheets and choose specific areas for reporting (ie. all checks to the landlord). Graphs allow limited forecasting—for example, the future value of an investment after assumed rates of return and inflation have been calculated.

If I keep using HOME ACCOUNTANT, who knows? Those valuable investments might even be mine.

MARSHA MATHER-THRIFT: HOME ACCOUNTANT has finally entered the jet age with new versions written in (faster) compiled BASIC (in ProDOS for Apple). HA isn't as comprehensive as MANAGING YOUR MONEY, but it's a lot less exclusive, since it runs on nearly every computer ever made. New Apple IIc and IIe versions are out plus a Macintosh version complete with financial planner and double the mailing-list storage capacity of the standard HA (100 names and addresses instead of the old 50). The IBM version has a reasonably complete forecasting module, and all versions have the invaluable ability to funnel information to Continental's low-priced TAX ADVANTAGE. That gives you an onscreen version of a completed tax form you can then transfer to the official IRS papers, and saves you a heck of a lot of calculating in the process.

GEORGE BEEKMAN: I struggled with DOLLARS AND SENSE on the Mac for three months and I never felt very comfortable with it. It took an hour with the HOME ACCOUNTANT to convince me to retype all my old D&S data into this new program. HA may have problems on other systems, but the Mac version is a joy to use. It's so intuitive and Maclike that my wife (who's always hated the idea of computerizing our finances) is hooked. It's not perfect—it could stand to be more flexible and it would be nice if you could move data to and from other applications—but it's miles ahead of the competition.

Check-writing and tracking . . .

QUICKEN

Thomas Proulx, David Drews and Anthony Tyson. Copy-protected. \$79 - \$99 (street \$50 - \$70). IBM PC family and compatibles (192K); Apple IIe (extended 80 column card required)/IIc. Intuit, 540 University Ave., Palo Alto, CA 94301; 415/322-0590.

ANDREA SHARP: Ten minutes with QUICKEN and I changed my mind about using computers to manage a personal checkbook. I had thought it wouldn't be worth the effort, but this program makes the process fun and is extremely easy to use. You can sit down and run it in just a few minutes.

The program will memorize repeat payees' names and addresses (as well as memos for tax categories and amounts if you want) and print out computer-style checks. As you "write" your checks, the program makes a check register for you and keeps your transactions in date order. (Note: the checks cost \$30.95 for 500 and take two to three weeks to arrive.)

RUSEL DE MARIA: QUICKEN is simplicity itself. You write the checks on a screen that looks just like a paper check and you work in a check register that looks just like a paper register. If you use the memo space for budget categories, you can print a report that lists each transaction according to date and totals all the transactions at the bottom. If you need to list your medical costs in a hurry, this is an easy way to do it.

MARSHA MATHER THRIFT: QUICKEN was designed to be foolproof for people with phobias about computers, and it is. A former writer for the well-known Sunset "how-to" books designed the manual and the program shares the same commonsense approach. With it you can set up your checkbook to yield year-end tax information or an accounting for the costs of any particular job. And when you balance your bank statement and see a heart-stopping deficit in the little box at the bottom, QUICKEN offers the kind of help you need in finding the gremlins that have mucked up your calculations.

DIFFERENCE ANALYSIS

There is a difference of \$ 96.98. Your register may have:

- too few payments marked as cleared
- and/or - too many deposits marked as cleared
- and/or - incorrect dollar amounts on some items

To help find the difference, compare the bank statement to the summary of your register shown below:

WHAT YOU'VE MARKED IN YOUR REGISTER

	Number	Dollar Total
Payments marked cleared	7	\$ 838.18
Deposits marked cleared	1	\$ 8.88

Press F9 to examine the Check Register.

Press F18 to ignore the difference and accept the statement's total as correct.

QUICKEN makes banking at home a reality. An ingenious help screen that you call up when your statement fails to balance can prevent one more tedious trip to the bank. Since you already have the information you need in hand, the problem is doing the necessary sleuthwork without having to recheck all your entries. QUICKEN helps you track the differences at home in a fast and efficient way.



MEANS: NEW TO 2.0 EDITION

Small Business Programs

Tightly controlled . . .

BACK TO BASICS

Sentient Software. Version 1.01. Copy-protected. \$180 - \$575 (depending on machine); street price \$125 - \$300; individual modules (GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE) \$60 - \$175 each; street prices \$40 - \$120 each. Atari 800; Commodore 64; Apple II family; Macintosh (512K); IBM PC/XT/AT and compatibles (available only as three pack); IBM PCjr. Requires 80-column printer. Peachtree Software, 3445 Peachtree Rd. NE, 8th Floor, Atlanta, GA 30326; 800/554-8900 or, in GA, 404/239-2000.

JAN PEHRSON: For years, Peachtree accounting packages have set a *de facto* standard, but those early programs had a lot of problems associated with their use, partly because they offered a lot of flexibility. There were many options, but they weren't always clearly documented.

BACK TO BASICS is a clearer, cleaner version of Peachtree's early programs with many of the hidden options now appearing as menu selections. There's a little loss of flexibility, but the gain in clarity is worth it.

In operation, this is a much safer program than Peachtree's earlier accounting packages. BACK TO BASICS tests data entered and account number validity (against the account numbers set up in the general ledger). You can add expense accounts to the payable module, for example, but only if they have been previously set up. The program flow is so tightly controlled, there is little chance of making a fatal error.

HOWARD DYER: BACK TO BASICS gives you 30 standard reports to choose from and deals with accounting reports in an efficient, simplified way. The rat race of having to customize report forms every time your business shifts direction is gone. (Other programs, such as the EASYBUSINESS series, make you learn a minor programming language to create custom reports.) In addition, BACK TO BASICS allows variable terms for billing customers, variable discounts, and the ability to pre-define a palette of vendor terms.

The bad news: This is a *floppy disk only* system; there is no online help although screen prompts are exceptionally clear; and the manual wasn't as much help as we wished. Also, there's no payroll or inventory module, as yet.

MARSHA MATHER-THRIFT: For do-it-yourselfers stepping onto the shaky tightrope of a small business start-up, this program is definitely a safety net. It's designed for the absolute novice and the safeguards are excellent. The manual includes a short course in basic accounting. There are also helpful sketches of sample business situations to give you some tips on setting up your books. Some cautions: the program prints statements, but not invoices, so it's not much good to anyone interested in manufacturing or high-inventory sales. And unlike the old PEACHPAK 4, you can't use it with the PEACHTXT word-processing program. But for anyone doing the kind of small-scale labor-intensive business we do around our house—writing and cabinetmaking—BACK TO BASICS would be my first choice.

A sensible double-entry small-business system . . .

THE ACCOUNTING PARTNER

Version 1.22: IBM PC/XT compatibles; 128K RAM • CP/M-80 and CP/M-86 machines; 64K RAM; 2 disk drives or hard disk, 132 column printing capability; copy-protected? NO; \$395; Star Software Systems, 367 Van Ness Way, Torrance, CA 90501; 213/533-1190; modules available: G/L, A/R, A/P, Payroll, Inventory.

JAN PEHRSON, M.B.A., C.D.P. (Datalink, Novato, CA): Most small-business bookkeeping systems are a combination of spit and baling wire. A lot of businesses don't even produce quarterly statements. In fact, plenty of owners run "successful" companies by frequently asking, "Just how much do we have in the bank, anyway?" Then the accountant (if there's a good one) picks up the pieces at the end of the year.

THE ACCOUNTING PARTNER is one of those sensible accounting systems that can change all that. It's a double-entry system complete enough for businesses that don't require elaborate inventory control. For retailers, there are plenty of options for vendor payment and purchasing—enough, at least, to give you an extra inflation hedge through discount buying. THE ACCOUNTING PARTNER also includes accounts receivable and an invoicing module. And you can do a sales analysis on products by item file, invoicing your items at five different prices.

There are also some features you can't get elsewhere. First, it interfaces with the STAR LEGAL TIME AND BILLING PROGRAM, which makes it a good candidate for attorneys and consultants. THE ACCOUNTING PARTNER's journals are divided into three simple categories: cash disbursements, cash receipts, and a general journal. And one of its most far-sighted features is a function that permits small companies to print checks straight from the general ledger check-disbursements journal.

Still, victory doesn't go uncontested to the ACCOUNTING PARTNER. A/R allows only balance-forward accounting, so you can't check detail on invoices for previous months. This might be fine for a five-and-dime, but not for most inventory-maintaining businesses. And despite Star's good documentation and freely offered 800 number, there is no index to help you through the rough spots. Worse yet, it costs \$50 per quarter for the benefit of the company's direct advice. From Star's point of view, this is probably a good way to get rid of malingers, but it's not terribly practical for customers.

You don't have to be an accountant to use this program, but you'll have to act like one if you want to make any corrections. Reverse entries are your only way out of errors. Also, THE ACCOUNTING PARTNER is not entirely interactive, so you'll have to post transactions in a separate maneuver, but at least you can rely on the accuracy of your figures this way.

Still, despite all this, THE ACCOUNTING PARTNER is a cinch to give you a better idea

of how your books are being kept. And you won't be likely to discover, as someone who recently hired us did, that you've been invisibly losing money for the last six months.

MARSHA MATHER-THRIFT: If you've got a growing small business and limited cash flow, then THE ACCOUNTING PARTNER can offer low price now and an easy move up to more sophisticated accounting software from the same manufacturer later.

```

*****
                          The Accounting Partner
                          (c) 1983 by Star Software Systems
                          Enter/Sort/Post Transactions Sub-Menu
*****
Code      Function
-----
1)        General Journal Transaction Entry
2)        Check Disbursements Journal Transaction Entry
3)        Cash Receipts Journal Transaction Entry
4)        Daily Journal Transaction Sort & Register
5)        Post Sorted Journal Transactions
*****
Enter Code Number of Choice (or 0 to return): 1
    
```

ACCOUNTING PARTNER has three simple entry screens (cash receipts, cash disbursements and general journal). These help to separate financial transactions and cut down chances for error. ACCOUNTING PARTNER is a good buy if you have a small business and limited cash flow. A better buy may be Star's new ACCOUNTING PARTNER 2 (a four-module program for \$995) if you need a completely interactive updating of reports and the option of either balance forward or open item accounting.

100 ACCOUNTING

Systems Plus, Inc.
1120 San Antonio Road
Palo Alto, CA 94303
(415) 969-7047



INVOICE
2482

Adventures In Sports
225 Highland Street
Cincinnati
Ohio

Adventures In Sports
415 Main Street
Cincinnati
Ohio

INVOICE DATE	YOUR ORDER NO	YOUR ORDER NO	TERMS	Net 30 Days	SALESPERSON	George Parsons
12/11/85	559	5587				
QUANTITY		DESCRIPTION	UNIT PRICE	AMOUNT		
36		Work On Color Brochure For the next 30 days original format, and for time spent in discussion on layout and color	25.00	900.00		
12		Travel Time Time spent traveling to your office on four occasions, in accordance with your notes	20.00	240.00		
		Deposit In accordance with your verbal instructions - deposit will hold slot until 1/1/86		400.00		
		Merry Christmas and a Progressive New Year				
		Net Due		1,540.00		

Thank You

BOOKS! is a novice businessperson's dream. A bookkeeping tutorial and ten simple charts of accounts streamline initial setup. A report (such as the one above) provides a tidy summary of outstanding debts with balances aged at four different rates. Overdue bills can quickly sink busy or inexperienced entrepreneurs, but with **BOOKS!** you can instantly monitor cash and receivables.

CORNER HOME IMPROVEMENT CENTER
TRIAL BALANCE
JUNE 30, 1985

PAGE 1

CURRENT ASSETS		
1010 REGISTER CASH		128.99
1020 CASH ON DEPOSIT		.00
1021 CITY NATIONAL		8,255.67
1022 COMMERCIAL USA		252.29
1110 ACCOUNTS RECEIVABLE		5,065.33
1120 PREPAID INSURANCE		56.32
1130 EMPLOYEE ADVANCES		449.50
1140 RETAINAGE ON CONTRACTS		.00
1150 INVENTORY		25,674.11
1160 CONSTRUCTION IN PROGRESS		.00
1180 LABOR CONTROL		.00
FIXED ASSETS		
1510 FURNITURE & FIXTURES		10,274.26
1520 MACHINERY & EQUIPMENT		48,179.86
1550 ACCUMULATED DEPRECIATION		4,316.04
OTHER ASSETS		
1800 DEPOSITS		7,466.58
1830 PREPAID INTEREST		11,585.40
CURRENT LIABILITIES		
2005 DEPOSITS ON CONSTRUCTION		.00
2010 ACCOUNTS PAYABLE		13,061.25
2030 SALES TAX PAYABLE		1,592.80
2040 FICA PAYABLE		215.35
2050 FEDERAL INCOME TAX W/H		269.87
2060 EARNED INCOME CREDIT		.00
2070 STATE INCOME TAX W/H		101.12
2080 NEW YORK CITY TAX W/H		23.34
LONG TERM LIABILITIES		
2620 NOTES PAYABLE-EQUIP		66,237.32
CAPITAL		
3010 CAPITAL STOCK		24,500.00
3050 RETAINED EARNINGS		7,071.22
INCOME		
4011 SALES		.00

The workhorse of small business accounting, BPI requires month-end closings and audit reports. Trial balance (above) gives you a quick summary of all your general ledger accounts—a handy tool for quickly assessing cash and excessive spending.

For the old-fashioned bookkeeper . . .

BOOKS! THE ELECTRIC LEDGER

Version 1.2; IBM PC/XT compatibles; 128K RAM; 2 disk drives or hard disk • most CP/M-80 & -86 machines; 64K minimum RAM; copy-protected? NO; \$745 for complete package or \$395 for basic module plus \$75-\$150 for additional modules; Systems Plus, Inc., 1120 San Antonio Rd., Palo Alto, CA 94303; 415/969-7047.

DENNIS JOW: BOOKS! is a program with a revolutionary approach. The screen is a graphic simulation of the familiar journal worksheet (with columns for debits and credits) designed to make the changeover from paper to machine an easy task.

BOOKS! is closer to textbook accounting than any other system on the market. The reference manual has a section explaining the theory of double-entry accrual accounting and there is a tutorial. There are G/L, A/P, and A/R functions in the main package and options (at separate cost) for invoicing, check writing, recurring entries, and budgeting (including job cost). The accounts receivable part of the program includes selections for open-item aging reports and detailed aged or balance-forward customer statements. It will also handle any number of customers you wish.

One of the nicest features is the chart of accounts. There are predesigned charts for

ten different types of businesses—wholesale, manufacturing, construction and others. You can modify any of these to your own specifications.

HOWARD DYER: In an effort to be flexible and innovative, the BOOKS! designers loosened standard accounting controls. For example, the program doesn't close out the month, which makes later revisions easy but displaces the customary audit trail. Also, account descriptions are used instead of accounting numbers, and since there are no predefined account ranges, finding errors later could be a bit tricky.

MARSHA MATHER-THRIFT: The biggest drawback of BOOKS! is a freewheeling approach to entry that increases ease of use but sacrifices safeguards. ONE-WRITE PLUS, a new program by Evergreen Software, which includes check writing and sells for \$295, offers the same journal worksheet approach as BOOKS! and more controls. Unfortunately, there is only one G/L module available thus far and no invoicing, so it's only worth considering for the smallest of businesses until the next modules hit the shelves in the stores. (ONE-WRITE PLUS. Melanson and Johnson. Copy-protected. \$295; street \$190. IBM PC/XT/AT compatibles; 128K. 2 disk drives required. Evergreen Software, Inc., The Meeting Place, Amherst, NH 03031; 800/528-5015 or, in NH, 603/673-0830).

A workhorse for small businesses,
flexible and expandable . . .

BPI GENERAL LEDGER

Version 1.8; Apple II family; Lisa • IBM PC/XT compatibles; PC DOS • most MS-DOS machines • most CP/M machines; copy-protected? NO (except Apple II); \$595-\$795; BPI Systems, 3001 Bee Cave Road, Austin, TX 78746; 512/328-5400; modules available: A/R, A/P, Payroll, Inventory Control, Job Costs, Time Accounting. Call BPI for specific machine compatibility and requirements.

PAUL WALHUS, business systems consultant: BPI was started by the owner of a chain of grocery stores in Austin, Texas, who needed accounting systems to run his stores. He teamed up with a programmer and created a product that Apple, Commodore, and IBM fell in love with. The product caught on and sold more than 100,000 copies in two years.

It doesn't take knowledge or expertise in computers to use BPI. This is truly a program for the small business. Besides a general ledger module, BPI offers accounts receivable and payable, inventory control, payroll, job cost, church management, association management, and time accounting for lawyers.

The programs are easy to use, well-supported, well-documented, relatively bug-

free, and the menus are always consistent. You can stack up commands in the BPI "queue" menu and enter data in several journals without going back to the main menu. And you can do the same with the reports. This shorthand data entry saves a lot of keystrokes.

The program will let you keep a whole year's transactions on a hard disk. But there is one drawback: BPI is a month-to-month accounting system, which means your access to data for use in spreadsheet projections and similar analyses is nil, unless you buy a file-transfer program. But more important: BPI is an expandable system. The general ledger can provide the heart of a small business financial system and then hook up with more powerful receivable and payable modules later. The newest version (C13) for the IBM also links to a universe of BPI products (the Aura line), including information managers and word processors.

MARSHA MATHER-THRIFT: BPI has outsold other accounting programs in this price range. It's dependable and offers a lot of options (such as legal time and billing and job cost) that you won't find in similarly priced programs. And the best news is that the IBM version is now written in compiled BASIC and finally fast enough to satisfy even the most hardened computer program reviewer.

Pricey and Sophisticated

Full-featured and carefully designed . . .

THE BOSS FINANCIAL ACCOUNTING SYSTEM

John Burns and Sally Craig; Version 1.31; IBM PC compatibles and other MS-DOS machines; 128K • most CP/M and MP/M machines; 64K; 2 disk drives or hard disk; copy protected? NO; \$1595; Balcones Computer Corporation, 3435 Greystone, Suite 106, Austin, TX 78731; 800/531-5483 or, in TX, 800/252-8184; system includes G/L, A/R, A/P (\$579 each purchased separately); also available: Inventory Accounting (\$1095), Payroll (\$795), Time Billing (\$795), Invoicer (\$295), Multiple Terminal Entry (\$295), Spreadsheet Interface for 1-2-3 and MULTIPLAN (\$195 each).

JOHN R. SOWDEN, JR.: Unlike most software packages, THE BOSS's manual lists its program writers right up front. So it was my first impression that if somebody was taking responsibility for it, the whole program must be well put together. I wasn't wrong. When I called Balcones (via an 800 number), the first person I talked to fully understood the program—and also had a strong knowledge of accounting.

The manual is well-written and the system offers a number of features for easy use. You can create your own function keys, for example, so if you want you can easily design your command keys to resemble those of MicroPro's WORDSTAR, which is helpful if your staff is already familiar with WORDSTAR commands.

Another help is the preset chart of accounts. You can delete the accounts that don't match your operations and add ones that do. Ordinarily, setting up a chart of accounts is one of the most time-consuming and complicated tasks in computer accounting.

There are lots of flexible features, too. THE BOSS allows you up to ten transaction categories per entry. If ten isn't enough, Balcones performs an accounting sleight-of-hand by allowing one of these entries to refer to a temporary account that makes another ten entries available.

The system has three levels of password security, and there are excellent error-detection features to warn you if your disk is bad or your hardware malfunctioning.

Balcones also gives you a chance to test what they're selling. You purchase the demo disks and manual. If you buy the package within 30 days, the demo charge is credited and the company sends you unrestricted disks along with a new reference manual that covers the program in even greater detail.

MARSHA MATHER-THRIFT: THE BOSS is a leader in outstanding system safeguards. It's a good multi-user program, and it's the only one recommended in this price range that offers a general time-and-billing package as well as an interface with 1-2-3 (p. 68).

A fine, market-tested integrated system . . .

PEACHTREE BUSINESS ACCOUNTING SYSTEM

Version 2.3; Apple III with Profile hard disk • DEC Rainbow 100 • IBM PC/XT compatibles • TI Professional; 128K • Standard 8" CP/M machines; all require 2 disk drives or hard disk; copy protected? NO; \$595 per module; Peachtree Software, 3445 Peachtree Road NE, 8th Floor, Atlanta, GA 30326; 800/554-8900; modules available: G/L, A/R, A/P, Sales Invoicing, Inventory Control, Payroll, Job Cost, Fixed Assets.

JAN PEHRSON, M.B.A., C.D.P. (Datalink, Novato, CA): If you don't care much for frills and want a good easy-to-use accounting system, PEACHTREE BUSINESS ACCOUNTING SYSTEM is one of the best buys on the market. My firm installs business software and trains people to use it, so we've spent lots of time looking for programs that give small businesses the power and flexibility they need. We found PEACHTREE several years ago and still think it's dynamite. Recently, we converted a small pest-control business from its old manual system and found that set-up and training on PEACHTREE took only four and a half hours of our time. That's the kind of miracle small, understaffed companies are looking for.

PEACHTREE is similar to BACK TO BASICS (p. 99) but a lot more powerful. Available components include job cost, payroll, order entry, and a general ledger for CPAs. The system is truly modular and written in compiled BASIC, which means it's fast, and you can be sure it's well-tested. Peachtree is the third largest software manufacturer in the country, and the company has a solid reputation for both user and dealer support.

PEACHTREE is a less complicated accounting system than REALWORLD (p. 103) and more flexible than EASYBUSINESS (p. 102). A systems file lets you choose the way you want to handle editing and control reports. If you're very security conscious, this may not be the system you want, but in most businesses with 20 or fewer employees, people know each other well enough to make a locked-up program unnecessary. The series has two levels of password security, and I really think that's sufficient.

PEACHTREE offers all the standard accounting features, such as balance sheets and income statements. You can do custom invoicing by using PEACHTEXT 5000. All modules feed directly to the general ledger, and trial balances can be run. Accounts payable allows open invoices and aging on balances due (with a 30/60/90-day format); it also provides an unusual and extremely useful cash-requirements forecast. Payroll includes a subscription service for updated tax tables, so you never have to key in new information as the laws change.

MARSHA MATHER-THRIFT: The best thing about Peachtree is the company's interest in constantly improving the basic program. The newest version has greatly eased initial set-up through clear-cut menu options and includes dozens of craftsmanlike touches that make the programs easier than ever to use.

JAN ENTERPRISES		JAN ENTERPRISES		JAN ENTERPRISES		JAN ENTERPRISES		JAN ENTERPRISES	
		DEPARTMENT INCOME STATEMENT				FUR PERIOD ENDED: 06/30/82		PAGE 4	
DEPT	DEPARTMENT	THIS MONTH	LAST MONTH	THIS MONTH	LAST MONTH	THIS MONTH	LAST MONTH	THIS MONTH	LAST MONTH
SALES	SALES - DEPT 1	11,574.20	43.4	47,212.20	53.4	49,344.67	11,500.00	42,945.75	
SALES	SALES - DEPT 2	6,244.70	34.3	35,957.94	44.5	47,700.00	10,814.57	37,414.15	
SALES	SALES - OTHER	0.00	0.0	0.00	0.0	0.00	2,457.70	4,121.91	
		18,199.90	99.7	129,239.34	107.9	137,044.67	24,772.27	86,524.91	
EXPENSE	EXPENSE - DEPT 1	25.00	0.1	915.00	0.7	4,464.47	1,415.12	5,229.33	
EXPENSE	EXPENSE - DEPT 2	40.00	0.3	2,070.00	1.4	9,700.00	2,463.02	9,054.44	
EXPENSE	EXPENSE - OTHER	0.00	0.0	0.00	0.0	0.00	0.00	0.00	
		65.00	0.4	2,985.00	2.1	14,164.47	3,878.14	14,283.77	
ASSETS	ASSETS - DEPT 1	0.00	0.0	2,500.00	2.0	932.33	352.10	940.20	
ASSETS	ASSETS - DEPT 2	0.00	0.0	3,500.00	2.9	1,033.33	1,181.40	657.31	
		0.00	0.0	6,000.00	4.9	1,965.67	1,533.50	1,607.51	
COST	COST OF SALES	2,542.00	12.9	29,244.04	21.7	33,332.33	4,582.12	73,407.17	
COST	COST OF SALES-OTHER	2,200.00	12.1	19,258.00	15.3	22,222.22	5,970.20	18,220.00	
		4,742.00	25.0	48,502.04	37.0	55,554.57	10,552.32	91,627.17	
INVENTORY	INVENTORY - DEPT 1	120.00	0.7	2,797.00	2.2	1,333.33	458.00	1,758.00	
INVENTORY	INVENTORY - DEPT 2	114.00	0.6	2,614.00	1.4	1,333.33	442.11	1,543.05	
		234.00	1.3	5,411.00	3.6	2,666.67	900.11	3,291.05	
DIVIDENDS	DIVIDENDS ON SALES	0.00	0.0	5,304.94	4.2	4,444.47	180.15	740.25	
DIVIDENDS	DIVIDENDS - OTHER	0.00	0.0	4,449.56	3.1	4,444.47	172.11	503.85	
		0.00	0.0	9,754.50	7.3	8,888.94	352.26	1,244.10	
SALARIES	SALARIES - DEPT 1	2,400.00	14.2	12,400.00	9.9	4,444.47	2,400.00	6,990.00	
SALARIES	SALARIES - DEPT 2	2,200.00	12.1	10,400.00	8.4	9,744.47	2,200.00	7,490.00	
SALARIES	SALARIES - OTHER	0.00	0.0	0.00	0.0	0.00	0.00	0.00	
		4,600.00	26.3	22,800.00	18.3	14,188.94	4,600.00	14,480.00	

Stuck with expanding business and a floppy disk computer system you can't afford to trade? PEACHTREE BUSINESS ACCOUNTING was designed to ease your dilemma. Although any accounting system performs best with a hard disk, PEACHTREE keeps disk-swapping to a minimum. You get plenty of standard business reports, nonetheless, including a departmental income statement (above). A vital aid in comparing departmental profit margins for combined sales and service operations.

ACHME CORPORATION		SHORT FORM CHART OF ACCOUNTS NAMES	
Printing Date: 05-02-81			
***** ASSETS *****	452 LT Note Payable-Leander	811 Legal & Professional Fees	
100 Checking Account	454 Secured L.T. Note Pay	812 Bad Debt Expense	
103 Savings Acct-Round Rock	***** EQUITIES *****	813 Franchise Tax Expense	
150 Cash on Hand	500 Owner 1 - Net Worth	890 Interest Expense	
151 Petty Cash Funds	510 Owner 1 - Contribute	***** NON-OPERATING *****	
153 Certificate of Deposit	520 Owner 1 - Withdrawal	900 Non-Operating Income	
156 Stock	530 Owner 1 - Other	925 Non-Operating Expense	
159 Bond	540 Owner 1 - Special	950 Federal Income Taxes	
200 Accounts Receivable-Sales	550 Common Stock - Par	955 State Income Taxes	
201 Accounts Receivable-Empty	551 Common Stock - Surplus	956 Other Income Taxes	
202 Accounts Receivable-Other	580 Retained Earnings	965 County Income Taxes	
210 Note Receivable	585 Dividends Paid	965 City Income Taxes	
250 Inventory	590 Fiscal Year Earnings	970 Foreign Income Taxes	
290 Prepaid Expenses	***** INCOME *****		
291 Accrued Revenue	600 Cash Sales-Hardware		
292 Security Deposits	601 Cash Sales-Point		
300 Furniture & Fixtures	602 Credit Sales-Hardware		
301 Machinery & Equipment	621 Credit Sales-Point		
302 Cars & Trucks	640 Interest Income		
303 Leasehold Improvements	650 Cash Return & Allow-Hardw		
304 Organizational Expenses	651 Cash Return & Allow-Point		
305 Patents	670 Credit Retcs & Allow-Hardw		
306 Copyrights	671 Credit Retcs & Allow-Point		
310 Building	690 Earned Discounts		
330 Storage Land	***** EXPENSES *****		
350 Depreciation-Furn & Fixtu	700 Cost of Goods-Hardware		
351 Depreciation-Mach & Equip	701 Cost of Goods-Point		
352 Depreciation-Cars & Truck	750 Advertising Expense		
353 Depreciation-Leasehold Im	751 Vehicle Repair Expense		
354 Depreciation-Organization	752 Vehicle Fuel Expense		
355 Depreciation-Patents	753 Salesmen Expense		
356 Depreciation-Copyrights	754 Salesmen Salary Expense		
360 Depreciation-Building	755 Store Salary Expense		
380 Goodwill	757 Store Insurance Expense		
381 Trademarks	758 Store Rent/Lease Expense		
399 Inter-Account Transfers	759 Store Utilities Expense		
***** LIABILITIES *****	760 Store Telephone Expense		
400 Accounts Payable	761 Store Supplies Expense		
405 ST Note Payable-Leander			
425 Fed Withholding Payable			

THE BOSS accounting system is well-designed for safety and ease of use. Error messages warn if disks or programs function improperly. A short form chart of accounts report helps in coding items to the proper account before entry. Balcones clearly dreams up its programs with ordinary users in mind.

Extreme ease of use . . .

THE CHAMPION

Version 4.01; PC DOS, MS-DOS, CP/M-86, most IBM compatibles; 128K; \$595 per module • CP/M 80 machines; 64K; \$495 per module; copy-protected? NO; Champion Software Corporation, 17301 West Colfax Ave., #250, Golden, CO 80401; 800/243-2626 or, in CO, 303/278-8666; call Champion for specific machine specifications and compatibility; over 75 configurations; modules available: GL, A/R with order entry & point of sale, A/P with purchase order, Inventory, Payroll.

DATA BASE RESEARCH CORPORATION
STATEMENT OF FINANCIAL POSITION
JUNE 30, 1982
PAGE 1
ASSETS

CURRENT ASSETS:		
NETTY CASH		150.00
CASH IN BANK - CHECKING		332,464.15
CASH IN BANK - SAVINGS		269,000.00
TOTAL CASH		601,614.15
TOTAL ACCOUNTS RECEIVABLE		0.00
INVENTORY - FINISHED GOODS		164,246.00
TOTAL INVENTORY		164,246.00
TOTAL CURRENT ASSETS		765,860.15
FIXED ASSETS:		
COMPUTERS		101,400.00
FURNITURE & FIXTURES		17,300.00
TOTAL FIXED ASSETS		118,700.00
ACCUMULATED DEPRECIATION		-5,500.00
NET FIXED ASSETS (LESS DEPR.)		113,200.00
OTHER ASSETS:		
TOTAL OTHER ASSETS		0.00
TOTAL ASSETS		879,060.15
LIABILITIES & EQUITY		
CURRENT LIABILITIES:		
ACCOUNTS PAYABLE - TRADE		242,951.79
TOTAL ACCOUNTS PAYABLE		242,951.79
FEDERAL WITHHOLDING PAYABLE		4,389.79
FICA WITHHOLDING PAYABLE		1,059.44
STATE WITHHOLDING PAYABLE		458.79
MISC PAYROLL DEDUCTIONS		250.00
TOTAL TAXES PAYABLE		6,358.02

ANDREA SHARP (Whole Earth bookkeeper): Bookkeeping must have been one of the tasks for which computers were conceived. And Champion has put together a five-module accounting package that makes bookkeeping a bearable activity. You can use the modules—general ledger, payroll, accounts payable, accounts receivable, and inventory—together or as stand-alone functions. The amount of disk storage you have will determine what you can run together and how many months you can run concurrently. These programs are not suitable for small computers. On a Kaypro 2 (190K disk drives) I could only run the general ledger module for one month at a time.

The program will automatically produce financial reports—just like the ones your accountant gives you (although you cannot create a *customized* budget or financial report directly). But herein lies the one complication of using such software. You need to think like an accountant to set up your chart of accounts and general ledger unless you want to use the standard one CHAMPION provides.

I sure got an instant education going through the set-up procedure on my own. Once that

If you rely on your accountant, you normally wait until year's end for a statement of financial condition. With CHAMPION, you can produce on-the-spot reports any time during the year. Not only that, but because it's written in DBASE II (p. 85), CHAMPION is the fastest and most expandable system in the upper price range (that is, if you're a programmer or a wizard with DBASE conversions).

was done it was easy street. A program like this does such niceties as post all your payroll deductions to the proper accounts in your general ledger while you are printing out your payroll checks. When all modules are used, this is a true order-entry system that updates inventory.

CHAMPION is designed to be extremely easy to use, with a compact manual that's coordinated with the menu-driven program. Both the manual and the help screens for the 4.0 version have been completely rewritten, so there are onscreen help functions available at all times, as well as a recovery procedure should the program unexpectedly crash.

Once your system is set up, even a temporary employee could come in and do your bookkeeping for you. This is one of CHAMPION's major advantages. There are audit trails for all activities, and any accountant could make sense of the system—which rescues you from the potential tyranny of an idiosyncratic bookkeeper.

MARSHA MATHER-THRIFT: CHAMPION's biggest limitation has been its report-producing flexibility. A new spreadsheet interface and report generator called FREEWAY is in the works, which would solve this problem. But if your business needs are fairly standard, CHAMPION can supply all the reports and features you need. If you want a purchase-order module, for example, CHAMPION is the program that has it.

Security conscious accounting with excellent support . . .

EASYBUSINESS SYSTEMS

Version 4.0; IBM PC/XT/AT/3270 compatibles • TI Professional; 64K; 2 disk drives; \$595 per module except Payroll (\$795); copy protected? NO; SORCIM/IUS Micro Software, 2195 Fortune Dr., San Jose, CA 95131; 408/942-1727; modules available: G/L, A/R, A/P, Inventory Control and Analysis, Order Entry, Payroll, Time Billing & Client Receivables.

JAN PEHRSON, M.B.A., C.D.P. (Datalink, Novato, CA): SORCIM/IUS puts out one of the most useable small-business accounting programs in the currently available herd. It's a kind of maiden aunt among accounting software, decidedly trustworthy and predictable even though its design is a little behind the times. Modeled on the old minibatch design, it is extremely safe, but for my tastes a little cumbersome to use. Still, all this caution does have its benefits. EASYBUSINESS SYSTEMS has excellent error-detection capabilities, enhanced by easily understood messages and a "catastrophic error" warning to stop you dead in your tracks when hardware or software malfunctions occur.

Set-up goes quickly, despite the fact that this is a complicated accounting system. There are good instructions for allocating file space

on disks and setting up your chart of accounts. The manuals are small enough to fit on a desktop or shelf (a plus if you've ever tried to wrestle one of the damned things put out by most software companies), and readable.

Despite its accessibility, EASYBUSINESS offers plenty of flexibility and power. It can handle multiple departments and divisions using a twelve-digit account number (but can't consolidate multiple companies). Available reports are strongly management-oriented, offering such niceties as cash-flow monitoring and reports from the Inventory module that track order progress. The financial reporter, included in the general ledger module, makes report generation an art.

The EASYPLUS windowing system (\$149; hard disk required) also adds a touch of new vigor by allowing EASYBUSINESS to interface quite easily with 1-2-3 (p. 68), DBASE (p. 85), SUPERPROJECT (p. 117), and others. It's a little like putting a miniskirt on the maiden aunt: fashionable yes, but not likely to change the old girl's fundamental approach.

MARSHA MATHER-THRIFT: Consider EASYBUSINESS if you're looking for an accountant's dream of a program that will give you excellent safeguards against errors in data entry.

STATEMENT

THE UNIVERSAL CORPORATION
2184 Rockcliffe Road
Ann Arbor, MI 48107
9032 849-9548

DATE: JUN 29 80
ACCOUNT NUMBER: 700

DATE: JUN 29 80
ACCOUNT NUMBER: 700

To: Mr. Ronald Black
2820 Wabash Road
Los Angeles, CA
90048

To insure proper credit please check those items being paid in the "TOTAL" column and return this portion of the statement with your payment.

REFERENCE	DATE	CODE	DESCRIPTION	AMOUNT	BALANCE	REFERENCE	CODE	AMOUNT	
Bal Fwd				123.45	123.45	Fwd	BT	123.45	
17580	02/05/80	PA	PO# 345	248.80	372.25	17580	PA	248.80	
17587	02/15/80	CR	# 8789	864.90	1,237.15	17587	CR	864.90	
17602	02/15/80	CA	#201	100.00	1,337.15	17602	CA	100.00	
17617	02/28/80	CR	# 538	13.50	1,350.65	17617	CR	13.50	
899999	02/29/80	II	Interest	0.20	1,350.85	899999	II	0.20	
				PLEASE PAY	1,122.65	TOTAL		1,122.65	
CODES: C ON MEMO, P PAYMENT, D DISCOUNT, F FINANCE CHARGE				30 DAYS		60 DAYS		90 DAYS	
				1,113.70	0.00	9.95	0.00		

Invoices in many programs require you to use quantity and unit cost categories whether you manufacture, sell retail goods, or service clients. This can make an excellent accounting system useless if your business requires a more flexible invoicing format. EASYBUSINESS invoicing is more flexibly designed than most, and slated for further improvements.



MEANS: NEW TO 2.0 EDITION

Minicomputer ancestry and volume . . .

REALWORLD ACCOUNTING

Version 3.1; PC DOS; MS-DOS; CP/M-86 machines; 128K (256K recommended); CP/M, TURBODOS, MmmOST, UNIX, XENIX; 64K; hard disk recommended; 132-column printing capabilities; \$695/module except Sales Analysis (\$348); call for specific machine requirements and configurations; copy-protected? NO; RealWorld Corporation, Dover Road, Chichester, NH 03263; 800/255-1115 or, NH, 603/798-5700; modules available: G/L, A/R, A/P, payroll, order entry, inventory control, sales analysis.

LEROY TAVARES: REALWORLD GENERAL ACCOUNTING is not the accounting software for someone who wants to do household accounting or keep the books of a cottage business, but it is ideal for wholesalers and distributors who do volume sales, have a large inventory, and deal with numerous customers and vendors. In addition to the Basic Four—G/L, A/R, A/P, and payroll, modules are available for sales analysis, inventory control, and order processing. The program is derived from a minicomputer accounting system and has been on the market for eleven years, so it is well-tested and predictable.

This is a double-entry system, but transactions can be easily edited in order to balance entries prior to posting, unlike some systems that require data from each entry session to be in balance.

All reports, except the customized G/L financial statements, are pre-designed and

ready to run. They require a printer capable of printing 132 columns. The 3.0 version of REALWORLD provides a way to install control codes in order to use the compressed print feature of most popular dot matrix printers. It's mighty handy being able to compress these wide reports onto a standard 8½" page without fooling around.

The program is written in COBOL, a widely-applicable computer language. A multi-user version has been introduced for a number of local area networks. Because of the number of programs and data files for each module, I highly recommend a hard disk.

REALWORD has improved installation procedures, but layout of financial statements and set-up of payroll tax computations require some real work. It's a good idea to discuss set-up options thoroughly with your accountant before wading in.

REALWORLD is available only through dealers and, because it is complicated to set up, a good dealer is invaluable for proper installation. Certain dealers are licensed to take the original COBOL source code and rewrite it to fit unique business requirements. Such flexibility makes REALWORLD an inexpensive route for acquiring custom accounting software without the risk of hiring someone to develop your accounting system from scratch.

MARSHA MATHER-THRIFT: REALWORLD is a complicated but excellent system for wholesalers and retailers. It also gets high marks as a good general ledger for use by scrupulous Certified Public Accountants.

A new small-business package called 4-IN-ONE BASIC ACCOUNTING (\$995) has just been released by the same company. If REALWORLD seems like overkill, you might take a look at the new program, which promises the same high quality as the higher-priced software.

RUN DATE: 01/25/79		472 COMPANY		PAGE 0005		
YEAR-END PAYROLL REPORT						
COMPANY: 472 COMPANY						
ADDRESS: 201 NEW CALIFORNIA DR						
1020 WILLOW BLVD.						
LOS ANGELES, CA 90010						
FED ID: 95-1139917						
STATE: CALIF TAX CODE 156MGLY STATE ID: 215-4495-1						
SOC-SEC-NO	NAME/ADDRESS	1ST-QTR	2ND-QTR	3RD-QTR	4TH-QTR	YEAR-TOTAL
367-09-1234	WILLIAM B. WILKERSON 2075 W. REDWOOD TERRACE WALL VALLEY CA 94480	GRS-WAGES FRT-GRS EMP-FICA-GRS EMP-FICA-MEM SW-FGRS SFT-GRS OST-GRS OST-PAY CMT-GRS CMT-PAY LIC-GRS LIC-PAY EMP-FICA-GRS EMP-FICA FUI-GRS FUI-PAY EMP-RET-GRS APTD-TIPS	1,500.55 0.00 2,025.55 20.20 2,925.55 242.81 1,021.55 18.75 0.00 0.00 0.00 0.00 0.00 0.00 2,025.55 701.20 1,021.55 3,025.55 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	3,000.55 1,025.55 3,025.55 201.20 2,925.55 242.81 3,025.55 18.75 0.00 0.00 0.00 0.00 0.00 0.00 3,025.55 701.20 3,025.55 1,025.55 0.00
EARNING CATEGORIES YEAR TOTALS:		REG-PAY	858.47			
		OST-PAY	0.00			
		REG-PAY	571.00			
		OST-PAY	0.00			
		LIC-PAY	332.28			
		LMP-PAY	100.00			
DEDUCTION CATEGORIES YEAR TOTALS:		GARNISH	100.00			
		LOAN	70.00			
		UNEMP	0.00			
MISC DED-EARN CATEGORIES YEAR TOTALS:		PENSION	30.00			
		CONTRIB	1,200.00			
		TRAVEL	450.00			

Good payroll software is expensive but invaluable if you have numerous employees whose hours and job rates vary from month to month and year to year. RealWorld puts out well-tested software with excellent safety features. A data integrity program helps detect hardware-caused errors before you store any faulty information. You won't have to worry about undetected errors that can bring IRS wrath upon your company's head.

Multi-user accounting . . .

TCS TOTAL ACCOUNTING SYSTEM

Version 2.0 (CP/M 80). Version 3.0 (MS-DOS). Not copy-protected. 128K required (exceptions noted). Modules available: Ledger (includes Q*Link); v.2.0, \$595; v.3.0 (requires 256K), \$795 • Receivables, Payables and Inventory; v.2.0, \$595 ea; v.3.0, \$795 each • Payroll; v.2.0, \$595 • Materials and Sales (hard disk recommended); v.3.0, \$795 each • Assets; v.3.0, \$595 • Q*Word and Q*Label (one package); v.3.0, \$395 • Q*Net; v.3.0, \$795 per 4 users • Q*Link; v.3.0, \$150. Available from TCS Software, Inc., 6100 Hillcroft, Suite 600, Houston, TX 77081; 800/231-6454 or, in TX, 800/392-5973.

JAN PEHRSON: TCS looks like a clone of the PEACHTREE BUSINESS ACCOUNTING SYSTEM, so similar is it in design and features. In fact, the originators of TCS and PEACHTREE once worked together developing software, so it's not surprising that both programs seem grown from the same root.

Few accounting programs are designed with the kind of database power and the loads of

useful options that you get with TCS. You can extract data from your basic set of books and then add or subtract items to get a realistic view of the way any single element of your business may be functioning—particularly helpful for any small businesses that must absorb costs and income from a number of different sources. TCS modules all let you design queries for the database using simple English-language commands and print the results at any time as custom reports.

One of the first companies to recognize that planning goes hand-in-hand with accounting, TCS includes a spreadsheet-linking program called Q*LINK that easily transfers data from the G/L to 1-2-3 (p. 68), SYMPHONY (p. 111), and MULTIPLAN (p. 70) so you can trot out figures from your accounts receivables and project the effect of adding service charges to all the accounts. Q*LINK lets you pick and choose the data you want to transfer, then "map" it into worksheet cells.

Unlike PEACHTREE, TCS is a multi-user system. Q*NET allows you to chain up to

sixteen computers together in groupings of four.

When it comes to ease of application, TCS does lag slightly behind in its race with PEACHTREE, but in ease of learning, it runs well ahead. The manuals contain tutorials that really give you a feel for the entire flow of work. This makes it easy to use for teaching our small business clients how to manage their books. The documentation from Peachtree and Sorcim/IUS isn't as easy to grasp.

MARSHA MATHER-THRIFT: TCS is the most flexible of all the accounting programs reviewed here and you won't have to hire a consultant to get it up and running. It's the one program that can give you multi-user capability, spreadsheet and word-processor interfaces (Q*LINK and Q*WORD), a mailing-label program (Q*LABEL), and the database power to create mailings to both present and prospective customers. It's also the only one we recommend that has a materials-inventory program for manufacturers. You can't think of much that TCS hasn't thought of first.

Hard disk on the Apple III . . .

GREAT PLAINS HARDISK ACCOUNTING

Version 3.0; IBM PC and XT (128K) /AT (256K; single user only) • Apple IIe; 128K; hard disk • Apple III; Profile hard disk • Macintosh; hard disk • Tandy 2000; 256K • TI Professional; 256K • Wang PC; 256K; Apricot; 256K • copy-protected? NO; \$695/module, single user; \$795/module, multi-user; Great Plains Software, P.O. Box 9739, Fargo, ND 58109; 701/281-0550; Modules available: General Ledger with Financial Reporting and Budgeting; A/R; A/P; Inventory Management with Point of Sale Invoicing; Payroll; Rapid Transfer; Job Cost with Estimating, Costing and Pre-Billing; Multi-User with Report Maker.

MARSHA MATHER-THRIFT: When you call Great Plains, instead of blank Muzak while you wait you get Rosanne Cash, a good indication that the company is up-to-date in every way. And it is. As Eugene Kramer

makes clear, the company's programs are flexible and well-supported. Great Plains now offers true multi-user programs (up to 16 workstations), RAPID TRANSFER (a spreadsheet interface to 1-2-3 (p. 68), SYMPHONY (p. 111), VISICALC, and MULTIPLAN (p. 70), a new report maker that will let you design your own reports, and a brand new Macintosh version of the Great Plains accounting system.

EUGENE KRAMER, C.P.A.: GREAT PLAINS allows flexible formatting of financial statements and prints these at any time during the month or year. It allows four, seven, or ten digit account numbers and account descriptions up to 30 characters long. (Unfortunately, GREAT PLAINS permits only twelve accounting periods per year, not thirteen.) The system also provides data security through password protection, and all other security features are superb. The documentation is excellent and so is the

telephone support, which is handled by people who specialize in each of the various applications.

GREAT PLAINS accounting programs are written in Pascal, which requires its own operating system. They run easily on the Apple III. To adapt these programs to IBM's PC DOS, GREAT PLAINS supplies an intermediary system called BUBBLE DOS.

This is an excellent accounting system at a reasonable price.

MARSHA MATHER-THRIFT: We've heard nothing but good reports on GREAT PLAINS for both IBM and Apple. Andrea Sharp doesn't recommend it for the Macintosh because of Mac's problems with speed and its lack of a number pad. But if all you own is a Macintosh, it's certainly worth a try.

Prepare Returns (On-screen)

1) New Name (Active Filename)	12) Schd W (Married Cpl Ddn)
2) Form 1040 (Main Form)	13) Form 2106 (Employee Expsn)
3) Schd A (Itemized Deductn)	14) Form 2119 (Residence Sale)
4) Schd B (Interest & Divs)	15) Form 2210 (Tax Underpymnt)
5) Schd C (Business Profit)	16) Form 2441 (Child Care)
6) Schd D (Capital Gains)	17) Form 3468 (Invstml Credit)
7) Schd E (Supplmnt Income)	18) Form 4562 (Depreciation)
8) Schd F (Farm Income)	19) Form 4797 (Supplmnt Gains)
9) Schd G (Income Averaging)	20) Form 5695 (Energy Credit)
10) Schd R&RP (Elderly Credit)	21) Form 6251 (All Min Tax)
11) Schd SE (Self-emplmt Tax)	

Which do you choose (Esc=exit)? 1

No more late-night scrambles to the Post Office for overlooked forms and schedules. TAX PREPARER supplies 90% of the paperwork most people need for returns. It's a preparer, a planner, and all-around April 15th wizard. A personal tax preparer that's good enough for professionals to use.

ENTER, CHANGE, OR REVIEW WORKSHEET

ALTERNATIVE	1-1983	2-1983	3-1983	4-1983	5-1983
1 Filing Status	.	.	.	.	.
2 Exemptions	..	..	..	..	..
3 Wages & Salaries	-I .....	.....	.....	.....	.....
4 Two-Earner Ear. and Income	-I .....	.....	.....	.....	.....
5 Interest	-S .....	.....	.....	.....	.....
6 Dividends	-I .....	.....	.....	.....	.....
7 Int & Div Exclusions	-I .....	.....	.....	.....	.....

WORKSHEET:

J)ump, C)alculator, T)ax plan, R)esults, S)how, S)ingle entry, W)orksheet layout, H)eadings, E)SC, ?

Taxes

Two things are certain . . .

TAX PREPARER

Version 85; Apple II family; 64K; \$250; • IBM PC/XT compatibles; 128K • IBM PCjr • TI Professional; 128 K; \$295; copy-protected? NO; HowardSoft, 8008 Girard Avenue, Suite 310, La Jolla, CA 92037; 619/454-0121.

WOODY LISWOOD: Death and taxes are inevitable here in the U.S. But TAX PREPARER almost makes tax preparation fun. It helps you look at your taxes in a logical manner, helps you prepare the proper documentation for your return, and also allows you to "what if" your return to see how various options, deductions, and whatnot might affect the taxes you pay.

I've used the TAX PREPARER in various versions for the past three years. It generates schedules and data that are accepted by the IRS. There is also a provision for batch data entry, if you are a business using TAX PREPARER for a number of clients.

The documentation is complete and to the point. I find that the program is very easy to use and mostly self-explanatory. Remember how many times you had to transfer data from form to form when you did your taxes by hand? No longer. TAX PREPARER automatically moves data into other areas and forms that use it. This means that if you make a change or a correction, all else is corrected automatically.

The program's best feature is the itemized lists that you can prepare as detail for each appropriate line item in each form. If your household is like mine, having some income property, a self-employed income, two kids in daycare, and so on, you will appreciate sitting down with the computer, going through your bags of receipts, entering them, and printing out the entire form at one sitting.

MARSHA MATHER-THRIFT: The HowardSoft TAX PREPARER is expensive, but it hasn't increased its price since last year, so it's getting to be less so. The new version is also full of improvements in help screens and automatic calculations. It's simply the best personal tax preparer around. In fact, it's so good that professionals can use it. So why hire them if you can do it yourself?

Schemer's helper . . .

PERSONAL TAX PLANNER

Version 1.0; Apple II family; DOS 3.3; 64K • IBM PC/XT compatibles; PC DOS; 128K; \$99; copy-protected? Apple: NO; IBM PC: YES; Aardvark/McGraw-Hill, 1020 N. Broadway, Milwaukee, WI 53202; 414/225-7500.

JOHN OVERTON, attorney: Sooner or later, most of us have the odd thought that if we refuse to spend most of our time thinking about the tax consequences of our daily lives, we will inevitably be penalized every April. Enter PERSONAL TAX PLANNER—a cheap, easy-to-use, effective means of modeling tax

THE PERSONAL TAX PLANNER is a tool for making investment decisions, solving real estate rent-or-purchase dilemmas, deciding job changes, and even restructuring settlements from lawsuits.

liability, and a tool for making investment decisions, solving real estate rent-or-purchase dilemmas, deciding job changes, and even structuring settlements from lawsuits. PERSONAL TAX PLANNER does not do your taxes for you or help you keep track of your income and deductions, but simply answers that powerful query, "What if?"

The program is essentially two programs of similar format: "alternative mode" and "projection mode." Alternative mode enables the user to compare the present-year tax consequences of up to five different courses of action, employing any of 48 different variables. For instance, is it preferable to realize a short-term capital gain of \$5000 or a long-term capital gain of \$4000? Projection mode allows the user to project tax consequences into the future as far as five years, thus making it possible to calculate balloon payments, pay raises, inflation, and other time-dependent situations.

Although my law practice is primarily copyright and intellectual property, complicated tax issues often arise. A client may need to know whether it's preferable to negotiate for a large advance or for a larger royalty payable in future years.

An accountant's time for this costs (conservatively) about \$50. If the TAX PLANNER can answer these questions for you, the program pays for itself.

MARSHA MATHER-THRIFT: Other tax-planning programs, like Sunrise Software's TAX MINI-MISER, offer more sophisticated calculating features but cost three times as much. If you don't like to part with your money, TAX PLANNER is a secure bet.

A significant time-saver for the professional tax preparer . . .

MICRO-TAX

Version 2.0; • most CP/M machines; 56K • IBM PC compatibles; 96K; 2 disk drives or hard disk; Bronze (Individual Package), \$295; Silver (Professional Package), \$995; Gold (Professional Package with Laser Print Option), \$1,195; Partnership and Corporate Packages, \$995 each; Expatriate (Overseas Tax Package), \$2,195; copy-protected? NO; Microcomputer Taxsystems, Inc., 2395 Midway Rd., Carrollton, TX 75006; 800/642-7689 or, in TX, 214/250-7800.

J. WILLIAM PEZICK: MICRO-TAX cuts my work time by 20-30 percent, and that's absolutely critical during tax season. The biggest single time-saver is the carry-over to state tax forms. MICRO-TAX repeats the federal data on the state form, and then allows quick review. You need only enter the figures that have to be changed.

A good tax-preparation program should give you flexibility in entry, a wide range of schedules, good carry-forward features, and, most important, reliable updating and support. MICRO-TAX scores well on all points. It provides 35 federal and numerous state forms, including Foreign Tax Credit, Alternative Minimum Tax, and Limitation on Investment Interest Expense. It also has a very serviceable depreciation module.

The program is fully integrated and clearly designed with the professional in mind. Level I contains fourteen of the most commonly used schedules, Level II covers at least 95 percent of the professional tax preparer's needs. The company also supplies up-to-the-minute information via an electronic mailbox on Taxnet through The Source.

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MICRO-TAX provides 85-90% of the tax forms necessary for professional preparation of federal and state tax returns. The company ships updated software that incorporates the most recent tax law changes regularly in January each year. Tax preparers can save loads of time entering repeated data and use those free hours to take on new clients.

I've prepared tax returns for ten years and used MICRO-TAX for three. In addition to all the preparation-time benefits, MICRO-TAX has also given me another deduction—after April 15 every year I'm now in business as a computer consultant.

Heroic planner and preparer . . .

PC/TAXCUT ★

1984 version. Copy-protected. \$195 (street \$150). IBM PC/XT/AT and compatibles (128K). Best Programs, 5134 Leesburg Pike, Alexandria, VA 22302; 800/368-2405 or, in VA, 703/931-1300.

JAMES STOCKFORD: PC/TAXCUT is the fastest-selling tax preparation software on the charts. Two programs come in the same box—one is a tax planner that helps you choose where and how much to invest to minimize your tax bite; the other is the tax-form preparer.

MICHAEL SEIBEL: I bought PC/TAXCUT on April 14, 1984. I entered my tax data, deductions, and so on in response to program prompts and menus, and got my return into the mail on time the next day. Not only would I have overlooked tax deductions without it, but with such little advance

planning I would no doubt have messed up the math as well.

The tax planning program uses your basic tax data to calculate coming taxes based on the next year's tax rates/brackets and changes in the rules. I used the planner to figure whether it was better taxwise to buy a house or rent when I moved to D.C. You can use the planner without using the preparation program, but once you've entered your data it sure is nice not to have to enter it again for the next year's planning.

ANDREA AND DANIEL SHARP: This type of tax prep/planner is a great aid, if not a total replacement for your accountant. It does not advise, but it does everything else. If you need to refer to past years (for income averaging or credits) it directs you to the exact line of your old returns. The program is a pleasure to work with. You can succeed at even complex tax returns on your own, or take a printout with you to your tax

appointment to greatly streamline the procedure.

THE BEST CONNECTION (\$20) links Best's PERSONAL FINANCE PROGRAM II (\$245) to PC/TAXCUT. If you take time to organize your personal recordkeeping around the categories required for a tax return, and you religiously enter all your checks and other expenditures into PFP II, the CONNECTION will load that data into your tax file for use there.

MARSHA MATHER-THRIFT: The Best series of programs offers one of the most complete home-finance packages available. With it you get a professional-quality home finance program (the reports, however, aren't up to business standards) that includes both tax planner and preparer. No other program reviewed here will give you exactly this combination. The others either let you prepare tax forms but not plan, or plan but not prepare the final paperwork for the IRS.

MANAGING

Sharon Rufener, Domain Editor

This section means business. We'll talk about software that can relieve the paperwork clog and make things possible that couldn't get done before the personal computer came into your office.

We'll cover the "integrated" all-in-one packages—those versatile, multi-talented tools containing a word processor, a spreadsheet, a database, and maybe more. The right "integrated" package might well be all the software you'll need.

If you want to make your own integrated system out of old favorites in your software library, take a look at our reviews of "integrated environment" software. These products can put unrelated programs on speaking terms with each other.

There are a number of interesting "desk accessories"—handy software gadgets that replace your calculator, appointment book, rotary card file, and notepad, among other things.

Maybe you need help keeping your projects under control and managing your activities better. We've found the three best "project management" packages to keep you on top of it all.

Need to make your decisions more intelligently? There's a program (LIGHTYEAR, p. 116) that helps you weigh all the variables and come to a clear-headed conclusion. The first of many decision support packages to come.

Finally, we have what is called "vertical market software"—packages designed to handle some or all of the paperwork activities for particular businesses or professions. Their number is vast, and still growing. Specialized vertical packages tend to be more expensive than the integrated packages, raising the question: why not get a general-purpose all-in-one package instead of one tailored to your type of business? Several reasons. It's a major undertaking to design a complete business system yourself, and it's expensive to hire a consultant to do it for you. Also, integrated packages are generally less capable than the ready-mades.

Since there are way too many of these specialized programs for us to attempt to cover, we are including reviews of a few favorites from happy users in some of the more common occupations. Beekeepers and dulcimer-makers will have to look to their favorite trade journals for help. Sorry.

WANT IT ALL NOW?

STEWART BRAND: Of course you want it all now. That's why you bought a computer. To increase your productivity by making your work faster, easier, and more connected to itself. You do not wish to spend your day helping machines translate code, endlessly manipulating a file received over the phone so you can edit it with the WORDSTAR you're stuck with, remembering which of your programs speak to each other and which don't, remembering the different command incantations you must make here and there, searching manuals for the fragment of arcana that will break the data logjam between your spreadsheet and your database.

The promise of relief from all that is what makes this domain one of the fastest moving in the marketplace. The integrators promise (and mostly deliver) the ability to have most of your computer operations all in one program. The integrators promise (and mostly don't deliver) the ability to have a facile over-program connecting all your existing application programs. The verticals promise (and charge royally for) a package suited precisely to your business.



Sharon Rufener

Matt Heron

BARBARA ROBERTSON: Domain Editor Sharon Rufener has been involved on all sides of information management. As an office manager equipped with typewriter and adding machine (for a branch of the Frank Lloyd Wright Foundation, the architecture firm that carries on Mr. Wright's work), she struggled with manual paperwork systems. As a COBOL programmer and system designer for banks and clothing manufacturers, she mastered the intricacies of big mainframe systems, while getting a law degree and passing the California State Bar. Now, as a consultant to small businesses, including County Fair organizations, securities marketing firms, and software dealers, she relishes the creativity of the micro world, where, she says, "hardware, software, and users are closer together." Deeply concerned about the quality and usefulness of software from the user's point of view, Sharon is an appropriate seamstress for this crazy-quilt section.

The Integrateds

SHARON RUFENER: One message keeps coming through from our reviewers: "If I had seen this integrated package first, I would never have bought my word processor, spreadsheet, and database. This is all the software a person needs!"

So why *did* they buy their standalone software? Because before Spring 1984, almost no all-in-one packages on the market integrated all three main functions into one smooth and easy system. Now a lot of products do it.

CHARLES SPEZZANO: Some critics argue that all integrated packages (those combining word processing, database, spreadsheet, and maybe more) are collections of mediocre programs and urge people to buy the best word processor, spreadsheet, and data manager right from the start to avert later regrets.

That's good advice if integrated packages clearly don't have the power you need. But what about a psychologist, a consultant, or an attorney who wants to write a few letters and reports, maintain a simple client database, and maybe put the office expenses in a spreadsheet? If an all-in-one integrated package has a good—maybe not the best—word processor and throws in a file manager and spreadsheet without adding new sets of commands to memorize, all for the price of one or two stand-alones, then it doesn't make sense for these professionals to buy, learn, and try to do-it-yourself-integrate over a thousand dollars' worth of individual, unrelated programs.

What Are Integrated Packages Good For?

SHARON RUFENER: With an integrated package, you can produce more varied documents than with a word processor alone. It allows you to include lists, calculations, and in many cases, graphs, all on one printout. That can be useful for bills, estimates, proposals, business plans, analyses, research reports—any communication involving numbers or lists.

Also, integrated software handles form letters more elegantly than do word processing programs with mail-merge capabilities. A database module handles a name/address file in a friendlier, more versatile fashion than, say, WORDSTAR (p. 56) with MAILMERGE. You enter your addresses and other data into a form on the screen. You can then select and sort records from that file before merging them into the form letter.

In an integrated program, you can automatically select activities and transfer data between them. You could, say, store transactions (such as sales) on your database, send the numerical data to the spreadsheet, and use totals from the spreadsheet to generate graphs or charts, illustrating, for instance, how this month's sales compare in detail to last month's.

Reasons for Not Integrating

Integrated packages are not good for setting up complete single-entry accounting systems to run a business. Transactions will not automatically post to more than one file. Further, "password" file security and data validation for error-trapping, which every good accounting system should have, generally are nonexistent on the integrateds.

EZRA SHAPIRO: Okay, I confess. I'm a segregationist. I still use a lot of the same old programs I used in my CP/M days, though I've upgraded to 16-bit (IBM PC/compatible) versions. I prefer to stick with the programs I've mastered, particularly for word processing and spreadsheeting.

When I've got something bizarre to do, I crank out one of those integrating utilities (see pp. 114-115) so I can play games with my data without losing the ease of using software that's as comfortable as well-worn jeans. These integrated newcomers may be slick, but I prefer the down-home comfort of not having to learn anything new, particularly when I've got a tight deadline.

The moral here is simple: if it works, stick with it. If your current tools do the job, plunking down the money on a big new all-in-one integrated package just to use "state-of-the-art" technology is a dumb idea.

Which One Should You Buy?

SHARON RUFENER: Which one? It depends—first on your hardware, then on your needs. If you have a CP/M system, you're out of luck here. The integrated programs were invented after the IBM PC captured the marketplace and simply don't run on the CP/M machines with their tiny (64K) memories. You'll have your revenge, however, if you're looking for vertical market software.

Apple II owners, on the other hand, have one lucky choice: APPLEWORKS (p. 108), the only program to outsell 1-2-3 last year, is wonderful.

Shoppers with IBM PCs have the most decision-making to do.

RUSEL DeMARIA: Having sampled just about all of the integrated smorgasbords in the IBM PC realm, I've come up with a recipe for the ideal (though mythical) integrated program, one that uses my favorite ingredients from three of the best. Here it is: I'd start with FRAMEWORK's (p. 110) ease of use; stir in ENABLE's (p. 109) database, word processing, and graphics; spice it up with SYMPHONY's (p. 111) spreadsheet and speed; then blend it all together with SYMPHONY's seamless integration. Well, that's it. Bon appetit!

SHARON RUFENER: Rusel left ABILITY (p. 111), INTUIT (p. 108), and the SMART (p. 112) series out of his list. We're including ABILITY for those who want the seamless integration of SYMPHONY (data is always current in every part of the program), don't care very much about word processing, and want a good database program. The SMART series is a collection of powerful stand-alone applications with beautifully crafted bridges between them. We recommend them for people designing tailored applications (systems that others will use) and for the individual power of each program. INTUIT is the only integrated program priced under \$100, requires the least memory, and would be recommendable at double the price.

Macintosh owners have reason to look smug. The Mac sets you up with a type of integrated environment from the start—it's part of the package. Take a look at p. 113.

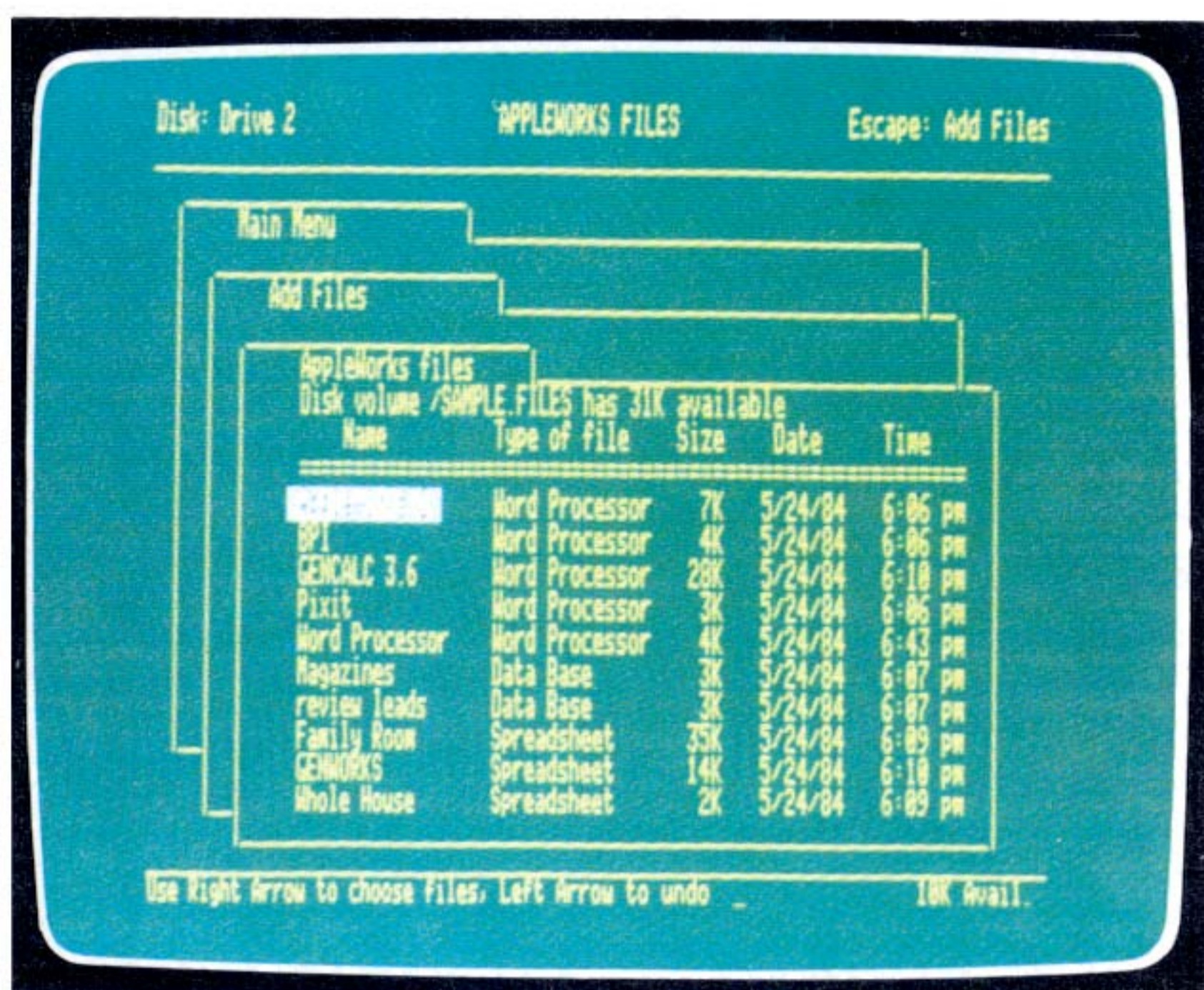
State-of-the-art integration for the Apple . . .

APPLEWORKS

Rupert Lissner; Version 1.2; Apple IIe/IIc; ProDOS; 64K; 2 disk drives; copy-protected? NO; \$250; Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696; also published as III E-Z PIECES; Rupert Lissner; Apple III; 256K; hard disk recommended; copy-protected? YES; \$295; Haba Systems, Inc., 15154 Stagg St., Van Nuys, CA 91405; 818/901-8828.

CHARLIE CLEMENTS: At last, a program that makes my IIe seem indispensable.

In this integrated package, everything is menu driven. The user works on an electronic



APPLEWORKS does the big three: word processing, spreadsheet, and file management. It has an easy, gamelike appeal—options take the form of a desktop filled with files to choose from. You can zoom in on all the data you have filed on a particular subject.

desktop, a wonderful metaphor that allows even the least experienced user to learn intuitively to “move” with the program. Makes my IIe feel like a Macintosh, kind of.

The word processor is not as muscular as APPLEWRITER but more than compensates by its elegance of use (see the table on p. 50). The cursor is easier to move than in any other word-processing program I've worked with.

The database is reminiscent of PFS:FILE (p. 80) in the way it lets you design your own files. One of the most remarkable features is the Zoom command, which allows you to get all the information in the database for the selected record.

Had APPLEWORKS been available when I got VISICALC and APPLEWRITER, those two programs would never have made it home with me.

DON SCCELLATO: It's possible to import outside files into the system, but it may take some work unless they're VISICALC files. Fortunately—since there's a possibility that you might want to use VISICALC along with APPLEWORKS. APPLEWORKS' spreadsheet offers standard features such as variable column width, the expected mathematical functions, plus a way to zoom into the logic and look at a formula lurking behind a cell with the press of a key—but it's less powerful than VISICALC. APPLEWORKS runs into memory limits at about 6000 cells on a 128K machine.

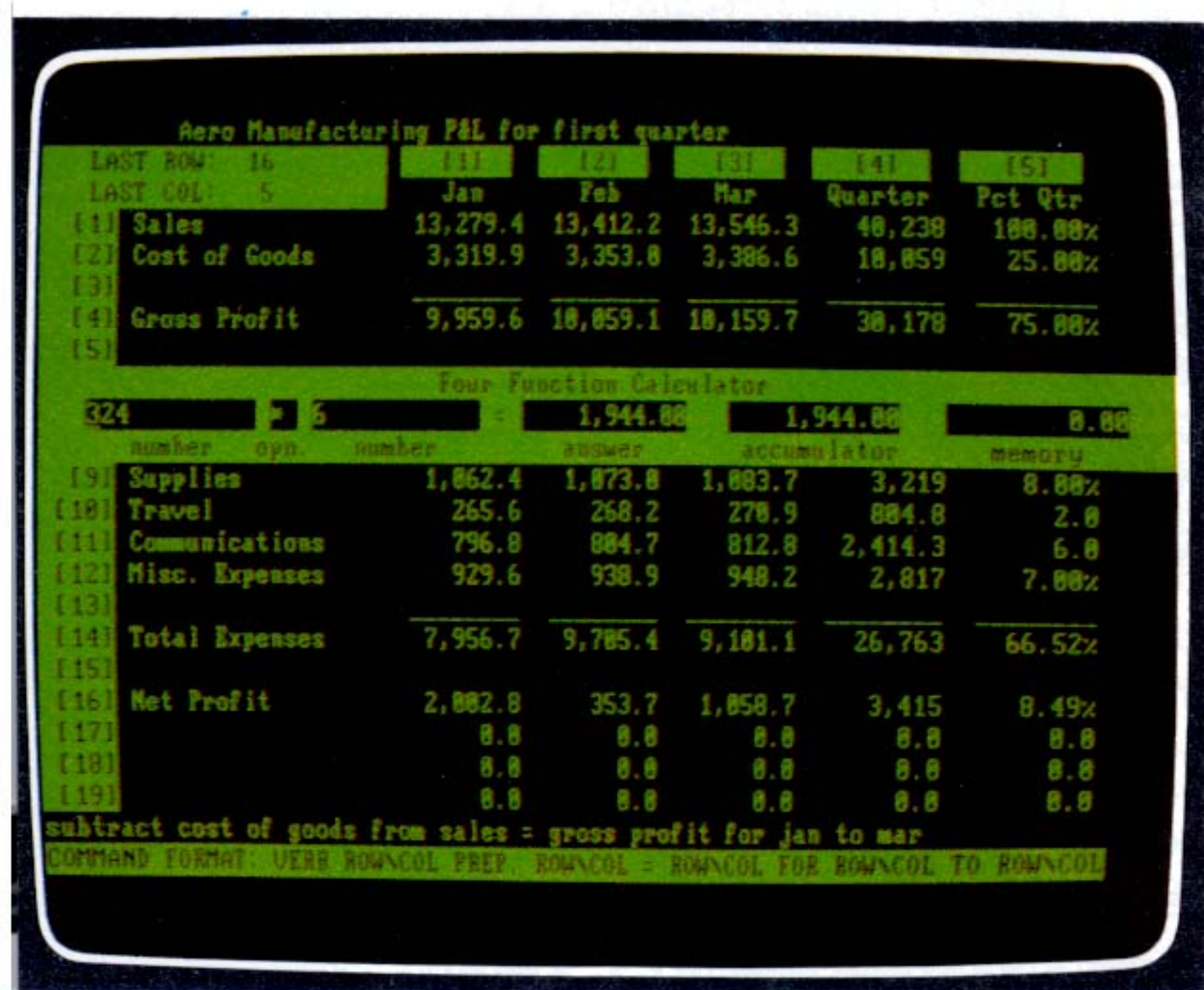
APPLEWORKS keeps everything that you are working on in memory, making it very speedy, so you should give it 128K worth of elbow room (it will run in 64K, but not handily), and a second disk drive is recommended.

PAUL WALHUS: APPLEWORKS has an almost gamelike appeal—you glide effortlessly from one function to another. The manual is written in warm and cuddly Apple style. The screen menus are clearly labeled, with pictures of file folders stacked on top of each other. Help screens are readily available. It gets files from its “desktop” and goes from application to application with lightning speed. You can have twelve files of any description on your desktop at the same time.

With cut-and-paste you can highlight a block of text, move the cursor to where you want it inserted, hit return, and your words leap into their landing place, no matter which application you target. Easy, obvious, and admirable!

APPLEWORKS convinced me that I had a power tool that would do all the jobs that formerly required an assortment of programs. This may be the most powerful Apple program of all time.

DON SCCELLATO: APPLEWORKS outsold 1-2-3 (p. 68) on the bestseller lists in early 1985 and as a result, frills and add-ons from outside vendors are beginning to appear. GRAPHWORKS provides a powerful business graphics extension, and HABAMERGE supplies a spelling checker and a mailmerge option for churning out form letters. The APPLEWORKS victory is well-deserved; it manages to put a lot of capability into the basic Apple. (GRAPHWORKS: Walter Horat. Version 1.2. Not copy-protected. \$79.95. Apple IIe/IIc. APPLEWORKS required. PBI Software, 1155-B Chess Dr., Suite 14, Foster City, CA 94404; 415/349-8765 • MEGAWORKS: Version 1.0. Copy-protected. \$125. Apple II family; 128K. APPLEWORKS required. Megahaus Corporation, 5703 Oberlin Dr., San Diego, CA 92121; 619/450-1230.)



A steal of a deal . . .

INTUIT

Martel Firing; \$90 (street price \$80); IBM PC/XT/compatibles (256K); Tandy Models 1000 and 1200 (256K)/Model 2000 (384K); 2 disk drives or hard disk recommended; copy-protected; Noumenon Corp., 512 Westline Dr., Alameda, CA 94501; 415/521-2145.

SHARON RUFENER: What do most of the integrated packages have in common? They need lots of memory—RAM for processing, hard disks for storage. Give them too little and they don't run so much as lurch. And they cost several hundred dollars. There is, however, a nice little product which happily

fits into a 256K floppy disk system and can be had for a rock-bottom \$90!

INTUIT is an unpretentious system with a word processor oriented toward structured reports; good form-letter capability; a no-frills file manager; and an easy and programmable spreadsheet that does goal-seeking and can print out an audit trail. An extra \$20 gets you a checkbook application for the spreadsheet, and you might have everything you need for the business you run out of your spare bedroom. I've been using INTUIT since summer of '84 and it takes care of my integrated requirements just fine.

BARBARA ROBERTSON: INTUIT has one major drawback—the program is its own operating system with a unique disk format. Though the program can transfer files to and from DOS disks, you aren't going to be able to run any other software without a few minutes of fussing. If you're fond of a particular spelling checker, communications program, or a utility like SIDEKICK (p. 114), you're sunk.

INTUIT's super-easy spreadsheet can be automatically generated from database records, including the titles for the rows and columns. The spreadsheet understands English. Tell it to “ADD SALARIES THROUGH MISC. EXPENSES GIVING TOTAL EXPENSES.” It will automatically add all the applicable blocks of cells and create the TOTAL line.

Probably the best . . .

ENABLE

Version 1.1; \$695; IBM PC/XT/AT and compatibles; 256K; hard disk recommended; copy-protected? NO; The Software Group, Northway Ten Executive Park, Ballston Lake, NY 12019; 800/932-0233 or, in NY, 800/338-4646.

CHARLES SPEZZANO: After evaluating just about every integrated package in the IBM PC universe, my choice is ENABLE. It has smooth cut-and-paste windowing. Great word processing. A very-close-to-fully-relational database. A spreadsheet that's easy to use, with adequate size and speed for most people. A fast and easy telecommunications package. It has menus to get beginners up and running, plus a full set of keyboard commands to replace the menus, once you get the hang of it.

I think that most writers, professionals, and managers will be delighted with it. The word processor is unquestionably the best in the integrated area, both in terms of speed and versatility. The telecommunications module integrates word processing better than any other package and is a delight. You can write something, hop into the telecommunications module from the word processing document and shoot it off, or do the reverse and edit incoming data. ENABLE has a versatile built-in utility for converting to and from ASCII (plain vanilla text) format (with optional stripping of those pain-in-the-neck carriage returns and line feeds on the way in) that allows me to use the WORD PROOF (p. 62) spelling checker almost as if it were part of the package. It works just fine with MCI Mail (p. 145) and The Source (p. 141). But with EIES (p. 147), ENABLE's Version 1.01 squishes my paragraphs into one, so I'm using SMARTCOM II (p. 150) while I wait for 1.1 to arrive.

The spreadsheet holds 65,000 cells in your choice of configurations, and is speedier than everything I've used except 1-2-3 (p. 68) and SYMPHONY (p. 111).

The database is a fast and efficient blend of commands, menus, and a procedural language that doesn't require a semester at MIT. Forms are painted onscreen in a handy manner, and offer a full array of data checking features. Fields in different files can be related so that you can have ENABLE copy a client's address from one file into another or you can put information from more than one source into a report.

Data moves around in a cut-and-paste fashion—easy, but there's no interaction between modules. That's different from programs like ABILITY (p. 111) where a worksheet copied into a report is updated whenever a change is made in the original. A second annoying shortcoming (soon to be remedied, the company claims) is ENABLE's inability to move data from the word processor to elsewhere. This is important because it's the word processor that

captures telecommunicated data, and if that information is meant to go to your database or spreadsheet, you're out of luck.

More than any software package I have used so far though, ENABLE is, for me, a total information management system under one roof.

SHARON RUFENER: Charles Spezzano is so enamored of ENABLE that he abandoned his beloved FRAMEWORK, even though he paid good money for it.

WOODY LISWOOD: ENABLE's spreadsheet is a 1-2-3 clone with an integrated database that has many more options than the database in 1-2-3 or SYMPHONY. The wonderful thing about having the database integrated with the spreadsheet is that you can use any of the spreadsheet functions (except range) within the database, which means you can do things like square roots—impossible even in powerful stand-alone databases like R:BASE 4000 (p. 87). I have two quibbles: it's somewhat slow when you fill a worksheet with data, and the size is limited; however, you can juggle the arrangement of rows and columns within the 65,000 cell limitation. If you wanted to buy only one software package today that does most of what you need, ENABLE is my recommendation.

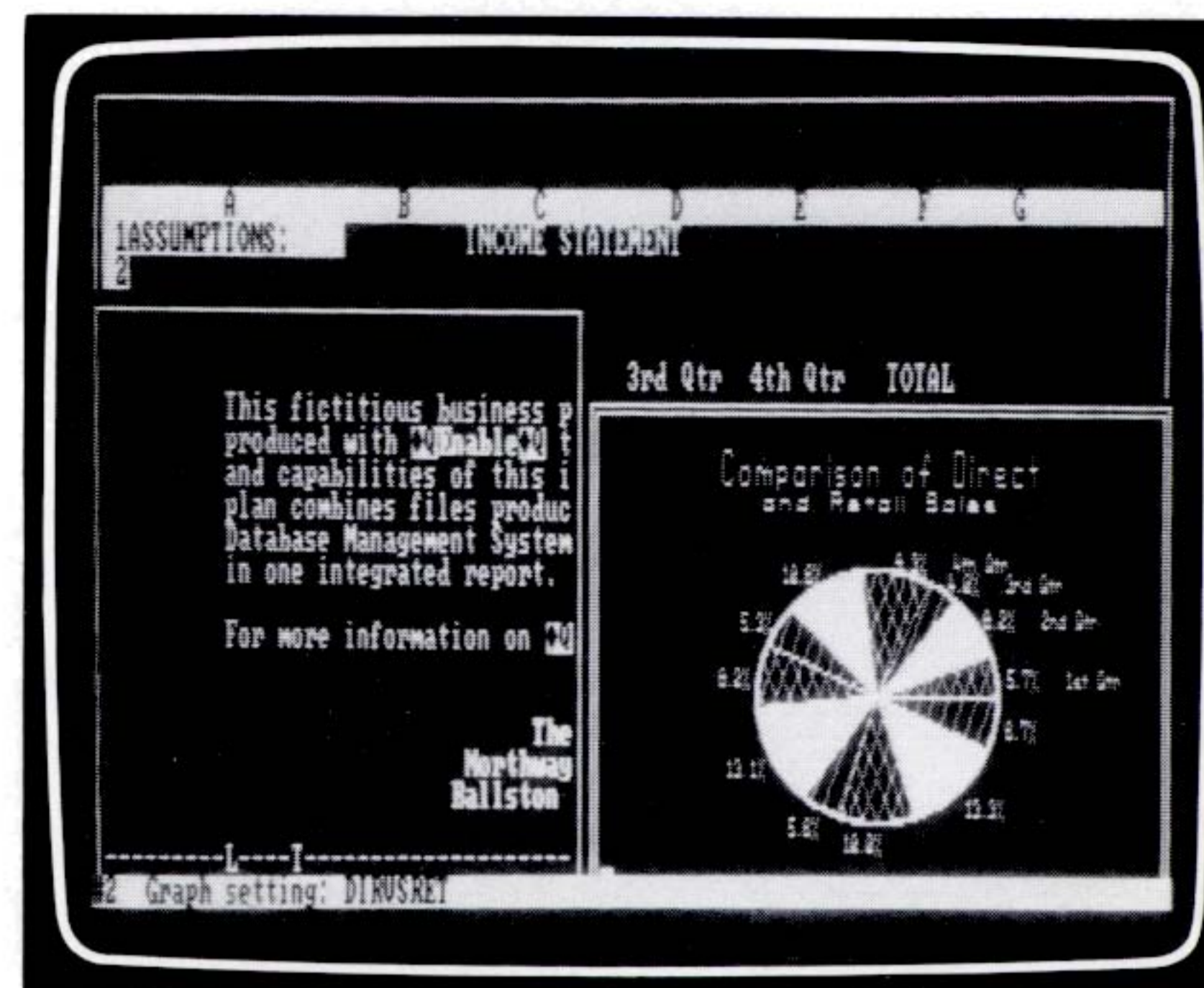
LION GOODMAN: As a new computer user who needed a powerful integrated package but did not want to become a programmer or get a program I couldn't master, I was afraid I might have to make some painful compromises. Fortunately, I discovered ENABLE. It has all the power I need to run my executive search business and handle my personal business as well.

The word processor does everything but proportional spacing. The format instructions are saved with the document (handy for structured forms and reports), and you can put "rulers" (for margin settings) anywhere in the document.

The graphics can use data from the spreadsheet or from a database file, but generating the graphs can be cumbersome and the graphs aren't that special.

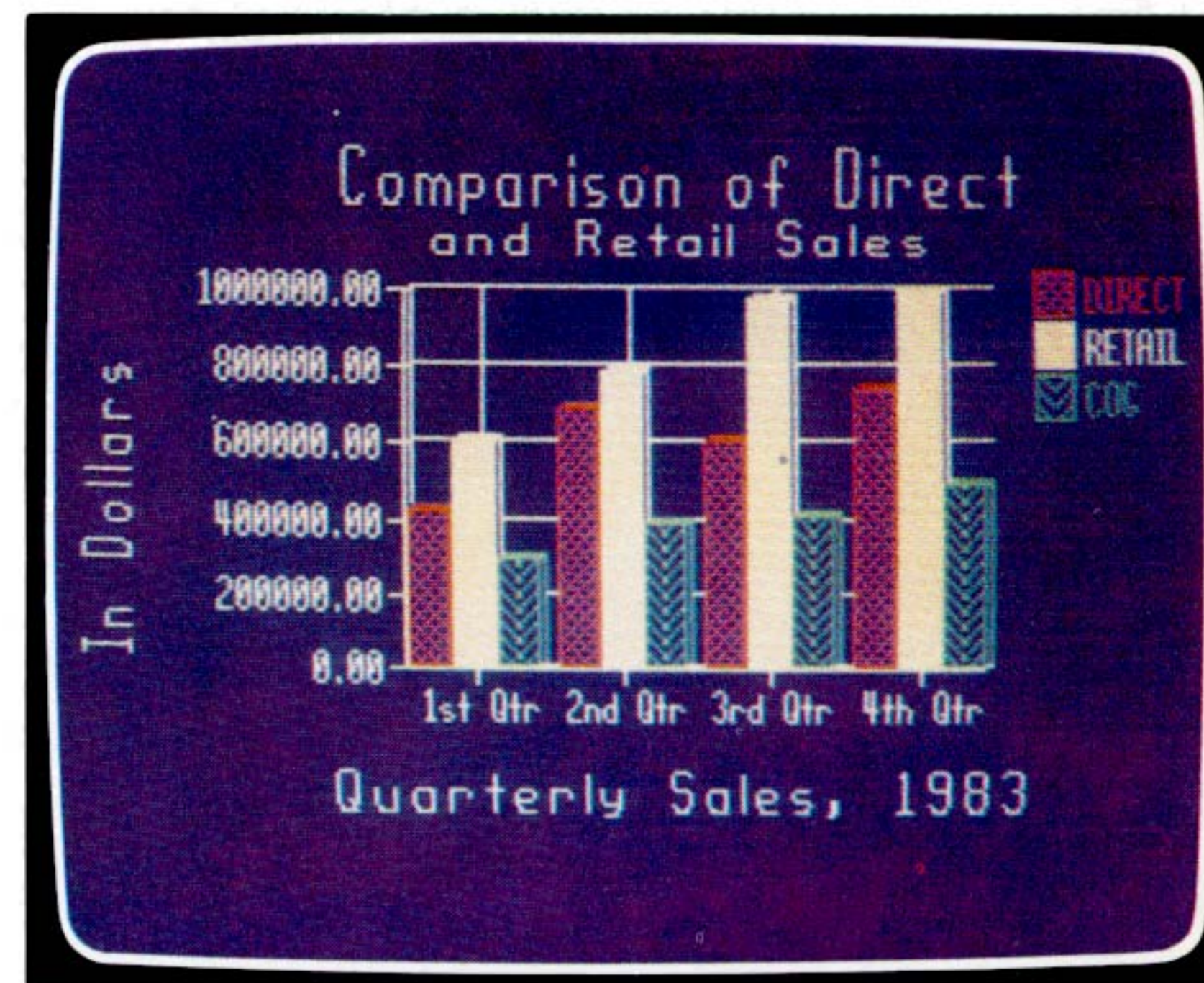
The documentation is clear and well-indexed, although I found the system easy and logical enough that I could learn it with minimal reading. There are context-sensitive help messages, and I got great customer support from the publisher (they even have an 800 number for users). ENABLE comes with a tutorial which is also good and helpful.

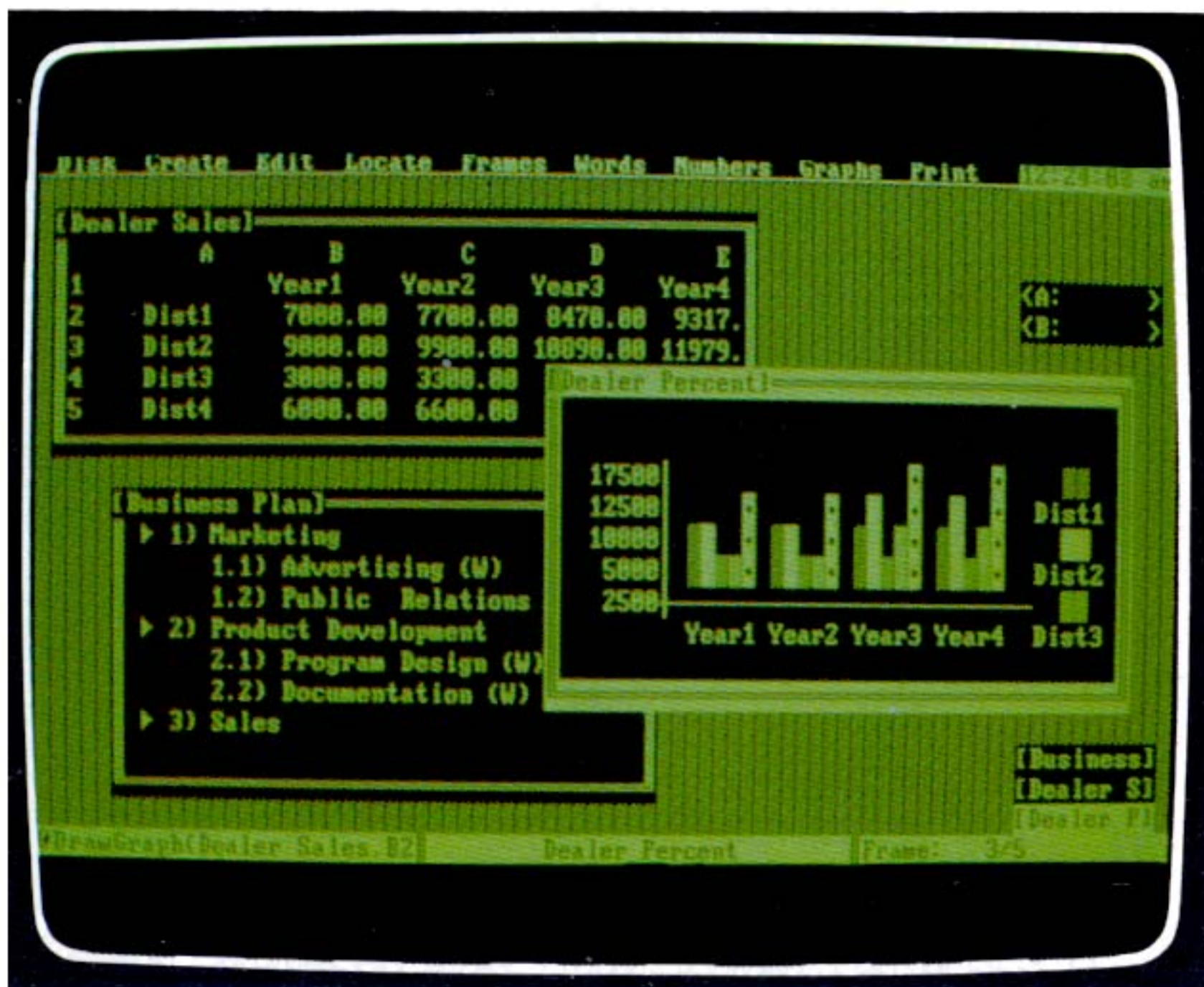
Drawing data from the Spreadsheet module, ENABLE can create colorful though simple bar graphs as part of its very competent but unspectacular toolkit. Graphs can be pasted directly into a word processing file.



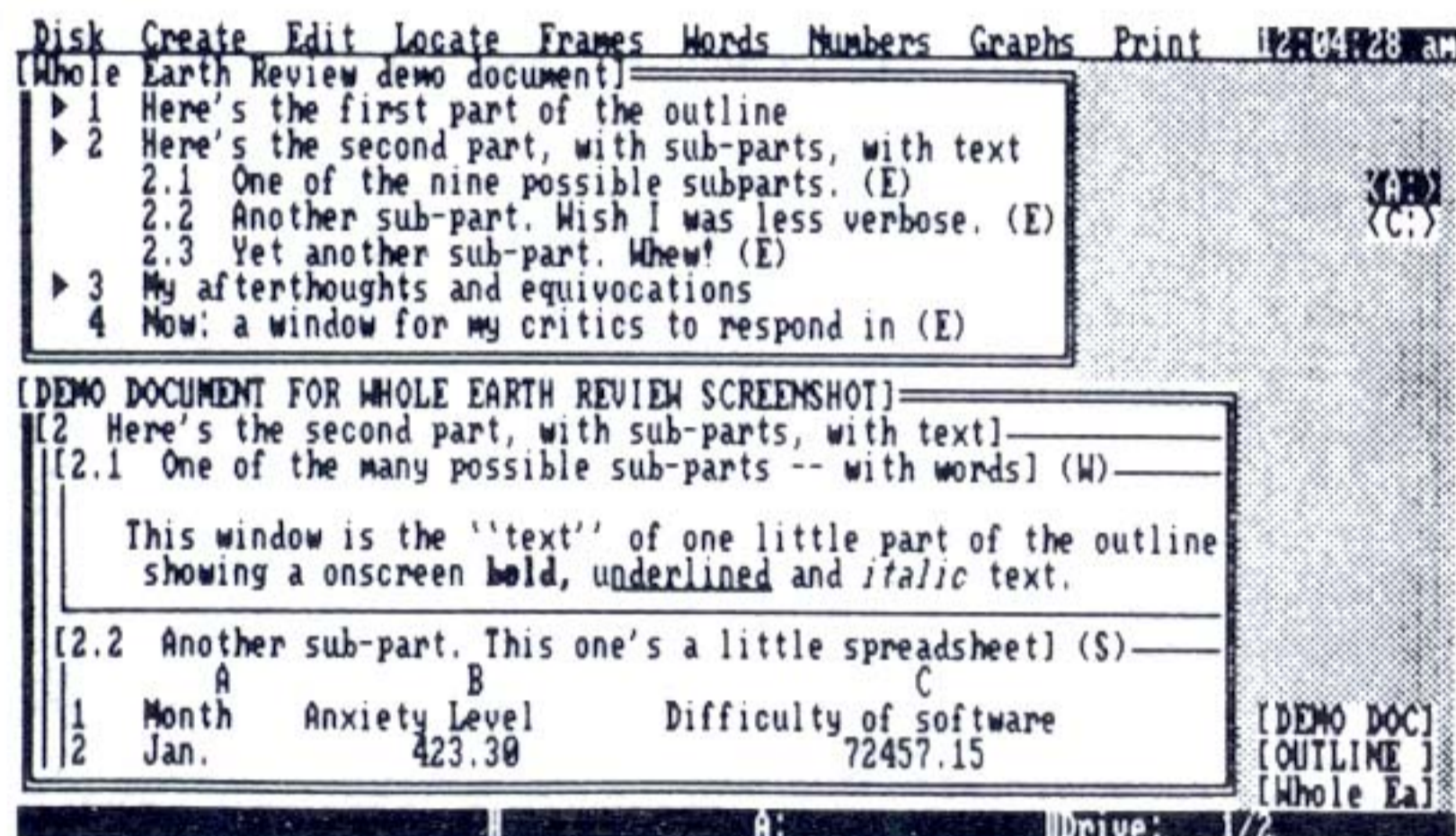
Windowing with ENABLE lets you create a pie chart with data from the spreadsheet while writing a description on the word processor.

The database module of ENABLE allows long text entries with flexible form construction.





FRAMEWORK uses an outline format to group and display files relating to a particular job. It will display several of its integrated functions (word processing, spreadsheet, database, and graphics) in windows—you can shuffle the windows around and work on the contents in the top one.



FRAMEWORK's best feature is its overall organization, shown here in a printout of the screen. The cursor is now on the "A" drive; if you hit the return key, a window appears with all the "A" drive files listed in it. That's shockingly easy compared to most software programs, where calling up a new file usually requires mental contortions.

An all-in-one geared to text work . . .

FRAMEWORK

Robert Carr; Version 1.1; IBM PC/XT/AT and compatibles • DG/ONE • TI Professional; TI Pro-Lite • Tandy 2000; 384K; 2 disk drives or high density (728K) disk drive; copy-protected? YES; \$695; Ashton-Tate, 10150 Jefferson Blvd., Culver City, CA 90230; 800/437-4329, ext. 2240 or, in CO, 303/799-4900, ext. 2240.

PATRICIA H. TAYLOR: For my financial management business, I typically need to write something, then pull up a spreadsheet so I can deal with figures, and then slide back into writing. It's impossible to do that sort of graceful juggling act with separate programs.

I picked FRAMEWORK because my major clients use DBASE III (p. 86) and 1-2-3 (p. 68) and I needed a program that could interact with them. FRAMEWORK has made me look like a genius—I can electronically communicate with my clients' programs in a slick, hassle-free computerized way.

The word processor's outlining capability is a wonderful thinking tool. It lets me juggle concepts around, then flesh out my "framework" with words or plug-in notes or data from another file—it's easy to pull in stuff from all directions and move things around. Frameworking has enhanced my writing productivity considerably—I rarely write anything without using it in some way—although I do wish their spelling checker were in my package instead of still on their drawing boards.

I even prefer FRAMEWORK to 1-2-3 for spreadsheeting. 1-2-3's macros are very primitive by comparison, and can't perform the kind of looping and decision-branching logic I need. 1-2-3 is also more fragile—hit the wrong key and your spreadsheet may collapse like a house of cards. FRAMEWORK also has the "not available" feature, critical for statistical analyses based on time-series data (if no data is available for a particular time slot, it will not distort the results).

The MITE (p. 151) telecommunications module also does what I need. I use its auto-answer function extensively; I leave my computer ready to receive and the other

party can add or extract information at his or her convenience. The MITE documentation could be better, however.

It's easy to get into this system—I went through the tutorial in about six hours and was off and running. And Ashton-Tate's support has been excellent—I never have to wait on hold more than five minutes, they always call me back when they say they will, and they're friendly and helpful.

CHARLES SPEZZANO: FRAMEWORK is the sleekest of the integrated packages. When searching and sorting, the database module is a screamer. Everything is in memory and things happen in seconds, but there is a trade-off in size. You need lots of RAM if you want to have giant database files.

I think the spreadsheet is terrific. It was the first one I used seriously, and it let me enter that unfamiliar territory with minimal anxiety.

The word processor is slick and fast, but it lacks features serious writers want like page counting, page breaks, and protection against widowed or orphaned lines. You can't print selected pages from a document because when you do, you awaken a resident bug which screws up the margins. All the files in all the directories and subdirectories on a hard disk are available at any time, onscreen in alphabetical order. You can bring reports and databases and spreadsheets onto the "desktop" and leave them neatly piled on top of one another in the corner of the screen, to be opened or closed selectively and in a flash. Or open them all and go to work.

BARBARA ROBERTSON: FRAMEWORK is a visual whizbang of a program; its rapid-fire windowing can dazzle onlookers who find SYMPHONY to be appallingly businesslike. However, a good bit of similar work has to be done to get both programs running full bore. Both depend on macro programming languages for serious data manipulations. Just because FRAMEWORK is easier to grasp at first glance, don't be lulled into thinking it's a snap to use. Data frames must be connected by using the FRAMEWORK language, and formatting for fancy output requires major gyrations.

The spreadsheet that communicates . . .

SYMPHONY

Version 1.1; IBM family and compatibles; 384K; Version 1.0; DEC Rainbow • Tandy 2000; 320K; 2 disk drives; color graphics board required for graphics; copy-protected? YES; \$695 (street price \$400); Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 617/577-8500.

TED NELSON: SYMPHONY is Lotus's generalization of the idea of spreadsheets—a virtual machine based upon a checkerboard of text and numbers, the way FORTH (p. 166) is a virtual machine based upon a stack. You can swap data between disk files and sections of a worksheet; but all the data you're working on has to fit into SYMPHONY'S one big worksheet somehow. It's real estate to be planned and cordoned off for your different purposes, and looked at through different types of windows—especially worksheet and document windows.

The problem with one big spreadsheet is that changes can have undesirable effects downstate; if you add a column in one place it could mess things up in other parts of the worksheet. SYMPHONY localizes these effects by letting you fence in rectangles of the grid—"restrict ranges"—which you must keep track of.

SYMPHONY will do unattended dial-up, log-in, query, and sign-off, without boxing you into a particular data format. You can have an unattended home-base machine with password security.

SYMPHONY is not easy at the start. It's harder to get into than FRAMEWORK, but more powerful if some complex hazy application beckons you from the horizon. The set-up complications are fierce, and there is real clumsiness; for almost every serious operation you have to do a lot of set-ups and prearrangements—to dig a garden, in effect, before you plant anything. But one of the beauties of spreadsheet programming is that you can create applications incrementally. Get a basic set-up working quickly, then use the partially-built system to find out how you want to change it.

A SYMPHONY program can be written simply by turning on the LEARN toggle and getting down to work. This stores the steps for later replay! This "programming by example" represents a new kind of programming, because you have to think about where to set up the rectangles of data. You have to think a lot about the origami of the big sheet.

BARBARA ROBERTSON: SYMPHONY is an integrated package with document and database capability, yet Lotus can't seem to make the world see the product as anything other than a super-duper spreadsheet, even by selling "add-ins" that give it, for example, outlining capacity to aid in the battle with FRAMEWORK. So why pay to upgrade from 1-2-3 (p. 68)? 1-2-3 can be made to jump through hoops, too, using the proliferation of third-party templates like the DSS Optionware series (p. 69). If your primary task is spreadsheet work, and you need an enormous number of rows as well as programmability (and don't mind copy

protection that makes you keep a disk in drive A) SYMPHONY is your best choice—plus you get telecommunications and an arcane word processor thrown in. However, to really make SYMPHONY sing, you'll want to consider adding a board like the Intel Above Board to your IBM PC to give this behemoth some breathing room.



Using windows to display the different environments is the only way to really integrate SYMPHONY's functions. When you create a window, what you put in it must be restricted to a certain area of the contained environment's worksheet.

Delightful database . . .

ABILITY

Version 1.0; IBM PC/XT/AT and compatibles; 320K; 2 disk drives or hard disk; copy-protected? NO; Xanaro Technologies, Inc., 321 Bloor St. East, Suite 815, Toronto, Ontario M4W 1G9; 416/927-8369 or, in U.S., 702/322-0144.

CHARLES SPEZZANO: ABILITY is a tight, self-evident, completely menu-driven program that makes some complicated computing tasks very easy and some simple tasks very difficult.

On the tight side, ABILITY is as seamlessly integrated as any package I've tried—the only all-in-one program that integrates data as well as SYMPHONY.

Most of the integration takes place through the word processor. When you place a spreadsheet into a document with ABILITY it's the same spreadsheet in both places—not a copy. Change either incarnation and you are changing the original. It's convenient, but also potentially dangerous—

easy to forget when you're editing a document that you're also changing the spreadsheet.

Unfortunately, the word processor is the weakest part of the group. Inserting text into pre-existing files is tedious and clumsy, deleting is awkward, there is no simple command to highlight blocks for copying, and reformatting is painfully slow. I found it exasperating just to write this review using ABILITY as my word processor.

However, ABILITY's database is a delight. Searching, sorting, generating reports, and modifying data entry forms after data is entered are self-evident and flawless. The database is not relational, but two files can be easily joined so that a report can pull information from both.

The spreadsheet is almost as large as SYMPHONY's, but not as fast. On the other hand, ABILITY can be mastered in a working day, while SYMPHONY can be mastered in one of the biblical days God took to create the world.

Almost everything proceeds through such easy-to-master menus and submenus that you rarely have to look at the (excellent) manual or call up a context-sensitive help screen. You can create macro commands, but there is no "learn" function like SYMPHONY's nor enough keyboard command shortcuts that bypass the menus as in ENABLE (p. 109). You have to love menus to like ABILITY because you'll be weaving your way through them again and again.

SHARON RUFENER: We recommend ABILITY to people who want an easy to learn all-in-one that has strong, interrelating database and spreadsheet modules. Change the data in one module and it's changed in all—saves data entry time. It's a good program for businesses where there's lots of fast action and interrelations.

Megamodeling for big applications . . .

THE SMART INTEGRATED SOFTWARE SYSTEM

Version 2.0; IBM PC/XT/AT and compatibles; 256K; 2 disk drives or hard disk; copy-protected? NO; complete package, \$895; separate packages: SPREADSHEET, \$395; WORD PROCESSOR, \$295; DATA MANAGER, \$495; Innovative Software, Inc., 9300 West 110th St., Suite 380, Overland Park, KS 66210; 913/383-1089.

RIK JADRNICKEK: This is a great series of programs and with each new version I

become more and more impressed with the company's attention to the needs of end-users. I use the SMART SYSTEM to develop what I call megamodels. For example, in one application I've been working on, I've drawn the floor plans of a shopping center in AUTOCAD (p. 135), then moved data (dimensions, etc.) from AUTOCAD into the SMART SYSTEM and can now generate database reports that (among other things) show lease areas with price per square foot, and spreadsheets that do complex lease roll-over analyses. Megamodels like this one take microcomputing into another dimension—one with minimum data entry and maximum analysis. I started megamodeling using 1-2-3 (p. 68) and SYMPHONY (p. 111), but found I was running up against their limitations—primarily with copy-protection schemes that make it difficult to move between these programs and others. Fortunately, I could load my 1-2-3 models straight into SMART, and with no problem at all still use them. The SMART spreadsheet is even faster than 1-2-3 because the program manages memory so effectively.

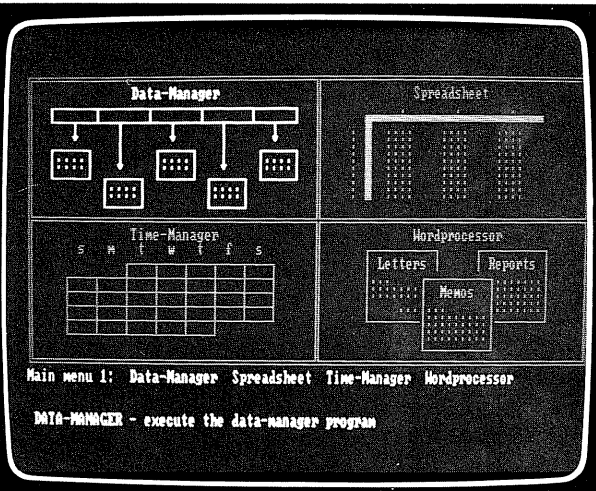
You can buy and use the SMART modules separately or as an integrated package. They all use the same commands and macro commands pull them together by automating the transfer of data. You enter the commands, SMART remembers the path you took and creates a macro—an optimized, compiled macro (when you use it later, it runs very fast). Since one macro can invoke another, I can create complex, multilevel operations that move from one program to another and from one function inside a program to another.

SMART is easier to use than SYMPHONY or DBASE (pp. 85, 86), yet you can develop the same kind of applications. You can import and export just about any kind of data files into any module. There is a time manager and a communications program included with each module. And each program has its own text editor so you don't have to bounce into the word processor when you need to write something.

The SMART SYSTEM provides a very convenient method of creating an entire system, one that carries out routine tasks automatically, one through which data can flow easily from one application to another, and one that's easily modified.

BARBARA ROBERTSON: You needn't create the kind of megamodels Rik creates to find good uses for any program in this set. Clifford Figallo uses the database program alone to manage the **Whole Earth Software Catalog** library (see p. 89). However, having the kind of flexibility and depth in these programs that Rik describes means that you won't outgrow them, nor will your data be stuck in an isolated world of its own. SMART is particularly good for creating systems other people will use. If you are the only one working with the data and your applications are not particularly complex, you'd find ENABLE (p. 109) easier to use and less expensive.

SHARON RUFENER: Setting up an interrelated system is not a snap with any program. You'll need lots of patience and maybe even a computer consultant.



The SMART SYSTEM's opening screen is like the lobby leading to separate similarly decorated workspaces. Whichever way you go, the menu structure remains familiar and comfortable, and files can be ported from one module to another.

Integrators

SHARON RUFENER: Last year the hot products were all-in-one integrated software packages; this year the big news is "integrators"—programs that let you mix and match your favorite software. You can have all the speed—and most of the convenience—of the "integrated all-in-one" packages without having to give up the familiarity and power of stand-alone, one-function applications. With the tools we present on the next few pages, you can tailor your own home-built integrated system.

EZRA SHAPIRO: Programs that provide software integration—easy switching from one sort of task to another—make use of two very simple computer secrets. The first secret is that programs designed for modern 16-bit machines like the IBM PC and the Macintosh rarely use all of the computer's available internal memory. Unless you're working with a gigantic spreadsheet or an enormous database, chances are very good that a lot of your computer's capacity is sitting idle. The second secret is that computers are so much faster than you are that they spend most of their time merely waiting for you to do something. While you're typing a memo, all the time between your keystrokes (nothing to you, but forever to your computer) is wasted.

You can stuff other programs into that unused memory, which can then pop up like lightning because you don't have to wait for the computer to read them from a disk drive. And you can take those centuries between your keystrokes and let the computer do something productive with them; why let the machine take a nap while you're working?

That, in a nutshell, is the theoretical basis of software integration.

BARBARA ROBERTSON: IBM PC "integrated environments" like TOPVIEW, GEM (p. 168), and Microsoft's not yet released WINDOWS all let you run application programs within their windows as does Mac (GEM even looks like the Mac), but you can't cut and paste between applications unless the programs were written with the "environment" in mind. Thus, the three giants (IBM, Digital Research, and Microsoft) are vying for support from software developers. The recommendation of any one of the three must be based, therefore, on the quantity and quality of software that runs within a particular "environment." As of yet, there's simply not much support for any of them. Before you consider buying any of the three, find out whether the software you want to use in the environment has been adapted to run in the environment—otherwise, all you get is a shell that, albeit quite clever and cute, simply

masks the operating system, and is worth considering only if you absolutely hate seeing the A> and don't want to learn DOS commands. You might have more fun instead with a program that doesn't insist on having the world conform to it—one of the “desk accessories,” a “context-switcher,” or try a “concurrency” program, until it's clear who wins this game.

“Desk accessories” are useful little programs that let you perform tiny but essential tasks like jotting down an appointment or dredging up a phone number, without having to shut down your application program. Usually only a keystroke

or two is needed to pull one of these tools onto a corner of your screen.

“Context-switching” products allow you to load several programs into your computer and casually flip among them without having to get back to the operating system.

“Concurrency” programs can be used the same way as context-switchers, but they add an important feature—programs not shown on the screen can continue to process data.

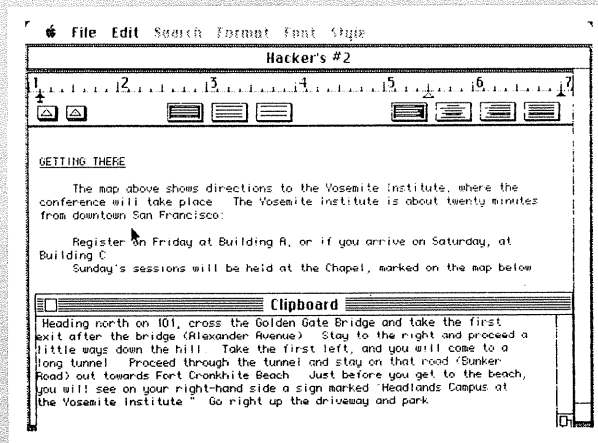
THE MACINTOSH INTEGRATED ENVIRONMENT

JOHN LEININGER: In the old days, when you wanted to add information or pictures to your documents, you had to use pen, ink, scissors, and glue. Now you can do it on the Macintosh (p. 20) with the click of a mouse.

The Macintosh operating system facilitates the movement of data from one program or document to another. You can Copy, Cut, Paste, and put things into a temporary storage slot (the Clipboard). Let's say you have a word processing document and you want to move some of it into another one. You locate the part you want and highlight it by clicking the mouse at the top and bottom of the section. You then pull down the menu for Edit, and select Copy or Cut. The Macintosh makes a copy or moves the original to Clipboard. You display your second document and Paste the stuff stashed in the Clipboard into place. The information stays in the Clipboard so you can plop it to as many places as you like. If you need to copy more than one block of data into temporary storage, you can use a “desktop accessory” called the Scrapbook (sort of a larger Clipboard) that holds items for future use.

Since the Cut, Paste, and Clipboard functions are always available, the Macintosh allows you to choose the applications you want. In effect, you can tailor your own “integrated application” and expand and modify it as you desire.

BARBARA ROBERTSON: Using the Mac's cut-and-paste functions, you can scissor together data (numbers, pictures, or text) from many programs so that the graphic result looks seamless—but the data from one program is totally unaware of the data from another. Transferring data between programs so that, for example, a database program actually uses data from a spreadsheet program is nearly as easy but the programs themselves must agree to cooperate.



Desk Accessories

BARBARA ROBERTSON: Desktop accessories (p. 114), or “pop-up” programs that remain resident in memory, give you ready access to a set of quick little tools no matter what application you're using. They really encourage you to think of software as part of an environment.

SHARON RUFENER: The ones we like for the IBM PC realm are DESK ORGANIZER (full-powered desktop integration), SIDEKICK (amazing bargain), HIGGINS (a personal butler on a diskette), and POP-UPS (handy little tools). Which desktopper is for you? HIGGINS has its own relational database, for organizing major activities. If you need a heavy-duty appointment calendar/daybook, complete with alarm clock and phone dialing, get DESK ORGANIZER. If you want to cut'n'paste almost as though you had a big ticket integrated system, POP-UP DESKSET is your best bet, although the others can shove data around also. With lots of notes to stash, you will like DESK ORGANIZER's handy indexing better than SIDEKICK's file IDs. For almost-serious word-processing both SIDEKICK and DESK ORGANIZER are ahead of the POP-UP product. If a multi-talented alarm clock is needed, grab the POP-UP \$5.00 wonder, or settle for the less versatile one provided by DESK ORGANIZER. Programmers will appreciate SIDEKICK's ASCII table and the calculator which can do hexadecimal math as well as the normal kind.

Many of these programs owe their inspiration to the Macintosh.

Desk Accessories

A dashboard full of utilities for the IBM PC . . .

SIDEKICK

Version 1.5; IBM PC/XT/AT and compatibles; IBM PCjr; copy-protected version, \$54.95; non copy-protected version, \$84.95; Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066; 408/438-8400.

JAMES STOCKFORD: This new windowing utility promises to be as indispensable as socks and underpants. No matter what program you're using, push a button and SIDEKICK's calendar, notepad, calculator, phone dialer, or ASCII conversion chart will immediately pop up on the screen.

SIDEKICK let us put this review, a calendar, an appointment log from the calendar, and a calculator all onscreen at once. Handy for anyone who spends a lot of time in front of a screen.

Here's how it works. When you start your machine, boot up SIDEKICK right after you boot up your operating system. Then load any program you want to use and begin working.

SIDEKICK sits invisibly in the computer's RAM memory. When you call SIDEKICK, the program you're working on stops dead in its tracks, leaving whatever you were doing on the screen. The SIDEKICK utilities you choose appear in windows on top (in various colors, if you have a color monitor). The perpetual calendar includes a daily appointment scheduler; the notepad is a simple word-processing program that uses WORDSTAR commands; the dialer is not a communications program but can (if you have a modem) dial any number stored in a phone list; the calculator includes basic arithmetic (binary and hexadecimal) plus nine nested levels of parentheses and logic operators. You can slide the windows around to peek at work underneath and run the cursor all over the screen as a pointer. When you've finished with SIDEKICK, you push a button and the main program begins again exactly where you stopped. Text and data entered into SIDEKICK can be moved into the program you're using, or saved in a file to be moved into another program later.

Push-button convenience . . .

POP-UP DESKSET

IBM PC/XT/AT/3270 and compatibles; PCjr; uses up to 110K (depending on the features chosen); not copy-protected; \$69.95; Bellsoft, Inc., 2820 Northup Way, Bellevue, WA 98004; 800/44P-OPUP or, in WA, 206/828-7282; DESKSET PLUS includes TELECOMM; \$129.95.

SHARON RUFENER: A tidy bundle of software tools at a very tidy price. All these mini-programs (formerly called POP-UPS) retain their pop-up character—sitting quietly in the background, then popping up to perform a handy task when you call.

DESKSET contains all our recommended POP-UPS: CALCULATORS, CALENDAR, ALARM CLOCK, and POPDOS (quick DOS access), plus three new ones that didn't arrive in time for review: POPWORD, which replaces NOTEPAD and absorbs CLIPBOARD; POP-UP ANYTHING, runs two programs at once; and POP-UP VOICE to dial your phone in the middle of other tasks.

With POP-UP ANYTHING keeping two programs open at the same time, and POPWORD (née CLIPBOARD) sending screens full of data back and forth between them, you get a bit of software integration at a very low price.

Like a Swiss Army knife of desk accessories, the POP-UP DESKSET covers all of the incidental chores a desk-bound computer professional might encounter through a typical day at work.

It's all related . . .

HIGGINS

Version 1.0; IBM PC/XT and compatibles; 256K; hard disk required; copy-protected YES; \$395 (street price \$270); Conetic Systems, Inc., 1470 Doolittle Dr., San Leandro, CA 94577; 415/430-8875.

RICHARD DALTON: I think I've gotten lucky with a sneaky-fast program named HIGGINS. HIGGINS takes on the Herculean task of providing access to all appointments, "to-do" items, people you need to contact, expenses you incur, notes you make, and correlates these with various projects or categories.

HIGGINS offers more than other "desktop organizer" software. It is built on a fully relational database manager, but you never have to do anything to make use of its sophisticated features! You merely tell HIGGINS to relate an appointment to X project and Y person and it's there.

What are the drawbacks? It's slow (but much faster than juggling paper). It isn't very flexible (expenses have to be accumulated in fixed categories). It will schedule conflicting appointments without notifying you. It requires a hard disk and it costs a lot (but then so does disorganization). Still, it's the best I've seen in the embryonic "people and event management" software category.

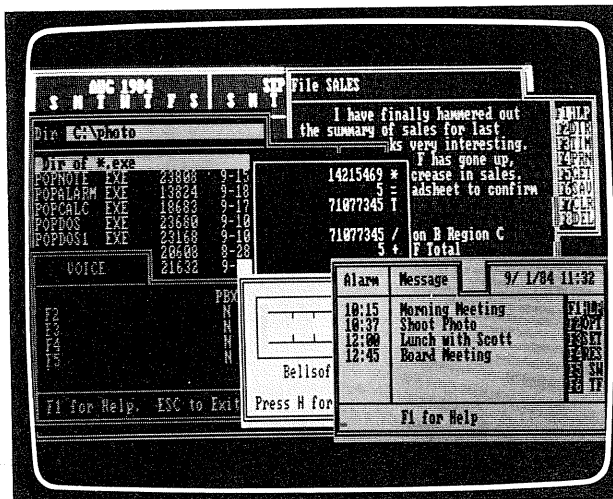
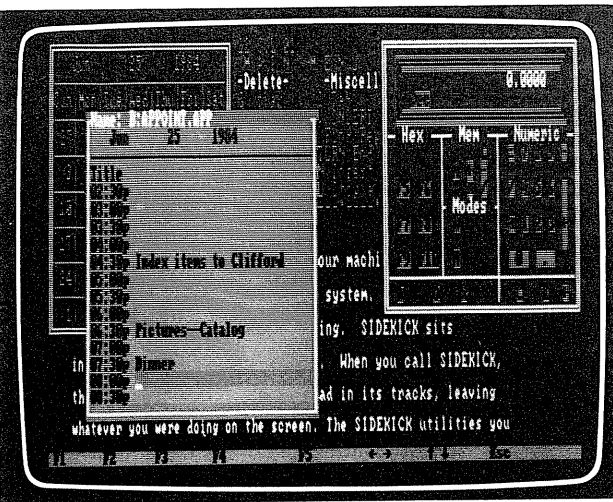
For note-taking and organizing . . .

DESK ORGANIZER

Collopy, Hesman & Milner; IBM PC/XT/AT and compatibles; 128K • Macintosh; copy-protected NO; \$99; Warner Software, Inc., 666 Fifth Ave., 9th Floor, New York, NY 10103; 212/484-3070.

DAVE SMITH: Now that I've used DESK ORGANIZER on a daily basis for months to

organize what I once jotted down haphazardly on yellow pads, dirty napkins, and outdated maps, it has become like an old friend, waiting faithfully at my desk to assist me whenever called upon. Disappointingly, it does not nag me to keep it updated. If I neglect it for a while, it gets stale and useless, just like my messy desk used to. But if I keep on top of it, it responds admirably.



Context Switching

Switch between programs on the IBM PC . . .

MEMORY/SHIFT

Jonathan More; Version 3.0; MS-DOS/PC DOS machines; 128K; copy-protected? YES; \$99 (non-copy-protected version, \$125); DESK/SHIFT; \$169 (\$100 to upgrade from MEMORY/SHIFT); North American Business Systems, 3840 Lindell Boulevard, St. Louis, MO 63108; 314/534-7404.

BARBARA ROBERTSON: MEMORY/SHIFT is the spiritual parent of all the context-switchers on the market. It's a generic MS-DOS program, which means it runs on Tandy and TI machines as well as IBMs and compatibles. A simple installation program lets you divide your computer's memory into as many partitions as you want for separate applications. However, you can load more than one program into each partition (you can run a "desk accessory" along with an application), and you can also load "global" memory-resident programs (RAM disks and "desk accessories"), so you can get to them from any partition. Cut-and-paste data transfer from one partition to another is easy and smooth. It's been around a long time and Jonathon More, its author, has learned how to make it nearly crash-proof. You can buy it by itself, or as part of a larger collection called DESK/SHIFT, that also includes the POP-UP DESKSET (p. 114) and BATON, a communications program.

Switching programs on a Macintosh . . .

SWITCHER ★

For availability, contact your local authorized Apple dealer or Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.

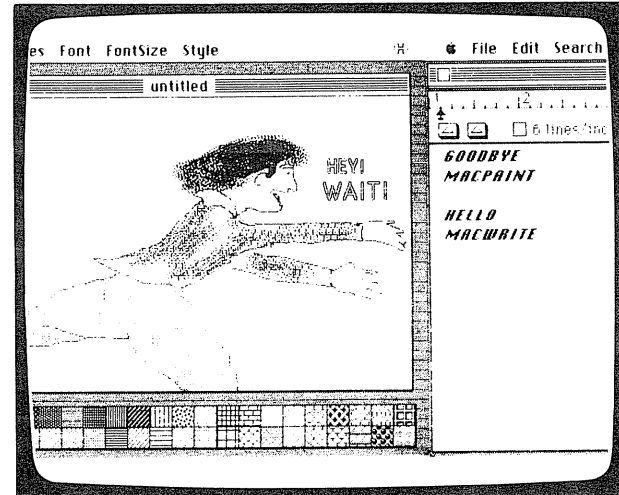
JAY KINNEY: SWITCHER is a utility program which enables the owner of a 512K MAC to switch back and forth, nearly instantly, between different programs without having to go through the tedious formalities of terminating one program and loading another. This is good news indeed for those MAC owners who already have separate spreadsheet, word processing, and business graphics programs and would like to be able to bounce between them.

It doesn't turn your MAC into a multi-tasking computer with different programs running concurrently. Rather, it simply halts one program in its tracks when you move over to use another, enabling you to take up where you left off when you switch back again.

STEVEN LEVY: SWITCHER enables Macintosh to make good the previously broken promise of painless integration between programs, and it's fun to watch—it uses an animation routine where one program slides out while the other slides in.

To really fulfill the power of SWITCHER, you should use it with a hard disk drive (or a

double-sided floppy drive) so you can quickly load up all your programs without swapping disks. Although it can handle several programs at once, I find that more than three on a 512K Mac is pushing it. I am happy as a clam when balancing a humble two programs, because previously moving stuff between, say, communications and word processing programs meant staring at that despicable watch icon until fossilization occurred.



For quick switching between Macintosh programs, there's nothing like SWITCHER.

Concurrency

BARBARA ROBERTSON: Although "context-switching" software, like MEMORY/SHIFT and SWITCHER that allows you to jump from program to program without reloading, seems to be relatively solid stuff, when you add "concurrency" (the ability to run more than one active program at the same time), things get sticky. All the concurrency utilities we looked at in the IBM PC world were both complex and frighteningly fragile; they had a tendency to crash repeatedly and unexpectedly. While the lure of running one program in background while you work on another in the foreground may be hard to resist,

programs that offer this kind of concurrency are not for the naive, nor the faint-hearted.

Remember, too, that concurrent processing creates some new problems. If two programs try to access the same file at the same time, which one wins? What about the printer? Finally, concurrent processing implies splitting up the microprocessor's activity. If a program on the screen is doing something simple, like waiting for input into a document or spreadsheet, and a program off-screen is doing heavy computational work, you're probably going to experience some slight delays in the foreground. If both foreground and background programs demand serious computing power, they will run at half-speed, and sometimes even more slowly.

Easy, but . . .

E-Z-DOS-IT ★

Version 1.2; IBM PC/XT and compatibles; Version 2.0; IBM AT; 256K; Hammer Computer Systems, 900 Larkspur Landing Circle, Suite 250, Larkspur, CA 94939; 800/228-9602 or, in CA, 800/423-5592.

KEN MILBURN: Its cute name belies its purpose. E-Z-DOS-IT is a utility that allows the simultaneous execution of as many as eight programs on a PC DOS/compatible computer.

E-Z-DOS-IT runs in as little as 256K of RAM. It requires only 5 to 15K of memory overhead, plus whatever memory is required of the application programs you want to run. So it is practical to use on a floppy system with a couple of business programs whose applications complement one another. A word-processor and a communications package, for instance.

Windowing systems like TOPVIEW severely limit the choice of available applications and can take hours to set up. Because E-Z-DOS-IT can make allowances for some programs' input/output idiosyncracies, you can run a

wider range of applications than any of the windowing packages will allow.

BARBARA ROBERTSON: Running two programs at the same time is a charming idea; you can, for example, be downloading one file while you're editing another. However, E-Z-DOS-IT does complicated things to computer memory, and it may not be the panacea it seems at first glance. Fair warning: it's hard to predict how a set of application programs will interact in this concurrent environment (and impossible to test all the combinations), and crashes are not uncommon.

Cover-your-ass software . . .

LIGHTYEAR

Version 1.0; IBM PC/XT/AT and compatibles; 192K; copy-protected? YES; \$495 (street price \$335); Lightyear, Inc., 1333 Lawrence Expressway, Bldg. 2, Santa Clara, CA 95051; 408/985-8811.

Lightyear

SUBJECT: Case 2
VERSION: Marketing

CRITERION: Idea Uniqueness

ALTERNATIVES	LEAST DESIRABLE - MOST DESIRABLE
Special Effects	|-----X-----|
Laser Ray	|-----X-----|
Babetto	|-----X-----|
Sitting Pretty	|-----X-----|
Bubble Trouble	|-----X-----|
Stunt Car	|-----X-----|
Cluck!	|-----X-----|
Riddler	|-----X-----|
Salt'n'Rock'n'	|-----X-----|

F1-HELP F3-FINISHED ENTERING VALUES

SHARON RUFENER: Psychologists tell us that the human brain can hold only about seven items in its "short-term memory." Many of us, when pressed for a decision, will mull over only those seven or so factors which land on the tops of our heads, regardless of their weight or relevance, and then lurch into action. What's needed is a methodology for dealing with the variables. Here's how the elegant and expensive LIGHTYEAR could help . . .

Say you're shopping around for a car and your head is swimming with information. No problem. Pop LIGHTYEAR into your PC, enter the car names, type in all the important criteria (price, mileage, comfort, etc.) and specify how important each item is (very, somewhat, etc.). Then, give each car a score for each of the criteria (rate the FlashMobile excellent for beauty) and add rules if you like ("If the car costs more than \$10,000, then mileage must be more than 40 mpg"). You make lots of little decisions, LIGHTYEAR adds everything up and makes

the big decision: a competitive ranking of the contenders displayed in bar chart form.

WOODY LISWOOD: I like LIGHTYEAR. A blast to use, even if you could do the same thing with almost any spreadsheet. Presents data in an informative manner and the graphics make seeing the results of your decisions rather frightening. I suspect that with a little practice you could prove anything to anybody with LIGHTYEAR. It is too bad that you supply all the weighting because you know, then, what the answer will be before you start. Even if it is unconscious.

STEVEN LEVY: I agree with Woody on LIGHTYEAR. The idea, though, is that someone will eventually generate templates (third-party? or LIGHTYEAR? Both, sez LIGHTYEAR) with the weighting built in. So you can get the T. Boone Pickens template which picks out an oil company to take over, after you give simple data on various companies. I guess those templates (which have yet to appear, and probably won't unless lotsa people buy LIGHTYEAR) owe it to the user to provide the formulas for weighting. In any case, it's not a decision-maker but an ass-coverer.

A LIGHTYEAR Graphic Value screen. Beginning at the top with Special Effects, use the right and left arrow keys to move the x to a position between "least desirable" and "most desirable."

Project Management

SHARON RUFENER: Suppose you need to whip up a time or cost estimate for the job. Or do a feasibility study. Or track the progress and reschedule when things don't come through as expected. That's where project management software comes in.

PERT charts (Program Evaluation Review Technique) illustrate relationships and dependencies among tasks using boxes and connecting lines. They're good for a first pass at an upcoming project or when you want the big picture of how things fit.

Gantt charts show tasks as horizontal bars on a time grid. You

see what's going on (or should be going on) at any given moment.

The Critical Path Method (CPM) shows which tasks can happen concurrently and which must be sequential, identify the "critical" sequence, and show how changes or slippages affect the completion date of a project—and can appear alone or in combination with Gantt or PERT charts.

The beauty of computerized management is that you can automate the tedious process of designing, drawing, and calculating the various interacting elements and putting them all together in presentable form. You can try out changes without having to redraw an entire chart. And, you can store records of prior projects and have a handy knowledge-base to assist in future projections.

First Street Water Main, Revision 10, 1/1/83
Prepared by Mike Posehn

Job Description	Jan	Feb	Mar
1 Purchase the pipe	5	12	19
2 Dig 1st part of trench	0	1	2
3 Purchase fittings	0	1	2
4 Lay 1st part of pipe	0	1	2
5 Dig 2nd part of trench	0	1	2
6 Fill 1st part of trench	0	1	2
7 Lay 2nd part of pipe	0	1	2
8 Fill 2nd part of trench	0	1	2
9 Repave street	0	1	2
10 Repair sidewalk	0	1	2
11 Project completed	0	1	2
Operating Engineer=1	1	1	0
Laborer=3	3	3	4
Welder=0	0	0	2
Total manpower level=4	4	4	6
Manpower cost=2.5K	2.5K	2.5K	3.5K
Direct cost=75K	0	5K	13K
Total cost=77K	2.5K	7.5K	16K

Symbol - Explanation
 >-----> Duration of a normal job
 >.....> Slack time for a normal job
 >====> Duration of a critical path job
 >:----> Duration of a completed job
 * Job with zero duration
 0----- Job with no prerequisites
 >----X Job with no successors

Project management in the CP/M world . . .

MILESTONE

Organic Software; Version 1.14; CP/M-80; 64K • CP/M-86; 128K • IBM PC and MS-DOS compatibles; 128K; copy-protected? NO; \$295; Digital Marketing, 2363 Boulevard Circle, Suite 8, Walnut Creek, CA 94595; 415/947-1000.

STEWART BRAND: Someone loaned me a copy of MILESTONE, a critical-path method scheduling program. I nibbled at it tentatively,

A project such as laying a new length of water main can be studied, analyzed, scheduled and budgeted using a project manager like MILESTONE. Even the levels of expertise and wage levels of workers can be considered as seen in this critical-path report.

like a cat. It's pretty inviting. Soon I was inventing tasks and durations and prerequisites and pay levels, and the thing lined them up neatly, and correlated them, and prominently displayed the critical path of tasks that *had* to be done in sequence and the minimum time that would take. "Wanna print out?" it offered. "Sure." The printer snarled for a full minute, and I had a four-way analysis of the whole operation.

Instant scheduler. I'd messed around the subject of critical-path method for years, read and reviewed the books, spoken well of the technique. Now I was doing it. Power. Not just to me: to anybody in the shop who wanted to use the clarity and flexibility of a mutually made and understood schedule.

Visible training wheels . . .

MACPROJECT

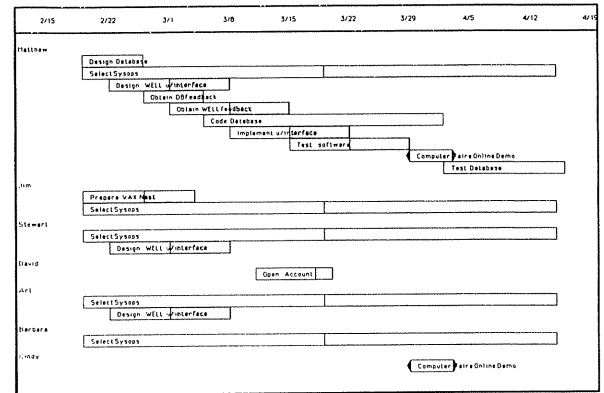
Version 1.0; Macintosh; copy-protected? NO; \$125 (street price \$81); Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.

SHARON RUFENER: You start by drawing a "Schedule Chart"—dragging boxes from a menu onto a window area, typing names (tasks) into each box, specifying which tasks are milestones, then connecting them with lines to show the order in which things must be done (dependencies).

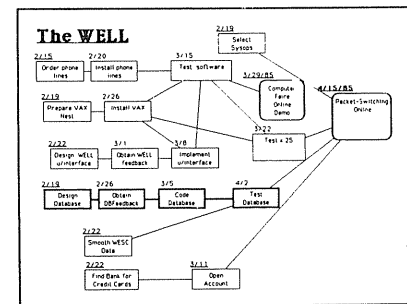
Next, you bring up a form to enter duration (minutes, hours, days, weeks, or months) and resources (people or equipment, usually) for each task. The result is a PERT chart that shows starting and ending dates for each task and highlights the critical path. Or, switch to Gantt charts and view the same project from other perspectives—a Task Timeline arranges activities chronologically; a Resource Timeline groups tasks by resource. You can have six resources per task, 50 resources per project, 200 tasks if you have 128K RAM, 2000 tasks if you've got 512K.

You can enter fixed costs and income for each task and costs per resource to generate two tables: a Cash Flow Table for a running "balance sheet" by time interval; a Project Table shows price per task. Change any part of the underlying information and the program automatically recalculates everything.

You couldn't send a rocket to Saturn with this program, but you could plan a wedding or build a cottage. It's unsuitable for complex projects because it's single-layered; you can't have sub-projects. However, being able to see a project take shape on the screen is probably the most sensible way to visualize and work through any problem involving entities and relationships.



Two views of Whole Earth's budding WELL project (p. 148) drawn by MACPROJECT. The Gantt chart (top) lets us see what should be going on at any given time. The PERT chart (bottom) shows how each task relates to the overall project (critical tasks are highlighted by bold boxes). One of the great things about project management software is that you can convince yourself that wildly improbable things are likely to happen.



Brainstorming with PERT charts . . .

SUPERPROJECT

IBM PC/XT/AT and compatibles; 256K; 80-column display; copy-protected? NO; \$395 (street price \$200); Sorcim/IUS Microsoftware, 2195 Fortune Dr., San Jose, CA 95131; 408/942-1727.

SHARON RUFENER: SUPERPROJECT is the software to get if you are more interested in defining a project before the work starts than in tracking and tweaking the ongoing activities.

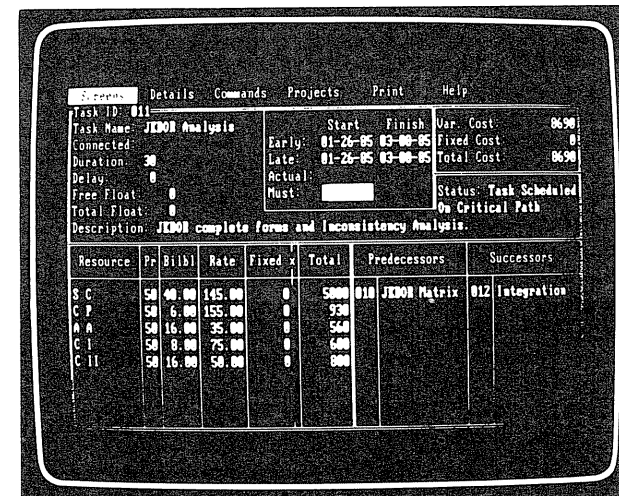
WOODY LISWOOD: This program is a winner. I was able to start it up and use it without ever looking at the documentation and I cannot say that about any other project manager I have used. One feature usually lacking in these programs is proportional use of resources—a way to include people who work on a project over ten days, but only for two hours a day. SUPERPROJECT is fantastic in this area. You can assign a resource to work all available time, a percentage of the time, or specify exactly how many hours will be worked at what rate.

You control the program. Since changes can be recalculated continuously or when you've finished, you can "what-if" project costs. You can arrange data in a variety of ways: by date, alphabetically, or by node number.

SUPERPROJECT prints out nice PERT and Critical Path charts; Resource Allocation and other reports are printed in SUPERCALC (p. 67) spreadsheet format. To get maximum use you will want to transfer data to a spreadsheet—directly to SUPERCALC2 (or greater) or a spreadsheet that uses DIF format; via a file transfer program (see pp. 72, 156) to another type of spreadsheet.

My only complaint is that I found the format for the Critical Path/Gantt chart confusing and hard to read because it uses letters to specify paths instead of arrows and symbols.

SHARON RUFENER: SUPERPROJECT is the best conceptual tool on the IBM PC for project definition. There's no better way to get an overview of a project than by brainstorming with PERT charts.



SUPERPROJECT lets you look at all the details of a task at once; any changes made here will be reflected in the overall project. On a color screen, project paths are differentiated very effectively by color.

Gantt charts and project control . . .

TIME LINE

Version 2.0; IBM PC/XT/AT/3270 and compatibles; 256K; 2 disk drives or hard disk; copy-protected? NO; \$495 (street price \$300); Breakthrough Software Corp., 505 San Marin Dr., Novato, CA 94947; 415/898-1919.

SHARON RUFENER: This heavy-duty manager is the best one to get for monitoring large projects and keeping complex activities under control. It permits gaps and overlaps between dependencies; allows task splitting and priorities; reschedules backwards from deadlines; sorts on user-defined criteria; and can "filter" (extract) the critical path as a separate file. It can store unlimited tasks per schedule with each one having unlimited dependencies.

TIME LINE uses the Gantt chart as its main tool and can generate PERT charts as a secondary view of the situation. The charts can be multi-level—you can break large jobs into sub-projects.

TIME LINE allows partial allocation of resources, resource pooling, and resource histograms. Reports show what's happening during a particular time frame, point out conflicts, and can serve as assignment sheets. You can also get summary reports, and planned vs. actual reports to see manpower and costing variances.

The costing capabilities are more powerful than competing programs. Cost reports can be generated by resources, tasks, week or month. You assign hourly, daily or weekly rates to people resources; fixed, variable or miscellaneous costs to other resources; and up to eight costs per task. Costs for each task can be accrued at the beginning of the task, prorated, or calculated at the end.

TIME LINE offers menus similar to those in 1-2-3 (p. 68), context-sensitive help, data-entry forms, and exemplary documentation. It handles data transfer easily to and from 1-2-3, SUPERCALC3 (p. 67), MULTIPLAN (p. 70), DBASE II (p. 85), and (soon) DBASE III (p. 86).

This TIME LINE Gantt Chart lists the project tasks that match the two specified criteria: projects assigned to Jo and CM.

Software and Services for Specific Businesses and Professions

SHARON RUFENER: Thousands of software packages have been created to serve specific business needs . . . almost every one created in-house by a lawyer, a wholesaler, a farmer, a booking agent, or some other computer purchaser/user/pioneer who forged his or her own solution to the problems of paperwork and information management.

Some people wrote programs from scratch (or hired programmers to do it for them). Others used an existing "productivity tool"—usually a database program such as DBASE II (p. 85), or a spreadsheet package like 1-2-3 (p. 68), and created a "template" or an "application." This type of cottage-industry software seems to share some common traits: it is inelegantly packaged; not well marketed; the documentation is amateurish; most of it runs on out-of-date CP/M machines, often slowly. On the other hand, each program was created to serve a real-life need by someone who understood that business.

A second type of program comes from small software firms who have taken their generic accounting packages and adapted them to various types of business needs. Since these products are designed for everyone and no one, they tend to be less than ideal.

Finally, we are starting to see more software professionally produced and tailored to specific types of businesses.

How do you find out what's available for you? Computer publications targeted at the mass market rarely devote precious space to software targeted for particular niches. Trade journals, however, are starting to carry ads for a few of the products and an occasional article describing a particular program. There are new magazines emerging which focus entirely on industry-specific uses of computers and software. These publications are caught in a journalistic dilemma—they depend on the products they are covering for much of their advertising revenue. Objective and hard-hitting coverage is not a practical course for them, so their articles tend to resemble publicity releases rather than critical reviews.

Finally, for the modem-equipped, there are national database services, bulletin boards, and online conferences for gossip-collecting. The databases have hardware and software information, news stories, market and technical information, and, often, online programs you can use from your computer. The bulletin boards and conferences let you send and receive messages and make personal contacts across the continent. Check the Telecommunicatng section's recommended online databases (Tapping into Databanks, pp. 143 to 145), and services like ONE-POINT and .MENU (p. 141) for more information.

Online data for doctors . . .

PHYCOM ★

Free to participating physicians only; 24-hour service; PDR updated daily; Fisher-Stevens, Inc., Campus Rd., Totowa, NJ 07512; 800/922-0352 or, in NJ, 800/221-4225.

//MEDX ★

Available at normal Dow Jones rates (see table, p. 140); Dow Jones/News Retrieval, P.O. Box 300, Princeton, NJ 08540; 800/257-5114 or, in NJ, 609/452-1511.

COLLEAGUE ★

\$50 registration; plus \$15/monthly minimum; plus \$32/hour (6 a.m. - 6 p.m., local time) or \$20/hour (after 6 p.m., weekends and holidays); BRS/Saunders, Colleague, 1290 Avenue of the Americas, New York, NY 10019; 800/468-0908 or, in PA and outside continental U.S. (call collect), 215/527-4155.

RUSEL DeMARIA: There are several telecommunications databases available to doctors, including BRS (p. 143), DIALOG (p. 143), and PHYCOM—a free bulletin board system provided by the pharmaceutical industry for information about drugs.

SHARON RUFENER: Doctors can also get medical and drug information on more than a thousand illnesses from the same service which helps them keep track of their investments—Dow Jones News Service (p. 142). This informational database is called //MEDX, and although it does not diagnose illnesses, it provides supplemental background data.

Another online medical library, called COLLEAGUE, supplies medical literature in the form of books, journals, indexes and abstracts.

Newsletter for computerized law offices . . .

LOGIC ★

\$120/yr (12 issues); \$95/yr new charter subscribers; LOGIC, 3315 Sacramento, Suite 407, San Francisco, CA 94118; 415/923-1747.

SHARON RUFENER: So far, we haven't seen a computer magazine for lawyers, but here's a monthly newsletter which covers the territory. It's called **LOGIC** (Law Office Guide in Computers), and it's published by the computer consulting firm of Remer, Remer & Dunaway. Since it carries no advertising, it's in a position to give tough reviews to software products.

Meeting house for non-city folk . . .

FIRST NATIONAL 800 DATA BANK ★

\$15.50/hour; U.S. Soil, Inc., P.O. Box 926, Salida, CO 81201; Voice: 303/539-3535, data: 800/325-0476.

BARBARA ROBERTSON: This inexpensive bulletin board system started out as a public service to farmers and has now expanded to include information from, for, and about several professions. Although not entirely free now, there are no sign-up or monthly charges. Since it was designed to serve the rural community, the service works with an 800 number rather than using Telenet, Usenet, or other services which usually involve toll-charges once you leave urban areas. It has approximately 4000 programs available for downloading and offers time credits to those that upload farm-oriented programs. Special interest group conferences range from computer oriented topics, to law, to dairy farming.

Online data for farmers and ranchers . . .

AGNET ★

\$50 annual membership (including monthly newsletter); charges based on usage (average \$25-\$35/hr); AGNET, University of Nebraska at Lincoln, Lincoln, NB 68583-0713; 402/472-1892.

SHARON RUFENER: AGNET is to farmers what the Dow Jones News/Retrieval (p. 142) database is to investors, and more. It provides daily quotes on commodities and futures contracts, and you can have them chart selected price information for you if you wish. Also available on their database are USDA reports, trade information, and news releases. They have a library of online programs available for members to use for financial and production management analysis.

AGNET also offers online conferences around general and specific topics and electronic mail. Talk to participants who share your interest in soybeans or llama breeding; send messages back and forth to individuals, groups, or everyone. Wish someone happy birthday, or start a political movement.

Two bi-monthly agricultural magazines . . .

FARM COMPUTER NEWS ★

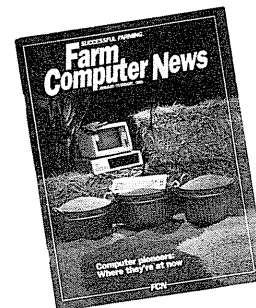
Farm Computer News; \$20/yr (6 issues); Meredith Corp., P.O. Box 10231, Des Moines, IA 50336; 800/247-2504 or, in IA, 515/284-2349.

AGACCESS ★

\$8.50/yr (6 issues); AgAccess, 615 Merchant St. Vacaville, CA 95688; 707/448-8287.

SHARON RUFENER: Articles in **Farm Computer News** are aimed at the farmer with a microcomputer and cover hardware, software, and various types of farming applications. It also includes industry news, first-person interviews with computerized farmers, and lots of software ads, making this magazine a good marketplace forum for shoppers.

The **AgAccess** magazine/catalog features reviews of books and software for horticulturalists and farmers along with listings of related computer resources and services. The publication is an adjunct of a mail-order business, so you can buy many of the things mentioned from them.



Heavy duty construction tool . . .

CONSTRUCTION MANAGEMENT

Version 4.0; IBM PC/XT compatibles; 192K
 • TRS-80 Models III and 4; 48K; modem and 5MB
 hard disk recommended; copy-protected? NO;
 \$5995; Small System Design, Inc., 1120 Oakdale
 Place, Boulder, CO 80302; 303/442-9454.

JOE TROISE: What's this? More than \$5900
 for software?

Well, as the tired old adage goes, you get
 what you pay for, and what you're getting is a
 package that can control just about every
 facet of the construction business.

I have used the CONSTRUCTION
 MANAGEMENT package for a year. It was put
 together in conjunction with builders, and the
 software reflects its "on-the-job" origins,
 being developed in part by people who know
 how to swing a hammer.

The system is divided into three major
 components—job control programs, payroll
 programs, and accounting programs—which
 work together to keep track of your business,
 from comparing bids with actual costs to
 handling your checking accounts. The net
 effect of all this interconnection is that every
 cost you incur, every penny you spend, is
 accounted for and incorporated into records
 and reports that not only store the data but

logically interpret it for you. This gives you an
 accurate assessment of your business's
 financial health. By making one entry into the
 payroll program, you print a check for an
 employee, calculate all the deductions,
 compute the tax records, create accounting
 records, add the payroll costs to the
 appropriate jobs, and update your billing file.

Included is a word processor (LAZYWRITER,
 which is a good one). Upcoming additions to
 the package include critical path scheduling
 and a materials take-off function, both of
 which are tasks generally found only in very
 expensive systems.

This package is a bit intimidating, but it
 comes with excellent documentation. The
 writers assume that you know how to run a
 computer, that you know accounting, and that
 you can competently provide the large
 amount of cost information that you must
 tediously enter (but just once) from whatever
 bid books or life experience you have. So plan
 to spend a few days plugging that information
 in.

True, you will have spent upwards of \$10,000
 by the time you buy all you need in software
 and hardware. But this package is not merely
 an "aid" to your business. It literally runs the
 whole show, with you in the director's chair.
 Make damn sure you're ready for that. If you
 are, no building package I am aware of even
 comes close in terms of price, power, and
 reliability.

	Materials	Labor	Base	Sub	Equip	Other	Total
BUILDING PERMIT	69.00	0.00	0.00	5,914.16	0.00	0.00	5,983.16
EXCAVATION BY MA	575.00	0.00	0.00	1,483.50	0.00	0.00	2,058.50
PERIMETER DRAIN	421.13	377.53	0.00	0.00	0.00	0.00	798.66
CONCRETE	3,875.56	2,874.54	143.75	2,300.00	0.00	0.00	9,193.79
PATIOS	262.20	278.37	0.00	0.00	0.00	0.00	540.57
WALL COATINGS AN	155.25	0.00	0.00	0.00	0.00	0.00	155.25
FLOOR FRAMING	2,503.00	2,269.29	23.00	0.00	0.00	0.00	4,795.29
SUB-FLOOR	632.50	415.83	0.00	0.00	0.00	0.00	1,048.33
PAVING	2,976.20	2,773.11	0.00	0.00	0.00	0.00	5,749.31
LANDSCAPING	1,546.75	1,682.76	0.00	10,350.00	0.00	0.00	12,579.51
NAILS & STAPLES						0.00	345.00
LANDSCAPING						0.00	10,350.00
	Materials	Labor	Base	Sub	Equip	Other	Total
Total Bid for Job -	69,514.76	38,072.50	895.85	76,549.46	0.00	0.00	185,032.57

When "architractor" Tom Lyon built a house for
 himself, he estimated the retail costs as if he
 were his own client, using the CONSTRUCTION
 MANAGEMENT programs. This spreadsheet
 section covers expenses; on other jobs similar
 spreadsheets help him put together bids.

Software for real estate offices . . .

BASIC PROPERTY MANAGEMENT SYSTEM

Version 3.14; \$395 (street price \$275).

REAL ESTATE OFFICE MANAGEMENT

Version 2.0; \$395.

REAL ESTATE TOOL KIT

Version 2.0; \$245.

for all: IBM PC/XT/AT and compatibles • Apple II
 family; Apple III (in emulation mode; not
 available for REAL ESTATE TOOL KIT); 2 disk
 drives; copy-protected? YES; Yardi Systems, 3324
 State St., Suite O, Santa Barbara, CA 93105;
 805/687-4245.

DICK YORK: You can computerize your real
 estate office for a modest investment in both
 cost and learning. Yardi Systems' three
 related packages have similar screens and
 logic.

Before committing our office to a
 computerized property management system
 a few months ago, I looked at about ten
 different systems. Yardi's looked too good to
 be true—it claimed to do too many things
 too cheaply—so I called them up. Al Yardi,
 the author, answered the phone and my
 questions were answered. Al is a property
 manager who wrote this program to fill his
 own needs. I like applications that are user-
 written—professional programmers usually
 have no idea what users really need.

Yardi Systems would not be adequate for a
 large professional property management
 company, but is more than ample for a
 smaller company or individual owner. It
 expands easily and can accommodate as
 many accounts as you wish. It writes
 checks, including recurring payables. It will
 produce a customized message on tenant
 statements. We use it to track payments on
 notes, mortgages, and land leases as well.
 Yardi didn't design it for this, but the system
 is flexible enough to alter for your own
 accounts.

There are "advanced" and "deluxe" models
 of PROPERTY MANAGEMENT available. Our
 office upgraded to the "advanced" version,
 and we would not go back to the "regular"
 strength version, nor would we recommend
 it, now that the better version is here.
 "Advanced" includes Tenant History (a
 must), General Ledger, and a sort function
 for 1099s, including the ability to interface
 with word processing. This system was
 already a winner—now it's an Olympic Gold.

OFFICE MANAGEMENT is a general
 accounting package, plus salespersons'
 individual histories and escrow control.
 Control over the office and, more
 importantly, the salespeople, is at your
 fingertips.

The TOOL KIT is the rest of what a real
 estate office needs: Investment Analysis, Buy
 vs. Rent, Tax Analysis, etc. Easy to use, fast
 to learn. The Buy vs. Rent program is the
 best I've seen so far. The bottom line "cost
 of owning vs. renting" is by far easier and
 clearer to understand than any other similar
 program to date.

Software for builders . . .

MASTER BUILDER

Smith and Omeara; Version I: Apple II + /Ile; 64K; \$800; Version II: Apple IIe/Ilc; IBM PC and compatibles; 256K; \$1250; Version III: MS-DOS (hard disk version); 256K; \$2000; 2 disk drives; 80-column printer; copy-protected? YES; Omware, 140 High St., Sebastopol, CA 95472; 707/823-7783.

KIRBY ODAWA: There is an irony to the notion that a software program for contractors might be perpetually "under construction." Yet THE MASTER BUILDER, like a summer cottage that grows with the family, has expanded from a simple bookkeeping package into a comprehensive, integrated accounting system. The program evolved through the authors' willingness to accommodate the requirements of contractors from a wide variety of building professions. If you're having difficulty finding a system that is flexible enough to manage your business, this program may be the tool you need.

THE MASTER BUILDER provides a complete financial management system. It will maintain and balance your books, produce job estimates, track job costs, generate financial statements, track your payables and receivables, and handle the payroll.

It is available in three progressively capable versions, offering different levels of detail and sophistication to builders, from the handyman to the corporation. For example, Version I tracks balances on up to 40 accounts receivable, while Version III provides for the aging and retention of up to 500 accounts.

Just as a customized home is often strikingly interesting, so MASTER BUILDER is unique in a number of ways. For example, you may simply record your transactions as checks or deposits (in single-entry form), and MASTER BUILDER will automatically create records in double entry format. The program checks your math on account spreads, insuring that your books will always be balanced. The payroll module is certified, and will account for piece-work in addition to salary and hourly rates. A report generator gives you the ability to customize your payroll reports, invoices, and statements, increasing your control over the reports that represent your business.

There is a demo package, a "crippled" version of the real thing, available for \$35.00, so you can try it on to see if it fits before you buy.

Real estate analysis . . .

INVESTMENT REAL ESTATE ANALYSIS SYSTEM ★

Wayne Pratt; most MS-DOS machines; 128K • Apple II + /Ile/Ilc; 48K; copy-protected? NO; Pratt Software, 822 North Sheppard, Kennewick, WA 99336; 509/783-5653; Modules available: Volume 1: INCOME PROPERTY ANALYSIS, \$250; Volume 2: MORTGAGES, DEPRECIATION, AND FINANCIAL COMPUTATIONS, \$100; Volume 3: UNDEVELOPED LAND ANALYSIS, \$150; Volume 4: LEASE/PURCHASE ANALYSIS, \$150; Volume 5: SMALL BUSINESS VALUATIONS, \$100; Demo Disk (Vols. 1-5), \$10.

DICK YORK: The INVESTMENT REAL ESTATE ANALYSIS programs take the tedium out of financial projections. They are quicker and more accurate than manual methods, and you can get the results on one page.

Pratt's INCOME PROPERTY ANALYSIS program, unlike many others, will give you the results even if they are negative—a useful feature for examining the situation and seeing what needs to change.

Pratt's programs come in modules that can be purchased separately. I use the FINANCIAL COMPUTATIONS models a lot. It's the easiest and best way to calculate discounted values or yields on a wrap.

Software for salespeople . . .

MARKETFAX ★

Version 2.21; IBM PC/XT/AT and compatibles; 128K • CP/M 80; 64K; 2nd disk drive; copy-protected? NO; \$695; Scientific Marketing, Inc., 3303 Harbor Blvd., Suite G-9, Costa Mesa, CA 92626; 714/957-0225.

KEN MILBURN: MARKETFAX is a special database program for tracking sales leads, prospects, and customers; a sophisticated and comprehensive tool for managing the sales process.

In one way, it behaves like an accounting package—each step toward the sale is recorded in an audit trail. You can look back and see what it took to sell a given customer—a big help in setting up sales projections based on reality instead of guesswork. In another way, it acts like a sales manager, forcing the salespeople to learn and follow all the critical steps of the sales process.

Want to automate the process of telemarketing? MARKETFAX will automatically dial your leads from a call-date list, and the appropriate "script" will appear on the screen, alongside of their vital statistics. When you get a promising

response, you can add it, along with your notes, to your prospects list while you are on the phone.

Form letters get generated automatically at all the appropriate times. Eighty-three prototypes are included for your convenience, and they can be modified to suit your general needs or to make them more specific to a given client. You can use your word processor to make original forms, letters, and documents to incorporate into your MARKETFAX system.

MARKETFAX files are written in standard ASCII (straight text) format, and can be copied into other software packages, such as a relational database or accounting system.

I reviewed Version 2.2. A speedier and more sophisticated version is due to appear in the Summer of 1985, as is a multi-user system.

The program is menu-driven. Novice users should have no trouble using it. Warning: the program will be useless to those who lack the time or the discipline to enter data on a regular and timely basis. The reward for the effort is that added sales could easily pay for both the computer and the program.

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=====
March 4, 1983 / Bill Johnson / ABC ELEC. / Santa Ana, CA / CM:c1:0006
Robert T. Price / Western Regional Manager
=====
SHOW LEAD CALL IN      R:R/A      A:CALL BACK      [A]
Prospect referred to us by Headquarters
Called us on the at the office
Has over 100 employees
=====
March 4, 1983 / Ms. Sue Atkins / CUMMINGS R US / Santa Ana, CA / CM:c1:0006
Robert T. Price/Western Regional Manager
=====
SHOW LEAD CALL IN      R:R/A      A:CALL BACK      [A]
Prospect referred to us by Headquarters
Called us on the at the office
Needs Multi User system
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MARKETFAX can create a log of all transactions between the sales department and prospects. Just as an accounting system captures an audit trail of financial transactions, MARKETFAX records this "communications audit trail."

DRAWING

Rik Jadrnicek, Domain Editor

RIK JADRNICKEK: Stick around if you like to doodle, draw cartoons, illustrate books, draw block diagrams or flowcharts, do space planning, develop advertising copy, design circuit boards, design buildings, or create any other casual or professional drawings. In this section you'll discover microcomputer software and hardware useful for graphic art, drafting, and design. Computer-aided design (CAD) is swiftly coming of age on microcomputers . . . at last, you really can draw with equipment that's reasonably priced.

Why are graphics programs becoming such an important part of a business software library? Ever catch yourself reading a magazine backwards? I do, and I suspect I'm in the majority. Perhaps it's simply the more natural, quicker path to the "bottom line" in this age of information overdose. I look at the pictures first, read the captions, look at any charts I find, and then if I'm still interested I read the text. It's the same with business reports. But before microcomputer graphics programs were available, a business had to hire an artist to depict the bottom line in full color. Today, bar charts and line graphs pop out at the push of a button.

Like a good word processor, a good graphics processor will soon be a mainstay of your software library. Microcomputers have placed the masterful control of numbers and text at our fingertips, and now they can give us that same degree of control over pictures.

BARBARA ROBERTSON: Word processors and spreadsheets were a giant step up from typewriters and adding machines, as typewriters and adding machines were a giant step up from handwriting. But picture processing has never had a mechanical middle-step equivalent to a typewriter or adding machine. With picture processing, you leap straight from pen on paper into the magical world of microcomputing: brush and canvas with a brain. In picture processing, just as in word processing or spreadsheet analysis, you can cut, copy, move, erase, and save all or pieces of your creation to be used again in a variety of forms. But you can also shade, texture, expand, contract, zoom in to toy with what was once just a speck on the screen; draw a straight line without a ruler; vary the size of your pencil, pen, or brush; paint with a palette of colors—and change anything in the blink of an eye.

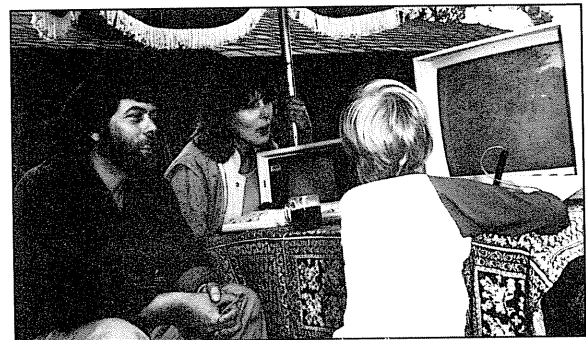
RIK JADRNICKEK: Drawing software falls neatly into three categories: *painting* (for artists), *two-dimensional drawing* (for architects, engineers, space planners and drafters) and *three-dimensional solids modeling*. You'll find all three in this section, in that order.

THE FUTURE DRAWS NEAR

STEWART BRAND: Every month personal computers have more memory and more storage at less cost. All programs benefit to some degree, but the ones that gain the most are the graphic programs, because it's taking them over the barrier between impossible and possible. And once possible, these programs are going to take off, I believe. Personal computer users are biased toward graphics, feel rewarded by them, and reward them right back with enthusiastic market support.

As a result, stuff in the Drawing section is probably neck-and-neck with Managing (the integrated packages) as one of the fastest-moving nags in the software horserace. Our coverage, necessarily, lags behind. Fortunately, Rik Jadrnicek covers the cutting edge of the field professionally, so he is able to report in detail on microcomputer graphic capabilities that may seem on the other side of the impossible barrier to many of us now but are rapidly coming within financial reach as we speak.

BARBARA ROBERTSON: Rik waited, watched, impatiently, yearly, for microcomputer graphics. Bought one of the first Apples and VISICALC for the analytical capabilities (a house designer and builder, he was immersed in the vagaries of California's real estate market), but mostly because he could create charts. He quickly discovered two things: analysis that formerly took hours happened in five minutes on the Apple; and he had a knack for fiddling with programs and sharing his enthusiasm. A true entrepreneur, he turned this sideline into a business, giving seminars on spreadsheet modeling, reviewing software for magazines, putting together systems for small businesses. Meanwhile, he kept



Rik Jadrnicek and family.

searching the marketplace for graphics packages he could use to draw architectural plans, to paint. About a year and a half ago it all clicked together—sophisticated drawing software landed on microcomputers. And Rik was ready. His clients are now artists, architects and designers. Is he content? Nope. Now he's tapping his feet waiting for software that lets him play with movies on the monitor—fully three-dimensional animated pictures of the world moved onscreen from a camera, created with the microcomputer, or both—an altered reality. I think he'd even like to carry this bit of magic in his briefcase. Who knows? Maybe he'll review it in the next **Catalog**.

STEWART BRAND: Humans drew before they wrote. For much of our brain, I suspect, drawing *is* thinking. It may be that computers will be releasing that brainpower in the next few years, as we learn to express ourselves graphically as easily as we use the car or telephone. I don't know that we'll get back to the exquisite artistry of the beasts drawn on the walls of the Lascaux Caves, but I wouldn't rule it out either.

FIRST YOU NEED THE HARDWARE

RIK JADRNICKEK: Whether you're shopping around or already own a computer you can use for painting, graphic design, drafting, or business graphics, understanding the tools that make computer graphics possible can help you comprehend the possibilities and potential of computer graphics software. In addition to evaluating the usefulness of a software program itself, look at how much attention the publisher is paying to your hardware needs, as well. If a program runs on a wide variety of computers and supports many boards, plotters, printers, and input devices, you'll have a wider choice (quality and price) of hardware tools. Also, if you want to share data with other people, choose a program that runs on the same type of computer (so far, you can't trade picture files between a Macintosh and an IBM PC, for example).

In a nutshell, you begin to draw using a graphic input device and/or the computer keyboard much as you would a brush or pencil. The software provides a palette of colors and brush types, T-square, triangle, compass, grid, framework, and a variety of other drawing tools. A graphics card (also called graphics board, graphics processor, and frame buffer) translates your work into an image on a monochrome or color graphics monitor. The computer saves your creation in a file on a floppy or hard disk from which you retrieve and edit it later. (We recommend a hard disk for professionals—pictures use up a lot of storage space.) As for output, drawings can be printed, plotted, photographed, or translated into video images.

The drawing instruments . . . Input Devices

BARBARA ROBERTSON: So how do you draw on a computer monitor? Although it's possible, using a gadget called a light pen, to actually draw right on the surface of the monitor, we don't recommend it—too imprecise and arm-wearying. Nor do we recommend joysticks—they're better for games. Instead, here are our favorite ways of putting drawings into a computer:

Keyboard—Least expensive (you need one anyway) and least desirable for artists and drafters, but a possible choice for engineers who want to type in exact data points, relative distances, and commands. Artists would use the cursor arrow keys, drawing lines as the cursor travels across the screen, then function keys to fill in areas with colors or patterns.

Mouse—Roll the little critter around and the cursor follows, drawing as it goes; click the mouse button(s) to enter commands. Mice are particularly good for finding and selecting commands (fill this area with color, cut and paste, etc.), take little desk space, are reasonably priced (\$199 and up), and can often be used with other software applications (word processing, spreadsheets, etc.). Recommended for business graphics, drawing, and sketching—not for drafting since they give only relative X, Y coordinates.

Digitizing Tablets—As close as you can get to pencil and paper. Using a stylus (pencil-like) or puck (mouse-like with cross-hairs), you "draw" on the tablet; and as you draw, the cursor draws on the screen with a precision that bears a direct relation to the price you pay for the tablet. The KOALAPAD (p. 131) is fun for sketching and pointing, but not recommended for professional artists. Higher priced (\$500 and up) tablets

have a higher resolution than mice, are more precise and have absolute X, Y coordinates. Digitizing tablets are the best and most expensive choice for artists and the only reasonable choice for drafters.

The best buy by far is the Hitachi 11-by-11-inch Tiger Tablet, which includes its own power supply and stylus (\$995; Hitachi America, Ltd., 950 Benicia Ave., Sunnyvale, CA 94086; 408/773-8833).

Image Digitizers—Now here's a bit of magic. With these devices, you can transport a photograph or drawing (or text for that matter) or video image into your computer and have it show up on the monitor. And you can actually retouch or completely alter the photograph, create a parts library, or put a picture into a document. There are two kinds of image digitizers: optical scanners and video digitizers.

Optical scanners range from the inexpensive (\$229) Thunderscan, a cartridge that fits into an Apple ImageWriter printer and reproduces (on a Macintosh screen) any picture flat enough to roll through the printer; to the more expensive (\$3950) Datacopy Model 700, a "flat-bed" scanner that looks like a copy machine in miniature and lets you move pictures from paper (8½" x 11") to your IBM PC screen and insert them into documents. Using CADCAMERA (p. 135), the Datacopy 700 can convert drawings into images that can be edited with AUTOCAD (p. 135)—possibly useful for building a parts library.

Video digitizers work with video cameras. Point the camera, push a button, and an image shows up on a computer monitor—or use an image stored on videotape. They work in combination with special software to translate video signals into digital images. For the IBM PC and compatibles, we recommend the PC Eye board; for the Macintosh, MACVISION.

You won't get resolution good enough for high-quality publication with any of these digitizers, and they're not fast, but they're good enough for newsletters, memos, and mock-ups.

Thunderscan: Andy Hertzfeld. Version 1.3. Not copy-protected. \$229; street price \$183. Macintosh. Requires ImageWriter printer. Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563; 415/254-6581.

Datacopy Model 700: Version 1.2. \$3950 (includes flat-bed scanner, board, and software). IBM PC/XT/AT. Requires 640K, Hercules Graphics Card; hard disk recommended. Output to QMS and Hewlett-Packard laser printers, Epson dot matrix printers. Datacopy Corporation, 1215 Terra Bella Ave., Mountain View, CA 94043; 800/556-1234 ext. 96 or, in CA, 800/441-2345 ext. 96.

MACVISION: Bill Atkinson. Version 1.1 Not copy-protected. \$400; street price \$226. Macintosh. Requires video input source. Koala Technologies, 2065 Junction Ave., San Jose, CA 95131; 800/562-2327.

PC Eye and Imagit image editor: \$750-\$2000; IBM PC/XT/AT/compatibles. Requires video input source. Chorus Data Systems, Inc., 6 Continental Blvd., P.O. Box 370, Merrimack, NH 03054; 800/624-6787.

The palette and the canvas . . . Graphics Cards and Monitors

Unless your computer is a closed box, you can choose the resolution and number of colors you want to work with. Generally, the higher the resolution and the more colors, the higher the price of both graphics cards and monitors—the two work in combination. They *must* work in combination. You have to carefully match band width and horizontal scan rates of cards and monitors or, at best, you'll waste money; at worst,

you'll fry your monitor. You don't have to know what the words mean, just read the specs for both and be sure the numbers match.

The ideal combination for professionals is a system that gives them high resolution—600 by 400 pixels (picture elements)—minimum, more than 16 colors onscreen at once and flicker-free viewing (the board must produce a “non-interlaced signal”). Board and monitor combinations that do this are now available and expensive—too new and expensive so far to have much software support.

Meanwhile, here are some alternatives: The Hercules graphics board (\$499, street price \$319; Hercules Computer Technology, Inc., 2550 Ninth St., Berkeley, CA 94710, 800/532-0600) gives you high resolution (720 x 348) monochrome graphics (which may be fine if you're doing line drawings), and it's very easy to install. The Tecmar Graphics Master board provides 600 x 480 resolution, 16 onscreen colors, and an interlaced signal (\$695, street price \$495; Tecmar, Inc., 6225 Cochran Road, Solon, OH 44139; 216/349-1009). Installing it is not for the faint-hearted, but since it emulates standard IBM color graphics it can be used by a wide variety of software programs. To reduce flicker, you can buy a special long-persistence phosphor monitor (\$695-\$1500). The IBM Enhanced Graphics Adapter is a good, well-supported card with 640 x 200 resolution and 16 onscreen colors; 640 x 350 monochrome (\$524). Also, see the Hardware section (pp. 14 to 21) for more information on graphics cards and monitors.

The artist's copy machine . . .

Output Devices

You have four choices: print drawings with dot matrix, ink jet or laser printers; plot them with plotters; photograph the screen; or transfer them to videotape.

We recommend pen plotters for drafters this year. Maybe by next year the price of the new electrostatic plotters (like having your own blueprint machine) will drop. The best pen plotter value is the Calcomp 1043, an “E” size plotter with 8 pens for \$8495, plus \$225/quarter for the warranty; a similar plotter (also good) from Hewlett-Packard costs nearly twice that. Another good buy is the Houston Instruments DMP 52 MP 14-pen plotter for \$5995—smaller paper, more colors. A plotter's price depends on three factors: the maximum paper size it can handle, the number of pens (and therefore, colors), and its speed. Speed and paper size will be most important to drafters.

Calcomp, 2411 West La Palma Ave., Anaheim, CA 92801; 714/821-2857 • Houston Instruments, P.O. Box 15720, Austin, TX 78761; 312/835-0900 • Hewlett-Packard Marketing Communications, 16399 W. Bernardo Drive, San Diego, CA 92127, 619/487-4100.

If you're using a computer for rough layouts and sketches you might be satisfied with black and white images from inexpensive dot matrix or ink jet printers. Laser printers are more expensive and print in a higher resolution. Apple's LaserWriter (p. 21) is the best—prints both graphics and text in a resolution (300 dots per inch) that begins to approach typeset-like print quality (2500 dots per inch) at a fraction of the price. (See p. 126 for a sample.)

If you want to print business graphics in color, we recommend color printers rather than plotters (lower price for comparable quality): the Diablo C-150 ink jet (\$1295; street price \$980; Xerox, 910 Page Ave., Fremont, CA 94537; 415/498-7769)

requires clay-coated paper, but it's the best (pictures on p. 130 and 132); or the Epson JX80 (\$895, street price \$550; Epson, 2780 Lomita Blvd., Torrance, CA 90505; 213/539-9140)—lower quality color, but (unlike the Diablo) it can be used for correspondence-quality text and it works with standard fan-fold computer paper. Plotters are better, however, for line drawings, flow diagrams, and organizational charts (see picture p. 129).

Often the best method of getting a drawing out of a computer is to photograph the screen—perfect for business graphics slideshows, and really the best option for artists or anyone wanting publication-quality images. To photograph the screen, use any camera on a tripod (you need careful lighting to avoid glare and a long exposure time to avoid getting bars of light across the image). Or try the “Screen Shooter,” a \$170 Polaroid camera with hood and 35mm adapter (NPC Photo Division, Newton Plastics, 1238 Chestnut St., Upper Newton Falls, MA, 02164; 617/969-3487) or the Kodak Instagraphic CRT Slide Imager (\$379; Eastman Kodak Company, Dept. 4121, Rochester, NY 14650; 800/445-6325) which comes with hoods (\$40-\$50 each) that fit various sized screens and a gizmo that makes instant slides or prints (included in camera price). For more money, you can use various hardware devices such as the Polaroid Palette. The Palette gives you pictures sharper than your screen with some software (GRAPHWRITER, SIGN MASTER, CHART MASTER and EXECUVISION, all on p. 129).

Palette: \$1800; street price \$1299 (includes 35mm film unit, slide processor, cables, software); IBM PC/XT/AT; DEC Rainbow/Pro; Apple IIe, II+; Polaroid Industrial Marketing, 784 Memorial Drive, Cambridge, MA 02139; 800/225-1618.

Video output—that is, putting computer images onto videotape—isn't difficult, but don't expect broadcast quality. You need a “video out” port on your computer (missing, unfortunately from the Macintosh) so you can connect a VCR to it using an RCA jack. The VCR records the image (a series of computer drawings, bar charts, animation sequence, etc.) which can then be played back on a TV set.



After MACVISION author Bill Atkinson pointed the video camera at himself and created a digitized self-portrait, Jay Kinney used his Macintosh and MACPAINT to create an alien double. He selected Bill's left eye on the digitized photo, then replicated it on his forehead, retouching with FAT BITS. To finish the transformation, he used the SPRAYCAN to add a beard.

Is the age of Desktop Publishing really here?

BARBARA ROBERTSON: One of the most exciting developments in drawing software has been tools that let you combine and print combinations of graphics and text. With these tools, you can bypass traditional costly typesetting and layout charges and create newsletters, proposals, price lists, brochures—or simply use them to quickly create mock-ups.

ROBERT MORGAN: Programs that promise easy electronic publishing are still “early” programs . . . analogous to the first steam engines. Just as in those early races between steam engines and horse drawn carriages sometimes the result was a “dead heat,” sometimes the horses won, sometimes the steam engine won, and sometimes the steam engine blew up—so it is with these programs. In many ways they still simply mimic what you’d do by hand. Until the programs include “electronic” features like automatically wrapping text around pictures and from column to column or page to page, they won’t win any speed contests.

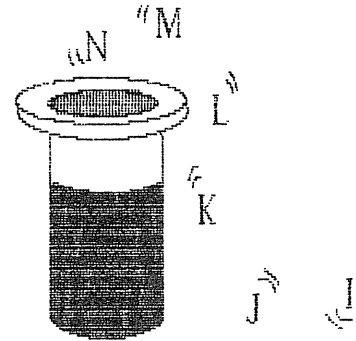
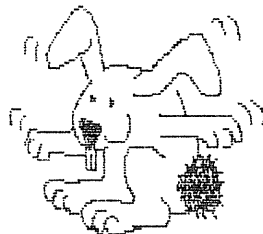
If you’re a writer, ask yourself if you really want to take on the extra work required to control the whole publishing process (writing, editing, layout, typesetting). Designing a page and selecting fonts, styles, and sizes to produce a professional result is a craft. If you’re a graphic artist, you’ll find these programs handy but not much faster than doing the same thing by hand. However, if you had a race today between a modern train and a horse-drawn buggy, it would be no contest. Given a little time, these programs will mature, I trust, until they truly automate the process to the point that they are the only way to “fly.”

BARBARA ROBERTSON: The bottom line for these programs is the quality of the output. On this page and the next, you can see for yourself how close to publication-quality you can get. The reviews on these two pages were created and “typeset” by Robert Morgan who picked three software packages: READYSETGO and MACPUBLISHER for the Macintosh, and FONTRIX for the IBM PC family. READYSETGO and MACPUBLISHER were printed on Apple’s LaserWriter, courtesy of Infomax Computers.

Created using FONTRIX on a COMPAQ and printed on an EPSON FX80 dot matrix printer:

FONTRIX (pronounced FONT TRICKS) ★

Steven Baker; Version 2.5; Not copy-protected; \$155; IBM PC/XT/AT and “true” compatibles; PCjr; 256K; IBM color graphics adapter or compatible • Version 1.5; Not copy-protected; \$95; Apple II Family and III (emulation mode); 48K; Data Transforms, 616 Washington Street, Denver, CO 80203; 303/832-1501



ROBERT MORGAN: It is hard to categorize FONTRIX. It has some features of a painting program, but not enough. It has some of the features of a word processing program, but doesn’t come close. You can produce some of the same results as READYSETGO (p.126), but not nearly as quickly or easily. Let’s just call it a “Font Producer And Then Some.”

You can go directly into the Graphic Writer and type the text in using various fonts. Or you can create the text in WORDSTAR (p.56) or another word processor, then let FONTRIX translate it into a graphic file, enhance it with the drawing tools using keyboard or mouse, and finally print it. Fonts can be edited, italicized, bolded, squeezed together or created, as long as you do it beforehand.

FONTRIX is quite versatile, but also quite tedious. To convert one page of WORDSTAR text to a FONTRIX graphic file takes 22 minutes if you are working with floppies. Make one mistake that can’t be fixed cosmetically, and you start all over. If you use a RAM disk or have a hard disk, you can cut that time down to 6 minutes. The graphic files created by FONTRIX are humongous! You need 180K for one 8-1/2 x 11 inch sheet. Here again, a hard disk is desirable. Although the program comes with 10 fonts and there are 100 more available in packs of 10 for \$25 each, you can NOT alter the SIZE of the font. When you move between the Graph Writer and the Graph Printer utilities, FONTRIX dumps all the selected fonts out of memory and forgets all the default settings for disk drive, etc. Give me a break!

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This section was created using READYSETGO and printed on the LASERWRITER:

Versatile and slick...

ReadySetGo versus

Restrictive but able...

MacPublisher

Version 1.0. Copy-protected. \$125; street price \$89. Macintosh (512K). Manhattan Graphics Corp. 163 Varick Street. NY, NY 10013; 212/924-2778.

By
Robert Morgan

Version 1.25. Copy-protected. \$99; street price \$78. Macintosh (128K). Boston Software Publishers Inc., 19 Ledge Hill Road, Boston, MA 02132: 617/327-5775

Some folks label these two programs "Electronic Publishers." Both MACPUBLISHER and READYSETGO let you do typesetting and layout... arrange and rearrange text and graphics on a dummy page. Both give a "bird's eye view" of the layout. Both can be used with the new Apple LASERWRITER to produce "near typeset quality" output. Both let you enter text directly or import text from MACWRITE (p.54). Both let you capture graphics from MACPAINT (p.127) via the Clipboard. Both help bridge the gap between word processors like MACWRITE (that don't allow columns of text or graphics beside text) and drawing programs like MACPAINT (that lack basic text editing features when laying out text). Here are some of the differences between the two...

READYSETGO ★

1. Infinite column width sizing.
2. Vertical bars and framing in 4 shades of gray.
3. Full justification displayed on screen.
4. Able to change Font, Size, or Style of each individual character in a line.
5. Pictures taken from Clipboard can be resized and reshaped at anytime.
6. No editing allowed on Show Page.

Why not use ReadySetGo instead of MacPublisher?

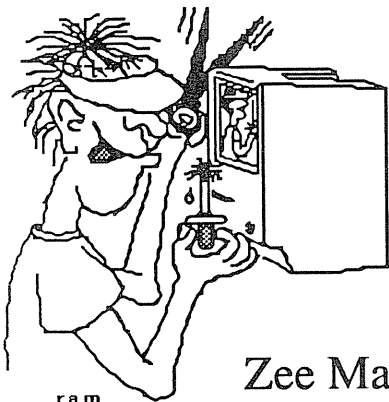
I will if you loan me your 512K "fat" Mac!



MACPUBLISHER ★

1. Limited to 4 preset column widths.
2. No vertical bars nor framing.
3. Full justification is not shown on screen.
4. When changing Font, Size, or Style, the whole line must be changed.
5. A portion of the Clipboard can be "photographed" and "glued down," but not resized or reshaped.
6. Easy editing and moving on Show Page.

This portion was created using MACPUBLISHER and printed on a LASERWRITER:



Zee Mad Publisher

"So what program should you choose?" The choice may already be made for you if you have a 128K "thin" MACINTOSH. In that case, you would have to go with MACPUBLISHER. But if you have a "fat" MAC, you may have difficulty choosing. READYSETGO excels in layouts such as restaurant menus, brochures, and overhead transparencies. MACPUBLISHER excels in multipage newsletters, or any other layout requiring a lot of text entry and editing, regimented column widths, and items that you want to reuse in another issue. The finished results of READYSETGO looked the most professional, thanks to frames and vertical bars. I personally would like a program that combines the best features of both. I would also like to see new features like "dynamic, automatic carry-over of text from one page to another." I know, "picky, picky, picky."

Painting in black and white . . .

Software for the Most Amazing Macintosh

RIK JADRNICEK: Apple's Macintosh is a no muss, no fuss, pixel-based graphics computer. It does other things as well, of course, but it is in pixel-based graphics generation that the MAC really shines. In high-contrast black and white. MAC's screen is small (nine inches diagonally), but its square pixels make the images seem sharp.

Irresistible . . .

MACPAINT

Bundled with Macintosh computers. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.

LYN CELOTTI: MACPAINT has bit-by-bit control for detail (Fat Bits), shades, and tones. It's particularly good for graphic designers; for freehand, aesthetically pleasing drawings.

RIK JADRNICEK: MACPAINT is the perfect example of the speed you can get out of a pixel-based drawing system that does not have to create a vector database or drive a 24 x 35 inch plotter. Its purpose is to paint the screen and print the screen image and this it does very fast and very well.

ROBERT MORGAN: Although MACPAINT is viewed as the "premier" paint program, it has its shortcomings. It lacks color support. There are limited printer options. The Grid is not adjustable. The Menu cannot be removed, so you have less than a full screen to draw on. And it would be nice if you could size, shape, and position Ovals and Rectangles before locking them into place.

In addition, many of the color painting programs (p. 130) have features not included in MACPAINT: multi-stage Fat Bits and control over size and shape of the print-out as in PC PAINTBRUSH; an underlay paste like TELEPAINT offers; automatic text scrolling and a local Undo as in PC PAINT; a 3-D mode like DIGITAL PAINTBRUSH offers.

I'd also like to have Tilt, Distort, Infinite Rotate, and Perspective without having to buy and invoke a desk accessory like CLICKART EFFECTS, and also the ability to move individual objects around on the Show Page.

Still, there are some unique things that only MACPAINT and the Macintosh offer: the Lasso function (for Cut/Paste of irregular objects in close proximity), sheer speed, square pixels, dual print modes (Final and Draft), and an environment that allows easy movement of pictures into other applications like MACWRITE.

Moving pictures in black and white . . .

ANIMATION TOOLKIT I

Scott Wiener. Copy-protected. \$49.95. Macintosh; Lisa (emulation mode). Ann Arbor Softworks, 308½ S. State St., Ann Arbor, MI 48104; 313/996-3838.

VIDEOWORKS

MacroMind, Inc. Version 1.0. Copy-protected. \$99.95. Macintosh. Hayden Software Co., 600 Suffolk St., Lowell, MA 01853; 800/343-1218 or, in MA, 617/937-0200.

DONNA COHEN: Animation traditionally has been a labor-intensive project requiring a large staff. Now anyone with a computer and one of these two animation programs has the ability to create and replay animations. ANIMATION TOOLKIT, a moving "Etch-a-Sketch," is perfect for the kids; VIDEOWORKS, a more sophisticated program, takes some studying.

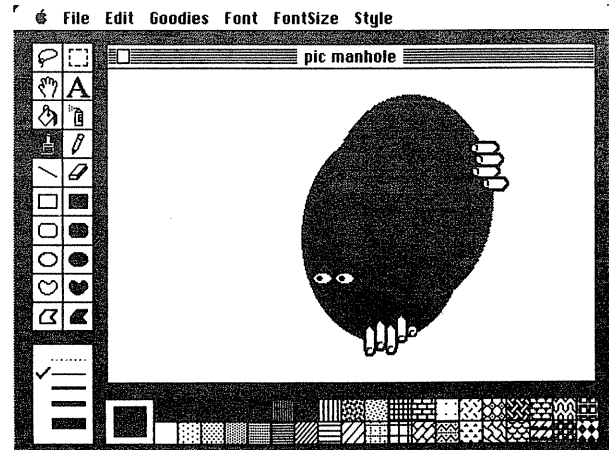
Both programs abide by the rules of animation and are intuitive to use. You can copy cells in perfect registration, alter each cell, adjust the speed of playback, and a whole lot more.

With ANIMATION TOOLKIT I created my first animation within 15 minutes, but the images were low resolution and looked a little clunky. With VIDEOWORKS, you can transfer pictures from MACPAINT, MACVISION (p. 123), or the samples provided on disk; create 256 different characters; have multi-plane animation, cell animation, or real time animation; add a sound track; and matte different objects.

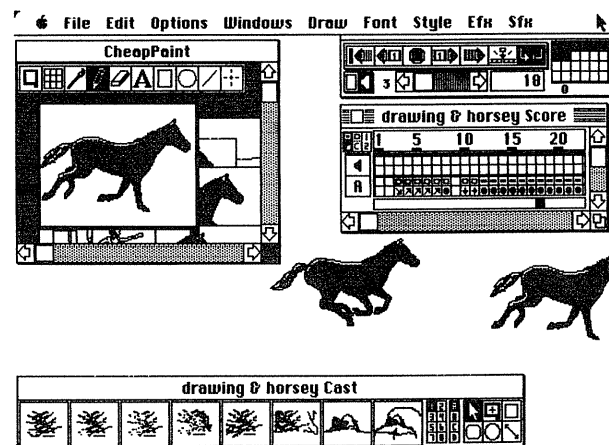
The first full-color comic produced on a Macintosh is Shatter (\$15/yr (12 issues); First Comics, Inc., 1014 Davis St., Evanston, IL 60201; 312/864-5330). Set in a Blade-Runner-like future, it's a cops-and-robbers story with dystopian overtones. The art is interesting although a little grainy.

—George Mokray

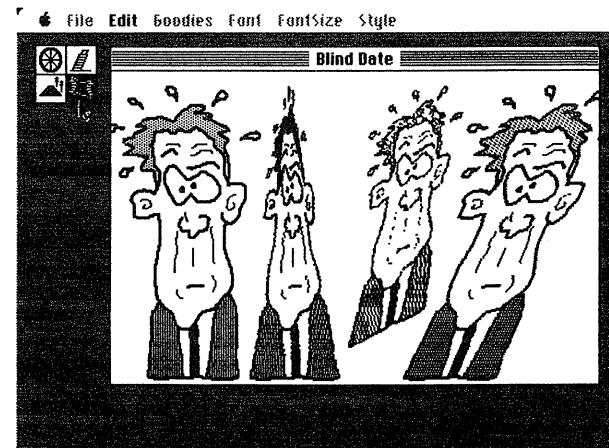
Making a good thing better: T/Maker Company's CLICKART EFFECTS provides four useful tools missing from MacPaint. When loaded as a desk accessory, CLICKART EFFECTS enables MacPaint images to be rotated degree-by-degree, slanted, distorted, and put into perspective. (\$49.95; T/Maker Company, 2115 Landings Dr., Mountain View, CA 94043; 415/962-0195)



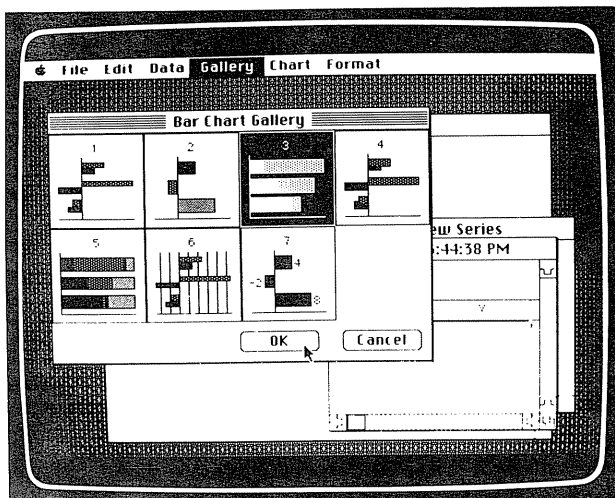
This MACPAINT drawing was created by cartoonist Jay Kinney, then printed on an Apple ImageWriter printer. The little icons in menus across the bottom and along the left side show some of the painting options available with MACPAINT.



Animation, the art of movement, is a new area for computer artists to discover. The VIDEOWORKS pictures of a racing horse are sophisticated; the program complex.



Black and White Business Graphics



"Gallery" on CHART on the Macintosh is a pull-down menu of 42 readymade chart formats. Enter your numbers, mouse-select a chart type, and—blink—there it is. You can quickly try on the various types to see which makes your point best. The program also offers the ability to create your own formats and tailor them extensively. It does not do curves, however.

Business Graphics in Color

Inexpensive charts and slideshows . . .

PRACTIGRAPH ★

Version 1.1. \$99. Not copy-protected. IBM PC/XT/AT/compatibles (256K). IBM color graphics card and compatibles. Output to Epson, IBM, Diablo, Okidata and NEC printers; Houston Instruments, Amdek, Hewlett-Packard and Sweet Pea plotters. Practicorp International, The Silk Mill, 44 Oak Street, Newton Upper Falls, MA 02164; 617/965-9870.

WOODY LISWOOD: The best buy. PRACTIGRAPH produces a basic set of bar, line, pie, and text charts that can be photographed from the screen, printed or plotted. Most business graphics programs do that. A special PRACTIGRAPH feature, however, is the program's ability to create slideshows. You can link a series of graphs together to run in sequence. (You simply plug your personal computer into a wide-screen monitor for group presentations.) I've used this feature to illustrate the graphic capabilities of computers and had a great reaction from the audience. The program is not as complete or flexible as GRAPHWRITER (p. 129), but it's much less expensive and works just fine.

★ MEANS: NEW TO 2.0 EDITION

Quick, efficient visuals . . .

MICROSOFT CHART

Apple Macintosh; 128K; copy-protected? YES; \$125; Microsoft Corporation, 10700 Northup Way, Bellevue, WA 98004; 206/828-8080.

STEWART BRAND: I agree with Andrew Fluegelman, founding editor of *Macworld*, that the Macintosh and software like CHART are going to gradually change the way we communicate. Illustration such as graphs no longer requires specialists, any more than typing does. Andrew found himself arguing points in his review of CHART with sparkling little graphs, quickly conjured on CHART and as quickly printed in publishable form on the ImageWriter printer.

Graphs are astonishingly efficient tools. They can convey broad understanding and great precision at the same time, of a variety of ideas at once, and in a tiny space. They help the brain meet numbers in the brain's terms—*analog pictures rather than digital numbers*; they tell quantity directly rather than through translation.

On the 128K Mac, CHART is potent but slow. On the 512K Mac it is a lot faster. You can

enter data directly or pull it from MICROSOFT MULTIPLAN (p. 70). The charts can be fine-tuned with MACPAINT (p. 127), and they can be blended with text via MACWRITE (p. 54) or MICROSOFT WORD (p. 60) and telecommunicated. I particularly like some of the power available under the command "Analyze," which can take your chart and render a second overlay showing Average, Cumulative Sum, Difference, Growth, Percent, Statistics, or Trend.

This program on this machine is an education.

JOHN LEININGER: CHART is one of those programs which allow you to get basic things done with relative ease. It has the flexibility for you to become an expert user and create some very complex charts. You can even get to the point of tricking it into doing things that perhaps it was not designed to do. It's a good tool, and like all good tools you must learn how to use it properly and get to know its limitations.

WOODY LISWOOD: CHART is also available for the IBM PC, however we prefer GRAPHWRITER (p. 129) in this world.

Very expensive slide shows . . .

PICTURE-IT ★

VIDEOSHOW ★

PICTURE-IT: Version 1.1. Copy-protected. \$600. IBM PC/compatibles (128K). Requires VideoShow 150 hardware display driver (\$3500; connects to any NTSC digital RGB monitor). Both from General Parametrics, 1505 Solano Ave., Berkeley, CA 94707; 415/524-3950.

DONNA COHEN: You don't have to draw to use this software. The program includes more than 20 different formats and color styles you can select. Or you can design your own styles and color schemes, choosing from 1000 colors and 18 built-in type fonts. You can use PICTURE-IT without reading the manual.

PICTURE-IT doesn't feel very creative to draw on—the keyboard is the only input device—but it produces a high-quality product comparable to images produced on \$100,000-and-up dedicated business graphic workstations—far superior to EXECUVISION (p. 129). Using a new display technology they call MacroVision, it increases the standard IBM PC resolution from 640 x 200 pixels to 2048 x 484. MacroVision works through a device called the VideoShow, a 16-pound box with built-in disk drive. You don't need a computer for presentations, just the VideoShow box, a disk with images you've created, a monitor, projection screen, or TV set. The VideoShow lets you jump out of order to any part of your presentation, quickly cut to another image, do fancy dissolves, even control a pointer. No other business graphics system has worked out its video interface so well.

Fancy overhead transparencies . . .

OVERHEAD EXPRESS ★

Version 1.11. \$195; street price \$139. IBM PC/XT/AT/compatibles. Program disk is copy-protected, font disk isn't. Supports IBM color graphics card, Hercules card. Output to Apple Matrix, NEC PC 8023A-C, Okidata 84 Step 2 dot matrix printers; IBM and Epson JX80 color printers. Business & Professional Software, Inc., 143 Binney Street, Cambridge, MA 02142; 617/491-3377.

WOODY LISWOOD: Need overhead transparencies but don't have a digital

plotter? Need to make transparencies with giant letters, but tired of press-type, hand lettering and "Orator" type faces? OVERHEAD EXPRESS contains multiple fonts and templates that will print on a variety of dot matrix printers. You fill in supplied templates or create your own slides using the OVERHEAD EXPRESS command language which is somewhat difficult to learn and use. Once you've mastered it, though, you can create good-looking slides using the multitude of fonts and shadings that come with the program.

Bar charts and linear regressions . . .**CHART MASTER** ★

Version 6.1. \$375; street price \$239; IBM PC/XT/AT/compatibles (256K).

SIGN MASTER ★

Version 5.1. \$245; street price \$179; IBM PC/XT/AT/compatibles (256K).

DIAGRAM MASTER ★

Version 5.0. \$345; IBM PC/XT/AT/compatibles (320K).

All three are copy-protected (but key disk not required with hard disk) and support IBM color graphics, Enhanced Graphics Adapter (8 colors supported onscreen), and Professional Graphics cards; Hercules; Output to Epson, IBM, Prism, Okidata, Tektronix, TI, Toshiba dot matrix printers; Hewlett-Packard ThinkJet and LaserJet printers; Hewlett-Packard, CalComp, Houston Instruments, Sweet Pea, Hitachi and most other plotters; Polaroid Palette and Matrix Recorders. Decision Resources, Inc., 25 Sylvan Rd., South Westport, CT 06880; 203/222-1974.

WOODY LISWOOD: All three of these graphics programs are menu driven, easy to use, and support a wide variety of printers and plotters. The latest versions include "solid fill" for crisper, plotted bar charts and new symbol fonts (cars, trucks, trains, oil wells, etc.) you can use instead of solid bars or lines to spice up plotted graphs.

I've used CHART MASTER since my Apple computer days—and still use it. It has a wide variety of graphics: cluster bars, stacked bars, scatter diagrams, line charts, pie charts, and area charts. You can also do linear, exponential, logarithmic, power, and travelling average regressions within the line chart section. You can import print files (ASCII files) from other programs, and CHART MASTER has one unique feature I especially like: you can specify that each chart be contained within a plotted border. Makes for nicely defined graphics. Less expensive than GRAPHWRITER and more limited; more expensive than PRACTIGRAPH and does more.

I use SIGN MASTER when I want presentation graphics with words and numbers rather than bar and pie charts. With SIGN MASTER, you can read in a spreadsheet, reproduce parts of it, and make those parts bigger for overhead transparencies. You can have tables, rows, columns with or without boxes, box just what you want, use different type fonts for each box, and probably do whatever you desire in the way of text charts.

With DIAGRAM MASTER, you can produce organizational, Gantt, and text charts. It is the *easiest-to-use* organizational chart function I've found. You simply respond to a series of prompts about what goes into each box on each level—or grab, move, grow, shrink, and fill in objects selected from the drawing board. And the chart is created practically automatically.

The best by far . . .**GRAPHWRITER**

Version 4.3. Basic \$395; Extension \$395, Combo \$595. Copy-protected, input forms not copy-protected. IBM PC/MS-DOS families; 192K RAM (256K RAM with image recorder and printer plots); Color graphics adapter; Output to Epson, Okidata and IBM printers; Hewlett-Packard, IBM, Calcomp, and Mannesman Talley plotters; Graphic Communications, Inc., 200 Fifth Avenue, Waltham, MA 02254, 617/890-8778.

WOODY LISWOOD: GRAPHWRITER is still the best. It does (when you have both the basic and extended sets, or the combo) one to four pies; scatter plots with or without regression lines; bar and line combination charts; line, text, table, surface-line, range, Gantt, vertical, and horizontal column charts; organization diagrams; pie-bar combinations; segmented, clustered, double-stacked, grouped, and paired bars; and horizontal bars with inset labels. The only thing it doesn't do is 3-D bars and pies.

PETER KIRKWOOD: The program can read Data Interchange Files (DIF) from both DOS and Pascal. Its weak points are copy-protection that requires keeping a program disk in the floppy drive, storage requirements (the full set of programs requires 2 megabytes of disk storage), the preview display of graphs (of unacceptable quality) and its lack of any free-hand or sketch facility.

For presentation graphics . . .**EXECUVISION**

IBM PC/XT/AT (256); copy-protected; \$395 (street price \$259); IBM color card and Enhanced Graphics Adapter, Tecmar Graphics Master. Input: keyboard only. Output to Epson and IBM graphics dot matrix printers; Polaroid Palette; Lang Videoslides. With E Z Capture Plus option (\$125): Output to most dot matrix printers; IBM color printer; Diablo Inkjet C-150 and other color printers; HP 7475A plotter. VCN, 238 Main St., Cambridge, MA 02142; 617/497-4000.

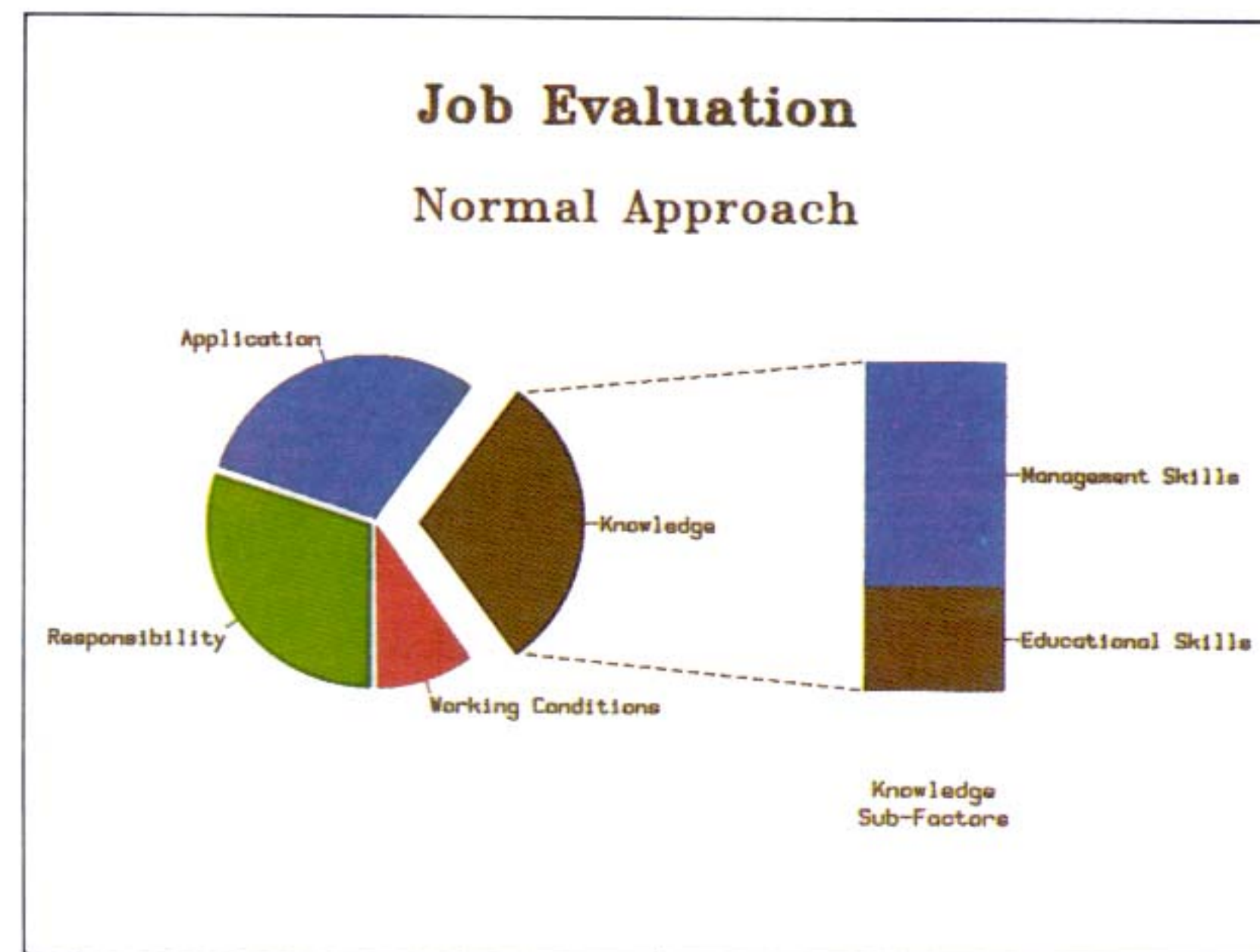
RIK JADRNICKEK: EXECUVISION steps beyond the world of basic business graphics with a fantastic set of tools for preparing presentation graphics. You can freely edit the images you create and include them in slideshows. You can cut small sections out of an image, save them in a library on disk and then paste them into other images you create later.

The creators of EXECUVISION sell libraries of graphic shapes you can use, including decorative borders, initials and decorative designs, faces and figures, and maps and international symbols.

The documentation is very thorough and extensively illustrated (even showing the IBM and its keyboard every step of the way). Let the pictures speak for themselves . . .

WOODY LISWOOD: GRAPHWRITER's documentation is overwhelming and the program's internal menu structure is enough to bring an unsuspecting person to his knees. However, after you have created one graph, you appreciate the multitude of menus within menus within menus as well as the extreme variation you can give your plots. I have recommended the program to a number of businesses and they have all fallen in love with it.

If you need high quality presentation graphics on selected plotters and graphics printers, GRAPHWRITER is superb.

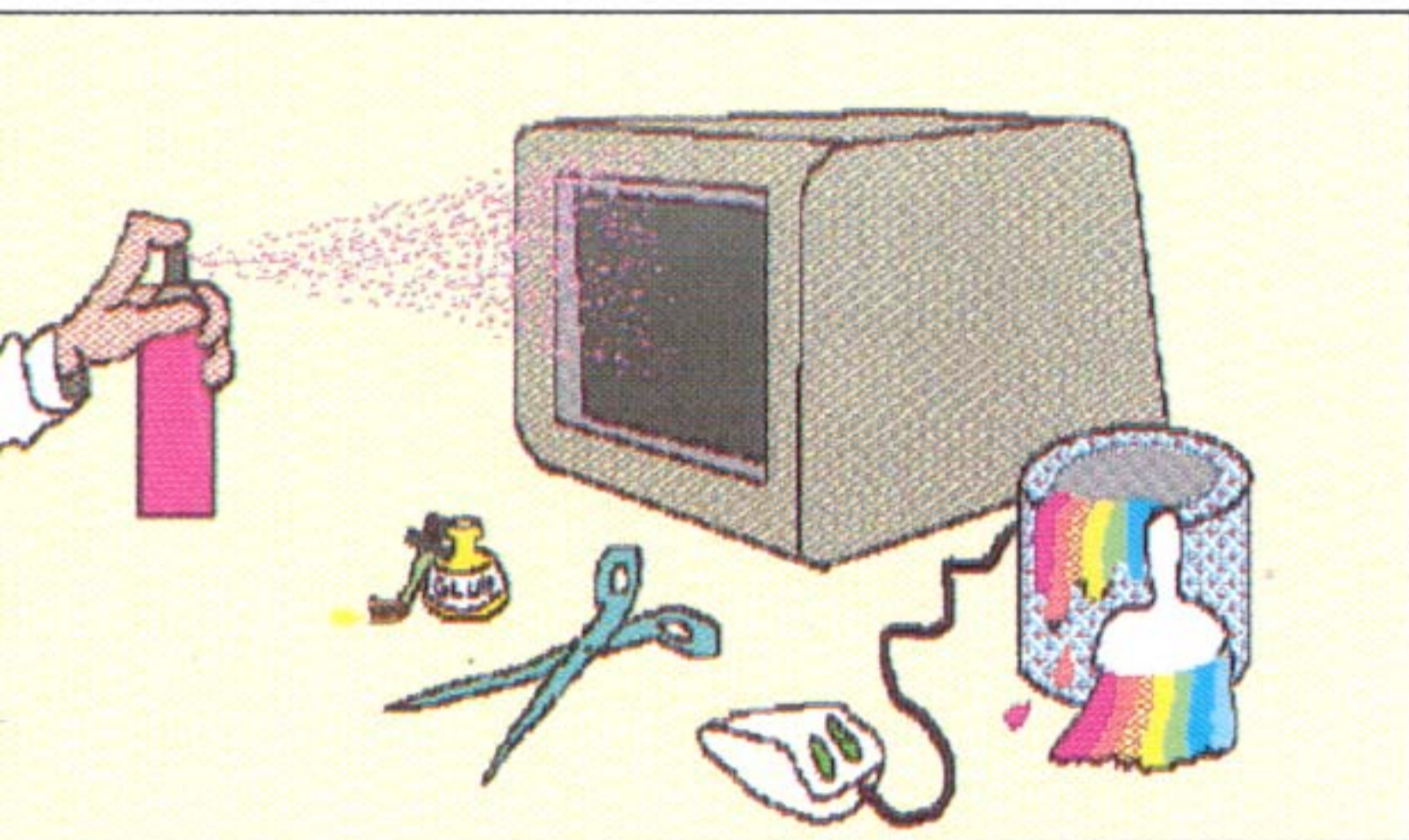


An example of the high-quality color presentations possible using GRAPHWRITER and a color plotter. Graphs such as this used to require the skills of a graphic artist.

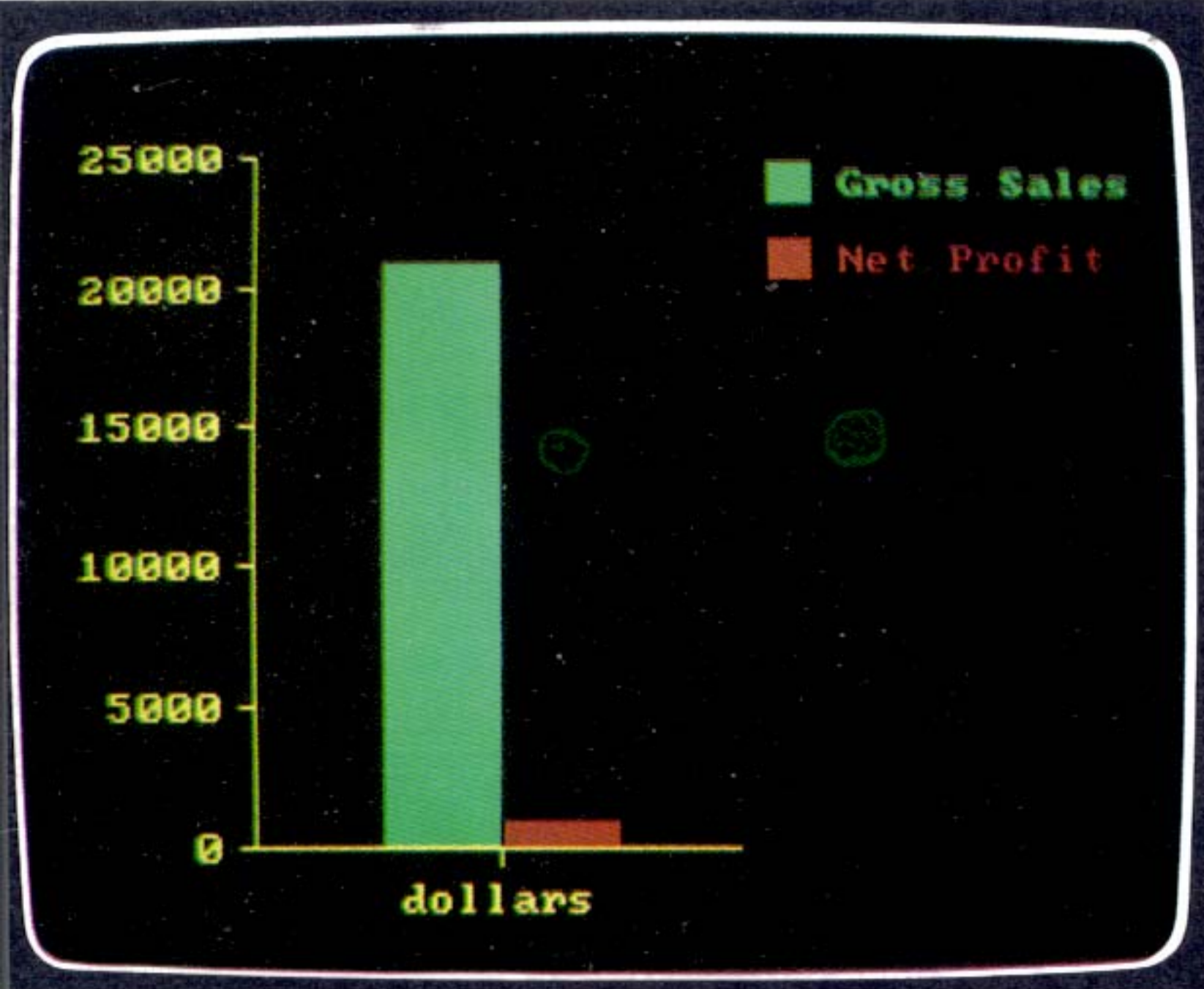


This graph didn't pop up automatically from data. It's entirely hand-drawn, with numbers typed onscreen, using EXECUVISION. With the E Z Capture Plus option, EXECUVISION can use data imported from 1-2-3 (p. 68), SYMPHONY (p. 111), FRAMEWORK (p. 110), or any screen in 320 x 200 resolution.

Painting with Color



Robert Morgan created this cartoon with PC PAINTBRUSH, using an IBM PC with a Tecmar Graphics Master card (16 onscreen colors, 640 x 400 resolution), then printed it with a Diablo C-150 color ink jet printer (p. 124). PC PAINTBRUSH is the most flexible of the three PC painting programs. It has a subprogram called FRIEZE that, among other things, allows control of the size and shape of drawings at print time, the easiest pattern editing, and some nifty features that let you tilt, grow, and shrink drawings.



Three New Painting Programs ★

RIK JADRNICKEK: Painting software is often called "pixel-based" software because the images are really made of hundreds of little dots of light—pixels, or picture elements. With painting software you can control each pixel on a graphics monitor. Manipulating groups of pixels "paints" an image on the graphics monitor, and manipulating groups of pixels creates animation over time. Depending on the quality of the software and hardware you are using, you may only be able to turn the pixel on or off, or you may be able to choose a color for the pixels from a palette of more than 16 million colors.

BARBARA ROBERTSON: Most painting programs (black-and-white or color) give you the same basic tools: brush/pen sizes and shapes, special effects (like mirroring), erasers, undo, windows for cutting and pasting, and a variety of colors, patterns and shapes—all selected by moving the cursor to an icon.

ROBERT MORGAN: We've selected three IBM PC painting programs, PC PAINTBRUSH, PC PAINT and TELEPAINT. All three are colorful, fun and quite good, but compared to MACPAINT (p. 127), they seem crude.

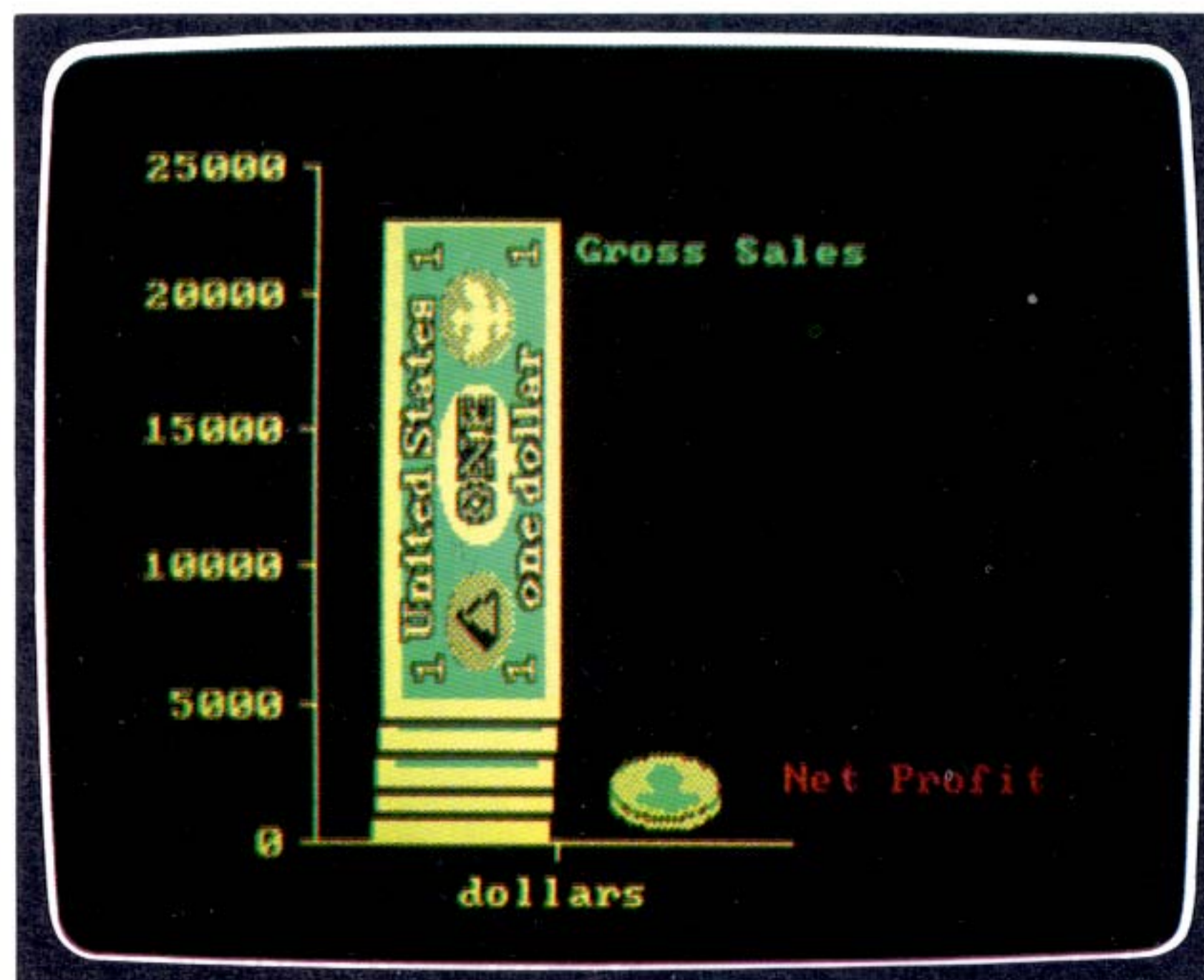
TELEPAINT, the newest of the three, is much like PC PAINTBRUSH and PC PAINT with two exceptions: it is the only one with an 8½" x 11" worksheet, a transparent underlay feature that lets you slide one image beneath another, and a whole library of "clip art" you can cut and paste into drawings. This picture, supplied by the publisher, shows what you can do with standard IBM PC colors (4 onscreen at once) and resolution (320 x 200).

The picture on the left is a SUPERCALC3 (p. 67) bar chart; the picture on the right is the same picture enhanced by Robert Morgan using PC PAINT. PC PAINT is fastest of the three, most MACPAINT-like, and you can use FONTRIX (p. 125) font packs with it. These pictures were taken off the screen of a TAXAN monitor plugged into an IBM PC equipped with a Persyst BOB board.

Although any of the three let you bring pictures in from programs like spreadsheets, you can't take their pictures out and paste them into a document as you can with MACPAINT and other Macintosh programs. But then the IBM PC wasn't designed to be a Macintosh.

BARBARA ROBERTSON: All work with the standard IBM PC color graphics card and monitor, giving you four colors onscreen at once and a maximum resolution of 320 x 200. By adding graphics boards, you double the resolution and add colors—to a maximum of 16 colors onscreen from a palette of 256 (PC PAINT with STB board; PC PAINTBRUSH with IBM Enhanced Graphics Adapter).

PC PAINT. Version 1.5. \$99 alone, copy-protected; \$220 with Mouse Systems Mouse (street price \$135), not copy-protected. IBM PC family; IBM color graphics card and compatibles; STB Graphics Plus II (16 colors onscreen); input also from Microsoft Mouse. Output to color, black-and-white dot matrix printers, Polaroid Palette. Mouse Systems Corp., 2336H Walsh Ave., Santa Clara, CA 95051; 408/988-0211 • PC PAINTBRUSH. Z-Soft. Version 2.8. \$139; street price \$89; \$189 with Logitech or Mouse Systems Mouse; \$495 with Summagraphics 6 x 9 digitizer; \$795 with Summagraphics 12 x 12 digitizer. Copy-protected. IBM PC family (192K; 320K high res); AT&T 6300; Tandy 1000. IBM color graphics or enhanced graphics adapter boards, Persyst BOB, Scion Display Adapter, Plantronics, Hercules, STB Plus II, Tecmar, AT&T high res, Quadram Quad color and others. Input from GTCO Micro DigiPad and Summagraphics digitizers. Output to wide variety of color and black-and-white dot matrix and ink jet printers; HP7470 and 7475A plotters. IMSI, 1299 4th Street, San Rafael, CA 94901; 415/454-7101 • TELEPAINT. Version 2.0. \$149. Not copy-protected. IBM PC/XT/AT/compatibles (256K). IBM color graphics card/compatibles; Input from Microsoft Mouse or compatibles; Output to Epson and IBM black-and-white dot matrix printers, IBM color graphics printer; Polaroid Palette. LCS/Telegraphics, 261 Vassar St., Cambridge, MA 02139; 800/427-0036 or, in MA, 617/547-4738.



Drawing tool for a variety of programs and machines . . .

KOALAPAD

Apple IIe/IIc (48K); \$125 • Commodore 64 (disk or cartridge); \$110 • IBM PC (128K); \$150 (street price \$89); IBM PCjr (128K); \$125; copy-protected; Koala Technologies Corp., 2065 Junction Ave., San Jose, CA 95131; 408/946-4483.

BARBARA ROBERTSON: Koala bundles a painting program with each version of their KoalaPad, an inexpensive digitizing tablet. KOALAPainter for the Apple II, one of the first microcomputer painting programs, has many of the same features as the newer MACPAINT (p. 127) and other painting programs.

KATHLEEN O'NEILL: I've been drawing ever since I can remember, and any graphics software that makes me use the keyboard instead of a stylus leaves me quickly frustrated. If you're interested in drawing with your computer and don't want to jump into elaborate additions to your micro, the KoalaPad is an easy, wonderful place to start. The pad works with either your finger or a stylus and is surprisingly sensitive and accurate. I find it much quicker and easier to use than a joystick.

The menus are full-screen, showing both words and pictures, so you don't have to remember any codes. A button on the pad changes you to the drawing screen. Storage and retrieval are very simple and quick, so it's easy to save drawings or to rework ones you've started.

KOALAPainter for the Apple II family will draw in several pen shapes and do points, lines, connected lines, rays, circles, disks, erase, fill, frame, box, and magnify (control each pixel).

The Commodore 64 version adds "oops" (undo), copy, mirror, swap (move pictures between windows), and X-color (changes one color to another). The PCjr version has even more colors and functions.

A little animation . . .

MOVIE MAKER

Apple II family • Atari (48K) • Commodore 64; copy-protected; \$50. Interactive Picture Systems, 42 East 23rd St., 4th Floor, New York, NY 10010; 212/475-7053.

ERIK TIMMERMAN: Compared to doing animation the traditional artwork-and-camera way, MOVIE MAKER is an absolute joy, but it is not for children. It's a complicated program, the documentation is fuzzy, and drawing in MOVIE MAKER is slow, difficult to control, and frustrating. While the limitations—low resolution (160 x 96) and only four of Atari's 128 colors can be used at

Incredible colors on an Apple II . . .

DAZZLEDRAW ★

David Snider. \$60. Apple IIe (128K)/IIc. Copy-protected. Requires mouse, joystick, KoalaPad or Apple Graphics Tablet for input; Apple IIe version works with Microtech Dumpling, Apple Super Serial, Apple II parallel, Orange Interface, Grappler, Grappler Plus, Epson APL and Picasso cards. Output to Apple Scribe, Epson JX80 color printers, Epson, NEC 8023A, C.I.TOH 8510 ProWriter and Star Gemini dot matrix printers; will not run with RGB monitors or cards. Broderbund Software, 17 Paul Dr., San Rafael, CA 94903; 415/479-1170.

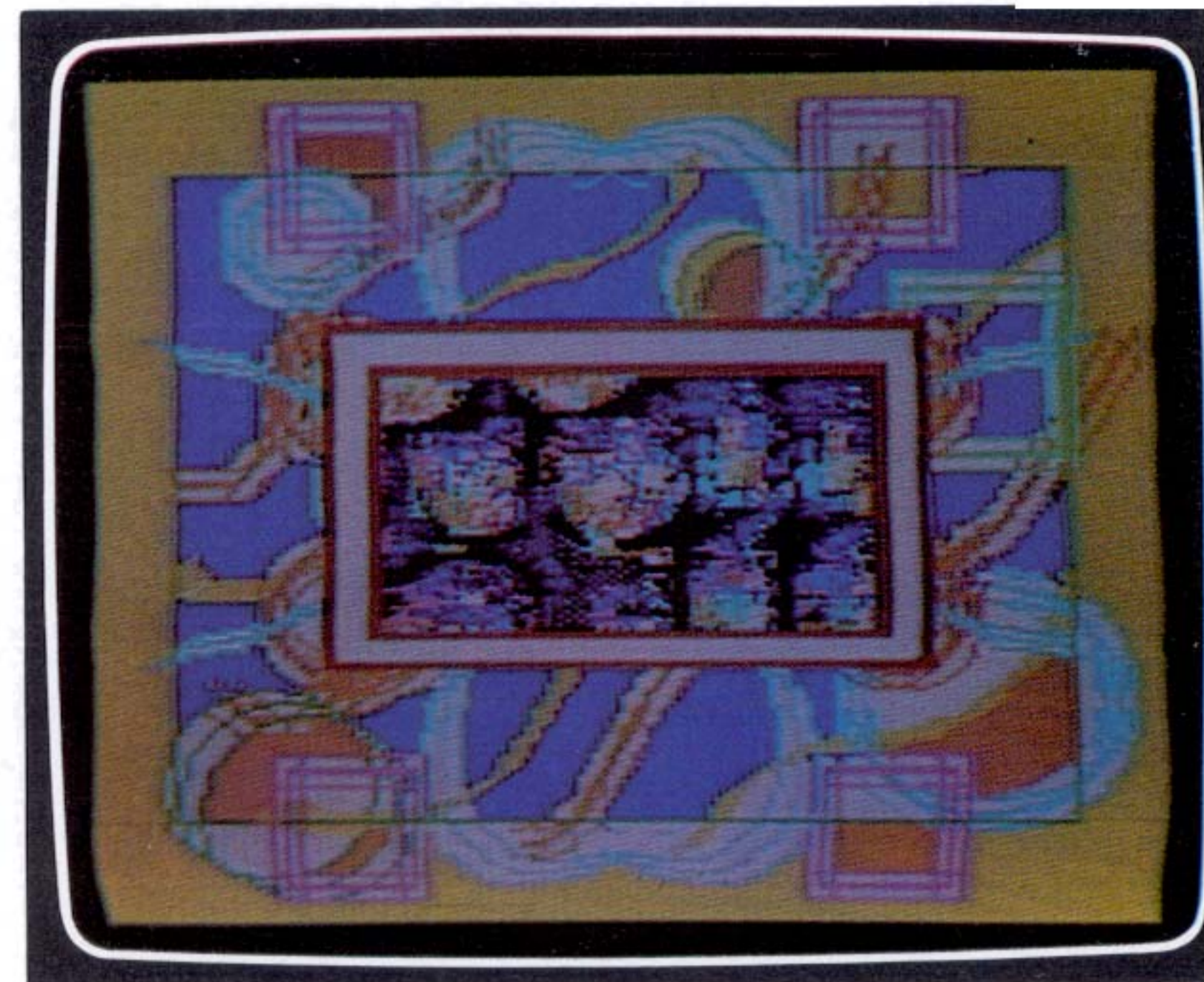
KEN GOEHNER: DAZZLEDRAW is a sophisticated double-hi-res program that features 16 colors and 30 precreated patterns that can be modified or totally redesigned. It emulates and goes beyond MACPAINT with 24 different brush options, efficient shape options, and more point-to-point line options. DAZZLEDRAW is easy to use, the documentation actually makes sense and the program is largely self-explanatory. It's much better than MOUSEPAINT, a clumsy painting program that comes bundled with the Apple II mouse (the best graphic input device short of a graphics tablet). However, DAZZLEDRAW needs 128K, MOUSEPAINT requires 64K.

DONNA COHEN: The wonderful color choices and slightly different menu approach make DAZZLEDRAW my personal favorite. You can have soft, uncomputerish tones like pink, olive green, and some nice earth colors. The menus are structured slightly differently than most other painting programs: after choosing a particular graphic feature from the first menu, a submenu appears at the bottom of the screen giving you a larger working picture area and offering deeper choices for each particular function.

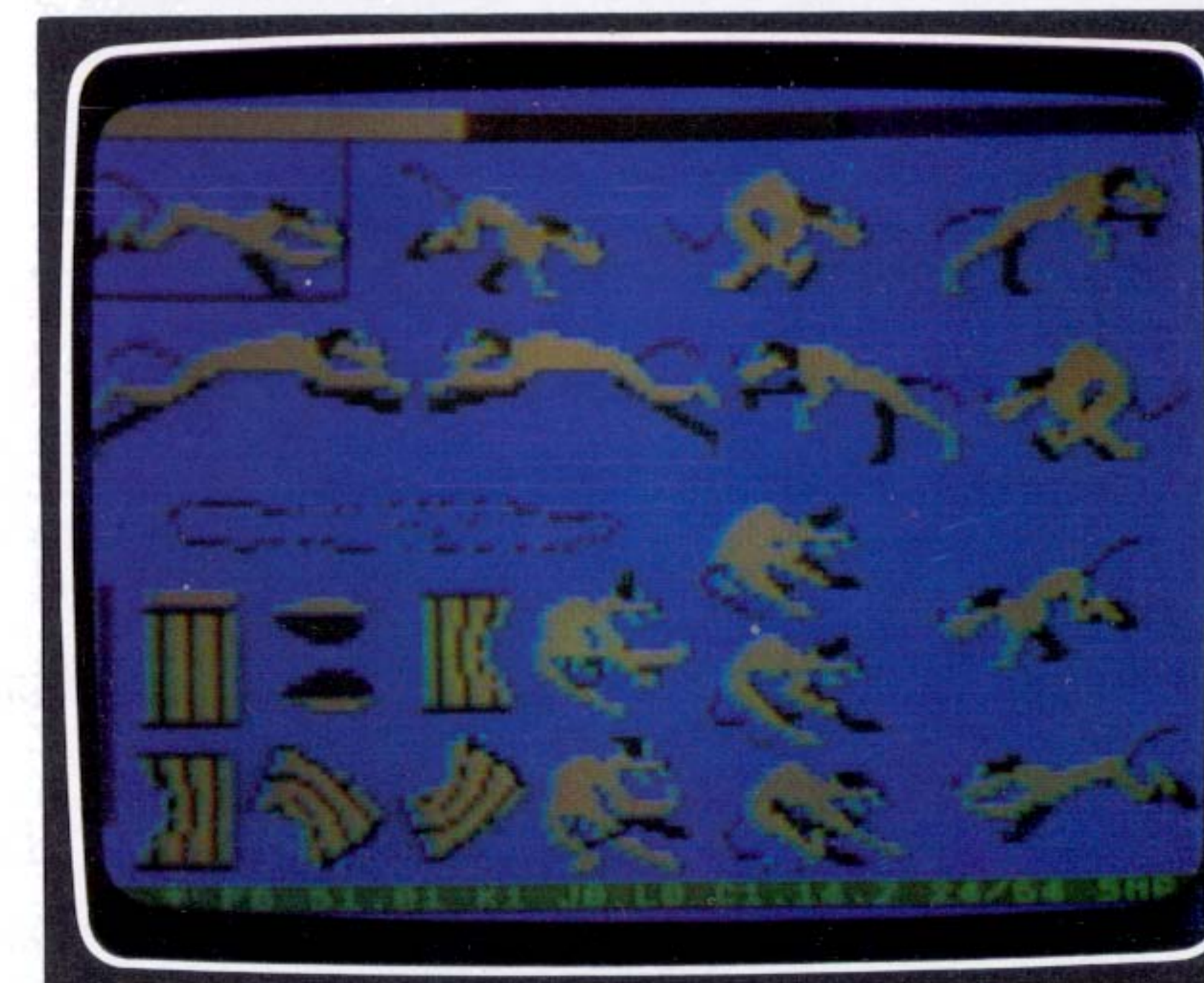
DAZZLEDRAW has better color choices than any Apple II painting program and a slideshow capability that makes the program a viable presentation system as well as a source of constant amazement and amusement.

any one time—are challenging, I recently did a title sequence that compares favorably with Monday Night Football titles. If you can get an Atari 800 with a good (read "non-Atari") disk drive at a low street price, add a good quality color monitor/TV, a VCR, and an audio tape recorder, you could open a "movie studio" for around \$1500, and still have money left over for a good lunch.

BARBARA ROBERTSON: Be aware, though, that you won't get broadcast quality video using an Atari 800. Macintosh animation programs (p. 127) are light-years easier to use, include more sophisticated drawing tools, and take advantage of Mac's high resolution.



All Koala's programs are easy to use and fun. KOALAPainter (for the IBM PCjr) has the most colors and functions—here demonstrated by Kathleen O'Neill.



Create a sequence of drawings with MOVIE MAKER on an Atari 800 and chain them together for a 45-second onscreen "movie." Or, even better, record them on video tape by plugging the Atari into your TV set (with VCR) and create an animated feature film.



After James Dowlen drew this landscape with LUMENA software on a Mindset computer, he printed it with a Diablo Inkjet printer (\$1350). This is the printout. Inkjet printers, like dot matrix printers, print dots. The resolution matches what you would see on the monitor with this software—about 300 by 200 pixels.



Artist James Dowlen created this image using LUMENA, and says, "If you have ever tried to draw a checkerboard tile floor in proper perspective, you know that even though it is simple perspective, it can be quite a task. With LUMENA you can lay out the tile pattern flat on the screen (as you would see it looking straight down), choose a horizon line and a vanishing point and the floor will lie down in perfect perspective."

It takes a pot of gold to buy a rainbow . . .

Professional Painting Packages

BARBARA ROBERTSON: If you're a professional artist, you'll soon discover you want more than 16 colors onscreen at once. You need the additional colors for subtle shadings that add dimension to your work and also for "anti-aliasing"—a method of fixing "escalator" lines by adding color shades to the jaggy stair steps until they blend into the background and appear straight. Software that works with graphics cards to give you a palette of 16 million colors with 256 onscreen at any time is available for IBM PCs; however, the price of admission to this colorful world is steep, and putting all the expensive pieces together compatibly is very tricky. Software developers, keenly aware that artists have low budgets, and faced with costly customer support necessary just to answer hardware questions, are targeting small, manageable niches with deep, cost-justifiable pockets (advertising agencies and video studios, primarily) rather than fighting for survival in the mass market. Meanwhile, hardware manufacturers and "system integrators" who sell dedicated graphics workstations (\$20,000 and up) are stepping into the fray. **Computer Graphics World** (\$30/yr [12 issues]; PenWell Publishing, 1714 Stockton St., San Francisco, CA 94133; 800/331-5959) is the best source of information on this topsy-turvy world. Although technical in tone, they frequently publish informative surveys of painting packages, graphics boards, and monitors.

LUMENA, a wonderful painting package for professionals, provides a good example of the changeable market. LUMENA has an enormous number of features—MACPAINT (p. 127) carried to the nth power in 16 million colors. Last year you could buy the software alone. This year you must buy a software/hardware combination from the software publisher. Next year . . . ?

RIK JADRNICKEK: You can freely edit and manipulate images you create with LUMENA—in some cases, even images transferred from video—using, to name a few of the more unusual features: rotating, rescaling, temporary zoom, tapering, shadowing, perspective mapping, grid overlays, gravity lines, and masking.

JAMES DOWLEN: You have several pen and brush choices: a "-1" pen has the feel of a fine-point detail pen; using a large brush feels like painting with thick paint. The colors are beautiful and can be mixed at will, with very subtle adjustments of tone or value, and the luminosity is exciting—has the same emotional impact as stained glass lit from behind. Since you are dealing with light, you may need to alter your thinking when mixing colors: primary colors are now red, green, and blue rather than red, yellow, and blue. You'll catch on, it's not difficult.

LUMENA SUBKIT: \$7000. IBM PC/XT/AT/compatibles (256 to 512K); copy-protected. Includes 2 graphics boards (frame buffer and image memory module) and LUMENA software. **LUMENA PRODUCER: \$9995.** Includes IBM PC compatible computer (256K), 10 MB hard disk, high resolution RGB monitor, 1 floppy disk drive, digitizing tablet, and LUMENA SUBKIT. One-year warranty on PRODUCER software and hardware; one free software update. Input: Mice, digitizing tablets (call for latest list). Output to NTSC video, Diablo C-150 color inkjet printer, Matrix PCR and OCR, Polaroid Video Printer, Kodak CRT Slide Imager, and Calcomp Samurai film recorder. Time Arts, Inc., 3436 Mendocino Ave., Santa Rosa, CA 95401; 707/576-7722.

Great precision . . .

Two-D Computer-Aided Design (CAD)

RIK JADRNICKEK: Two-D CAD software is best suited for drafting applications and is often referred to as vector-based software. With pixel-based painting software, information on every dot of light (pixel) is saved and used to describe an element such as a line. Vector-based storage is more efficient, in that only the end points of a line need to be stored; the rest of the points are filled in automatically using a mathematical description of the line. A

circle can be described with center data point and a specific radius.

The key difference between the two kinds of software is the physical size and detail of the drawing each is capable of producing. Painting software controls only the area appearing on the monitor display surface. Good 2-D CAD software lets you create a drawing larger than the monitor display surface—the monitor acts as a window onto smaller areas of the drawing. For example, you might define a 2-D X and Y coordinate system to

be a 24 X 36 inch piece of paper. As you enter an element into the drawing on the screen, numbers (coordinates) and attributes (e.g., color, layer, line type) are recorded in a drawing database. This lets you then freely manipulate (edit), mathematically transform (move, copy, rescale, rotate), store, and transmit the drawing. You might zoom in so that one square inch fills the entire monitor screen, permitting you to draw very precisely. You might then zoom out so that the entire 36 X 24 inch drawing fills the monitor screen, giving an overview of what you have drawn.

Good 2-D CAD software comes with ready-to-use drawing tools called "primitives": line, arc, circle, fill, array, and text—the more the better. These can be combined to produce curves, polygons, fillets (rounding corners), etc. Dimensioning and math calculations should also be included.

In addition, you ought to develop your own tools—for example, building a library of shapes and drawings you can save on disk

to use in future drawings and save time. Good documentation, tutorials, ease-of-use, and user customization are also important considerations, since CAD software tends to be complex.

The more computers and supporting hardware devices (plotters, digitizers, graphics boards) the software supports, the more people you will be able to share your drawings with. This is, after all, the spirit of microcomputers.

Two-D CAD programs are beginning to communicate with other programs, such as spreadsheets and analysis programs. Some software permits you to produce a parts list or bill of materials along with a database of specific drawing elements.

Video scanners are being developed that will enter drawings previously created manually into computerized parts libraries without requiring that they be redrawn. Designing and drafting functions are beginning to blend into one operation.

Low price, good for simple drawings . . .

PC-DRAW

Version 1.4. \$395, street price \$259. IBM PC family/compatibles (256K); IBM color card. Not copy-protected. Input: Micrographix light pens, keyboard. Output to IBM color printer, Epson, IBM, Okidata, C.Itoh and other dot matrix printers; Hewlett-Packard and Houston Instruments plotters. Micrografx, Inc., 1701 North Greenville, Suite 305, Richardson, TX 75801; 214/234-1769.

BOB SOHR: Applause to Micrografx for an excellent, exceptionally easy-to-learn, well-documented program at the lowest price level. PC-DRAW has limited capabilities compared with state-of-the-art CAD software, but it's a quarter of the price. It has all you need to do flowcharts, office layouts, forms, circuit or graphic design, and business graphics (pie and bar charts, etc.). This is the way to start for the "just curious." You can use it as an educational tool or a toy (it's simple and should be fascinating for a child).

The tutorial and documentation are excellent—among the best I've seen and a model for other software vendors. The installation worked as advertised when I followed it line by line. I made one phone call to the company (concerning printer support) and obtained immediate, friendly, and competent help.

You can freehand-draw from the keyboard using the cursor-control keys (limited to vertical, horizontal, and diagonal moves); draw lines point to point; create circles, arcs, and ellipses; or select symbols from two onscreen libraries, and you can create your own symbols and menu. Once in your drawing, you can move, expand, or reduce, replicate or dimension any symbol, however produced. Also, you can toggle on or off a background grid (size adjustable) and add text (provided or custom). Four abutting pages forming a square are in memory at any time (allowing you to create a drawing four times screen size). Symbols can be copied from one screen page to any other.

All this is enough to produce an amazing variety of drawings, although it would be nice to have unlimited freehand drawing (curves and angles). I didn't get to try a light pen, which presumably would help. Medium-resolution color is now supported with lots of color combinations onscreen, but of course it gives you less drawing on the same size screen.

PC-DRAW is highly recommended as an entry-level CAD package. For some applications, it will be all you ever need, and in any case it can serve as a tutorial and introduction to the 2-D graphics world.

PC-DRAW's onscreen menus take the guesswork out of command and symbol selection. At \$395 a bargain program and a good one to start with for 2-D technical drawing.

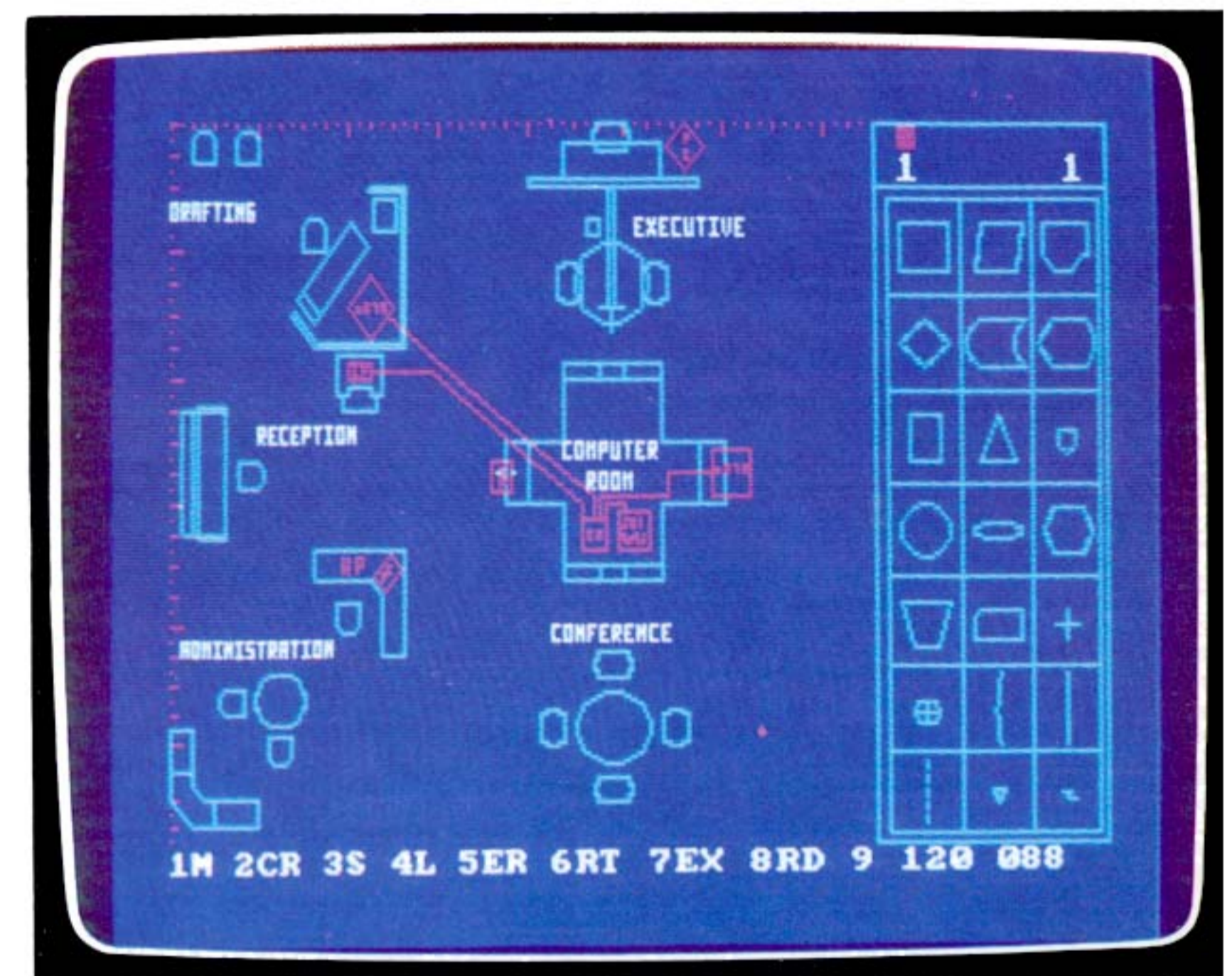
Introductory program, good for isometrics . . .

ROBO GRAPHICS CAD-1

Apple II family; 64K; includes joystick controller; supports accelerator board; input: Apple graphics tablet, Houston HI-PAD and IIc mouse; output to dot matrix printers with graphics dump; drives most plotters, including Hewlett-Packard, Houston Instruments, Roland, Amdek, Apple Color Plotter; copy-protected? YES; CAD-1, \$1095; CAD-2, \$1495; Chessell-Robocom Corporation, Robo Systems, 111 Pheasant Run, Newtown, PA 18940; 215/968-4422.

RIK JADRNICKEK: CAD-1 is for the Apple owner who wants semi-professional CAD capability. It is best used for small drawings ranging from block diagrams to detailed architectural and isometric drawings and as an introduction to computer-aided design.

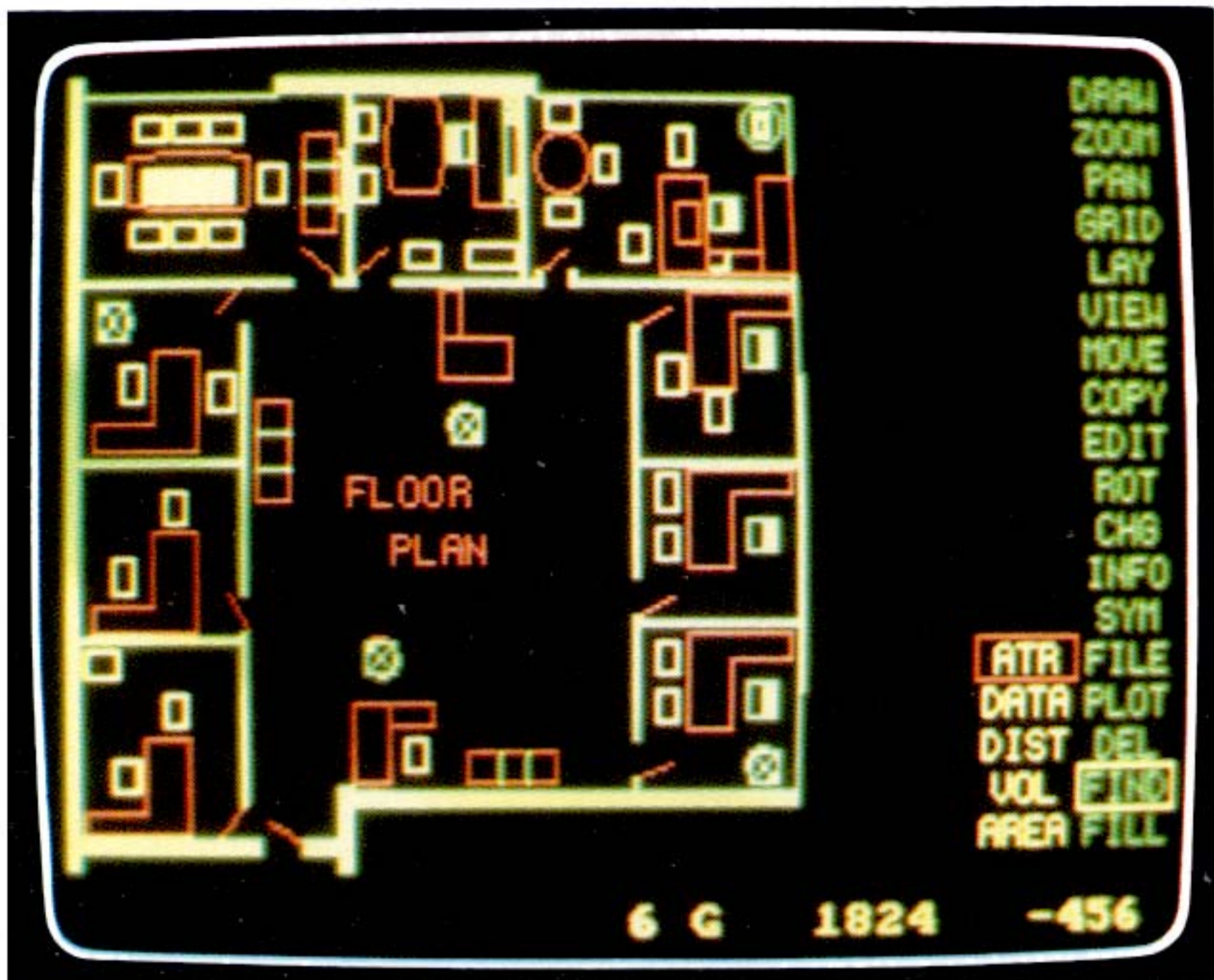
CAD-2 adds keyboard data entry, semi-automatic auto-dimensioning, cross-hatching and other advanced drafting features, and reduces the amount of disk swapping necessary with CAD-1. ROBOVIEW (\$195), a 3-D visualizer that works with



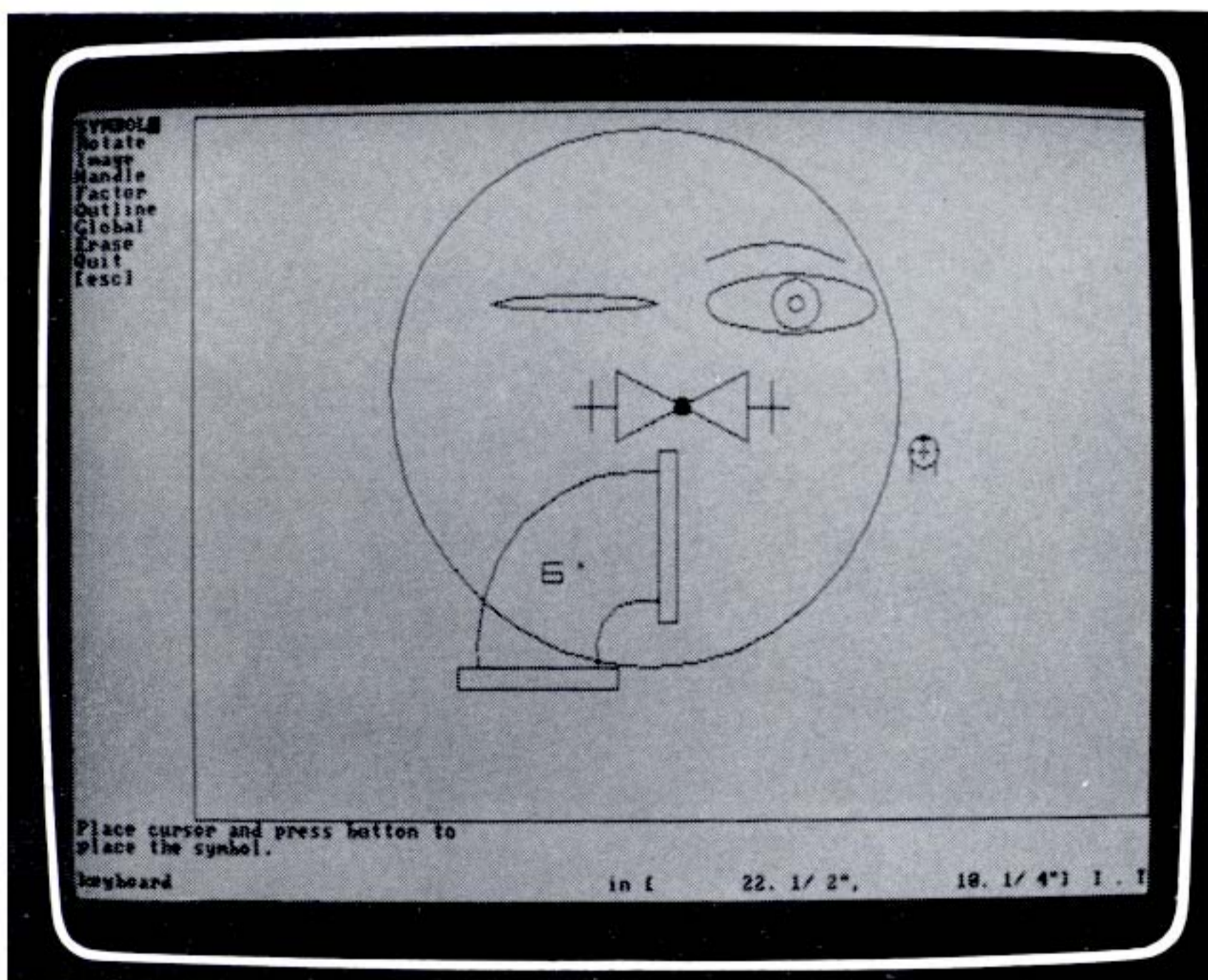
CAD-2 drawings, can generate wire frame representations of structures you can then view from any point in space—above, below, all around, or from inside. ROBODATA (\$125) works with either and generates database information for a parts list or bill of materials.

Both programs have onscreen menus, good documentation, and file management utilities to help you through the learning process. While not as all-encompassing as CADAPPLE (p. 134), both ROBOGRAPHICS programs are written in fast assembly language and are significantly faster. They overcome Apple's memory limitations by developing and using libraries of shapes. If a drawing gets too large and occupies too much memory, you can save a copy and re-insert it in the drawing as a single entity which thus requires less memory.

A few drawing niceties are missing, like the ability to draw on different layers and the support of high-resolution monitors, but these programs are fast, powerful, and easy to use.



With CADPLAN, you can print a bill of materials based on information in the drawing—in this case a list of office furniture with costs automatically totaled for multiple items in the drawing.



Simple technical drawing . . .

MACDRAW ★

Mark Cutter. Version 1.7. \$195. Not copy-protected. Macintosh. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.

THOMAS E. GRAVES: MACDRAW is aimed at the technical draftsman. While MACPAINT (p. 127) treats objects as a series of pixels, MACDRAW treats objects as attributes (circles, squares, lines). With MACDRAW, you can slide objects over each other and each retains its identity. With MACPAINT, sliding one object over another causes the two to merge.

DAN DUGAN: Screen rulers let you change scale without changing the drawing. However, accuracy is limited and sometimes

Medium precision, and easy . . .

CADPLAN

Version 1.45. IBM PC/XT/AT/compatibles (320K). \$1600. Copy-protected. IBM Color Graphics, Conographics, Scion, Sigma and Hercules Cards. Input: Mouse Systems Mouse, GTCO, Kurta or Houston Instruments digitizers. Output to IBM, Calcomp, Houston Instruments or Hewlett-Packard plotters; Epson or IBM dot matrix printers. Personal CAD Systems, Inc., 981 University, Los Gatos, CA 95030; 408/354-7193.

RIK JADRNIČEK: CADPLAN is good for space planning, block diagrams, even freehand sketching, and it includes most of the elements of a good CAD system: multiple (65) layers, grids, zooming and panning, and symbol libraries. It works easily with inches, but if you want to do detailed architectural drawings and define points and angles in decimal units, it may not be precise enough. Also, very large drawings require pre-planning since the capacity of a drawing depends on the available memory.

CADPLAN includes semi-automatic dimensioning (the program tells you the distance between any two points according to the scale you set). With the optional report generator (\$400) you can, for example, produce a bill of materials or parts list from the drawing you just created.

CADPLAN supports a variety of input and output devices and is very easy to use, but make sure it will suit your needs. The more basic version called CADDRAFT (\$495), or PC-DRAW (p. 133), may be all you need if you are interested primarily in space planning or block diagrams.

Drafting by hand is faster than using a CAD system when you're drawing an object in detail. However, once drawn, the object (a flange, bolt, 2 x 4, cabinet, etc.) can be inserted in a new drawing in a matter of seconds. After you've created several object files, the speed gains over drawing with pencil and paper become enormous. VERSACAD provides a library of objects you can use right away.

ambiguous. For example, a three-pixel-wide line can be accurately centered using the pixel in the middle, but the ruler must center a two-pixel line to the nearest pixel. Therefore, some "tenths of an inch" might be 7 pixels wide, and some 8. Also, MACDRAW seems to have a subconscious aversion to angled lines—maybe because it can't make them look right, "angle" isn't even in the index.

BARBARA ROBERTSON: MACDRAW is comparable to PC-DRAW (p. 133) in capability and application, but has some severe limitations. I'm often amazed, though, at what Mac owners will endure. For example, although drawings can be quite large, you must print them out on 8½" by 11" sheets and paste them together. Reviewer Dan Dugan bought MACDRAW and a paper cutter.

Professional drafting . . .

VERSACAD

IBM PC/XT/AT/compatibles; TI Professional; Version 3.1 (384K); Version 4.0 (512K); \$1495; copy-protected; supports IBM color card and Enhanced Graphics Adapter, Conographics, Hercules, Artist; input: Houston Instruments, Kurta or Summagraphics digitizing tablets. HP 200, \$2495; input: HP 9411A graphics tablet. Output to Houston Instruments and Hewlett-Packard plotters.

CADAPPLE

Version 3.0; \$1495; Apple II family (64K); copy-protected. Supports California Computer Systems 7710-01, Apple Super Serial, Asynchronous serial interface and Grappler cards; input: joystick, Houston Instruments DT11 digitizing tablet; output to dot matrix printers.

Both from T&W Systems, Inc., 7372 Prince Drive, Suite 106, Huntington Beach, CA 92647; 714/847-9960.

RIK JADRNIČEK: VERSACAD and CADAPPLE are two versions of a capable 2-D drafting program developed in 1977. With either program you can create very professional drawings including full architectural plots. All the basic editing and image-manipulation functions of a good CAD system are present. Unique features are: you can save "snapshot" zoomed views of your work and, with the library feature, develop groups of 100 symbols and plot them out on a 10" x 10" symbol grid for later use in drawings.

Professional CAD software using floating-point math tends to be inherently slow in zooming and panning and VERSACAD is no exception, although speedy RAM-disk configurations can be developed. Version 4.0, written in C, works under the PC DOS operating system and is faster than the Pascal-based version 3.1. New features in 4.0 include: geometric functions (such as parallel lines), filleting, trimming of lines and arcs at intersection points, object swap, a paragraph style of text entry, unproportional scaling of object groups (changing objects to twice as high and three times wider), windows for merging drawings, panning in any direction, 250 layers, and options for changing the direction of objects. In addition, you can define any type of measurement unit—fathoms, rods, inches, metric, etc.—and change your mind while you're in a drawing. An optional Bill of Materials program (\$495) provides definable formats for calculating unit costs and labor rates.

BARBARA ROBERTSON: If you want to jump right in and begin drafting, consider VERSACAD—it's easier to learn than AUTOCAD (p. 135). But AUTOCAD can be customized to do many functions automatically which, if you are willing to invest the time initially, saves time later.

Professional 2-D drawing, precise through unlimited layers . . .

AUTOCAD

Version 2.1, \$1000; with ADE2: \$2000 (street price \$1475); with ADE2 and ADE3: \$2500; not copy-protected. IBM PC/XT/AT/compatibles (512K; hard disk; 8087 co-processor; IBM color card and Enhanced Graphics Adapter, Hercules, Tecmar, Scion PC640); TI Professional, NEC APC & APC III, DEC Rainbow, Fujitsu M16, Tandy 2000, Wang PC/PIC, Zenith Z100, NCR DMV, DG/ONE, Victor 9000, Apricot, HP150, IBM 3270. Input: Houston Instruments, Hitachi, Summagraphics, Calcomp, GTCO, Kurta digitizing tablets and others; Mouse Systems, USI, Microsoft, TI, Tandy and Wang mice; joystick; KoalaPad. Output to Houston Instruments, Hewlett-Packard, Strope, Sweet Pea, Calcomp and other plotters; Datacopy Model 100 and Wang PIC systems image digitizers (requires CADCAMERA software - \$3000); Autodesk, Inc., 2320 Marinship Way, Sausalito, CA 94965; 415/331-0356.

BARBARA ROBERTSON: AUTOCAD is as much the standard in the 2-D world as 1-2-3 (p. 68) is in the spreadsheet world, and for much the same reasons. It's good, fast, and can be customized. In fact, when Autodesk published their first catalog of applications in Spring 1985 they listed more than 100 products that work with, connect to, or are templates for AUTOCAD—products for architecture, facilities planning, piping, theatrical lighting, general drafting, and engineering—chemical, electrical, electronic, mechanical, structural, civil. One of the few applications programs sold by Autodesk is AE/CADD by ArchSoft, a \$1000 template for architects and engineers. The template actually lies on top of a digitizing tablet and has predefined parts—wall parts and sizes, windows, doors, appliances, stairs—all sorts of useful pieces that can be popped, pre-drawn, into a drawing. The template also has many predefined macro commands so you can, without learning how to "program" in AUTOCAD, do many functions automatically.

RIK JADRNICKEK: AUTOCAD is capable of drawings ranging from simple flowcharts to large and complex architectural drawings. Your microcomputer becomes a drafting table with pencil, paper, T-square, compass, and more. For example, with AUTOCAD you can simulate an unlimited number of layers of 24 x 36 inch tracing paper precisely registered one on top of the other, and you can draw on each piece of paper to an accuracy of less than one-trillionth of an inch (floating-point math). Since the program becomes slower as the drawing grows larger, a numerical coprocessor chip (8087: \$260; 8287: \$340) is recommended to speed things up. All data and commands can be entered from the keyboard or (faster and easier) with a variety of input devices supported by the program. Multicolored plots ranging from letter to architectural size can be printed.

A rich set of primitive commands enables various constructions of lines, arcs, and circles used for precision drawing. Editing features include erasing, moving, copying, scaling, and rotating of drawing elements. ADE2 adds semi-automatic dimensioning, object snap, filleting, cross-hatching, attribute assignments, and extraction (so that you can create a bill of materials), and mirroring.

ADE3 adds 3-D viewing of objects created in 2-D, French curves, polylines (for curve fitting) and a freeze and thaw feature that speeds up the program because you can prevent unaffected parts of the drawing from being updated with every change you make.

User-definable menus, macros, and command files allow facile customization by users without programming knowledge (a very powerful feature). You can create and save libraries of shapes, then retrieve and place in drawings by selecting them from an onscreen menu or by touching pictures on the digitizer surface.

Zooming and panning capabilities turn the monitor into a window scrolling over the surface of a large drawing. Zooming into a small area enlarges that area and permits detailed drawing.

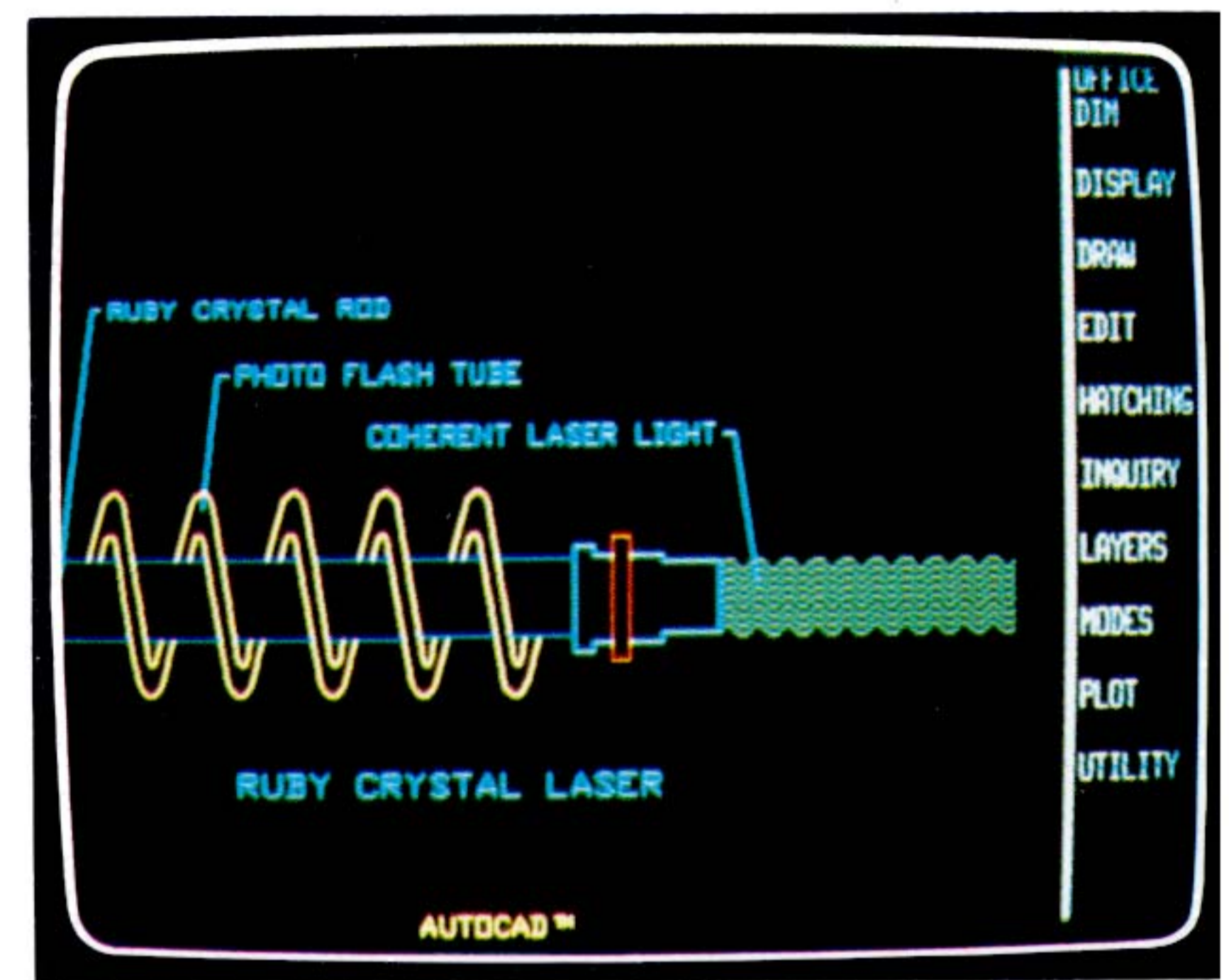
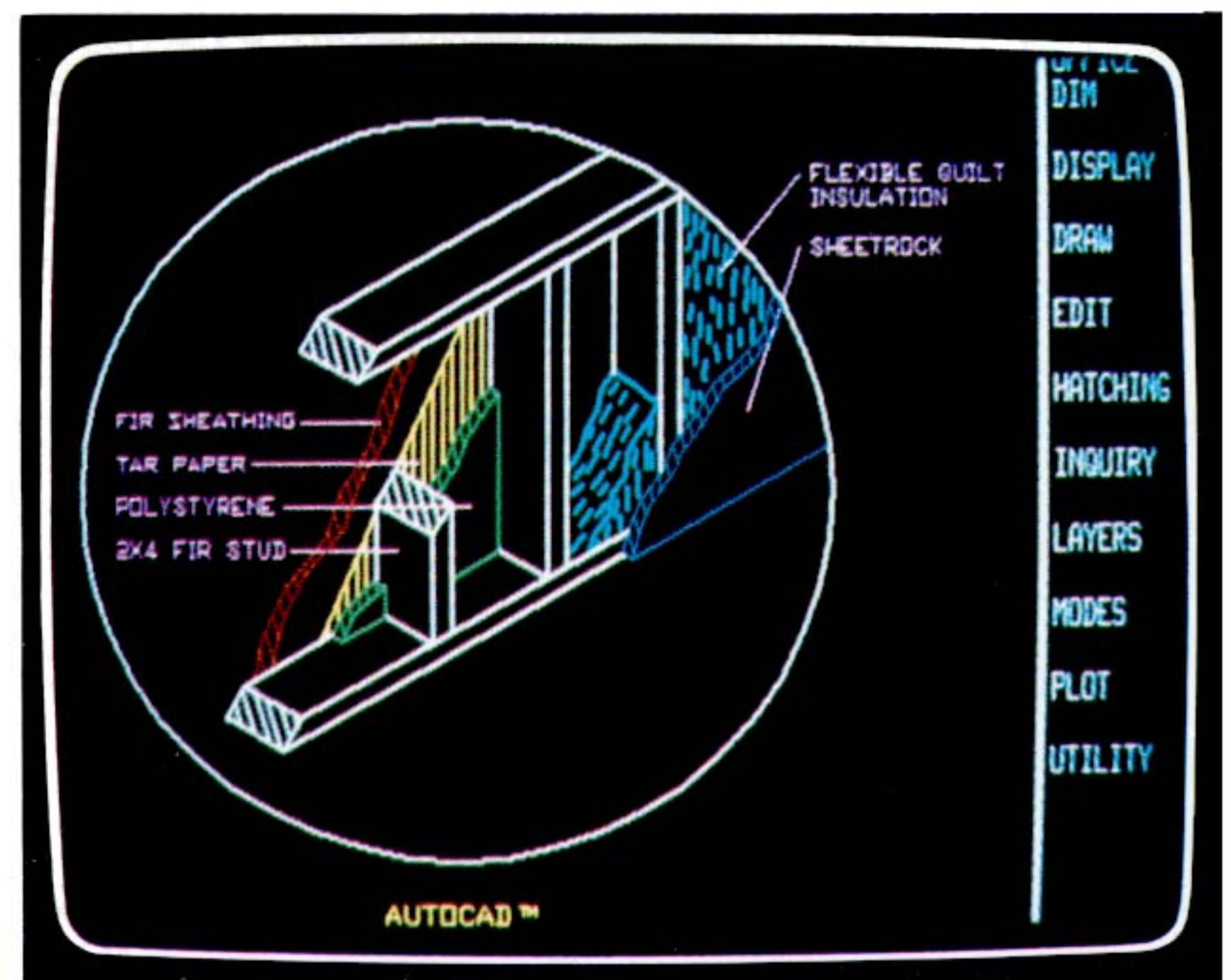
If you plan to do extensive work with the program, a hard disk drive is recommended to speed up disk input/output. Like a word processor, AUTOCAD is a picture processor, saving pages of drawings on disk as available RAM fills up.

AUTOCAD is a very sophisticated, mathematically precise program and an excellent choice for professionals.

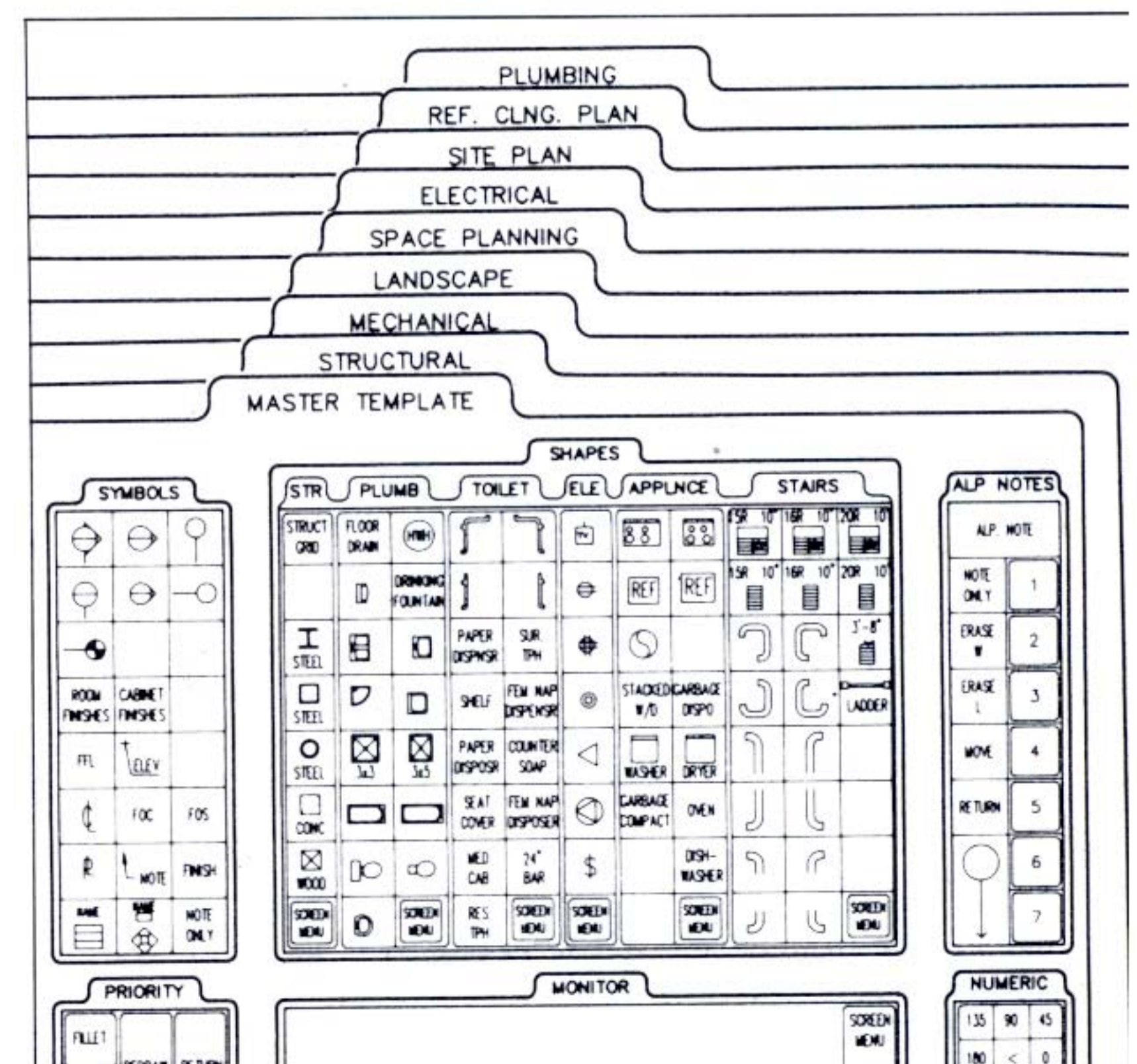
AUTOCAD's complete macro language is a subset of LISP which means you can now pass variables within AUTOCAD. You can, for example, define a scale as a variable and use it in equations with "if/then" and "go to" statements. It will be interesting to see what new applications are developed with this programming capability.

BARBARA ROBERTSON: The popularity of AUTOCAD has even spawned a magazine: **CADalyst, The Journal of the AutoCAD Users' Group** (\$4.50 each; 282-810 W. Broadway, Vancouver, B.C. Canada V5Z 4C9.) It's chatty, full of advice and product ads for AUTOCAD users and, although an AUTOCAD cheerleader, spends some of its pages making suggestions to Autodesk.

To insert a shape from this template into a drawing, simply touch it with a digitizer stylus or puck, select the insertion point in your drawing, and quick as a wink, you've added a pre-drawn object. The AUTOCAD template shown here is from AE/CADD.

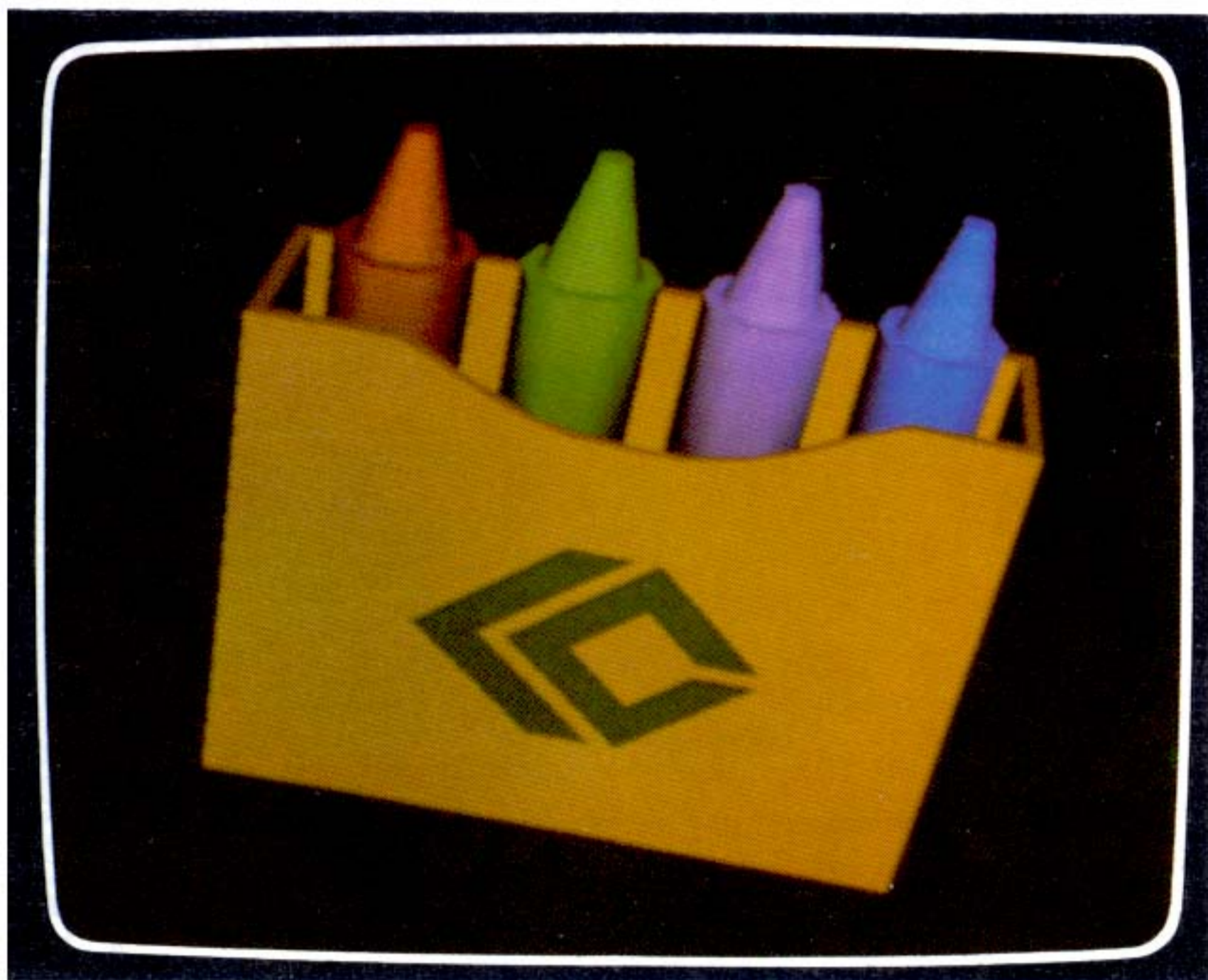


Both these drawings were created with AUTOCAD, showing the program's versatility. Although it looks as if the entire drawing is on one layer, in both cases, various pieces are actually drawn on separate layers.

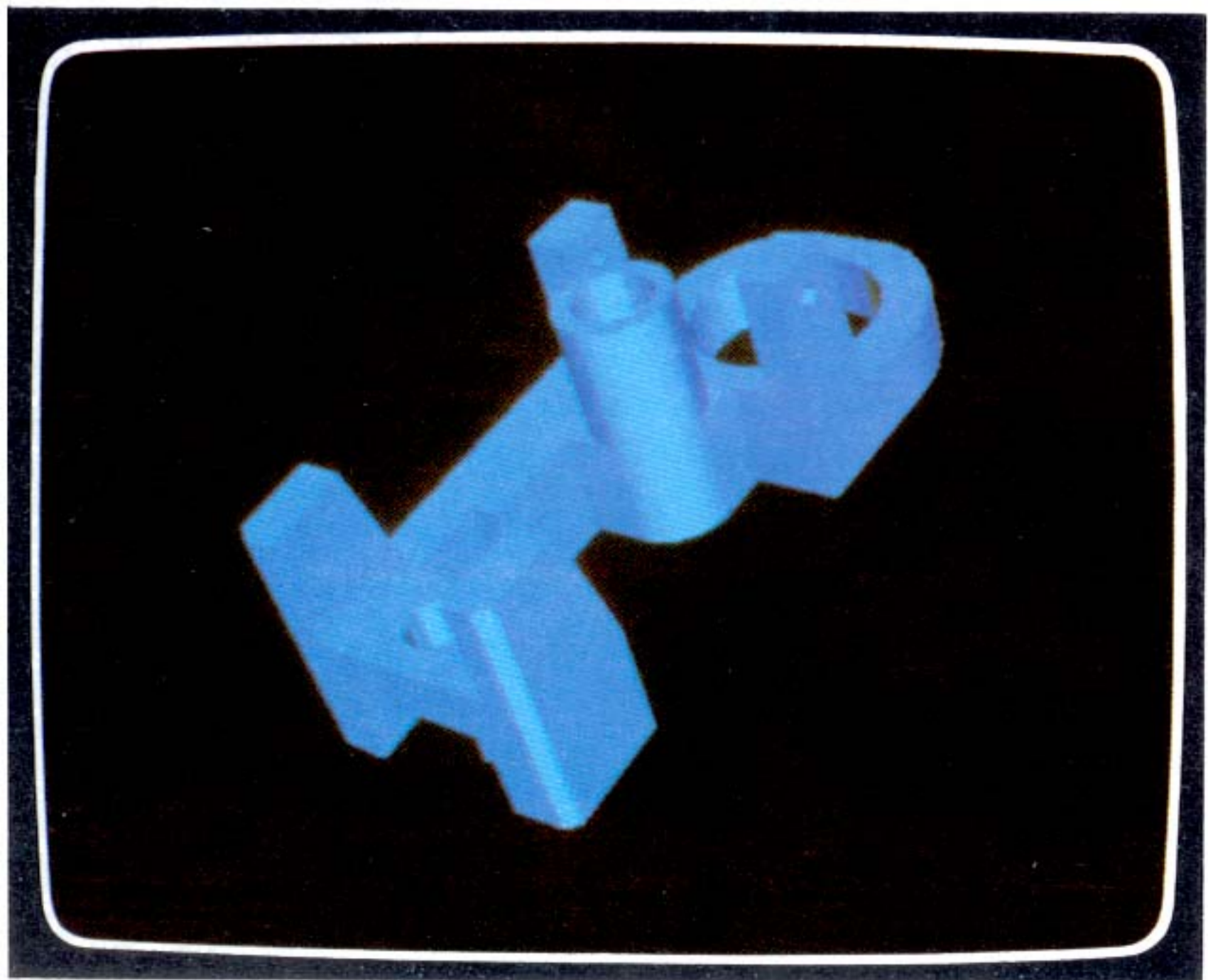




This picture, rendered using CUBICOMP software on an IBM XT, is actually composed of several 3-D and 2-D images layered one on top of another. The background, the room, the furniture, and the plants were all drawn separately and combined to make this realistic tableau.



The CUBICOMP system is expensive, but the kind of sophisticated surface and shading and smoothing you see in this 3-D drawing are very difficult mathematical feats.



Solids modeling . . .

3-D Computer-Aided Design (CAD)

BARBARA ROBERTSON: Three-D popped up everywhere this year—AUTOCAD (p. 135) gives you 3-D views of 2-D drawings, so does ROBOGRAPHICS (p. 133). The folks who make ADVANCED SPACE GRAPHICS (p. 137) released CADKEY—which lets you edit 3-D drawings in 2-D. 3-D is just beginning to become useful. I expect that by next year, all the 2-D programs will have 3-D capability, and some of it will be very sophisticated.

RIK JADRNICKEK: Three-D computer-aided design software is often referred to as solids-modeling software. The solid image is normally constructed by linking a collection of polygons of various shapes and sizes. The more polygons used, the smoother and more representative the shape will be. Advanced software (see CUBICOMP, p. 136) will even smooth curved surfaces so that a sphere (actually made up of polygons) really looks like a sphere.

As with 2-D CAD, data points are stored in a database. Since a database is kept of each element used in creating an object, once created, the objects can be rotated in space, scaled, edited, stored, and transmitted. More advanced packages include hidden-line removal and surface shading, both of which contribute to the illusion of reality. This simply means that lines normally out of sight (falling behind other lines and surfaces) are removed and that the surface is shaded to mimic the way light would be reflected off a real object. With advanced software like CUBICOMP a palette of more than 16 million colors can be used to precisely shade an irregular shaped object while changing the light source. So a doughnut really looks like a doughnut.

Loaded with features, priced accordingly . . .

CUBICOMP

ModelMaker 100: \$3500; Conographics card (4 colors onscreen from palette of 16). • **ModelMaker 300:** \$5000, Revolution card (8 bits/pixel; 256 colors onscreen from palette of 4096). • **ModelMaker 500:** \$11,900; includes Cubicomp's frame buffer (graphics card in external box) and interface card (12 to 16 bits/pixel; 4096 colors onscreen maximum from palette of 16,000,000); requires high resolution RGB monitor (Mitsubishi 3919 for \$2900 recommended). • **PictureMaker:** \$25,000; includes LUMENA (p. 132) adapted for Cubicomp's frame buffer, the Cubicomp frame buffer (with Genlock for video output) and interface card; requires high resolution RGB monitor.

IBM PC/XT/AT; 640K; Intel 8087 math chip recommended; hard disk recommended. Input: most digitizing tablets. Output to Houston Instruments, Hewlett-Packard plotters; Diablo C-150, Tektronix 4965 color printers; film recorders. Not copy-protected. CalComp Corporation, 3165 Adeline St., Berkeley, CA 94703; 415/540-5733.

RIK JADRNICKEK: For the price of an IBM PC plus hardware and software upgrades totaling about \$10,000 you can have a 3-D system as good as many costing upwards to \$100,000.

Start with a "wire-frame" model. Remove the lines that would be out of sight. Shade and smooth the surface, and you have a 3-D image. CUBICOMP's software even lets you punch holes and put objects inside.

You don't need to calculate coordinate points, since you can enter data points by using a digitizer. You can create wire frame models of three-dimensional figures while scaling and rotating them in space. You can design complicated and irregular shapes and even punch holes in them using the keyboard and digitizing tablet. Also, you can remove the hidden lines, save the images on disk, and recall them at will.

BARBARA ROBERTSON: All four packages let you string together many commands and automatically run the batch using macro commands, and all have the same basic capability to draw objects in three dimensions onscreen, display them with perspective and view them from any angle. However, the complexity varies with each program.

ModelMaker 100 displays wire frame line drawings using up to 1000 polygons and has hidden line removal. ModelMaker 300 adds simple shading to the drawings and anti-aliasing. ModelMaker 500 adds solid modeling, complex shading, and increases the number of polygons to 4000. PictureMaker adds LUMENA's 2-D painting capabilities, software for titling and true 3-D animation.

The four programs are compatible—a ModelMaker 100 picture can be moved into PictureMaker and enhanced; a PictureMaker drawing can be displayed in ModelMaker 100 (however, only as a wire frame line drawing).

Stick modeling and 3D . . .**ADVANCED SPACE GRAPHICS**

\$1095; \$1995 with Space Tablet Digitizer; IBM PC/XT/AT/compatibles (192K); not copy-protected. IBM color graphics card, Tecmar Graphics Master, Conographics. Input: Space Tablet Digitizer. Output to Houston Instruments, Hewlett-Packard plotters; IBM and Epson dot matrix printers.

CADKEY 

\$1895 (includes card); IBM PC/XT/AT/compatibles (512K); Requires Intel 8087 or 8287 math chip; copy-protected. IBM color card or Enhanced Graphics Adapter, Tecmar Graphics Master, Conographics. Input: Summagraphics, GTCO, Houston Instruments, Hitachi digitizers, Summa, Mouse Systems and Torrenston mice. Output to HP 7400/7500 and Houston Instruments DMP plotters; IBM and Epson dot matrix printers.

Both from Micro Control Systems, Inc., 143 Tunnel Rd., Vernon, CT 06066; 203/647-0220.

RIK JADRINICEK: ADVANCED SPACE GRAPHICS comes with the only 3-D digitizer I know of, a novel idea. You can place a bowl on the digitizing tablet and enter its shape into the computer by touching a number of points on the surface of the bowl. When the data points are connected (automatically), the result is an onscreen (monochrome) "stick" representation of the surface.

Once the surface is defined, you can look simultaneously at a top, side, and front view

Low price, requires math knowledge . . .**ENERGRAPHICS/PC**

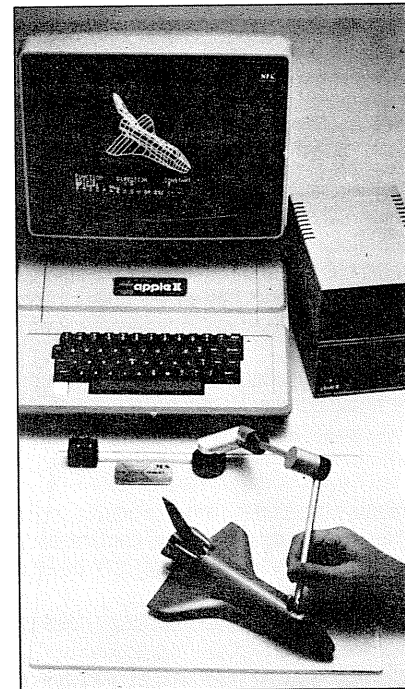
Version 1.3; IBM PC compatibles; 128K; color graphics board; RGB monitor; outputs to Epson MX/FX, C. Itoh, Okidata 92/93, Mannesman Tally 160/180, NEC 8023, IDS Prism black-and-white dot matrix printers; with \$100 plotter option, supports HP 7470A/7475, Houston Instruments DMP 29, 40 and 41, CalComp 84, Strobe 260, IBM 749/750/7371/7372, Sweet-Pea, Mannesman Tally Pixie, Amplot II plotters; copy-protected? NO; \$350 (street price \$259); Enertronics Research, Inc., 150 North Meramec, Suite 207, St. Louis, MO 63105; 800/325-0174.

RIK JADRINICEK: ENERGRAPHICS is a surprisingly inexpensive package chock full of graphics surprises. It will do everything from business graphics to 3-D solids stick modeling. If you want a tutorial and extensive documentation on the state of 3-D graphics, this would be the least expensive entry package to get involved with. But prepare yourself for a mathematical journey into the third dimension. ENERGRAPHICS is more of a tutorial or learning experience than a software package for practical everyday use. You get a lot for your money.

of the object on the monitor. You can expand and shrink both the horizontal X- and vertical Y-axis scales to manipulate the object, rotate and move the shape, even look at it from different perspectives, and zoom in to enlarge parts of the shape for more detailed drawing. You cannot (as with CUBICOMP, p. 136) remove hidden lines, but you can accurately measure distances from point to point—one of the best uses of the program.

With CADKEY, you design objects in 3-D, and then edit in either 2-D or 3-D. The product is primarily useful for mechanical engineers who want to draw a tool (a hammer, hose nozzle, etc.), look at it from several perspectives (a change here changes all the views at once), then finish the details in 2-D. With AUTOCAD (p. 135), you do the reverse: draft in 2-D, put each drawing in layers, "tape" the drawings together, and then view a 3-D representation.

With the ADVANCED SPACE GRAPHICS hardware/software combination you can trace a physical object in 3-D on the screen by moving the "Space Tablet" around the object's surface.

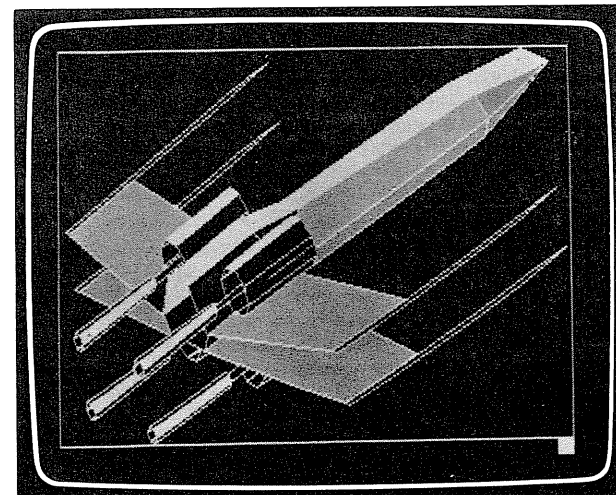
**3-D links to 2-D programs . . .****EXECADD**

3DESIGN3: \$1000 (includes interfaces to AUTOCAD, p. 135, VERSACAD, p. 134 and CADPLAN p. 134); \$1200 (includes Tritek 2-D software); SOLIDSHADE: \$500; IBM PC/XT/AT/compatibles (256K); copy-protected; IBM color card, Tecmar Graphics Master, Conographics, Hercules, Amdek, MAI, Revolution. Input: Mouse Systems and Microsoft mice; GTCO, Hitachi, Houston Instruments, Kurta and Summagraphics digitizing tablets. Output to Hewlett-Packard, Houston Instruments, Amdek and Calcomp plotters. SOLIDSHADE output only to graphics printers and Polaroid Palette film recorder. Tritek Vision Systems, 4710 University Way N.E., Suite 512, Box C-56789, Seattle, WA 98105; 206/632-2125.

BOB SOHR: With 3DESIGN3, architects, engineers, and designers can create images of objects and then rotate, scale, translate, and view these images from different perspectives. It's like being able to walk around the image on the screen. You can compose new objects using copies of images stored in libraries on disk. Or, using a digitizing tablet, create vertical, horizontal, and diagonal lines, circles, arcs, curves of lines at arbitrary angles. Images tend to look fairly crude, with noticeable aliasing (diagonal lines look jagged).

BARBARA ROBERTSON: New features this year include the ability to move drawings from 2-D programs into 3DESIGN3, and the SOLIDSHADE program that takes views of 3-D objects to let you flood the polygons with color, shade the image, reposition it, change the light source and add text.

BOB SOHR: Some nice features are a hidden-line removal routine (runs slow, as do most 3-D programs), rubber-band lines (get a starting point, then watch the line follow the cursor anywhere on the screen), a "Z-axis indicator" that shows you, with a kind of depth gauge, how far in or out of the screen the current point you're describing is, and a hierarchical structure for objects (the typewriter on the desk in your picture is "attached" to the desk and moves with it).



With 3DESIGN3 you can remove hidden lines and then take 3-D drawings one step past ENERGRAPHICS by adding elementary surface shading.

TELECOMMUNICATING

Art Kleiner, Domain Editor

ART KLEINER: Someday everybody will communicate by computer. Personal computer networking—exchanging words and pictures between terminals, over phone or cable—enhances communication so conveniently and powerfully it will eventually become as widely used as the telephone is now. The emerging army of dreamers who will make this happen includes corporations—AT&T, IBM, Sears, Citibank, CBS, and the Knight-Ridder newspaper chain—but the systems planned by those companies are greatly outnumbered by systems from individuals and small companies. These are still pioneer days, and personal computer owners are the pioneers.

People play games, order products, start small businesses that span continents on national conferencing networks, retrieve public-domain software from free bulletin boards, investigate

background material for new stories, seek romance, get stock quotations, and work at home.

Most national computer networks, such as The Source, CompuServe, and a dozen others reviewed in this section, give you a password and charge by the amount of time you're actually logged on (the "connect hour"). To reach them, you simply dial a local phone number that ties into one of several long-distance carriers which are cheaper than the regular phone lines.

Less expensive than national networks are local computer bulletin boards, which you can dial into to leave messages or take part in discussions.

They're often free, but you must pay any long-distance charges if you dial one far from home. We review guides to existing bulletin boards on page 148, and software for starting your own on page 149. Here's an example of the power of a local bulletin board: In 1983, David Hughes of Colorado Springs

WHY THIS IS THE LONGEST SECTION IN THE BOOK

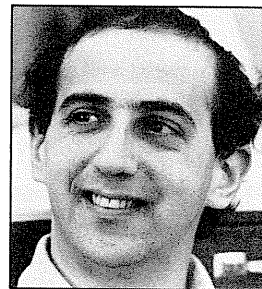
"A computer is a communications device first, second, and third."—Alan Kay

STEWART BRAND: "Telecommunicating" is our founding domain. Three ways, in fact.

For me it was a cold plunge into teleconferencing that swerved my life toward personal computers and led directly to this book. In January 1983 I was invited by the Western Behavioral Sciences Institute in La Jolla, California, to participate as faculty in their School of Management and Strategic Studies. It was a six-month stint, nearly all of it conducted from my office on a Kaypro they loaned me to hook up to the 40 or so nationwide "students" (corporate executives) via the marvelous EIES network (p. 147). A success in its own right, the project also revolutionized my writing, my thinking, my work network, and my business.

People have been interested in this book's sizable advance, the \$1.3 million from Doubleday, and in the fact that an eight-page proposal inspired it. What's more interesting to me is that it took only ten days for four coauthors to write that proposal and wrestle it through four drafts, even though one of us was traveling (Art Kleiner), one was on the East Coast (John Brockman), and two were jittering around in California (myself and Richard Dalton). The ectoplasmic bond was the EIES network. Its immediacy and convenience served admirably the need to make a single-voiced, enthusiastic, carefully proofed document. I'm not sure we could have managed it without telecommunications.

Art Kleiner is the living link between previous **Whole Earth Catalogs** and this project. He was Research Editor of the two editions of **The Next Whole Earth Catalog** (1981, 1982) and frequent Editor of our **CoEvolution Quarterly**. Building on his early involvement with EIES—he's been a user consultant since



Matt Herron

Art Kleiner

1979—he became Whole Earth's computer specialist, convener of the Personal Computer section in **The Next Whole Earth Catalog**. When this project came up, he had just left on sabbatical to do a book on the history of magazines and the invention of marketing. Returning to the rescue, he put together the network of friends and colleagues that initiated what you see here.

The telecommunications section is long because it covers online services as well as telecommunications software and hardware. Also, it is long because the subject is the most difficult in the book. Burdened by expertise, Art had the arduous task of triply distilling an already hard liquor.

TELECOMMUNICATING TOOLS

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Terminal Programs 150-154

entered onto his board the text of a pernicious city council bill outlawing professional work at home. Instead of tracking the bill down at City Hall, residents could dial in at their convenience and read the bill at home. Within a week, Hughes had gathered enough angry readers to storm the next city council meeting and influence council members to defeat the measure.

Hughes' newest venture is an example of the next wave of computer networks—local multi-user conferencing systems. These charge less than national networks, and are more reliable and (in many ways) more rewarding than local bulletin boards. For our report, see page 148.

To begin telecommunicating, you need to buy a modem—an electronic box that translates computer characters into sounds that travel through phone lines. Another modem decodes them at the other end. You also need a communications software package (called a terminal program) to run on your personal computer. This program controls the modem, shunting text between it and your screen, disks, and printer. Modems don't vary much—we recommend a small selection on page 155—

but terminal programs offer an increasingly large number of options. You'll find our recommendations on pages 150-154.

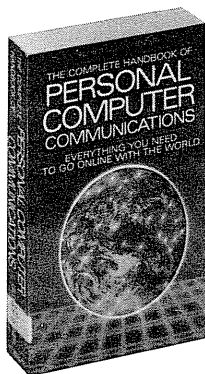
If you send a lot of programs and other files from one computer to another, you might want file-transfer software, reviewed on page 156. "An acquaintance regularly sends me spreadsheet files by phone," Louis Jaffe wrote us. "Loaded into SUPERCALC (p. 67) they work just fine." Ultimate file transfer—local networks that allow several computers in one building to work with the same files simultaneously—is described on page 157.

Although every computer network you use and file transfer you try will, at first, take a bit of fiddling with the terminal program before you get your connections right, don't be daunted: it's becoming easier. Programs are finally emerging (like SMARTCOM for the Macintosh, p. 153) that make telecommunicating a human activity instead of a technical obstacle course. Modems are getting much cheaper and more reliable. And the networks themselves become more plentiful, reliable, and innovative every week. The more people use these tools, the better they'll get.

Still the best guide . . .

THE COMPLETE HANDBOOK OF PERSONAL COMPUTER COMMUNICATIONS, Completely Revised and Updated

The Complete Handbook of Personal Computer Communications; Alfred Glossbrenner; 1985, 512 pp.; \$14.95 postpaid from St. Martin's Press, 175 Fifth Avenue, New York, NY 10010; 212/674-5151; or COMPUTER LITERACY.



ART KLEINER: This book covers much of the telecommunicating lore that nobody tells you about unless you know what to ask: how to compare networks, how to find the particular conference you need, how to connect your computer to someone else's typesetting equipment or directly to another computer.

Glossbrenner's massively updated new edition describes all sorts of networks and innovations that weren't even conceived of three years ago when the first edition came out. There's also a new and wonderfully comprehensible explanation of the technical esoterica of networking. Like all of Alfred's books, this one resounds with enthusiasm and clarity. Telecommunicating is the best way to get good, free, public-domain and user-supported software hot off the programmers' hands. A second Glossbrenner book, *How to Get Free Software* (p. 27), is the best guide around.

HOME BANKING

ALFRED GLOSSBRENNER: With all of the hype and publicity you're likely to hear, it's important to remember that home banking is barely in its infancy. It has a long way to go before it becomes widespread, and there are sure to be bugs and kinks along the way. Here are the most important questions to ask:

- 1. How many creditors can I pay automatically?** By far the most crucial question. The only system so far capable of paying any and all creditors that you specify is Direct Access from Citibank in New York. Despite home-banking promoters' implications, with other banks, you can pay *only* those firms on the bank's list of pre-approved payees. If your local dry cleaner isn't on the list, it's back to the checkbook, stamp, and envelope routine.
- 2. What hours is the system available?** New York's Chemical and Citibank are online around the clock; HomeBanking from California's Bank of America is up from 6 a.m. to midnight (Pacific Time) only.
- 3. What does the sign-on process involve?** Security is an important concern, of course, but most home-banking programs use a system of multi-level passwords that appear to offer more than adequate protection. However, since at least one of these passwords is typically imbedded in the program disk the bank sends you when you open your account, you must use a system with a disk drive, which rules out many lap-size computers. The HomeBanking and Boston's Shawmut Bank (available via CompuServe) password schemes don't force you to use a special password disk with a unique imbedded password.
- 4. What does it cost?** Banks typically charge \$8-\$12 monthly for home banking in addition to other account fees; required minimum balances vary. Usually there is no per-check fee for electronic checks, but be sure to ask—some systems charge for *both* paper checks and electronic "checks." Network and phone costs depend on whether you call straight through using a local phone number (as with Citibank)—that's free—or go through CompuServe (Shawmut of Boston) or Tymnet (B of A and Chemical), and get charged by the hour.
- 5. How will you get cash?** Most home-banking programs accept nonlocal home banking customers, but it's preferable to "home bank" with a local bank. If that's not possible, you'll have to either keep a separate account in a convenient local bank to get cash, or request a supply of paper checks from your home-banking bank and find a local merchant who'll cash your checks.

THE COST OF NETWORKING								
Name of Network	Initial Charge	Monthly Charge	Connect Charge (Per Connected Hour)				Charge Per Transaction	Other Charges
			Business Hours		Evenings & Weekends			
			300 BAUD	1200 BAUD	300 BAUD	1200 BAUD		
CompuServe pp. 142, 144, 146	\$39.95 (Includes five free hours)	None	\$12.50*	\$15.00*	\$6.00*	\$12.50*	None	\$500-\$1,000 per month for maintaining your own conference☆
CONFER II p. 147	\$20.00 per group (2 or more members)	\$10.00 minimum per group	\$21.00	\$21.00	\$17.00	\$17.00	None	None
DELPHI p. 146	\$49.95	\$3.50/month for direct bill customers	\$16.00	\$16.00	\$6.00	\$6.00	None	\$5/hr extra for 2400 baud
Dow Jones News/Retrieval pp. 142, 144 (Any member can choose one of three plans:)								
Standard	\$75.00	None	\$72.00	\$72.00	\$12.00	\$12.00	None	\$48-\$72/hour extra for free-text search
Blue Chip	\$175.00 (\$100 annual)	None	\$72.00	\$72.00	\$7.80	\$7.80	None	\$32.40-\$72/hour extra for free-text search
Executive	None	\$50.00	\$48.00	\$48.00	\$7.80	\$7.80	None	\$32.40-\$48/hour extra for free-text search
EasyLink p. 145	None	\$25/year or \$25 monthly minimum	\$21.00	\$30.00	\$12.60	\$18.00	20¢ per address, \$2-\$5 per overseas TELEX.★	20¢/min extra for signing on from remote locations via WATS lines.
Electronic Information Exchange System (EIES) p. 147	None	\$75.00	\$7.00	\$7.00	\$3.00	\$3.00	None	\$15/monthly (approx.) storage fees for each extra conference you create.
International Electronic Mail Service (IEMS) p. 145	\$100 (\$50 per account. IEMS has a 2-account minimum).	\$5 per account	\$3.00	\$3.00	\$3.00	\$3.00	25¢ per 1000 characters (a 250-word message costs 50¢); \$2-\$4 per overseas TELEX.★	None
MCI Mail p. 145	\$18.00/yr	None	None	None	None	None	Per message: 45¢-\$1 as electronic mail, \$2 as first class mail, \$8 and up as overnight mail or TELEX.	None
The Source pp. 141, 144, 145, 146	\$49.95	\$10 (\$1 fee plus \$9 minimum connect charge).	\$20.75	\$25.75	\$7.75	\$10.75	None	\$10/monthly (approx.) storage fees for each conference you create.

* \$2/hour surcharge if you use a different transmission network than CompuServe's own (will affect people in some small cities).
 ☆ Depends on whether the conference (SIG) includes extra text databases.
 ★ TELEX rate depends on destination.

ART KLEINER: This table shows relative costs for communication networks reviewed in this book. Typical users spend 5-15 hours a month online. Only services you would actually subscribe to are included here. Comp-U-Store, for

instance, is available through three networks here—CompuServe, Dow Jones News/Retrieval, and The Source—plus its own. For addresses of the services, see the individual reviews.

Inexpensive, interactive, graphic, online fun . . .

PLAYNET

\$40 initial subscription fee (includes 90 minutes of connect time); \$2/hr., \$6/month; 6 p.m. to 7 a.m. locally weekdays, 24 hrs. weekends and holidays. Commodore 64. 1541 disk drive and 300-baud compatible modem; color TV/monitor recommended. PlayNET, Inc., 200 Jordan Rd., Troy, NY 12180; 800/752-9638.

ART KLEINER: A national computer network with no pretense of Serious Purpose, PLAYNET is unabashedly set up for casual talk and game-playing with other people who happen to be online at the moment. Some games are full-scale versions of chess, bridge, reversi (Othello), battleship, and the like; PLAYNET provides disks that put the image of, say, a chessboard onto your computer. When your opponent makes a move, you see the chess piece move on your screen. Other games are all text, taking place in impromptu message areas—there's an

ongoing informal version, for instance, of Trivial Pursuit that's as much fun as the original. Even while playing a game, you can exchange taunts and congratulations in another window on the screen ("Why did you move your king THERE?").

PLAYNET's online/disk combination is sometimes clunky (especially on the Commodore, where it takes more than a minute for the slow C-64 disk drive to produce a chessboard screen). But it's the least expensive national network yet.

Online discount shopping . . .

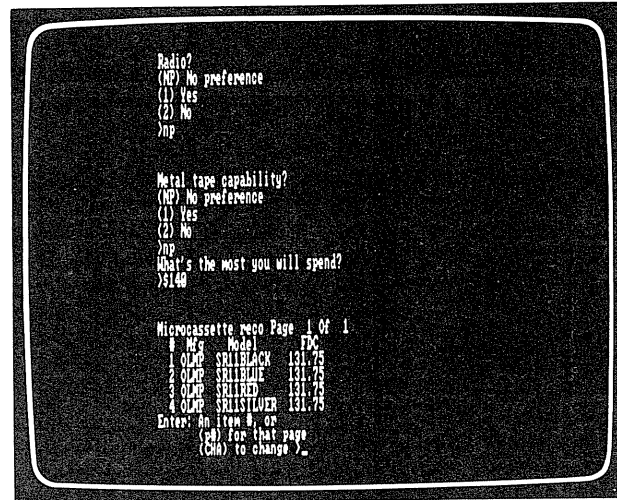
COMP-U-STORE

\$25/year membership; \$18/hr (9-5 wkdays), \$5/hr (eves & wkends), Comp-U-Card International, Inc., 777 Summer Street, Stamford, CT 06901; 203/324-9261.

ELIZABETH M. FERRARINI: If you know what you want, don't need to touch the item beforehand, and want to save time and a lot of money, then let your micro shop at Comp-U-Store for everything from hair dryers to computer printers (mostly computer equipment and the kinds of products sold in mainstream discount houses). Most Comp-U-Store goods are 20 to 40 percent below the manufacturer's price; you also pay regular connect charges to CompuServe, The

Source, or Dow Jones for the time you spend browsing online, plus an annual \$25 membership fee.

You shop for one item at a time, proceeding through a series of menus that usually offer several selections and a "no preference." Beware of "no preference": specific answers help Comp-U-Store narrow the search to find exactly what you want. When you're done, Comp-U-Store lists all the products that meet your specifications. You can then see any product's list price, manufacturer's name, delivered price (including shipping to your area and all taxes), available colors, and description. You can purchase any by credit card or check. Most items come via United Parcel Service, and you can only return merchandise that arrives defective or broken. For the moment, Comp-U-Store is the only national electronic buying service. Since new regional electronic buying services are constantly expanding, that could change any time.



Comp-U-Store takes you through a series of questions that narrow down your desires, then shows you a menu of choices—in this case, for a cassette tape recorder/player.

Publish online and get paid for it . . .

SOURCE PUBLIC FILES

Available at normal Source rates (see table, p. 140); Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102; 703/734-7500.

LEVI THOMAS: PUBLIC—a service within The Source—is the only place in computer networking where users publish their writing and get paid each time it's read. What you find there will vary in quality and intention; I found helpful information for navigating around the rest of The Source, plus entertaining stories such as "Published From a Bar-Stool: or, Saloon Journalism With the Model 100." My Great-Form-But-Too-Bad-About-the-Content award goes to a hillbilly-style newspaper called the **Par Mt. Telegraph**, containing cliché outhouse humor in an ingeniously interactive format, complete with comic strips. It takes very little time to learn PUBLIC's ins and outs and sample the selections there. The table of contents for each publication features the reading time of each entry and the number of times it's been read (for those interested in what's hot among other Source users). But each publication has different commands, which confuses most readers, who see several publications in one session. I don't know why The Source doesn't require a common Help command from its user-publishers.

PUBLIC is a great way to experiment with the format of computer communications. If you don't find anything that interests you there, why not write something yourself? Anyone can publish, but representatives of The Source must approve PUBLIC files before the author may collect a portion of readers' connect-time charges.

ART KLEINER: There's some public-domain software on PUBLIC, but not as much as you'll find in CompuServe SIGs (pp. 27, 146).

Stalking the wild software publisher . . .

ONE POINT COMPUTER INFORMATION NETWORK

\$250 subscription fee (currently being waived), \$40/hr.; available for any personal computer with communications software and a modem; One Point, 2835 Mitchell Dr., Walnut Creek, CA 94598; 800/222-2250 or, in CA, 415/947-0850.

.MENU—THE INTERNATIONAL SOFTWARE DATABASE

\$60/hr. (business hours) or \$24/hr. (evenings and weekends); plus \$.15/full record printed offline; for available evening and weekend hours refer to DIALOG KNOWLEDGE INDEX (p. 143); DIALOG, 3460 Hillview Ave., Palo Alto, CA 94304; 800/227-1927.

ART KLEINER: "I want to know which online databases can help locate software that fills a particular niche and find publishers of particular products," said Barbara Robertson. A legitimate reason to search online; software is especially hard to track down because printed catalogs date so quickly. After some research, I found two relatively good online databanks of microcomputer products. Since their contents overlap very little, I'd use both.

ONE POINT is far easier to learn; its menus are designed to narrow down the desired specs to help you find a particular package. Unfortunately, the resulting listings are inconsistent: sometimes they go on for pages, even mentioning past reviews of the product in magazines; other times they tell little more than the publisher and price. ONE POINT concentrates on IBM PCs and compatibles, but I found products for CP/M, Apple III, and Macintosh there. Once you

find a product, you can order it online. Since our demo account didn't permit ordering, I don't know how good their prices are.

.MENU, which runs on the venerable DIALOG databank service and its much cheaper nighttime daughter KNOWLEDGE INDEX (p. 143), uses DIALOG's relatively difficult commands. After a couple of concentrated hours, you can be proficient enough to search effectively. The listings, when you get them, are consistently complete. The service seemed particularly strong on Apple II software, but it covers all types of microcomputers.

We were in Guaymas, Mexico, with a guy from Chicago. He was busy denigrating the area, "who could stand to live here, you wouldn't know anything about the world, it is so squalid, etc." I was busy taking pictures of houses perhaps 25 feet square with a 1954 Chevy pickup in the driveway and a satellite dish on the roof. An area of perhaps 1,000 people, with about 50 satellite dishes! He said, "What do those dishes do anyway?" I said, "Well, these people can get 130 TV channels in five languages, and subcarrier FM stereo. They have Quebec, Venezuela, Mexico City, all of America, BBC, and they get the Chicago Symphony as clearly as you do." He was stunned. And silent for a while. And then he said, "What do they think when they see all that, and they look at this, where they live?" And I was silent, and Nan was silent, and he was silent. And I can't get rid of the notion that Scarcity and Abundance will have to be dealt with by the materialistic nations (today's equivalent of the monarchies that went down to democracy's force with the advent of the cheap printed word). —Charles House

Online Services for Investors

PATRICIA H. TAYLOR: Investors do three things: gather information (news, research, recommendations, and prices) to help them come to a decision; execute that decision (trade, order, buy or sell); and track the aftermath. Online services mesh naturally with the need to manage detail in all three of these tasks.

In addition to the services listed below, investors might also look into NEWSNET (p. 145),

Your phone is your computer . . .

DOWPHONE/SCHWABQUOTES ★

DowPhone: \$.50/minute plus toll phone charges or, if using a WATS line, \$1/minute; touch tone phone required; Dow Jones and Company, P.O. Box 300, Princeton, NJ 08540; 800/345-6397 • **SchwabQuotes:** \$20 subscription/year; 15 minute delay rates: \$.05 ea/Rapid Quote; \$.10 ea/Expanded Quote; Dow Jones News, \$.50/minute; stock list, \$.50/valuation; Real-time rates: \$18.50 extra/month; touch tone phone required; local call service only available in San Francisco, Sunnyvale and Century City, CA; Chicago; New York World Trade Center and New York Biltmore Offices; Charles Schwab and Company, 101 Montgomery St., San Francisco, CA 94104; 800/334-4455.

PATRICIA H. TAYLOR: Now you can program your telephone to get 15-minute delayed stock quotes over the phone with DowPhone. Any number of portfolios, each containing up to 100 securities, can be created; you can then get quotes for each member of the portfolio, hear the latest hour's headlines, and access the Dow Jones News Service for the particular category of your interest. SchwabQuotes, an expansion of the basic DowPhone, has real-time quotes and costs a little more.

Online investor's monthly bible . . .

WALL STREET COMPUTER REVIEW ★

\$39/year (12 issues); Dealer's Digest, 150 Broadway, New York, NY 10038; 212/227-1200.

PATRICIA H. TAYLOR: Essential reading for anyone serious about online investing. Reviews range from online databases to software programs to latest industry developments. The reviews are well done and have saved me the time and tribulation of finding out a lot of important information on my own.

Best single source of financial news . . .

DOW JONES NEWS SERVICE

Available at normal Dow Jones rates (see table, p. 140); Dow Jones News/Retrieval, P.O. Box 300, Princeton, NJ 08540; 800/257-5114 or, in NJ, 609/452-1511.

PATRICIA H. TAYLOR and ELIZABETH M. FERRARINI: The industry standard. Quotes from DJNS news scroll across the screens of investment brokers and managers all day long. Within fifteen minutes of the latest transaction, quotes on common and preferred stocks, composite options, and corporate and foreign bonds arrive from a variety of exchanges; quotes from mutual funds and selected U.S. Treasury Bonds are updated several times a day. A database of historical quotes goes back to 1978. Dow Jones' tracking service lets you create five investor profiles and track news and stock quotes for as many as 25 companies within each profile. The service is easy to use if you keep a list handy of Dow Jones' abbreviations for the particular stocks you have in mind.

ART KLEINER: Other services available through Dow Jones (often at extra cost) include: Media General, which has statistics on corporate earnings, dividends, and comparative stock performance, and Disclosure, which has balance sheets and directors' names for more than 6000 corporations. Sometimes you can get lower rates by directly accessing the parent company (known in the trade as the "information provider").

No static at all . . .

MODIO ★

IBM PC and compatibles; 256K; not copy-protected; \$549.95 plus monthly subscription charges: \$50/month 1st exchange (non-professional), \$80/month 1st exchange (professional); \$10/additional exchange; \$20/stock option; plus exchange fees which range from \$7.50 to \$50 (non-professional users) or \$12.50 to \$68 (professional users); Dataspeed, 1900 South Norfolk, San Mateo, CA 94403; 800/762-7538.

PATRICIA H. TAYLOR: Modio is an FM-based quote receiver system that transmits current market quotes on securities, options, and commodities via FM airwaves for display on a computer screen. With this product, active traders have market-monitoring devices similar to those in brokerage firms, at substantial savings. Data can be transferred to other programs using special software. Quotes are transmitted from one of eleven stations covering the largest U.S. metropolitan areas, so check to see that you're within the broadcast zone.

Most diverse services at least expense . . .

COMPUSERVE INFORMATION SERVICE

Available at normal CompuServe rates (see table, p. 140); CompuServe Information Service, 5000 Arlington Centre Blvd., Columbus, OH 43220; 800/848-8199 or, in OH, 614/457-0802.

PATRICIA H. TAYLOR: The Volkswagen of investment services. You'll find: Market News Service for interest-rate markets and international news; Commodities News Service, the industry standard; excellent weekly reports from Money Market Services (MMS) reflecting money managers' forecasts for the economy, interest rates, and foreign exchange; "Ask Mr. Fed," a "SIG" (discussion forum) where investors ask questions about the MMS reports or the economy as a whole; and MicroQuote for quotes on stocks, bonds, mutual funds, and options at very cheap rates.

CompuServe also has an arrangement with Max Ule and Company for online discount brokerage. You get overnight computerized order-entry, but no portfolio-tracking capabilities. For additional fees CompuServe provides portfolio evaluation, market highlights, forecasts, and online programs for financial modeling and planning.

Research, buy, analyze and gloat —all in one package . . .

THE SCHWAB EQUALIZER ★

\$199 (includes up to \$168.50 in free services); news and quotes, normal Dow Jones rates; company reports, \$3.50 each plus network use charge; Standard & Poor's Marketscope, \$36/annual subscription plus \$1.50/15 pages viewed, plus network use charge; Charles Schwab and Company, 101 Montgomery, San Francisco, CA 94104; 800/334-4455.

PATRICIA H. TAYLOR: This software/online program provides easy access to Dow Jones and to the (not otherwise recommended here) Standard & Poor's Marketwatch service. Quotes are on a 15-minute delayed basis; real-time while making an order. You enter orders by filling out a "ticket" which zips through the Schwab computer to the floor of the appropriate exchange. The portfolio is updated each time a trade is made through Schwab, either via computer or telephone. The colorful, clean, menu-based program and the comprehensive package of online services are beautifully designed. The Electronic Accountant part of the program provides complete portfolio management, generating full reports for year-to-date gains/losses, transactions, and income accounts. Portfolios can include stocks, bonds, and options purchased elsewhere.

Tapping Into Databanks

The publications you'll need . . .

ANSWERS ONLINE

Answers Online; Barbara Newlin; 1984; 373 pp., \$16.95; Osborne McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; 415/548-2805; or COMPUTER LITERACY.

THE OMNI ONLINE DATABASE DIRECTORY

Omni Online Database Directory; Mike Edelhart and Owen Davies; 1985, 324 pp.; \$14.95; Macmillan Publishing Company, 866 Third Avenue, New York, NY 10022; 800/257-5755 or, in NJ, 609/461-6500; or COMPUTER LITERACY.

MODEM NOTES

\$36/year (12 issues); *Modem Notes*, 2921 South Brentwood Blvd., St. Louis, MO 63144; 314/962-1015.

ART KLEINER: You can use your modem to find hitherto ungatherable information—stored online citations on topics from the location of toll bridges in Alaska to the names of minor government officials in Zanzibar. But you can't just log in and poke around—databanks charge by the minute, and you can hemorrhage your budget getting your feet wet. These three publications will help you narrow your search for the best databank to use.

Answers Online is the best overall guide. It describes 50 of the databanks you're most likely to use, shows sample records for each, and includes a very nice chapter on searching techniques.

The *Omni Online Database Directory* is more exhaustive, less hand-holding. It lists more than 1100 databanks, including quite a few compiled in foreign countries. The more specific and esoteric your needs, the greater chance you'll find this book valuable. It's riddled with comments from users, most of which describe surprisingly well what purpose a given databank serves. (Caution: a few minor factual errors are sprinkled throughout.)

Finally, *Modem Notes* is a monthly magazine aimed at businesspeople who do databank searching. It's the best affordable source of ongoing news about searching online. If you spend a significant part of your work time doing research, these three publications could change your life.

Virtually every argument in every article against computer technology applies equally well, and often better, to the written word and its supporting technologies.
—W. Scott Morris

 MEANS: NEW TO 2.0 EDITION

Late-night,
low-cost data searching . . .

BRS AFTER DARK

Available Mon.-Fri. 6 p.m. (local)-4 a.m. (E.S.T.); Sat. 6 a.m.-4 a.m., Sun. 6 a.m.-2 p.m. and 7 p.m.-4 a.m. (E.S.T.); \$75 initial charge; \$12 monthly minimum; \$6-\$25/hour, depending on which database is searched. Bibliographic Retrieval Service, 1200 Route 7, Latham, NY 12110; 800/833-4707 or (in New York state) 800/553-5566.

DIALOG KNOWLEDGE INDEX

Available Mon.-Thurs. 6 p.m.-5 a.m., Fri. 6 p.m.-midnight, Sat. 8 a.m.-midnight, Sun. 3 p.m.-5 a.m., all caller's local time. \$35 initial charge; \$24/hour. DIALOG, 3460 Hillview Ave., Palo Alto, CA 94304; 800/528-6050, ext. 415 or, in AZ, 800/352-0458, ext. 415 or, in AK or HI, 800/528-0470, ext. 415.

STEVEN LEVY: My first shock in telecomputing came when I realized that the Brave New World of getting information through your home computer did not yet exist for schlumps like me who aren't on some corporate tab. Though dozens of online databanks were available via modem—each derived from a bibliographic reference book like the *Science Citation Index* or *Chemical Abstracts*—they typically cost \$75 or more per hour, and using them well requires training. Then along came BRS After Dark—a cheaper, evening-and-weekend version of its parent, the Bibliographic Retrieval Service. I hooked up, admittedly a little worried that it would offer only abstracts, not the full text of articles I'd need.

One of my first searches was for information about the military-funded ARPAnet communications network. I had found very little in conventional libraries. Within five minutes (50 cents connect time), using the simple search function (BRS After Dark lobotomized the sophisticated commands used in its high-ticket day service), I discovered a 100-page report on the history of the ARPAnet. Its price wasn't listed, but the address of the research firm that prepared it was. I called them, and they sent it to me gratis. Never would have found it otherwise.

I later tried BRS's competitor, Knowledge Index (child of DIALOG, the other main on-line data bank vendor). It had a great manual (clear without reverting to third-person-stupid, with sample sessions for each database) and more databases (hence more topics) than BRS After Dark. But it cost more.

If you plan well, a typical search on either service costs as little as one or two dollars, especially if you hone the wording of your request. Prices will drop when the masses use these services, but if you need information now, sign up.

Main complaint: neither allows you to search through all its databanks in one sweep. You have to hop in and out of menus, retyping your search strategy each time. (The daytime services let you store your search strategy online and check in every week or so to see what's new.) Even so, we're talking New Age bargain here. Highly recommended. You may never look at a card catalog again.

TOPIC: Find books on using personal computers in business.

- ① ?BEGIN BOOK1
5/16/83 14:31:46 EST
Now in BOOKS (BOOK) Section
Books in Print (1490-1983) (BOOK1) Database
(Copyright 1983 R. R. Bowker Co.)
- ② ?FIND PERSONAL AND COMPUTER?
5993 PERSONAL
7100 COMPUTER?
S1 127 PERSONAL AND COMPUTER?
- ③ ?FIND BUSINESS AND S1
15703 BUSINESS
S2 8 BUSINESS AND S1
- ④ ?DISPLAY S2 Display 2/L/1
1075211 7797527XX
Business Applications for the IBM Personal Computer
Zimmerman, Steven; Conrad, Leo
224p.
R J Brady 06/1983
Trade \$16.95
ISBN: 0-89303-243-3
Status: Active entry
Illustrated
SUBJECT HEADINGS: MICROCOMPUTERS (00596668)
- ⑤ ?LOGOFF
5/16/83 14:32:44 EST
Session Total: 0.021 Hours \$ 0.50 User U40003

Knowledge Index has a clear, comprehensive manual; this excerpt shows how to refine your search in its database of Books in Print, which includes every available American published book.

The full story online . . .

MAGAZINE ASAP

\$84/online connect hour plus \$7/full record printed offline or displayed online; DIALOG Information Services, Inc., 3460 Hillview Ave., Palo Alto, CA 94304; 800/227-1927 • Complete list of magazines available from Online Services, Information Access Co., 11 Davis Dr., Belmont, CA 94002; 800/227-8431.

ART KLEINER: If you need to find a magazine story published in the last two years, this database can send its full text

cascading down your screen—while other databanks on, say, Knowledge Index will just give you a citation and send you scrambling to a library to look it up. MAGAZINE ASAP is nowhere near as versatile and comprehensive as NEXIS, but it doesn't require its own special software package. It does require learning the relatively arcane commands used on DIALOG/Knowledge Index. A typical search on this service costs \$25 to \$50, even if you're careful (that price is still cheaper than NEXIS). Measure the cost against a day of your time in a research library.


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ENTER DEPARTURE CITY NAME OR CODE
SAN FRANCISCO
ENTER DESTINATION CITY NAME OR CODE
BOSTON
ENTER DEPARTURE DATE
29 JUN
                FARE MENU
FARES FOR          FARES FOR
DIRECT FLIGHTS    DIRECT FLIGHTS
AND CONNECTIONS  AND CONNECTIONS
-----          -----
1 COACH CLASS AND EQUIVALENT FARES 6
2 FIRST CLASS AND EQUIVALENT FARES 7
3 BOTH COACH AND FIRST CLASS FARES 8
4 ADVANCE-PURCH AND EXCURSION FARES 9
    
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Finding the cheapest fare from San Francisco to Boston with the OFFICIAL AIRLINE GUIDES ELECTRONIC EDITION. First you enter the departure city, target city and date; then choose what type of ticket you want. OAG shows you a list of fares; and (not shown) lets you expand any listing to find more information.

Superb weather and sports . . .

COMPUERVE INFORMATION SERVICE

Available at normal CompuServe rates (see table, p. 140); CompuServe Information Service, 5000 Arlington Centre Blvd., Columbus, OH 43220; 800/848-8199 or, in Ohio, 614/457-0802.

ART KLEINER: CompuServe's news wire service only goes back one day, offering a few stories in each of a dozen or so categories. Though mediocre for news, it's the best place to find weather (superb land and maritime forecasts, keyed by locale, from the National Oceanographic and Atmospheric Administration) or sports results (Levy checks baseball box scores here).

Four months of business news . . .

DOW JONES NEWS SERVICE

Available at normal Dow Jones rates (see table, p. 140); Dow Jones News/Retrieval, P.O. Box 300, Princeton, NJ 08540; 800/257-5114 or (in New Jersey) 609/452-1511.

ART KLEINER: Type in the code for a particular industry or corporation and scan a list of appropriate stories adapted from the **Wall Street Journal** going back four months. Choose the stories you want to read and they appear. You can make a search for particular words embedded within the stories, but it will cost extra and require a special manual. Nonetheless, Dow Jones is a good place to start research on any business-oriented topic. When I wrote about AT&T's new proposed computer network last fall, I depended on it. It's a good thing the service is so easy to use, because it offers almost no online help.

 MEANS: NEW TO 2.0 EDITION

Dial-Up Flight Information . . .

OFFICIAL AIRLINE GUIDES ELECTRONIC EDITION

\$50 initial charge; \$.10/minute and \$.10/unit (fare screen, 2 units; schedule screen, 3 units); Official Airline Guides, Attn: Electronic Edition, 2000 Clear Water Drive, Oak Brook, IL 60521; 800/323-3537.

ART KLEINER: This dial-up databank permits you to browse among commercial airline fares and schedules as easily as you'd browse among shirts in a department store. You choose your departing city, arriving city, and date; see the available fares; check the limitations on each fare; print out the appropriate schedules; and make reservations online. A diligent travel agent might do more for free, but finding a good fare online will make you feel as triumphant as scoring well on a computer game. You can sample this database through CompuServe or Dow Jones News/Retrieval, but joining directly is much cheaper.

Software for searchers . . .

INSEARCH

Version 1.03; IBM PC & compatibles • TI Professional; 192K; 2 disk drives; Hayes 300, 1200 or 1200B Smartmodem or Novation 103, 212, Smartcat modem, or an acoustic modem; copy-protected? YES; \$495; Menlo Corporation, 4633 Old Ironsides Drive, No. 400, Santa Clara, CA 95050; 408/986-1200.

SUPERSCOUT

Software is free; subscription fees: \$5/month or \$50/year; online charges based on rates of databases accessed; Hayes SmartLink II modem required; Business Computer Network, Inc., 1046 Central Parkway So., San Antonio, TX 78232; 800/446-6255.

ART KLEINER: INSEARCH translates DIALOG's arcane commands into reasonable menus, helps you figure out which databanks to search, and saves money by letting you type in most of your request *before* you sign online. It's one of the most enjoyable telecommunications programs to use.

With SUPERSCOUT, instead of signing up with 20 different online information services, you sign up with the Business Computer Network: their software will dial the networks for you anytime, and bill you at the network's regular rates plus a quarter (25 cents) for each call. The networks include CompuServe, BRS, DIALOG, NewsNet, and the Official Airline Guides; they're constantly adding more. An excellent way to use databanks occasionally without paying membership fees for each.

History begins on Saturday . . .

SOURCE UPI NEWSWIRE

Available at normal Source rates (see table, p. 140); Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102; 703/734-7500.

ART KLEINER: The Source's service, based on the UPI news wire, lets you tag a particular topic and follow that day's stories about it, often while they're coming off the wire for the first time. You can look backwards about a week. While the news wire invites browsing, finding obscure topics is tricky. On the other hand, when there's a fast-breaking national or international news story that's important to you, and you want the news faster or in more detail than the daily paper will provide it, the Source UPI news wire is the place to turn.

Top of the line magazine, newspaper and wire service data . . .

NEXIS

\$50/mo, \$28/hour, \$7-\$21/each search request (7:30 a.m.-7:30 p.m., local time, wkdays), \$3.50-\$10.50/request (eves and wkends), \$1.50-\$3/search modification; IBM PC; Apple III; Wang PC; Macintosh; many MS-DOS machines; 64K; a variety of 1200-baud modems; and Mead Data Central Interface (\$245); copy-protected? NO; Mead Data Central, 9333 Springboro Pike, Miamisburg, OH 45342; or P. O. Box 933, Dayton, OH 45401; 513/865-6800.

ART KLEINER: If you spend \$2500 or more worth of your time annually in library work, NEXIS is the best single tool to invest in.

NEXIS keeps the full text of dozens of newspapers, magazines, specialized newsletters, and news wires, most going back several years, some to the late sixties: the **New York Times** and the **Washington Post**; the AP, UPI and Reuters wires; news services from Japan, Taiwan, and Britain; **Forbes**, **Computerworld**, and the **Almanac of American Politics**. (It has fewer newsletters than NewsNet, and no computer-oriented ones, but that will probably change.)

NEXIS is the smartest online information service, and the easiest to learn and use. Unlike the others, if you ask for "fortune telling" it will also find "telling fortunes." You can easily modify your request if it didn't hit right the first time. You can search all databanks simultaneously or move among them, your search request moving automatically with you. The best feature, called KWIC, pulls up each story with your search words highlighted within it, so you can instantly judge the story's value.

NEXIS has some limitations: You can't save incoming text on a disk, and can only print one screenful at a time, which slows down your sessions by a third. And even if you share an account, it's expensive. But worth it.

**Two to three years' worth
of expensive newsletters . . .**

NEWSNET

Rates vary depending on which newsletters are read: \$24-\$120/hr (8 a.m.-8 p.m., E.S.T.), \$18-\$80/hr (eves and wkends); \$15 monthly subscription fee; average session: \$40. NewsNet, 945 Haverford Road, Bryn Mawr, PA 19010; 800/345-1301 or (in Pennsylvania) 215/527-8030.

ART KLEINER: NewsNet outrages me, just as many of its industry newsletters do: they're all too damned expensive, and only add to the cultish mystique of inside access. But these publications do help track specialized news, and they're cheaper and more current online than in print. The selection includes **Defense Industry Report**, **Legislative Intelligence Week**, **Fiber Optics News**, **Entrepreneurial Manager's Newsletter**, **TRW Credit Reports**

on Companies, and **VuQuote**. Many go back two or three years. NewsNet's easy-to-use commands let you find articles by scanning titles or searching for key words. The best feature, called Flash, flags everything that comes in related to a particular topic and delivers it daily to your account. Use their On-Line Computer Telephone Directory to find someone's TELEX or SourceMail number.

Electronic Mail

Pay by the minute . . .

SOURCEMAIL

Available at normal Source rates (see table, p. 140); Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102; 703/734-7500.

ART KLEINER: The oldest electronic mail system for personal computers is still the most versatile. As with MCI Mail, with SourceMail you can learn to send and receive messages within minutes. You pay by the minute, but there's no extra charge for multiple copies. To cut costs, type messages on your word processor and then send them with your communications software. SourceMail offers a wide range of alternatives—you can reply to messages as you read them, send copies to other people, keep lists of groups who will all get one message, or "express mail" your message so it goes to the front of the receiver's incoming queue.

Low-cost access to TELEX . . .

EASYLINK

See table on p. 140 for rates; EASYLINK, c/o Western Union, 1 Lake Street, Upper Saddle River, NJ 07458; 800/527-5184 or, in TX, 800/442-4803.

INTERNATIONAL ELECTRONIC MAIL SERVICE (IEMS)

See table on p. 140 for rates; International Electronic Mail Service, 21686 Stevens Creek Blvd., Cupertino, CA 95014; 408/446-4367.

ART KLEINER: Some of your would-be electronic mail correspondents may be reachable only via corporate mail systems—Tymshare's OnTyme, ITT's Dialcom, and the three or four interwoven international TELEX services. Corporations can afford the hefty minimum fees, but the rest of us can now link in through these two networks, which bundle their members into one "corporate" account on each service, like a group chartering an airplane. Western Union's EASYLINK is also the only way to send your computer text as a

telegram, and the cheapest way to send or receive TELEXes. At a reasonable cost to you, IEMS links to as many corporate mail networks as it can find.

EASYLINK has easy commands and one of the best manuals in the business. It lets you forward incoming messages to others with your own comments attached, and tag your sessions so that several users can share the same account. Unfortunately, it won't let you edit a mistake in a message before you send it. IEMS permits editing, but uses OnTyme's arduous commands (for instructions, you type EXE ** HELP instead of just ? or HELP).

Instant delivery, online or on paper . . .

MCI MAIL

See table on p. 140 for rates; MCI Mail, 2000 M Street, N.W., Third Floor, Washington, DC 20036; 800/MCI-2255.

ART KLEINER: Everyone with a computer and modem should join MCI Mail. It costs only \$18 a year, and doesn't charge you for time online. For 45 cents you can send a message to anyone else with an MCI Mail account; for \$1 you can send a document online; for \$2, MCI will print your message on paper and drop it off as regular first class mail. (Warning: in my experience, this can sometimes be slower than first class mail.) Higher rates ensure hand-delivery; for a short manuscript that *must* be across the country tomorrow, MCI Mail is probably the cheapest (\$8) overnight delivery service. MCI Mail made possible a business I know of (Taramar, in Sausalito, CA) that sends discarded U.S. industrial products to third-world countries, coordinating scavengers, industries, and freight airlines on four continents.

I sent MCI Mail successfully two minutes after signing on the first time. Now, I wish I could shut off its clunky menus. It also needs a better directory. As with other electronic mail networks, you can send the same message to twelve people as easily as one, but be wary: MCI Mail will charge for twelve letters! These caveats aside, MCI's pricing scheme really does make this the most likely place to find anyone by electronic mail.

MCI Mail

The nation's new postal system

February 9, 1984

Lyn Grey
Whole Earth Software Catalog
150 Gate Five Road
Sausalito, CA 94965

Dear Lyn, You know there are so many ears listening whenever we speak at Whole Earth, that I must resort to this -- this -- Electronic Mail Message! -- to fully say what I need to say to you.

I want you to know that this message you hold in your hand is our test of the ability to send anyone a letter via electronic mail. If we were paying for this letter, it would've cost us \$2. Cheap, huh?

But we aren't paying for this letter. That's why, as a part of this test, I'd very much like for you to let me know when it arrives. And if you do that I will proudly display my ---- pride....

I dunno. I've lost my head. This test message is almost over. Before it ends I will tell you the story of the red fox who wanted a brown box for his birthday. At the end of the day, he opened the box, and out popped....

Well, gotta go. But that's how electronic mail is.

Please let me see this when you get it. Yours, ArtK

From: Art Kleiner/Whole Earth
Whole Earth Software Catalog
150 Gate Five Road
Sausalito CA 94965

MCI Mail

First Class

To: Lyn Grey
Whole Earth Software Catalog
150 Gate Five Road
Sausalito, CA 94966

A typical letter sent on MCI Mail: written and telecommunicated on a personal computer, printed out in MCI's offices in a remote city, and delivered as a local letter through regular first class mail. For an extra \$10/month, you can store your letterhead and signature with MCI, and, with their laser printer, they'll print them on each letter.

drive" type problems. That's fine, I guess if you heavily enjoy rapping on computers endlessly, but it got quickly boring. ...Richard
 CB66 CC251 Richard Dalton (wesc ed,334) 2/15/84 9:45 AM L:6

CB66 CC252 Anthony D. Fanning (TonyF,1608) 2/15/84 4:46 PM L:7
 KEYS:/BBS/TEN-YEAR-OLDS/

BBS's can follow the WALKIE-TALKIE pattern. You know, with the two ten-year-olds walking down opposite sides of the street saying, "Can you hear me?"..."Yeah, can you hear me?"..."Yeah, can you hear ME?" I see it a lot the day after Christmas. On the other hand, you can find useful information on BBS's (if you're interested in computers, that is).

CB66 CC252 Anthony D. Fanning (TonyF,1608) 2/15/84 4:46 PM L:7

CB66 CC253 Larry Freeman (LarryF,1218) 2/15/84 7:01 PM L:13
 KEYS:/MAC VS. KAYPRO/

On Monday, I stopped in to my "friendly" local computer store and sat down to play the piano, I mean I sat down in

A new kind of conversation . . .

The Movable Electronic Computer Conference

ART KLEINER: Exchanging electronic mail among a group of people is like holding a seminar in a corridor—there's no centralized space where people know they should congregate. A computerized conference, on the other hand, supplies a focus: it maintains a transcript that keeps track of everybody's place and shows them new material automatically. Use conferencing to share research, to coordinate an ongoing project spread across the country, or to investigate new interests.

To find a local conferencing system in your area, use **The Computer Phone Book** (p. 148). Or set up your own system on a microcomputer and leave it hooked to the phone all day (see COMMUNITREE and MIST +, pp. 148-149). Or join established conferences on dial-up national computer networks. We list four national networks here, all somewhat complex but worth the time and money to explore.

Wit and wisdom from EIES teleconference discussions. The Bulletin Board Systems remark is by Organizing Domain editor Fanning in Whole Earth's public conference on telecommunicating. The Lebanon comment, made just after the marine barracks fiasco in '83, is from a private set of conferences called the School of Management and Strategic Studies, run by the Western Behavioral Sciences Institute in La Jolla, California. Harlan Cleveland made this particular comment from Minneapolis, where he is director of the Hubert Humphrey Institute of Public Affairs at the University of Minnesota.

C349 CCB72 Harlan Cleveland (481) 10/27/83 11:50 PM L:44
 KEYS:/LESSONS FROM LEBANON..ONE/
 A: 871

In the 1960s those of us involved in fashioning peacekeeping forces (mostly through the UN, at that time) had one simple notion engraved on our minds: Superpower forces had best not be used as international peacekeepers, and sparingly even as mediators.

If the mediator or peacekeeper shows up at the bargaining sessions with a nuclear bomb sticking out of his rear pocket, the disputants are going to tune their antennae toward the middleperson rather than toward dialogue with each other. The U.S. as peacekeeper cannot be credibly neutral.

A giant information department store . . .

COMPUERVE SPECIAL INTEREST GROUPS (SIGS)

Available at normal CompuServe rates (see table, p. 140); CompuServe Information Service, 5000 Arlington Centre Blvd., Columbus, OH 43220; 800/848-8199 or (in Ohio) 614/457-0802.

DELPHI NEWSLETTERS ★

See table on p. 140 for rates; General Videotex Corporation, 3 Blackstone St., Cambridge, MA 02139; 617/491-3393.

ART KLEINER: The best nationwide systems for beginners. CompuServe's SIGs (user forums) are easily its most rewarding feature. The several-dozen SIGs on specific topics are like benevolent fiefdoms, each with a presiding duke (called a sysop, for "system operator") who manages the flow. Each SIG weaves up to eleven thematic threads; members choose which to follow. A beginner's menu makes the fairly complex commands masterable after an hour or so. Regular users should switch to the expert menu and buy the SIG manual (\$3.95 extra).

SIG topics include every type of computer users' group imaginable plus environmental issues, health, music, religion, animal care, and working at home. Whole Earth manages a SIG on CompuServe (type GO WEC), as do several other magazines.

The main SIG drawback: CompuServe only stores about 400 messages' worth of back discussion, so on an active SIG like the Apple Users' group, yesterday's discussion may already have "scrolled away" when you log in today. Sysops will often store discussions in permanent data libraries which are also used to house public-domain software (p. 27). You can gather those free programs with CompuServe's own VIDTEX (p. 153) or any program running XMODEM (p. 156).

DELPHI is just cranking up its conferencing system (called "Newsletters") now, so it's hard to evaluate; by the time you read this it will probably be fairly lively. Commands are much less flexible than CompuServe's, but easier to learn. The system response feels slow at times, but for people using 1200-baud modems it's cheaper than CompuServe.

Dozens of subjects —or create your own . . .

PARTICIPATE-ON-THE-SOURCE (PARTI)

Available at normal Source rates (see table, p. 140); Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102; 800/336-3366 or, in VA, 703/734-7500.

LOUIS JAFFE: The most freewheeling of computer conferencing services, PARTI allows any user to start a public or private conference on any topic at any time. Despite frequent technical problems and a command structure that baffles even old hands, PARTI has become one of the most popular branches of The Source.

Both the 1983 Korean Airliner attack and the Grenada invasion spawned PARTI conferences that attracted hundreds of comments—some from well-informed military and intelligence people. These discussions subsided after a couple of weeks,

but other PARTI conferences have gone on for months, on topics as diverse as UNIX, interpersonal relationships, and the nature of language.

Scanning PARTI is like watching TV commercials—you find a jumble of briefly presented, often unrelated topics. As new conferences branch spontaneously from old ones, you can get pulled into the flow and lose track of time (which is how PARTI generates revenue for The Source). It's as if you were lost in the aisles of a giant information department store. By the time you find your way out, you're carrying a shopping bag full of ideas, assertions, and inanities.

ART KLEINER: Source PARTI is sometimes used for "electures"—where knowledgeable people share their cogency online and suffer the heckling of the electronic crowd. Well worth following.

For connoisseurs and companies . . .

CONFER II

See table on p. 140 for rates; Advertel Communications Systems, Inc., 2067 Ascot, Ann Arbor, MI 48103; 313/665-2612.

ELECTRONIC INFORMATION EXCHANGE SYSTEM (EIES)

See table on p. 140 for rates; New Jersey Institute of Technology, 323 King Blvd., Newark, NJ 07102; 201/596-3437.

ART KLEINER: These are the best conferencing systems for organizing projects or bringing together working groups of people. Both rooted in academia (the University of Michigan and New Jersey Institute of Technology, respectively), they have a wide range of complex capabilities. Both offer a diverse, warm community of people already in place who welcome new members. CONFER II is somewhat easier to learn and slightly more expensive; EIES is somewhat more perplexing (no one, not even designer Murray Turoff, knows all the EIES commands).

Both systems have features that really help people communicate. Detailed member directories let you learn more about the author of an intriguing comment before you contact him for follow-up. Pseudonyms permit anonymous comments (surprisingly useful for honest criticism). Elaborate search commands retrieve all items written by a particular author, in a particular month, or on a particular topic. Modifying commands let you change your mind, even after entering your words into public view.

CONFER II is available in customized versions for large groups and corporations. If you join as a small working group or individual, you choose an existing CONFER II arena, either

THE PERSONAL EFFECTS OF NETWORKING

First there's uncertainty: "Did my message go through all right? Did I send it to the wrong person? Is it really private? How do I sign off this thing?"

As you feel more secure, pleasure takes over. The flow of ideas is exciting and flattering. "I posted my query at ten and by noon there were seven replies waiting!" You step into the rarefied atmosphere of a literary correspondence—but one faster, more immediately engaging, and easier to keep up with than that of the conventional world of letters. Mutual projects and opportunities blossom quickly, without regard for geographical distances.

Some people move on to addiction: signing on a dozen times a day ("maybe something is waiting"), cutting back offline relationships because they're less convenient ("if they're not on the network I don't want to talk to them"), running up unexpectedly large connect-time bills, merging work and home lives so they can sign on at night, and even dreaming about the network.

Fortunately, addiction is short-lived. You get overwhelmed by overload and cut back, learning to filter out material. You don't have to lose appreciation for the physical world; you can become more sensual elsewhere to compensate for the hours spent online. You use the telephone more sparingly, scheduling calls and exchanging agendas in advance.

Networking is catnip for people who communicate best by the written word. Good writers have charisma. Mediocre writers improve. Pushy or insensitive writers get ignored. People learn to articulate their emotions more explicitly to avoid being misunderstood. Race, gender, shyness, disabilities, age, and physical presence all lose importance.

Since you don't need an appointment to reach someone via computer network, you come to feel as if everyone is always accessible. But you also learn not to pressure people—they'll just shrug and ignore your message. For most participants, the increased contacts break down old hierarchies and make unforeseen relationships possible—as with the corporation vice-president and the college student who swap tips on playing ARCHON. The key impression is one of civilization—or, more precisely, a new way of being civilized.

—Art Kleiner

public or private. Public conferences are usually devoted to a broad subject like Computers or Law; within that, people initiate and respond to individual topics. You can join in as many arenas as you like, but be careful; CONFER II incites more give-and-take than any other system, and you may feel like you're drowning at first. With practice, you can easily choose which topics to follow and which to avoid.

As a nonprofit computer-based teleconferencing laboratory, EIES feels to its members like an online village, encouraging them to mingle messages with as many others as possible. One of EIES's main attractions is its unusually creative and knowledgeable membership. Though EIES's commands often feel tacked-on, its basic structure is simple enough. Both EIES and CONFER II are roughly masterable within a couple of hours.

The two systems charge differently but seem to cost about the same over a year. EIES's connect time rates are low, but accounts cost \$75 per month. CONFER II has no monthly fee, but charges \$15-25 per connect hour, making it better for casual use. Ultimately, your choice will depend on which system has the people you want to reach. I'm unabashedly biased towards EIES; we organized the **Software Catalog**, met many of our best contributors, and still share software evaluations there. After experimenting with CONFER II, I feel strongly drawn there, too. Had I but modem enough and time . . .

A low-priced alternative to national networks . . . Electronic Bulletin Boards

Good overall BBS directories . . .

THE COMPUTER PHONE BOOK

The Computer Phone Book; Mike Cane; 1983; 466 pp.; \$9.95 postpaid from The New American Library, Inc., 1633 Broadway, New York, NY 10019; 212/397-8000; or **COMPUTER LITERACY**.

ONLINE GUIDE TO THE COMMODORE 64

Online Guide to the Commodore 64; Mike Cane; 1984; 384 pp., \$9.95; New American Library, Inc., 1633 Broadway, New York, NY 10019; 212/397-8156; or **COMPUTER LITERACY**.

ART KLEINER: These detailed directories are the work of a madman named Mike Cane, who actually called more than 2000 computer bulletin boards, of which he describes hundreds. When they bore him, he tells you ("There is nothing interesting on

here. If you call this system, try to leave an interesting message"). When they enthrall him, he shows it ("If you stare at the stars and long to go into orbit, give this system a call to meet some kindred spirits"). **The Computer Phone Book** contains an excellent guide to bulletin board commands, and to CompuServe, The Source, Dow Jones, and several fascinating-sounding regional networks.

The Online Guide to the Commodore 64 is a version of the same book, tailored to that machine. Particularly valuable: directions for signing onto Commodore-based bulletin boards, where you can download software and vent your frustra—er, share advice on using your C-64. Both books need updating—many of the most enticing-sounding boards are long since gone. But you can supplement this guide with **PLUMB** and **COMPUTER SHOPPER** (p. 11).

LOCAL AND REGIONAL NETWORKS

ART KLEINER: Saving money and keeping in touch with your nearby community—two reasons to dial local computer networks instead of national ones like CompuServe and The Source. The best-known local systems are computer bulletin board systems (BBSs)—running on microcomputers, often free or available for a small entry fee, linked loosely by a common heritage of public-domain hacker anarchy. The first bulletin board, CBBS, was specifically designed for distributing public-domain software. Though bulletin boards sometimes have more sophisticated messaging features than their mainframe cousins, they're limited by the small computer size to one user at a time—which means that on popular bulletin boards, you often get shut out by a busy signal—and since they're often managed by hobbyists, some bulletin boards come and go unreliably.

This year an alternative is emerging—local multi-user conferencing networks, able to handle eight or more people online at once, and much less expensive than national networks (you don't have to pay cross-country transmission costs). So far I know of four worth checking out: ArborNet in Ann Arbor, Michigan (voice: 313/994-4030; data: 313/663-6400); Chariot in Colorado Springs, Colorado (voice: 303/632-4848; data: 303/632-2906); The Connection, in South Bend, Indiana (voice: 219/277-5306; data: 219/277-5743); and our own Whole Earth Lectronic Link in the San Francisco Bay Area (voice: 415/332-4335; data: 415/332-6106). The costs range from \$2 to \$4 per hour, sometimes with a small monthly or yearly charge. The range of conferences and information online is impressive, and the overall tone is warm and welcoming. Many more will bloom, and I suspect some will become true regional nerve centers.

If you'd like to start one, you need a minicomputer or multi-user micro running UNIX (see p. 168). Chariot manager Louis Jaffe investigated most of the available software and ended up recommending PICOSPAN, which is available from Network Technologies in Ann Arbor (it's a variation of CONFER, p. 147). If thirty thousand dollars or more (that's the minimum investment) is beyond your range, you can still dedicate a personal computer to your own electronic bulletin board and, with FIDO, have something in between.

Public domain gateway to a bulletin board network . . .

FIDO

Tom Jennings; free (downloaded); \$100 (by mail); IBM PC and compatibles; Tom Jennings, 2269 Market St. #118, San Francisco, CA 94114.

EZRA SHAPIRO: FIDO is a collection of public domain software programs that allow a user to set up a full electronic bulletin board system on any of several MS-DOS computers. On the surface, FIDO looks a lot like similar systems—callers can send and receive messages, or upload and download files. However, FIDO goes far beyond other BBS software in one important aspect . . . late at night, with no human intervention, the FIDO systems send mail to each other. Thus it's possible for a caller to enter a message for a friend in New York on a FIDO in California; in the early hours of the morning the California FIDO will zap the message across the country to a FIDO in New York where it can be read by the addressee. A typical message costs the sender about 25 cents. (Compare that to the prices charged for overnight delivery by commercial systems.) At present, there are around half a dozen FIDO systems in the San Francisco Bay Area and roughly 250 others in the U.S., Canada, England, Sweden, and Indonesia. The list of systems, or "nodes," is growing by about 12-15 a week. This whole thing is a volunteer, grass-roots operation. There are no membership fees or minimum charges; all you have to do is work out some way of paying the local system operators for any long-distance charges you incur. (The FIDO you're logged onto figures out the cost and tells you immediately.) Or you can just call in and use a FIDO as a standard BBS, without using the mail feature, for free.

Choice software for groups . . .

COMMUNITREE

Apple II family; 48K; 1-6 disk drives; Hayes Micromodem II • TRS-80 Model III, 48K, TRS-80 modem; \$145 • IBM PC with Hayes-compatible modem and hard disk; \$295; copy-protected? NO; CommuniTree Group, 1150 Bryant Street, San Francisco, CA 94103; 415/861-8733; distributed by Synergetic Communication, P.O. Box 9964, Berkeley, CA 94709; 415/548-8170.

RIC MANNING: Because CommuniTree's system can pack a lot of messages into only 48K of memory and can handle a variety of "branches" within one "tree" discussion, it's ideal for organizations. A Minnesota medical group, for example, divides their COMMUNITREE bulletin board by specialties such as surgery, radiology, and immunology. Callers append new comments to existing messages and thus build ongoing computerized discussions for each topic. At first the software is slightly intimidating, but once you're familiar with the full-word commands, it's easy to use.

Write your own communications structures . . .**MIST/MIST +**

Peter & Trudy Johnson-Lenz; IBM PC; 256K; Hayes-compatible 1200 baud modem; hard disk recommended; \$495 w/database • Kaypro or Vector; CP/M; 64K; Hayes-compatible 1200 baud modem; 2 disk drives or hard disk; \$375 w/database; copy-protected? NO; New Era Technologies, 1252 Columbia Rd. N.W., Washington, DC 20009; 202/234-2117.

CONEXUS 

Version 1.2; copy-protected? NO; \$624 (includes MIST +); \$129 (purchased separately as a template for MIST +). Requirements: MIST + version 1.3, 256K, Hayes compatible modem, hard disk; New Era Technologies, 1252 Columbia Rd., NW, Washington, D.C. 20009; 202/234-2117.

ART KLEINER: MIST contains a full programming language with specifications for telecommunicating; a database system nearly as extensive as DBASE II; and a complete (albeit line-oriented) text editor. With MIST, you can build your own conferencing system that has a built-in databank anyone can dial into and search through. You can also create an easy-to-use "front end" for complicated network structures and a "networking robot" that boldly goes forth into online systems where no personal computer has gone before.

The people who did MIST also did CONEXUS, a bulletin board/databank program written in MIST +. As bulletin board programs go, it's extremely versatile, very easy to set up and operate (more so than FIDO), and very expensive (much more so than FIDO). Modeled partly on the EIES network (p. 147), CONEXUS can keep track of where each member is in a particular online discussion (so you can tell who has and has not read your pearls of wisdom), and it allows anonymous or pen-named comments.

State of the art . . .**TBBS**

TRS-80 (NewDOS 80, LDOS, DOS +); IBM PC and compatibles; Epson QX-10; Kaypro 2X, 10; \$295; copy-protected? NO; eSoft, 4100 South Parker Rd., Box 305, Aurora, CO 80014; 303/699-6565.

LOUIS JAFFE: THE BREAD BOARD SYSTEM, written by Phil Becker, is one of the few BBS that a nonprogrammer can operate. It does everything a BBS is expected to do and more, with unusually fast response time. The sysop can set up menus and submenus leading to any number of public or private message boards. There are four protocols for uploading or downloading software, including XMODEM (p. 156).

OTHER GOOD BULLETIN BOARD PROGRAMS**C-64**

A lot of Commodore 64 users' clubs use ELECTRIC MAGAZINE for their own bulletin boards—it has messages and downloadable software. There's a public-domain version available on CompuServe, but the mail-order version is easier to get into shape. It uses the standard Commodore 1541 disk drive. However, my source (James Meehan, Mendota, MN) says the RAVICS BBS, though more expensive, is faster and easier to use than ELECTRIC MAGAZINE. It's also more versatile. It works with an IEEE disk drive or a Hayes modem, in addition to stock Commodore hardware; supports multiple message bases and electronic mail; and its downloaded software is ready to run when it arrives on your computer.

Atari

The public-domain FORUM BBS is the best Atari board, with quicker response and more sophisticated command structure than our previous recommendation, AMIS. FORUM BBS is available on the CompuServe Atari SIG.

Apple II

NET-WORKS is the most popular of nearly a dozen Apple II bulletin board programs. It's a good, general purpose, bargain-priced BBS program, easy for both the system operator and callers to use. It's used by people with small bulletin boards running on single-drive Apples as well as on larger, hard disk-based systems like Pirate's Cove, which has more than 50 special interest groups.

IBM PC

RBBS is the cheapest bulletin board on the IBM PC (\$8), but it's a good program, and you get a fair amount of documentation with it.

Co-Co

There are dozens of Radio Shack Color Computer BBS systems running on COLOR-80. The program is reliable and includes a user log, handy for compiling mailing lists.

Mac

MOUSE EXCHANGE runs on single-drive 128K MACs (but the author recommends a second drive); requires a Hayes-compatible modem. It's a straightforward bulletin board; supports XMODEM file transfer. No special Mac features, but it's the first for the Mac.

—Ric Manning

ELECTRIC MAGAZINE: Robert Shannon; CP/M (5¼") or any Commodore; \$39.95; Coast BBS, 33175 Oceanview Dr., Fort Bragg, CA 95439; voice: 707/964-4440, data: 707/964-7114 • RAVICS BBS: \$99.95; Computer Era, 206 S. Emerald, Anaheim, CA 92804; voice: 714/778-4858, data: 714/533-3197 • NET-WORKS II: Nick Naimo; version 2.62; Apple II family; one disk drive; \$99; High Technology Software Products, P.O. Box 60406, Oklahoma City, OK 73146; 405/848-0480 • RBBS: \$8; Capital PC Software Exchange, Box 6128, Silver Spring, MD 20906; data: 703/759-5049 (or 9659) • COLOR-80 BBS: 64K; 2 disk drives and auto-answer modem; copy-protected? NO; \$150; MegaSoft, 935 Marble Ct., San Jose, CA 95120; 408/268-9049 • MOUSE EXCHANGE: Michael Connick; version 4.0; copy-protected? NO; \$39.95; Macintosh; 2 disk drives or hard disk recommended; Dreams of the Phoenix, Box 10273, Jacksonville, FL 32247; voice: 904/396-6952, data: 904/725-8925.

Monthly bulletin-board updates . . .**PLUMB**

Ric Manning, Editor; \$26.50/yr (6 issues); Box 300, Harrods Creek, KY 40027; voice: 502/228-3820; data Source: STQ007, CompuServe: 72715,210.

STEVEN LEVY: Though many computer bulletin boards are technically oriented, I've

come across a few that have little or nothing to do with computers. One of the first I tried was a New York City BBS devoted to astronomy (no astrology, please). Then there are lots of religious BBSs, plenty for dating, and a well-known one in Kansas with movie reviews. These and more are listed in this monthly newsletter, along with boards devoted to genealogy, rock and roll, ham radio, stocks, medicine, space, writing, jokes, and the occult.

Communications software Terminal Programs

CP/M

Cheap software with a community of public-domain hackers: MODEM7 (p. 150)

The best: MITE (p. 151)

IBM PC/MS-DOS

Inexpensive, flexible, dozens of versions and improvements: PC-TALK.III and QMODEM (p. 152)

Spend lots of time conferencing? Create automated sequences: CROSSTALK.XVI (p. 151)

Run other programs while saving text to disk: RELAY (p. 150)

The simplest: PFS:ACCESS (p. 151)

High-budget, good for electronic mail: TRANSEND PC COMPLETE (p. 154)

Good, general-purpose programs: MITE (p. 151) and SMARTCOM II (p. 150)

Apple II:

Works with Pro-DOS, Apple's Super Serial card, and IIc: APPLE ACCESS II (p. 152)

The easiest: PFS:ACCESS (p. 151)

Nice, general-purpose programs that use Apple DOS: PERSON-TO-PERSON (p. 152) and TERM EXEC (p. 152)

Full-featured but difficult program that uses Apple DOS: ASCII EXPRESS "THE PROFESSIONAL" (p. 152)

Macintosh

The simplest and cheapest: PRETTY GOOD TERMINAL (p. 153)

Lots of features, user support, and evolving capabilities for \$40: RED RYDER (p. 153)

The best: SMARTCOM II (p. 153)

Other computers:

Atari 800: AMODEM (p. 154)

Commodore 64, PET: VIDTEX, COMMODORE ULTRA-TERMINAL (p. 153)

The hacker's free standard . . .

MODEM7 (and its progeny)

Free • or \$10/disk; The Public Domain Software Copying Company, 33 Gold Street, C-13, New York, NY 10038; 212/732-2565 • or \$6/disk; SIG/M User's Group of ACG-NJ, P.O. Box 97, Iselin, NJ 08830; voice 201/272-1793; or CBBS 215/398-3937 • or \$4-\$12 plus \$24 membership fee; FOG, P.O. Box 3474, Daly City, CA 94015-0474; voice: 415/755-4140.

ART KLEINER: Bargain-priced (sometimes free), easy to use, hard to learn. Modifying this public-domain family is a great CP/M hacker tradition. The resulting hundreds of variations fall into two main "families": MDM7, designed around a menu; and MEX, completely command-driven (and specially adapted to CompuServe), with a built-in programming language of its own. Documentation ranges from meager to none; onscreen help is usually a cryptic list of one-key commands.

Installing these programs may require some assembly-language hacking, so it's best to find one already installed for your type of computer—through a friend or a users' group. (See "How to Get Free Software," p. 27). With any version you can call a local CP/M bulletin board (p. 148) or CompuServe's CP/M SIG (p. 146) and pull in newer versions—which might be only days old.

Pretty slick . . .

RELAY ★

Version 2.3; copy-protected? NO; \$149; IBM PC/XT/AT and compatibles; Wang Professional; Data General 1; 256K; VM Personal Computing, 6 Germantown Rd., Danbury, CT 06810; 800/222-8672 or, in CT, 203/798-6755.

RUSEL DEMARIA: With RELAY, you can send and receive files at the same time . . . and print one to your printer simultaneously . . . and while all that is happening, chat with the person at the other end, on a split screen, both of you typing messages at once. You can set up RELAY to call automatically at a preset time (like when phone rates are lowest), execute a complex "script" of commands, and log off by itself. It can even send a script to another computer using RELAY that tells that computer to call yet another computer and execute another script and thus "relay" to itself ad infinitum. And, you can receive messages from a remote host while running another program.

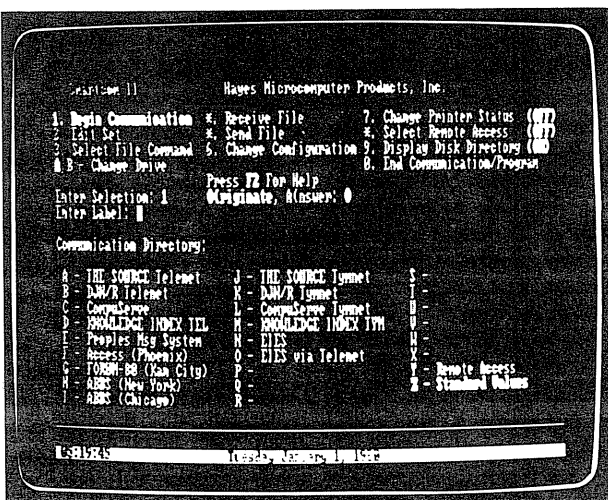
ART KLEINER: Relatively easy to learn. Almost as versatile a command language as CROSSTALK. Almost as intuitively clear a structure as MITE. More limited than it should be for uploading text. Unabashedly aimed at corporate types who need terminal emulation. Excels at file transfer (see p. 156).

Almost dropped, but back by popular acclaim . . .

HAYES SMARTCOM II

DEC Rainbow 100 • IBM PC/XT • Kaypro 2 • Xerox 822; copy-protected? NO; \$149; Hayes Microcomputer Products, 5923 Peachtree Industrial Blvd., Norcross, GA 30092; 404/441-1617.

ART KLEINER: SMARTCOM II offers many technical choices, and the manual and menus explain them so well that using the program is an easy-to-swallow basic telecommunications course in itself. The macro commands are particularly easy to set up. But there's a price: the menus make SMARTCOM II somewhat cumbersome to jump around in. SMARTCOM II's best feature: it lets you scroll back to see something lost off the top of the screen. MITE on the PC and SMARTCOM II could profitably borrow features from each other. The difference between them is a matter of personal taste.



The main selection menu of SMARTCOM II along with the directory of built-in macros for dialing up many of the popular on-line services. To dial a network not included in the directory, just fill in a chart with prompts and replies.

None easier to use . . .

PFS:ACCESS

Version C; IBM PC/XT/jr, compatibles except Hyperion (MS-DOS, modem, 128K); \$140. Version A; Apple IIe, IIc (modem, 128K); \$70; copy-protected, but can be installed on hard disk; Software Publishing Corporation, 1901 Landings Drive, Mountain View, CA 94043; 415/962-8910.

ART KLEINER: If you want as little bother as possible, get PFS:ACCESS and be done with it. Like other PFS products, there's every essential feature and very little more. You create log-in commands by going through the motions once, and thereafter the program remembers what you did (TRANSEND PC COMPLETE, p. 154, does this too). Major limitation: you can save only eight log-on command sequences. Bulletin-board hoppers will be frustrated; file transferers, who need an error-checking protocol, won't find one here.

BARBARA ROBERTSON: It's a matter of style. I choose PFS:ACCESS over CROSSTALK because it's so easy—it's entirely function key and menu driven—nothing to learn, absolutely no commands to remember. I log on automatically to conferences in three networks and several bulletin boards and send files without any problem. Once in a conference, I can scroll backward through what's just zoomed by at 1200 baud using the cursor arrow, PAGE UP, and PAGE DOWN keys; then, by simply pressing a function key, print or save selected portions (text that's being saved is highlighted). With CROSSTALK's macro commands, you set up automated sequences that save everything indiscriminately (once the text has disappeared from the screen, it's gone). You don't have to tend the process, but you often end up with a file full of garbage to be edited later.

When you know enough to use the best . . .

CROSSTALK XVI/CROSSTALK 3.0 (MS-DOS)

Version 5; most CP/M and MS-DOS computers; Bell-compatible modems; copy-protected? NO; \$195; Microstuf, Inc., 1000 Holcomb Woods Pkwy., Suite 440, Roswell, GA 30076; 404/998-3998.

ART KLEINER: For experts who want their networking more fully automated than MITE can offer now. With two keystrokes CROSSTALK logs me on to CompuServe and our Whole Earth conference there; it asks whether I want to see new items or print out old messages for our library files; if I request old messages, it asks me which message I want to start at, collects them, saves them on disk, and logs off when it's done. It took about three hours to program this sequence; now it saves me hours every week. CROSSTALK also lets you preset the screen colors, so at a glance you can differentiate the

Our benchmark for CP/M and MS-DOS . . .

MITE

8-bit CP/M or MP/M, \$150; 16-bit CP/M, CONCURRENT CP/M (MITE/86) or MS-DOS (MITE-MS), \$195; terminal emulation, \$25 • Macintosh, \$145 (no terminal emulation available); copy-protected? NO; Mycroft Labs, P.O. Box 6045, Tallahassee, FL 32314; 904/385-1141.

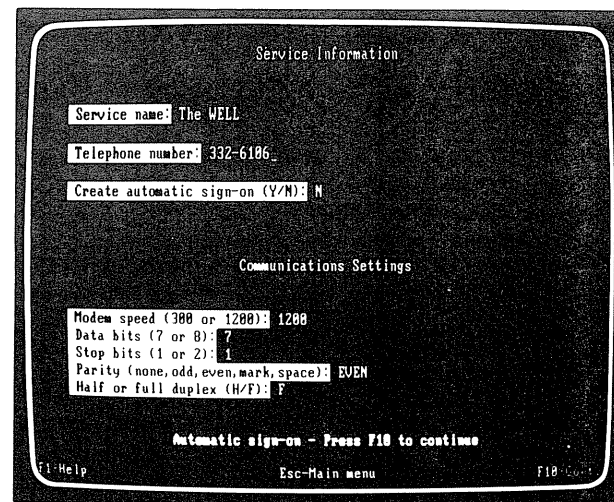
ART KLEINER: Finding MITE was like sailing into safe harbor after a violent storm. Before I found it, I looked at a dozen other CP/M terminal programs. Some didn't work. Others took hours to install, or had no break key, or no automatic log-in commands. Some were just organized illogically, so it took constant concentration to use them.

It's probably the most compatible terminal program in existence. You can meddle with (or ignore) a wide range of specs, filter out unwanted characters that might confuse your word processor, and customize the keys you use to operate MITE itself. MITE is organized so you can understand at a glance where to go next in the program. MITE also has one of the clearest manuals of any telecom program. On CP/M computers, no other terminal program I've seen comes close. On MS-DOS machines it's slightly less elegant, not taking complete advantage of the IBM PC function keys.

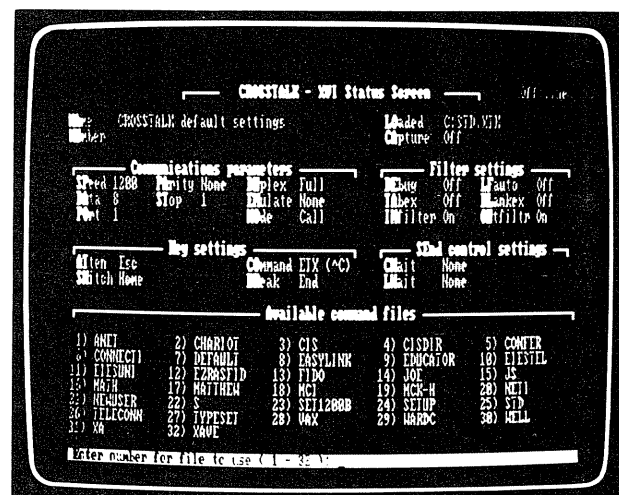
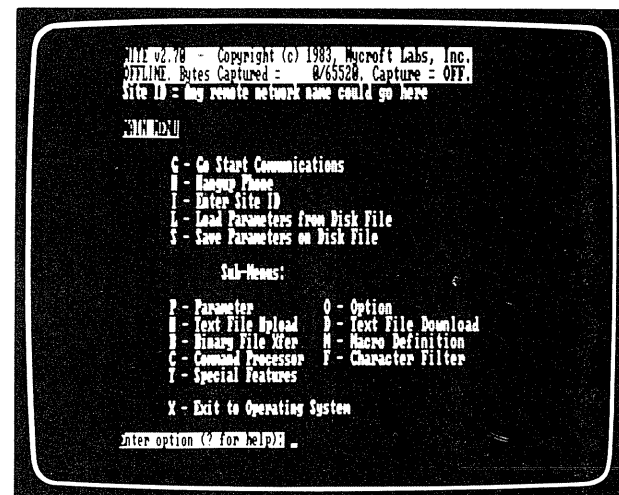
MITE's main menu. Each submenu in the bottom half allows you to customize different specifications. MITE is more easily adaptable to various computers, modems, and networks than any other terminal program.

text you receive from the text you send and from CROSSTALK's own commands. (MITE does this too, but not as elegantly.) CROSSTALK versions 1.0 and 2.0 are much less capable, and I don't recommend them.

JOHN MARKOFF: CROSSTALK doesn't force you to wade through vast levels of menus. You can summon all the program's commands from a single, unobtrusive command line at the bottom of the screen, while the rest of the screen shows what's happening on the network you've dialed up. The program can also function as a simple host system (with password protection), so I can dial my office and download files from my PC while I'm away. It supports both XMODEM and its own file-transfer protocols, and it controls file-transfer and micro-to-mainframe interaction as well as any program I've seen. But I enjoy CROSSTALK most because it has one of the cleanest user interfaces around: it feels right.



Keeping it simple, PFS:ACCESS gives you one set-up screen with all the bare essentials. Automatic sign-on enters your first responses to the online service and logs you in.



The CROSSTALK main menu includes choices for all of the parameters necessary for setting up communications as well as a directory of dial-up macros.

Almost free; bargains at any price . . .

PC-TALK.III and IIIB

IBM PC & most compatibles; most autodial & acoustic modems; 300-1200 baud; \$35 suggested donation; Freeware/Headlands Press, Box 862, Tiburon, CA 94920.

QMODEM

Version 1.03-E; IBM PC/PCjr/XT/AT and compatibles; 192K; most autodial and acoustic modems; 300-9600 baud; \$25 (\$20 suggested donation; \$5 for disk, mailer, and postage); John Friel, The Forbin Project, 715 Walnut St., Cedar Falls, IA 50613; data: 319/266-8086 (300, 1200 and 2400 baud).

ART KLEINER: PC-TALK's designer Andrew Fluegelman invented the "freeware" concept (you send the requested \$35 only if you like

the program and find it of value). Though easy to learn and use, original PC-TALK supports only Hayes Smartmodems, runs relatively slowly (it's written in BASIC), and doesn't log in to networks automatically.

ALFRED GLOSSBRENNER: Because Andrew makes the BASIC source code available, it has always been easy for users to add improvements and additional features, and this has encouraged the growth of an enthusiastic PC-TALK community—now more or less officially based in the CompuServe IBM/PC SIG (p. 146). That's where you'll find the latest and greatest version—PC-TALK.IIIB—which uses 192K of memory, and has automatic log-in commands and an improved version of the XMODEM protocol. This version and distribution point have the official sanction of Andrew Fluegelman and The Headlands

Press, holders of the copyright for PC-TALK. SIG members have taken sole responsibility for supporting the product.

John Friel's user-supported QMODEM has commands and a program layout almost identical to PC-TALK's, but QMODEM is written in Turbo Pascal; thus it runs 30-40 times faster. You can even specify a "CPU speed" if your machine runs faster than the standard IBM PC. Menus and prompts appear and disappear instantly in pop-up windows and, slickest of all, you can tell QMODEM to dial up to ten different phone numbers.

ART KLEINER: There are dozens of other homebrew PC-TALK mutations, with split-screen, terminal emulation, and real-time animated graphics and sound.

(Snarl) compatible with everything . . .

ASCII EXPRESS "The Professional" (Apple II)

Version 3.3 (DOS); Version 4.3 (ProDOS); Apple II family; 48K, 1 drive; copy-protected? NO; \$130; United Software Industries, 1880 Century Park East, Suite 311, Los Angeles, CA 90067; 213/556-2211.

ART KLEINER: Annoyed with its opaque and confusing structure, I dropped this from the **Catalog** and reinstated it after howls of protest from satisfied users. There simply is

no other Apple terminal program with this number of configuration options, or with this sophisticated a command language (APPLE ACCESS comes close).

LOUIS JAFFE: ASCII EXPRESS's achievement, and its Achilles' heel, is the procedure for setting up routines to log on to a remote system automatically. These routines are more powerful than those of most other programs, but to use them you must learn a mini-programming language. The manuals give this procedure only a brisk once-over. If you're a novice, count on finding outside help.

Patterned after APPLE DOS itself . . .

TERM EXEC

Elizabeth O'Neill; version 2.0; copy-protected? NO; \$95; Apple II family; Quinsept, P.O. Box 216, Lexington, MA 02173; 617/641-2930.

RIC MANNING: TERM EXEC is friendly without a lot of screen menus. Instead, it uses a single prompt and many commands patterned after Apple DOS. CATALOG reads the disk files, LIST displays them on the screen, and so on. TERM EXEC can do automatic log-ons and will memorize a sequence of keystrokes so you can use a built-in clock routine to send files unattended. The program uses DIVERSI-DOS and is not copy-protected. Current versions support the IIe 80-column configurations, but not Videx or other third-party boards for the II+. One interesting version is TALKING TERM EXEC for speech synthesizers. It will compress speech, screen out punctuation, change intonation, or repeat lines. And it's the same price.

The best-designed, from Apple itself . . .

APPLE ACCESS II

Version 1.0; Apple IIc/IIe (Super Serial Card; 64K); \$75. Version 2.0; Apple IIc/IIe (extended 80 column card); ProDOS; mouse required; copy-protected? NO; Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.

ART KLEINER: Each APPLE ACCESS II menu appears as a "filecard" on the screen, with previous "filecards" stacked up behind it. You can tell at a glance where you are in the program. Dialing into remote networks is easy, and you can save or send text without backing through a series of menus. APPLE ACCESS II can filter out control characters from incoming text, and has a well-written command language for running automatic sequences of events. A class act with only two limitations: you can only store ten phone numbers on each disk, and it only runs on the IIc or the IIe with Apple's Super Serial card and ProDOS. If you use APPLEWORKS (page 108) you'll particularly want this program.

Switch between voice and data . . .

PERSON-TO-PERSON

Version 1.1; Apple II/IIe (DOS 3.3, modem suggested, 48K, II requires one disk drive); \$69.95; copy-protected? YES; Trutech Software, 1700 Solano Ave., Berkeley, CA 94707; 415/525-4901.

ART KLEINER: This program runs on the Apple II, IIe, and IIc with a variety of serial cards and modems. It's one step less versatile than ASCII EXPRESS—no error-checking (so you can't use it for file transfer) and no break key—but twelve steps more comprehensible. As a bonus, it includes an electronic rolodex. You can pull out a name, dial the person's phone, talk to them, switch both computers to data, send an electronic message, and switch back to voice. PERSON-TO-PERSON has a good, clear method for customizing automatic log-in sequences. The developers of this program have thought about how human beings keep in touch with each other, and it shows.

I recently joined the ranks of UNIX-users, and started reading the collection of electronic bulletin boards who are known collectively (with their users) as "Usenet." . . . A bit of "netiquette" that I found amusing was the convention of using "Smileys." There are ;-) :-) B-) :) 8-) etc. If you turn your head 90 degrees, they look like smiling faces. #1 is winking, #2 is the "standard" smiley, #3 is wearing glasses, #4 has a fat nose, #5 is wearing granny glasses.*

—Andrea Frankel

Macfavorite . . .

HAYES SMARTCOM II (Macintosh version) ★

Version 2.1; copy-protected? NO; \$149; Macintosh; 128K (512K required for full graphics capabilities); Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092; 404/441-1617.

ART KLEINER: I have never been as impressed by a terminal program. SMARTCOM II is the first Mac terminal program to use icons and mouse intelligently. When you're online, icons help you turn on or off the disk, printer, or file transfer. When you write an automatic command file, you need memorize no special language—icons below the screen walk you through the process. As it dials and logs in, little screen images light up to show your progress and pinpoint any problems.

I suspect a complete novice could, within an hour's use of SMARTCOM II, happily log in, upload, download, and set up the computer to dial in while they're not around—without any idea that these snags have flummoxed terminal program users miserably in the past. A sophisticated networker could go years without exhausting the program's capabilities.

SMARTCOM II saves its incoming text automatically—you can easily cut, paste, and copy parts of it to the Mac's clipboard without losing your place online. A "magnify" option doubles the size of those eye-straining Macintosh letters. If all this is not enough, SMARTCOM is the first program to telecommunicate graphics—two Mac owners running SMARTCOM can work simultaneously on the same MACPAINT or graphic file, each seeing the other's changes shortly after they're made. A boon for long-distance art or drafting collaborators.

One caveat: the program requires Hayes' own Smartmodem. If you already bought an Apple modem, you're out of luck. Hayes-compatibles are chancy. Get the store owner to test it before you buy the program.

LAP COMPUTERS

ART KLEINER: Telecommunications is a necessity with a lap computer. You *can't* take it all with you; you have to keep transmitting some of it away. All the lap computers we recommend have either built-in modems or connections to outside modems. The Radio Shack Model 100 (p. 16) is the least expensive way to begin telecommunicating effectively if you don't already own a computer. Its built-in terminal program is fully featured and snag-free. For file transfer, see DISK+ (page 156).

User-supported software: two good Mac options . . .

RED RYDER ★

Scott Watson; version 5.0; Shareware; \$40 registration fee; Macintosh; FreeSoft, 10828 Lacklink, St. Louis, MO 63114; 314/428-8057 (after 6 p.m. CST).

PRETTY GOOD TERMINAL ★

Philip Zimmerman; version 6.93; Shareware; \$15 if you supply disk; otherwise \$25; Phil's Pretty Good Software, 440 South 45th St., Boulder, CO 80303; 303/494-1305.

ART KLEINER: These two programs are the first non-commercial Macintosh terminal programs that don't require MICROSOFT BASIC on the same disk to run; thus, they're faster, better adapted to the mouse, and less prone to crash.

PATRICIA NIEHOFF: RED RYDER has many features that other programs do not: programmable macro keys, user-defined auto log-on procedures for any service, three kinds of up/download protocols (straight text, XMODEM, and KERMIT), and an ability to transfer you directly into Apple's simple text editor called EDIT. You can even use the Macintosh Desk Accessories during the program's run. At \$40, it costs less than half of what MACTERMINAL or SMARTCOM II cost.

ART KLEINER: RED RYDER is not made for booting up and dialing; to use it effectively, you must learn to write moderately complex command files. Its many small conveniences include a mouseclick window on the screen for common control characters. The manual is well-written, but limited.

An alternative, PRETTY GOOD TERMINAL, dials the phone, logs you in, sends and receives text, and doesn't do much more. But it costs little, feels elegant to use, and you have to admire the gentle sense of humor of its creator.

Point and click the bottom icons of SMARTCOM II on your Macintosh and you can print, capture, send files, receive files or send drawings to another Smartcom Mac. The pull-down menus offer many choices and countless configurations for telecommunicating, while making it all seem so simple.

Commodore 64 and Radio Shack preference . . .

VIDTEX (Commodore 64 and Radio Shack)

Apple II family • Commodore 64, Pet • CP/M • TRS-80 Models I, II, III • TRS-80 Color Computer; \$40 • IBM PC; \$60; copy-protected? NO; CompuServe, 5000 Arlington Center Blvd., P. O. Box 20212, Columbus, OH 43220; 800/848-8199.

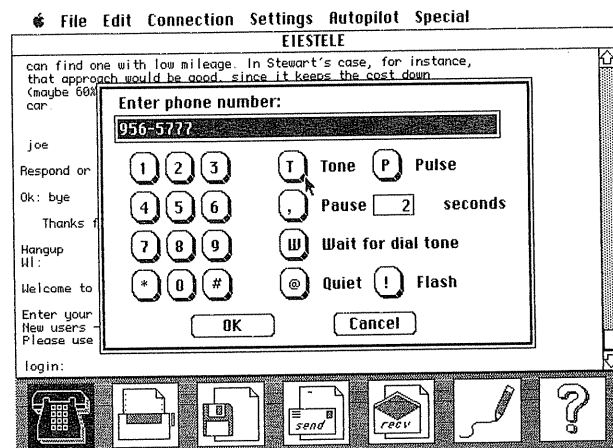
COMMANDER ULTRA-TERMINAL ★

Commodore 64 (1600/1650/Modem 300); \$69.95; Creative Equipment, 6864 W. Flagler St., Miami, FL 33144; 305/261-7866.

CHRISTOPHER DUNN: VIDTEX has all the major functions—it stores incoming or outgoing text in a buffer, sends and receives from networks, controls baud rate and other transmission parameters, and has CompuServe's special error-checking protocol. You can even arrange it to boot up automatically, dial and log you on, and take you directly to any area on any system.

ART KLEINER: VIDTEX has versions for more computer brands than any other type of terminal program. If it had the XMODEM protocol (see page 156) I'd recommend it more enthusiastically for other computers. As it is, it's an inexpensive, full-featured terminal program to poke around networks with. CompuServe is always working on improvements, which are usually offered for downloading from the network itself.

GEORGE BEEKMAN: COMMANDER ULTRA-TERMINAL displays an onscreen clock that tells you how long you've been online, and lets you choose the display's color scheme and format. If you do have a disk drive or printer, COMMANDER lets you save or print your communications while they're displayed on the screen.



Cute mailing system, but limited . . .

TRANSEND PC COMPLETE

IBM PC/XT/AT & compatibles; Transend or Hayes-compatible modem; copy-protected? NO; \$189; Transend Corporation, 1887 O'Toole Ave., Suite C209, San Jose, CA 95131; 408/435-0701.

ART KLEINER: Say you have people with IBM PCs spread over the country working on one project. They're not hackers; they can just about handle 1-2-3. You'd like them to exchange electronic mail—sometimes through The Source, but mostly by having each other's computers dial each other after the people have gone to bed. You want it to feel like walking down the hall and sticking a letter in the mail chute, not like engaging in "data communications." I recommend TRANSEND PC for this need, partly because

it's so damn cute. Its main screen looks like a desktop filled with in- and out-baskets. You pop in and out of the baskets like a mobile jack-in-the-box, typing letters on TRANSEND PC's facile word processor. Then, at your cue or at a preselected time, TRANSEND PC dials up a series of numbers, leaves messages where you want them and collects any that are waiting for you, tagging them separately. Each incoming message waits in your "in-box" until you read it and (if you wish) discard it. Then it goes to my favorite TRANSEND PC feature, a holding place called the "waste basket"; to delete it permanently, you must "shred" it. TRANSEND PC's iconic, nontechnical facade shows the direction that communication programs are taking; it also proves that Marshall McLuhan was right about new media imitating old.

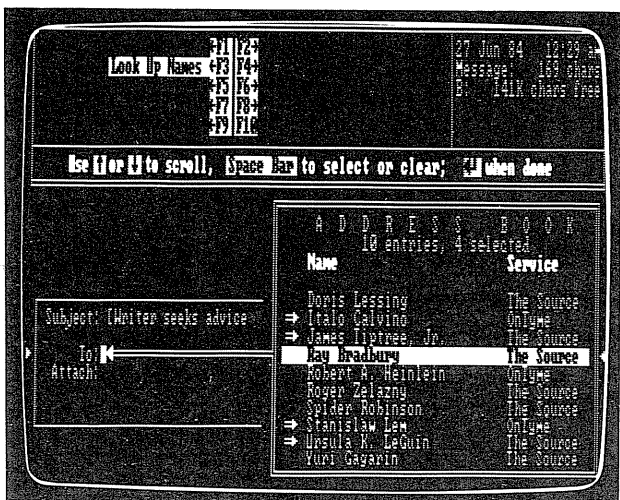
You can only send TRANSEND PC mail to another computer running TRANSEND PC, to The Source, or to OnTyme (see IEMS, p. 145). There's a limited regular terminal program tacked on, but if you want to be compatible with a lot of different computers, don't get this program. Those who can use it, however, will chortle all the way to the keyboard.

For Atari owners, the best is free . . .

AMODEM

Versions 4.2 and higher. Atari 400/600/800, 800XL; 48K; 1 disk drive; 300/1200 baud modem; send \$10 and specify which type of Atari and modem you have; Jim Steinbrecher, 33220 Tricia, Sterling Heights, MI 48077.

BERNIE BILDMAN: What a nice surprise is in store for Atari owners: the very best, most enjoyable terminal program is public domain . . . free! AMODEM 4.2 (written by Jim Steinbrecher) and its variations are the most popular. (I use AMODEM 4.9.) This program can capture incoming text and dump it to the device of your choice (disk drive, cassette, or printer). It will also transfer files with the XMODEM protocol (see p. 156). It runs at 300 or 1200 baud, sends text from disk or cassette, and toggles between phone and log-on automatically. One hitch: you need another public domain program, DISKLINK, to use AMODEM with the Atari 1030 modem. You can obtain AMODEM and DISKLINK by mail, from the Atari SIG on CompuServe (p. 146), or from most any Atari bulletin board or local users' group. An updated version (ETTMODEM) which runs on all Atari modems is available for \$15 from Steinbrecher.



First, you enter all the names and electronic mail addresses of your correspondents into TRANSEND PC. Then, when you address a letter, TRANSEND shows you everyone's name. You select the people who should receive this message. TRANSEND automatically figures out how to reach them—through The Source, OnTyme, or by dialing their computers directly.

Take your modem anywhere . . .

BLACK JACK

\$49.95; Microperipheral Corp., 2565 152nd Ave., NE, Redmond, WA 98052; 206/881-7544.

CHARLES RAISCH: So I was the electronic journalist at the Hyatt, taking notes on the Senator's drunken carousing with a woman who was not his wife, when shots rang out and the famous man slumped forward into his mashed potatoes. After getting out from under the table, I grabbed my portable

computer and rushed to my hotel suite to file my story. I set my gear up, plugged the cable into my modem, and—Holy Hell! It's an old telephone—no modular plug!

The Black Jack hits this problem right on the head. Simply unscrew the mouthpiece of the telephone, drop the round microphone lozenge out of the unit, and screw on the Black Jack. The mouthpiece becomes a modular jack connection for direct-connect modems. A neat gadget that works with all computers and modems. Now I always make the evening editions.

Between telephone and computer . . .

Modems

JIM STOCKFORD: Modems translate computer codes into sound signals that travel across telephone lines to other modems, allowing communication among computers of any brand. Some modems dial the telephone themselves; others require you to dial the telephone keypad. Many modems can also receive, or answer, a call.

Modems connect to the phone lines in two ways: directly, by cable to a jack, which is inexpensive and very reliable; or indirectly, with an "acoustic coupler," a device whose two suction cups fit on a telephone handset.

One important choice is the modem's baud rate—generally 300 or 1200 baud, figures that approximate the number of bits per second sent or received. Three hundred baud is just slow

enough to read as it scrolls by; 1200 is four times faster but still slow enough to skim. In areas where phone-line transmission is poor, a slow baud rate may be necessary to ensure correct reception (just as on a noisy phone line you speak more slowly to be understood).

A standalone modem works with most computer/software combinations, but it's on you to make sure they all work together properly. Standalone modems take up space on your desk or on top of your computer, but can be adapted to any new computer software you buy, or be sold later.

An in-board modem fits in a slot for your particular computer, and usually comes with software. However, it adds little to your computer's resale value, it takes up a slot you may need for something else, and you can't easily resell it. The several in-board modems we've seen are overpriced and machine-specific, so we don't recommend them. If you choose one, choose it according to the software that comes with it.

300-Baud Modems

JAMES STOCKFORD: We don't recommend 300-baud modems this year. For very little more money you can get a modem that works at both 300 and 1200 baud. Telecommunicating at 1200 baud generally saves you money in phone charges and 1200-baud modems are more convenient to use. However, for those who absolutely can't afford a 1200-baud modem, here's one very inexpensive but good 300-baud modem.

A basic, no-frills 300-baud machine . . .

VOLKSMODEM VMI

\$79.95; Anchor Automation, Inc., 6624 Valjean Avenue, Van Nuys, CA 91406; 818/997-6493.

JAMES STOCKFORD: The least expensive general-purpose modem, the Volksmodem VMI connects directly to standard modular phone connectors. It allows both connecting parties to transmit simultaneously (full-duplex mode) or, alternately, one party to transmit at a time (half-duplex mode). It automatically switches between answer mode and originate mode, and its built-in speaker lets you hear if there's a busy signal, no answer, or lost carrier tone. The VMI is low-priced and reliable—the best choice of the 300-baud modems.

MODEMS FOR COMMODORE 64 AND ATARI 800/XL OWNERS

JAMES STOCKFORD: Because the Commodore and Atari machines have non-standard connectors, modem shopping for them is a little peculiar.

We have found, though, that most serious Commodore and Atari telecommunicators buy RS-232 interfaces and, because they can then choose any modem that suits them, they usually choose 1200-baud modems.

Nifty gizmo . . .

DATAGUARD

\$39.95; Control Industries, P.O. Box 6292, Bend, OR 97708; 503/389-1969.

BARBARA ROBERTSON: If your modem is connected to a phone with more than one extension, buy a DATAGUARD. This little thingamabob fits easily inside your telephone (comes with clear instructions) and gives your modem, in effect, a dedicated phone line. If someone picks up an extension phone while your modem is using the phone line, they get a dead phone and you stay online. Otherwise, the phones work the same as before. It's worth every penny.

1200-Baud Modems

JAMES STOCKFORD: A year ago, 1200-baud modems were premium devices—expensive and exotic. This year they are the inexpensive standard—you can get a 1200-baud smart modem for about \$200. Why pay more? Modems suffer from two problems: heat (the more features a modem has, the hotter it gets) and phone line noise (which produces garbage on the screen and sometimes even prevents the modem from connecting). The more expensive modems avoid these problems. All the 1200-baud modems we recommend also allow 300-baud telecommunicating.

A basic, low-frills machine . . .

VOLKSMODEM VM12

\$299, street price \$225; Anchor Automation, Inc., 6913 Valjean Ave., Van Nuys, CA 91406; 818/997-7758.

SMARTLINK II

\$199; BCN, 2533 South Highway 101, Suite 210, Cardiff-by-the-Sea, CA 92007; 800/541-0199.

JAMES STOCKFORD: Anchor makes both machines—a barely smart, but good, low-cost 1200-baud modem. It senses a dial tone and the carrier tone of another modem, and it automatically adjusts to accommodate the signal of an incoming modem call. Using keyboard commands, you can change the modem's parameters (parity, baud rate, stop bit, echo, and duplex settings) and switch between tone and pulse dialing.

BCN packaged the Anchor modem in a different case, lowered the price, added software, and named it the SMARTLINK II. It may be this year's low-budget great deal.

Plenty of features and tough . . .

MULTI-MODEM MT212AH2

\$499; Multi-Tech Systems, Inc., 82 Second Avenue S.E., New Brighton, MN 55112; 612/631-3550.

JAMES STOCKFORD: The MT212AH2 offers many more features than the VM12. It also stores phone numbers in its battery-protected RAM memory, but with a single keystroke you can instruct it to dial and redial numbers a specified number of times and dial another number if the first is busy or unanswered. It features several test modes—analogue, digital, and remote digital loopback, handy for isolating problems. It is tough and works very well.

 MEANS: NEW TO 2.0 EDITION

Best for business . . .

VISIONARY 1200

\$495; Visionary Electronics, Inc., 141 Parker Avenue, San Francisco, CA 94118; 415-751-8811.

JAMES STOCKFORD: The new Visionary 1200 is amazing. In addition to all the features of all the other modems on this page, the Visionary 1200 comes with two micro-processors, RAM memory expandable up to 48K, built-in communications software, and an internal clock and calendar.

It stores phone numbers, log-on sequences, incoming and outgoing messages in any combination to the extent of its memory. You can instruct it to call many numbers at any time in the future, execute log-on operations, download information, and leave messages automatically, unconnected to your computer. It will answer incoming modem calls and store messages with a date/time stamp. You can call in with a password to get your messages or instruct it to call you at a remote location. The XMODEM (error checking) protocol is built in. It has a printer port and three programmable buttons you can set as you please (switch from data to voice, dial a TELEX or network address, whatever). It is our top choice as a business tool.

2400-Baud Modems

JAMES STOCKFORD: In an age where the differences between time and money are blurring, modems that let you telecommunicate faster would appear, on the surface, to be automatic preferences. But as yet, only a few of the major networks offer 2400-baud access; the rest are looking at this issue carefully. In this case, faster is not necessarily better—yet. Only if you spend a lot of time telecommunicating should you consider buying a 2400-baud modem.

Fast and reliable . . .

MULTIMODEM 224

\$795; MultiTech Systems, Inc., 82 Second Avenue S.E., New Brighton, MN 55112; 612/631-3350.

JAMES STOCKFORD: The MULTIMODEM 224 has the same features as its 1200-baud sibling, except that it allows 2400-baud communications in addition to 1200- and 300-baud. We connected it between our new VAX super-minicomputer and the Sausalito phone lines to try it on our new conferencing system, The WELL. Absolutely no complaints, it passed with flying colors.

HUGH DANIEL: MultiTech has been making good modems for years without a lot of hoopla. This modem seems to be the latest in a series of very good modems.

Moving data from one computer to another . . . File Transfer Programs

ART KLEINER: Typical problem: you want to transfer a file (words, numbers, or other data) from your Apple II to an IBM PC. How do you do it?

1. If the computers are near each other you can connect them using an RS-232 cable with a "null-modem." (Most computers use reasonably standard cabling, but double-check with your store to make sure.) If the computers are widely separated, you'll need to connect each computer to a modem. If all other factors are equal, choose a cable instead of telephones; it's easier, faster, and more reliable.
2. A terminal program on each computer. To transfer files without errors (helpful for text, essential for data), terminal programs need an agreed-upon "protocol." Any protocol will

do, as long as you have the same one on both ends, but the most commonly used is XMODEM, a public-domain protocol written by Ward Christensen. With XMODEM, you'll be able to swap files with 90 percent of the computers around you. Terminal programs with XMODEM include: MODEM7, PC-TALK.III, QMODEM, AMODEM, RED RYDER, CROSSTALK XVI, SMARTCOM II, TRANSEND PC COMPLETE, ASCII EXPRESS, and TERM EXEC. The two best are MITE (p. 151), which lets you send several files at once, and RELAY (p. 150), which lets you run other programs while you're sending a long file. KERMIT is better suited for mainframes.

3. Finally, if you're moving files from one program to another the data may need to be converted into another file format. If the programs themselves don't handle the conversion, you may need utilities. Many of these utilities are found in the public domain (see p. 25). The Programming section (pp. 158 to 174) also includes utility programs as does the Analyzing section on p. 72.

Stop! Before you transfer files, check this shortcut . . .

XENOCOPY

Version 3.0; copy-protected? NO; \$99.50; IBM PC/XT and compatibles; Vertex Systems, 6022 W. Pico Blvd. #3, Los Angeles, CA 90035; 213/938-0857.

CONVERT

Copy-protected? NO; \$99; PC/MS-DOS machines; 64K; 2 disk drives; Software, Inc., 3545 Chain Bridge Rd., Suite 3, Fairfax, VA 22030; 800/242-4355 or, in VA, 703/352-2977.

CROSSDATA

Version 2.0L; copy-protected? YES; \$99; IBM PC and compatibles; 2 disk drives; Award Software, Inc., 236 North Santa Cruz Ave., Los Gatos, CA 95030; 408/395-2773.

ART KLEINER: Computer designer George Morrow once said, "The best local area network is walking down the hall with a floppy disk." If the computers use the same kind of disks, these programs will, while you're using them, "trick" the disk drive on one computer into believing it's a disk drive for a second type of computer. They take, say, a KAYPRO II file and make a copy of it in, say, IBM PC format in the same computer.

Matthew McClure used these three to put together the **Whole Earth Software Catalog**. All are limited to file transfers between MS-DOS machines, CP/M machines, or from one to the other, and all work fine. They keep adding machines to their lists, so check the documentation to see if they'll work for you.

Model 100 to desktop . . .

DISK +

Version 2.0; copy-protected? YES; \$149.95; TRS-80 Models I, II, III, 4, 4P, 12, 16; Models 1000, 1200HD, 2000; Portable Computer Support Group, 11035 Harry Hines Blvd. #207, Dallas, TX 75229; 214/351-0564.

REMOTE CONTROL

Version 1.12; copy-protected? YES; \$180; IBM PC/XT/AT and compatibles; 256K; 2 disk drives; Kensington Microware, 251 Park Ave. So., New York, NY 10010; 212/475-5200.

JAMES STOCKFORD: I have used DISK + to exchange files between the IBM PC and the Model 100. The Model 100 controls the whole process, including the disk drive and the file-managing activity of the desktop computer. You can use the PC to store Model 100 files and thus avoid the much more tedious cassette recorder. DISK + comes as a plug-in chip, which saves memory space.

ART KLEINER: DISK + requires you to buy your own "null-modem" cable. For IBM PC owners, REMOTE CONTROL comes with everything, including cable, in one box. It puts a version of the Model 100 software on the screen of your PC.

Free micro, mini, mainframe moves . . .

KERMIT

Available for most mainframe, minicomputers, and microcomputers; 1 disk drive and modem or connecting cable; copy-protected? NO; free through most local users' groups; for availability to users' groups and other institutions contact KERMIT Distribution, Columbia University Center for Computing Activities, 612 West 115th Street, New York, NY 10025; 212/280-3703.

MARK COHEN: KERMIT allows file transfer between a wide variety of different computers. While originally developed for communication between mini and mainframe computers, the many authors of KERMIT now write new versions as fast as the computer manufacturers can crank out incompatible machines. The program is free and usually includes enough documentation for use. Complete and fancy documentation is available but costs money. Finding a copy of KERMIT is sometimes difficult. Most university systems have a version of KERMIT already set up that is yours for the taking and, being in the public domain, for many universities it is the preferred file transfer protocol. KERMIT won't allow you to run 1-2-3 (p. 68) on your Atari, but it does allow you to transfer both text and binary files simply and efficiently. The process of moving a copy of KERMIT to your own computer, however, can be a bit complex and/or poorly documented.

Like a white flag between battling armies . . .

PC TO MAC AND BACK!

Copy-protected? NO; \$150; IBM PC and compatibles (128K); Macintosh; dillithium Press, P.O. Box 606, Beaverton, OR 97075; 503/243-3313.

ART KLEINER: Because each machine has its own unique advantages, many offices have

both an IBM PC and a Macintosh—a frustrating arrangement because the two machines don't talk to each other very well. Now all the programs and parts—including the cable—for exchanging text, spreadsheet, or database files come in one box called PC TO MAC AND BACK! and you can get them going in an hour and a half. The one utility missing, though, is one that would convert MACPAINT drawings to painting programs that run on the IBM PC.

LOCAL NETWORKS: STILL NEXT YEAR'S MODEL

ART KLEINER: Local computer networks may change how offices work more than any other computer use. These networks link small computers to share expensive hard disks and fast printers, mutually used databases and spreadsheets, and complex programs. I asked Richard Solomon, editor of **International Networks**, a newsletter on world telecommunications technology and policy (\$225/yr; P.O. Box 187, Monson, MA 01057) and veteran networking consultant, to tell how to bring a local network into your business.

RICHARD SOLOMON: Business people often come to me with half-articulated local networking needs: Maybe they already have three Apples and an IBM PC in the office, with three more PCs and a Compaq on order, and they want them all to connect easily together. Unfortunately, no off-the-shelf product can do that yet, and I'd be skeptical of any manufacturer who said it could be simply done.

When you extend a web among computers, new complexities arise that you don't face when you try to interchange data between, say, SUPERCALC and DBASE II or between two ASCII word processors. First, there are no universal local network standards. Cable connections, operating systems, disk-access formats, and a host of other details are unpredictably incompatible. I once spent four days transferring WORDSTAR files from an Apple to an IBM PC. All sorts of problems arose that MicroPro seemed unaware of. Apple CP/M and PC DOS do different things with carriage return/linefeed. RS-232 serial-to-serial was out of the question without some extensive programming and resoldering of the Apple-Cat II. The modems or the software were not compatible at 1200 baud, so we had to settle for 300.

And the CP/M operating system stripped all the funny WORDSTAR characters, so the files required extensive manual manipulation. In the long run, rekeying would have been cheaper and faster—cheaper even than buying some untested software that promised the moon but, as usual, left out some small important detail.

A local network isn't going to do much for you where everything else is incompatible. But there are even more fundamental questions: How much wire can fit in your ceiling? How well can your office phone system carry computer signals? If it is an all-digital PBX, can it interface with your PC at all? (Probably not.) How well can your existing database software handle the tricky problems of access by more than one user? How compatible will your network be with the new equipment you'll want to buy next year, or with another local network you'll want to link it to later?

Local networks can have critical reliability problems. What do you do when your hard disk breaks? The smaller firms have neat products, but support is often terrible; you call them up and never get a straight answer. Their code is always proprietary, so you can't clean things up even if you know what you're doing. If all your data is on a hard disk and there was an error in their directory table, that can be catastrophic in a pinch. Too many companies have not graduated from the fun and games level of the microcomputer business and don't realize that people are using their toys for serious, money-making tasks. I dropped one

vendor real fast when its hotline was answered on a Friday with a recorded message that said they only worked four days a week! Well, we often work seven days a week. That's why we use computers.

This year, you still need a consultant to set up a local network—someone skilled in using them who knows about several systems, who understands the economics involved, and who starts by asking what you do, how you do it, and why you want to change it. If a consultant starts off by saying, "I've got a super-duper product for you," look for someone else fast. Be wary of any scheme that costs more than 50 percent of the total cost of your computers and terminals.

The simplest local network is two computers connected by cable—for swapping files (see p. 156). Some programs will let both computers share files simultaneously on the same hard disk (if the operating systems are comparable). An alternative is expanding one microcomputer into a multi-user system, with other computers serving as terminals to the first. (They don't even have to be similar machines, since the other micros could emulate terminals when connected to the host machine.) Multi-user operating systems like UNIX (p. 168) are more versatile, but may be overkill (especially in price) for most small businesses.

Most local networks use coaxial or fiberoptic cable, or ordinary telephone wire pairs, to link 3 to 25 machines. The more useful cable systems, like Ethernet, incorporate complex algorithms on interface cards so that each computer can sense when to send or receive a signal. Some office telephone systems are designed to carry data as well as voice, but require some special device for direct connection, since modems will not do. And next year telephone companies in many cities may offer AT&T's Circuit Switched Digital Capability, hopefully to be tariffed as a low-cost service sending data at 56 kilobits/second over ordinary telephone lines; this is fast enough to effectively extend your local network across a city or a continent.

Speed is important, because you won't just be sending files, you'll be interacting with a faraway program as quickly as if it were on your own computer.

I recommend waiting for the new products, which we'll review as good ones emerge. None of the popular PCs today were designed with digital high-speed (local or whatever) communications in mind. But some of the rumored offerings from AT&T (of course), IBM, Digital, and others will radically change the way software is written and micros are used. If you really need communications, you can probably assume that anything you buy now will be written off in less than three years, as these novel items come onstream.

CitiCorp in Manhattan sends its data locally by laser beams and microwave, coaxial cables, and fiberoptic lines running down the IRT subway line (which, as J.P. Morgan's bank, it financed back in 1904). Also, since 1918, the bank has had a pneumatic tube system in the IRT, still kept in very good shape. These are not department store tubes—they're large cylinders that carry their cargo between uptown and downtown at some 75 mph. Initially they carried paper, punched cards, and money, but now they transport floppy disks. When CitiCorp analyzed its various systems, it found that nothing was sending as much data faster than the pneumatic tubes.

PROGRAMMING

Gerald M. Weinberg, Domain Editor

GERALD M. WEINBERG: In 1905, when you went motoring, you took your mechanic. Twenty-five years later, mass production revolutionized the role of the automobile, but buying a Ford wouldn't have made sense if everyone still needed a mechanic on board.

In 1955, when you used your computer, you took your programmer. Twenty-five years later, mass production revolutionized the role of the computer, but buying a micro wouldn't have made sense if everyone still needed a programmer.

It was important to get rid of the mechanic in every car, but even after 80 years, we still need mechanics somewhere. Moreover, drivers who understand the mechanisms involved get a whole lot more satisfaction from their cars. Even if they don't make simple repairs themselves, their knowledge of the mechanical underpinnings makes them far more intelligent buyers of cars and service.

It's the same with programming, the technology that underlies all other software tools, the very instructions that drive the computer. The three most common problems software users face today are (1) selecting the right package, (2) understanding the documentation, and (3) coping with errors and shortcomings in the programs. If you use software—even though you never intend to write a program—you should read a few good books on programming. Why? A knowledge of programming (1) makes you a better shopper, (2) clarifies muddy manuals and foggy screens, and (3) suggests how to circumvent errors and shortcomings.

Some addicts say that programming builds character. If so, I must have built a lot of character in 30 years, but not enough to tolerate poor-quality software tools. Most of the tools available to the personal computer programmer are two decades behind the best that are available on mainframes. Fortunately, the micros are catching up fast, and they would develop even faster

if the market were more sophisticated. Few personal computer users would recognize fine programming if they saw it.

One example: An enthusiast sent me a review of a tool for resequencing line numbers in BASIC. No doubt he finds it useful, but it's unforgivable that this tool wasn't provided as part of his BASIC interpreter. Even worse, why would a sensible programming language use line numbers in the first place? They're a throwback to the old days when the only terminals programmers could use were printers rather than monitors (BASIC and APL), or to the ancient days of punch cards (FORTRAN). A tool for resequencing line numbers in BASIC is like a blowtorch to light the pilot on your solar water heater.

Though unacquainted with good programming, personal computer users have been introduced to the consequences of poor programming in the software they buy—errors, incompatible interfaces, errors, clumsy designs, errors, poor performance, errors, wipeouts, and errors. None of this garbage is necessary, but the buyers think "that's just the way computers are." That's why this section emphasizes some of the classic books on programming—to accelerate the revolution of rising expectations. And that's why it emphasizes the entire programming process from conception to design to debugging, not just hacking code on the screen.

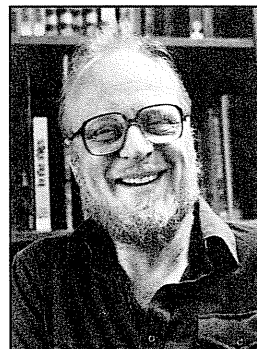
We have restricted the reviews of programming tools to a few of the best—partly owing to a lack of space, partly to a lack of more good tools, but mostly because it's time we learned from good examples. Unfortunately, some of the best programming tools are being treated as trade secrets within the software companies. Superior programming tools still have a small marketing potential, so they're more profitably used—like machine tools—to produce software products.

The market for software machine tools will always be smaller than that for prebuilt packages: There are a lot more Chevrolets than automatic milling machines. However, as hardware costs drop and user sophistication grows, the market for professional-quality programming tools will blossom. Some of these high-quality tools, like UNIX (p. 168), and object-oriented programming languages like SMALLTALK, are beginning to reach the personal computer market. As they do, their primitive imitations will be swept away. The sooner the better.

DO IT YOURSELF SOFTWARE

STEWART BRAND: Software is beyond soft, beyond liquid, beyond even gas—it is utterly non-material. Yet it is completely accessible. That makes it a standing invitation to meddle. The stages are easy. First you install the commercial programs on your computer, customizing to suit. Then you combine a couple programs on one disk and blend them a bit. Then you enhance the keyboard with the likes of PROKEY and SMARTKEY (p. 174). Then you're messing with utilities (pp. 172-174), further customizing your file and disk handling. You're programming. Keep it up and you'll be a programmer.

We're honored to have as domain editor the distinguished author of **The Psychology of Computer Programming** (p. 170)



Gerald M. Weinberg

Matthew McClure

and **An Introduction to General Systems Thinking** along with 20 other books. Jerry Weinberg has been working with computers for 29 years. At present he and his anthropologist wife Dani do consulting, training, and writing on the interaction between people and technology out of their base near Lincoln, Nebraska.

Why Bother Learning to Program?

PETER A. MCWILLIAMS: Teaching BASIC is a holdover from several years ago when there were no programs for personal computers. That time is past, but the habit of teaching the language of programming remains.

GERALD M. WEINBERG: Personally, I think everyone should learn to program, but that's not a problem, because all computer users *do* learn to program whether they want to or not. Any time you arrange your procedure for using a word processor or spreadsheet into a logical progression of steps, you are programming. In fact, even when you arrange your procedure into an *illogical* sequence of steps, you are programming. So the question is not whether you should learn to program, but whether you should learn to program *well*.

In short, the first reason to study programming is to improve your ability to think in terms of logical, efficient procedures, whether for using your computer or for using your own time without a computer.

Let's face it. The state of the art in software is still a bit crude, and most packages are more heavily influenced by their programmers' concerns than by their intended audience. When you run into trouble with such a package, even a slight knowledge of programming may get you out of trouble by allowing you to figure out what's going on behind the scenes—the things the manual doesn't say explicitly.

GIRISH PARIKH: Learning a programming language, though important for programming, is only half the story. Before building a house, you first get a blueprint. To program effectively, before writing code you must first have a design.

GERALD M. WEINBERG: For most personal computer users, learning to design programs will probably be of much more value than learning to write code in some programming

language. Those who understand design will make better decisions when buying software, just as those who understand architecture will make better decisions when buying a house. Fortunately for the beginner, there are now some excellent books on program design, which we review below.

GIRISH PARIKH: If you have learned programming, you can write short but important programs that you need but that are not available on the software market. And who knows? You might even get a software publisher interested, and make some money.

GERALD M. WEINBERG: Getting rich through programming is a common fantasy. If you intend to learn programming as a way of getting rich, try the lottery instead. Your chances are better. On the other hand, learning to program may help you get a job. But, as Parikh says, we still haven't reached that utopian state where only professional programmers need to write programs. Most of the programs you write will be trivial to everyone but yourself. Twenty lines of BASIC that change the format of all your files so you can use a new word processor may be worth thousands of dollars to you but not a penny to someone else.

To me, the ultimate reason for learning to program was perfectly expressed by Don Knuth as the first sentence of his monumental work, **The Art of Computer Programming** (Donald E. Knuth; Vol. 1, **Fundamental Algorithms**; 2nd ed., 1973; 634 pp.; Vol. 2, **Seminumerical Algorithms**; 2nd ed., 1981; 700 pp.; Vol. 3, **Sorting and Searching**; 1973; 722 pp.; \$36.95/volume; Addison-Wesley Publishing Co., Jacob Way, Reading, MA 01867; 617/944-3700; or COMPUTER LITERACY):

The process of preparing programs for a digital computer is especially attractive, not only because it can be economically and scientifically rewarding, but also because it can be an aesthetic experience much like composing poetry or music.

GERALD M. WEINBERG: You don't need more reason than that.

Which Languages Should You Learn?

GERALD M. WEINBERG: When Jean Sammett wrote **Programming Languages: History & Fundamentals** in 1969, there were hundreds of known languages. Though a few of them have died, many more have been born, so now there may be thousands. When you add the multiple dialects of each language, and the multiple implementations of each dialect, the beginner has a big problem: which language to learn first?

In my opinion, there are two important rules to follow in choosing your first programming language:

1. It doesn't matter much, so choose something that's easily available to you.
2. Don't learn just one, learn at least two at the same time.

I have always trained new programmers by having them write every program in two languages as different from one another as possible. At the very least, this practice prevents extreme

language chauvinism from developing. If you learn this way, you learn that *every* language has some good features and *every* language has some dreadful ones.

And since you're going to learn two, one of them might as well help you get a job—quite likely some form of BASIC, COBOL, Pascal, or some member of that family, like FORTRAN or PL/I. But don't choose two from this family. To save money, you'll probably choose the one that comes with your computer, which is quite likely some form of BASIC. Don't let it bother you; you're only learning.

MATTHEW MCCLURE: Most programming languages share certain fundamental concepts, such as variables, subroutines, arrays, loops, strings, conditional branching, input and output. Learn how one language, such as BASIC, implements these concepts, and it's usually not hard to learn how another language handles the same ideas. It gets more interesting when you have new concepts—structured/modular programming or extensibility, for example; then you get exposed to a whole new level of sophistication.

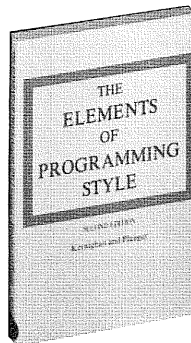
Teaching by bad example . . .

THE ELEMENTS OF PROGRAMMING STYLE

The Elements of Programming Style; Brian W. Kernighan and P. J. Plauger; 2nd Edition, 1978; 160 pp.; \$17.95; McGraw-Hill, 1221 Avenue of the Americas, New York, NY 10020; 212/512-2000; or **COMPUTER LITERACY**.

DENNIS GELLER: For programmers, this is the one book to have if you're having only one. Like its namesake, Strunk and White's *Elements of Style*, the book concentrates on the essential practical aspects of style by example.

Collected into chapters under such names as "Expression," "Control Structure," "Common Blunders," and "Efficiency and Instrumentation" are real programs, not toys made up to illustrate a point. These bad examples serve as springboards for incisive discussions of the best ways to write correct and readable programs. Sad to say, these programs come primarily from programming textbooks, where our next generation of programmers is turning for guidance. Each of the examples gets rewritten, sometimes in more than one way, to illustrate the principles the authors espouse. The examples are in FORTRAN or PL/I, but are nonetheless valuable in BASIC, COBOL,



Pascal or any other common language. As the authors prove, "The principles of style are applicable in all languages, including assembly codes."

Each example is followed by an aphorism that captures the point: "Write clearly—don't be too clever"; "Choose a data representation that makes your program simple"; "Make it right before you make it faster." The rules are listed together at the end of the book. A programmer could do worse than paste the list on the wall.

This book could be used as a textbook for a programming course, yet the examples are sufficiently self-contained to allow you to open the book at random, read a few pages, and come away a better programmer. In fact,

that's not a bad way to work with the book on your second or third reading.

One of the strongest messages in this book is that programming is a holistic task. The error in the sine function is not with the formula or the numerical analysis—the first place many programmers would look—but arises from the simplest of all blunders, an uninitialized variable. Time and again, using subtle or surprising examples, Kernighan and Plauger lead us to sharpen both our reading and writing skills by discussing what is wrong in a given instance, how to correct it, and, most important, how to avoid it.

To whet your appetite, here's a single example from Chapter 5. It's supposed to read the sides of a triangle and compute the area. Before you buy the book and find out what the authors have to say, can you determine what in the example is wrong (and what's right)? (For assistance, see p. 208.)

```
READ (5,23) A, B, C
23 FORMAT (3F10.0)
S = (A + B + C) / 2.0
AREA = SQRT(S * (S - A) * (S - B) * (S - C))
WRITE (6,17) A, B, C, AREA
17 FORMAT (1P4F16.7)
STOP
END
```

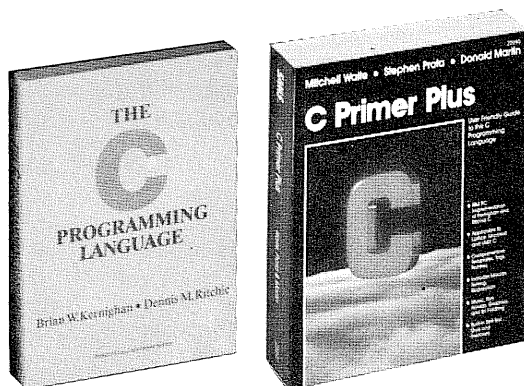
Structured, compact, powerful, portable...

THE C PROGRAMMING LANGUAGE

The C Programming Language; Brian Kernighan and Dennis Ritchie; 1978; 228 pp.; \$22.50; Prentice-Hall, P.O. Box 500, Englewood Cliffs, NJ 07632; 201/592-2000; or **COMPUTER LITERACY**.

C PRIMER PLUS ★

C Primer Plus; Waite, Prata & Martin; 1984; 448 pp.; \$19.95; Howard W. Sams, 4300 W. 62nd St., Indianapolis, IN 46268; 800/428-7267; or **COMPUTER LITERACY**.



DENNIS GELLER: C is a structured language in the same sense as Pascal, encouraging the user to build large programs in small, easy to understand pieces. C is a compact language that uses single symbols where others use whole words and that allows many shorthand notations. For example, `++i` is a complete statement that increments `i` by one.

Unlike languages that try to hide the details of the underlying computer, C aims to expose the bit- and byte-level details, making it ideal for writing systems software where individual units of memory must be manipulated efficiently. C compares favorably with assembly languages in efficiency and flexibility, yet has the feel of higher-level languages, leading to lowered costs for both programming and maintenance. Costs are lowered even more by C's transportability. In C, it is easy for the programmer to isolate the machine-dependent parts of the program so that moving the software to new hardware takes relatively little work.

Kernighan and Ritchie's book is the standard reference for C, but the Waite Group's careful introduction is a much better starting place for neophytes.

JACK TRAINOR: **C Primer Plus** gives a deep, thorough treatment of the language that's emerging as the standard for serious programming on personal computers—not "software development" or "Meet Igor the Computer" or how to convert hex to octal. Its level of detail would probably not be fun to read straight through, but when you get hung up on some fine point of C—and it happens all the time while learning—you can look up the topic and get your questions answered. It goes into the nitty-gritty of everything and has lots of short code examples.

C Primer Plus is the only book I have seen that adequately explains the difference between `typedef` and `#define`. Plus, it has lots of graphics—colored diagrams to illustrate the text and cartoons for comic relief. It even has a handy reference card for the C language, which would be a good idea for other language texts.

Becoming a standard . . .



AZTEC C: version 1.06F; Macintosh; 2 disk drives required; version 3.20C; IBM PC and compatibles; copy-protected? NO; \$499; Manx Software Systems, P.O. Box 55, Shrewsbury, NJ 07701; 800/221-0440 or, in NJ, 201/530-7997 • **DESMET C:** Mark DesMet; version 2.41; PC/MS-DOS machines; CP/M-86 machines; copy-protected? NO; \$159 (with source level debugger, 192K); \$109 (without source level debugger, 128K); C Ware Corporation, P.O. Box C, Sunnyvale, CA 94087; 408/720-9696 • **LATTICE C COMPILER:** Lynch, Hersee & Schmitt; version 2.15; PC/MS-DOS machines; 128K; 2 disk drives; copy-protected? NO; \$500; Lifeboat Associates, 1651 3rd Ave., New York, NY 10128; 212/860-0300 • **MAC C COMPILER AND TOOLKIT:** Bill Duvall; version 2.0 (floating point); version 1.5 (non-floating point); Macintosh (128K model requires external disk drive); requires Macintosh Development System (\$195 from Apple Computer); copy-protected? NO; \$425 (version 2.0); \$375 (version 1.5); Consulair Corporation, 140 Campo Dr., Portola Valley, CA 94025; 415/322-2757 • **MEGAMAX C LANGUAGE DEVELOPMENT SYSTEM:** version 2.1; Macintosh; copy-protected? NO; \$300; Megamax, Inc., 8620 Park Lane #403, P.O. Box 851521, Richardson, TX 75085-1521; 214/987-4931 • **OBJECTIVE-C COMPILER:** Cox, Watt & Breckenridge; Version 3.1; PC/MS-DOS machines; 64K • **LISA;** copy-protected? YES; Productivity Products International, 27 Glenn Rd., Sandy Hook, CT 06482; 203/426-1875 • **PLINK-86:** version 1.47; any PC/MS-DOS machine with DOS 2.0 or higher; CP/M-86; 128K; copy-protected? NO; \$395; and **PFIX PLUS:** version 1.07; IBM PC/XT/AT and compatibles; Wang PC; TI Business Professional; Tandy 2000; 80K (192K recommended); DOS 2.0 or higher; copy-protected? NO; both from Phoenix Products Corporation; 1420 Providence Highway, Suite 115, Norwood, MA 02062; 617/762-5030.

JOHN SEWARD: Most successful computer languages have had a powerful lobby pushing them into widespread use. ADA has the defense department, COBOL the federal government, PL/1 has IBM, Pascal has the universities, and BASIC was the only choice on microcomputers for a while. C is an exception to this rule. It is rapidly becoming the dominant language of professionals programming on microcomputers, for the simple reason that programmers like it. FORTH has the same kind of support, but not nearly as much of it.

A major premise behind the development of high level computer languages has been to eventually eliminate the need for programmers by making computers appear to be human, thus the pseudo-English patina of languages like COBOL. This effort has so far been wildly unsuccessful and will probably remain so for the foreseeable future. The C language was not designed to bypass programmers, but to help them. It's not really any easier to program in C than in assembly language. You still have to know what you're doing.

So what do programmers like so much about C? There are several things: 1) C

compilers tend to produce fast, efficient code, because the structure of C conforms to the way machines think instead of the way normal people think. 2) C trusts the programmer—there are few built-in structures to force safety or clarity on a programmer, so you can do anything you want. 3) C is extensible. If you do a good job of writing functions, the language will grow with you. The more you use it the more powerful it—and you—become. 4) C is portable. There are C compilers for virtually every machine, and if you are careful to write standard C, programs can be ported quite easily.

There are now somewhere around two dozen C compilers on the market for the IBM PC and its MS-DOS clones. Leader of the pack is LATTICE C, one of the first solid, complete compilers to come out for the PC. Also popular is AZTEC C, which also has cross-compilers available for the 6502 machines (Apple II and Commodore 64). The AZTEC compilers are all very similar and together they make a great environment for porting programs to all the different micros at once. By far the cheapest compiler on the PC is DESMET C, which nevertheless compares quite favorably with its more expensive brethren.

RICHARD FRIEDMAN: We use the DESMET compiler on our PCs and agree about the speed and price, but the small core is a serious limitation and it seems to have some compatibility problems if you try to compile it under UNIX.

MORRIS JONES: During the Ivan project at MicroPro one of our programmers spent considerable time evaluating various C compilers. LATTICE C still seems to come out ahead in terms of code generation and smooth, bug-free operation. LATTICE 2.15 is (fortunately) capable of doing very large projects without choking.

I would also recommend PLINK-86 linkage editor and PFIX PLUS debugger. PFIX PLUS is incredible—some of our people credit it with getting WORDSTAR 2000 shipped when we did instead of three months later.

JOHN DRAPER: On the Macintosh, two C compilers stand out from what's becoming a crowd. AZTEC C is a very UNIX-like product; for those used to UNIX, it appears to be the best. It also is the fastest, and has a Mac-type interface. It compiles very quickly because it doesn't have to run under the Finder, and it produces remarkably compact and efficient code. It has excellent examples and comes with extensive documentation and support. The only drawback is the price: \$500.

The compiler I use, MEGAMAX, comes very close to AZTEC in speed of compilation. The price is \$200 cheaper than AZTEC, and the performance is similar.

For further reading . . .

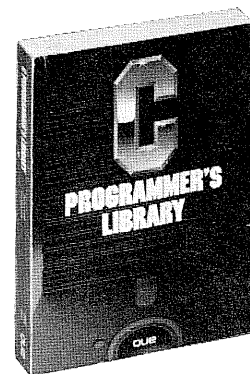
C PROGRAMMER'S LIBRARY ★

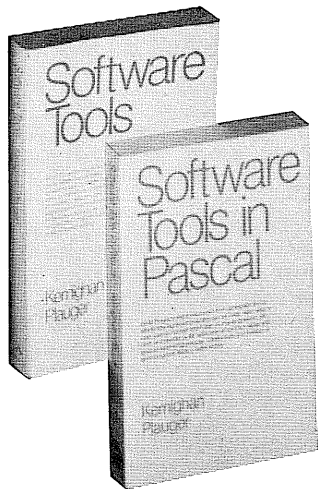
C Programmer's Library; Jack Purdum, Tim Leslie & Alan Stegemoller; 1984; 366 pp.; \$19.95; Que Corporation, 7999 Knew Rd., Suite 202, Indianapolis, IN 46250; 800/428-5331 or, in IN, 317/842-7162; or COMPUTER LITERACY.

JOHN SEWARD: So you've read Kernighan and Ritchie and you've written a few C programs. Now you're ready to get serious. I highly recommend **C Programmer's Library**. This is an advanced text on C that not only elucidates the fine points of the C language but also provides a number of C functions and complete, useful programs.

The first section of the book teaches, in a quite formal manner, everything you've always wanted to know about C data types but were too ignorant to ask. Section two presents a general methodology for library development, something you had better get disciplined at if you're planning to do a lot of C programming. The third section is mostly code, interspersed with explanation. You get free: several sorting routines, a general terminal library that will allow you to write device independent code to do all your screen handling, a complete set of ISAM functions, and a book-cataloging program that uses them. If you wish, you can also send away for a disk that has everything already typed in for you.

One of the best ways to learn programming is to study other people's code. This book will not only teach you a lot, but it will save you a lot of sweat if you're writing sophisticated C programs that display stuff on screens and read and write data to disk (hard to think of a program that doesn't do both). **C Programmer's Library** is an essential volume in every C programmer's library.





Top-notch tools teach good techniques . . .

SOFTWARE TOOLS

Software Tools; B. W. Kernighan and P. J. Plauger; 1976; 286 pp.; \$18.95;

SOFTWARE TOOLS IN PASCAL

Software Tools in Pascal; B. W. Kernighan and P. J. Plauger; 1981; 366 pp.; \$18.95;

both from Addison-Wesley Publishing Co., Jacob Way, Reading, MA 01867; 617/944-3700; or COMPUTER LITERACY.

MATTHEW MCCLURE: These two books are very similar; the examples in *Software Tools* were written in RATFOR, a language based on FORTRAN, while those in *Software Tools in Pascal* are in Pascal. Essentially the same tools are developed and explained in both.

JIM FLEMING: The concept of software tools as developed by Kernighan and Plauger is a must for serious software developers. The tools in question are helpful programs that enable people to do things by machine instead of manually, and to do them well instead of badly. The specific tools developed in the books are useful in their own right, but of equal or greater importance are the underlying principles for developing suitable software tools whenever you are embarking on a significant development project.

The authors recognize that no one learns good programming simply by reading abstract statements about program constructs and data structures. They show how such concepts as top-down design, structured programming, and simple user interfaces can be combined to produce significant programs that are easy to write, easy to read, and easy to maintain.

Each of the software tools is introduced by a discussion of the class of problems it helps solve, followed by a discussion of the significant design considerations that went into creating it. The resulting code is exhibited along with a discussion of potential extensions.

I have found that building a software toolbox has saved me many months of work over the life of several software-development projects.

GERALD M. WEINBERG: As their needs and skills grow, serious users will eventually "hit the wall" on any system—be it programming language, word processor, spreadsheet, or database manager. The ability to compose complex tools from simple ones allows you to get through the wall and continue working in an ever more hospitable environment. This ability is so essential to programming that I wouldn't consider recommending any programming environment lacking it.

Fun in a structured environment . . .

MACINTOSH PASCAL ★

Macintosh; copy-protected? YES; \$125; Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 800/538-9696.

DAVID TAYLOR: When you open the Pascal disk from the Macintosh desktop, the three default windows are: the Program window, where the source code is maintained; the Text window, which displays any text output from your program or any text received from the keyboard; and the Drawing window, which holds your program's graphics output. So you can type in or alter a program and immediately run it to see the results. That's all you need to know to start programming. All other implementations of Pascal require the programmer to know operating system commands, text or program editors, linkers, library managers, and debuggers. MAC PASCAL automatically "pretties" each line after the ENTER key is pressed, and keywords like "begin," "enter," and "procedure" are highlighted, so you are always looking at easy-to-read code. If the interpreter finds a problem with your code, a window appears with a picture of a beetle-type bug and an explanation of the problem. Point to the bug-picture and click, and the insertion point lands in the affected line. The error messages are usually helpful.

The most powerful feature of this language is its ability to use the famous Mac ROM routines as part of your own code, to help create graphics and use menus. There is also a complete library of binary floating point arithmetic routines called the Standard Apple Numeric Environment (SANE).

Unfortunately, if you try to give it a file on a clipboard longer than 32K, it vomits and dies. And there is no way to link multiple modules together. And worst, it's copy-protected; no self-respecting programmer will ever use a copy-protected program.

Outstanding value . . .

TURBO PASCAL

Version 1.0; CP/M-80 • CP/M-86 • Concurrent CP/M-86 • IBM PC compatibles • MS-DOS; copy-protected? NO; \$50;

TURBO TUTOR ★

Version 1.0; PC/MS-DOS machines; copy-protected? NO; \$34.95;

both from Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066; 408/438-8400.

KEVIN BOWYER: I would recommend this product for anyone interested in Pascal; it has the best price/performance of anything I've seen. Because I've written a book (*Pascal for the IBM-PC: IBM DOS Pascal and UCSD p-System Pascal*; Kevin Bowyer and Sherryl Tomboulain; 1983; 320 pp.; \$18.95; book/diskette, \$45; diskette, \$30; Robert J. Brady Co., Rts. 197 & 450, Bowie, MD 20715; 301/262-6300; or COMPUTER LITERACY) that uses as an example the DOS Pascal marketed by IBM, I tend to compare other Pascals to that one. TURBO PASCAL is smaller, easier to use, comes with its own full-screen editor, and is much cheaper—it's almost too good to be true.

TURBO PASCAL's editor allows you to reassign the editing commands to any keys you wish, making this editor look like whatever full-screen editor you already know. Moreover, this is not a bare-bones "standard" Pascal. It has all the normal extensions that make Pascal a convenient language for any task. At less than \$50, even people who already own one Pascal compiler can afford to buy this tool.

MATTHEW MCCLURE: TURBO TUTOR is an excellent language introduction. It comes with a disk that has actual code on it—just put the disk in and no more painful typing a line at a time. The code includes the nucleus of a library that you can use as building blocks for more advanced projects. Examples are given for tasks like sorted directories and modem control. "Frank Borland" rides a mule named "Lotus" and is obviously fictitious but intelligent.

Complete toolkit . . .

APPLE PASCAL

Version 1.2; Apple II family; 48K; copy-protected? NO; \$250; Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.

THOMAS MAYER: I bought an Apple to learn programming and for a long time experienced nothing but disappointment and frustration. Now I am fluent in Pascal and am paid big bucks for programming. All it took was hard work, a few good books, and APPLE PASCAL, the most used piece of software I own.

APPLE PASCAL has all the tools you need to program in Pascal. One purchase buys you a complete programming environment: an editor, a Pascal compiler, a linker, an assembler, and all the necessary file-maintenance utilities.

Structured fundamentals . . .

PASCAL FROM BASIC

Pascal From BASIC; Peter Brown; 1982; 182 pp.; \$12.95; Addison-Wesley Publishing Co., Jacob Way, Reading, MA 01867; 617/944-3700; or COMPUTER LITERACY.

MATTHEW MCCLURE: Pascal is the language most frequently taught in universities today. Descended from Algol 60 and designed by Niklaus Wirth, it is a block-structured language, so it is well suited for large programs—each block stands by itself and can be separately analyzed and debugged. Block-structured code is generally quite readable, which is nice when you come back to the big program you wrote a year ago and want to make some changes. Pascal is also faster and more portable than BASIC—a Pascal program written for one machine will usually run on another with little alteration.

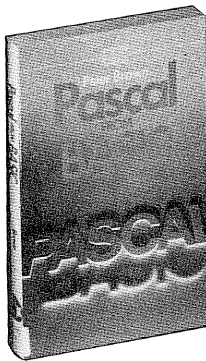
LINDA K. PHILLIPS: This book is for all BASIC hackers who want to learn Pascal. It assumes you are familiar with BASIC programming and concepts, and explains how to “think” in Pascal. The book does *not* teach you how to “translate.” Nor is it a textbook in the usual sense. Pascal can differ in different implementations, and Brown often refers the reader to specific implementation manuals.

Newton said he could see so far because he was like a midget standing on the shoulders of giants. Programmers, however, are like midgets standing on the toes of other midgets.

—Richard Hamming

The two manuals are for the experienced programmer; the beginner will need to supplement them. A lucid guide to the operating system is **Introduction to the UCSD p-System**, by Charles W. Grant and Jon Butah (1982; 300 pp.; \$15.95); an excellent description of the Pascal language that covers the UCSD implementation is **Introduction to Pascal Including UCSD Pascal**, by Rodney Zaks (2nd edition, 1981; 420 pp.; \$17.95); both from Sybex Computer Books, 2344 Sixth Street, Berkeley, CA 94710; 415/848-8233.

The Apple implementation lacks some standard Pascal features, but it is more than sufficient for training and for most applications. The system library contains several useful routines, including a full set of graphics primitives, and is readily supplemented. Isn't it nice to have a language that grows with you?



I'm not sure you could write a good program after reading this book alone, but that's not the purpose. The book aims at introducing the concepts of Pascal: the structured form, string and file handling, memory management, data types, and so on. It succeeds admirably.

My own decision after reading this book was that I am not yet ready to program in a new language. However, the IBM PC implementation of BASIC includes some of the Pascal concepts and allows for some structuring, so the structure that Pascal forces can be imposed to some degree on BASIC; I was surprised to find that reading the book has made me a better BASIC programmer.

It goes against the grain of modern education to teach children to program. What fun is there in making plans, acquiring discipline in organizing thoughts, devoting attention to detail, and learning to be self-critical?

—Alan J. Perlis

The very next thing? . . .

MODULA-2 86

Version 1.10; most MS-DOS machines reading IBM PC formatted diskettes; 256K; copy-protected? NO; \$495 (Base Language System; includes compiler, linker, symbolic post-mortem debugger and module library); \$700 (Professional Package; includes Base Language System plus Run-Time Debugger and Utilities Package); Logitech, Inc., 805 Veterans Blvd., Redwood City, CA 94063; 415/365-9852.

DAVID W. TAYLOR, Micropro: This is a mature compiler that produces bug-free machine code and is amazingly fast. Like all Modula compilers it defaults to producing code with built-in error checking for stack, array bounds and heap errors. The complete source is supplied with the product. The library and compiler source are not provided, but are available to developers at a (high by comparison with the executables) price.

The real joy of this system is the Run-Time Debugger. Yes folks! Two debuggers and both at source code level. With this system even I have produced prodigious amounts of verifiably bug-free code in a comparatively short time.

The Run-Time System enables the full implementation of concurrent processes, a feature of the actual Modula language. Concurrency is usually only provided by an operating system; it allows for the implementation of systems employing multiple tasks all running simultaneously even in a single-tasking operating system.

You shouldn't expect to learn Modula from the documentation. Instead, spend about \$18 and buy Richard Gleaves' **Modula-2 for Pascal Programmers** (1984; 145 pp.; \$17.95; Springer-Verlag, 175 Fifth Ave., New York, NY 10010; 800/526-7254; or COMPUTER LITERACY).

Whenever I have called Logitech they have responded promptly and courteously to my calls. Their support could only be described as excellent. You know the feeling you get when you are dealing with a good, happy and competent shop. That is what these people feel like.

As we progress through the different steps in the logical construction of systems, it's just good sense to review our products with a peer group of interested, competent people who may have a different perspective than we have. Viewing a product from these different perspectives will often find problems that the originator cannot see and the problems can be addressed and solved while it is still relatively cheap to solve them.

—W. Clyde Woods

High-quality BASIC . . .

MBASIC

Interpreter; version 5.21; CP/M-80 machines
 • version 5.28; IBM PC/compatibles and MS-DOS
 machines; copy-protected? NO; \$350; Microsoft
 Corp., 10700 Northup Way, Box 97200, Bellevue,
 WA 98009; 206/828-8080.

TRS-80 BASIC; Microsoft Corp.; TRS-80 Models
 100, 200, 1000 and 2000 (comes with machine);
 Model 1200, \$89.95; copy-protected? NO; Radio
 Shack, 1700 One Tandy Center, Ft. Worth, TX
 76102; 817/338-2392 or contact your local Radio
 Shack dealer.

BASIC COMPILER

Version 5.3; CP/M-80 • version 5.36; MS-DOS;
 copy-protected? NO; \$395; Microsoft Corp., 10700
 Northup Way, Box 97200, Bellevue, WA, 98009;
 206/828-8080.

CBASIC

Concurrent DOS; CP/M-86; copy-protected? NO;
 \$200;

CBASIC COMPILER

Concurrent DOS; PC DOS; CP/M-86; copy-
 protected? NO; \$600;

both from Digital Research, 60 Garden Court, P.O.
 Box DRI, Monterey, CA 93942; 408/649-3896.

DARRELL R. FICHTL: Let's set the record
 straight. I've worked with FORTRAN and
 own a C, a Pascal, and a BASIC compiler. All
 these work exceptionally well, but I like
 BASIC—it's the Chevy of the computer
 business. You'll also hear that BASIC is
 sloppy. That depends on the person doing
 the programming. The impression that

nothing "serious" can be written in BASIC is
 totally erroneous. If you do a cross-section
 of programs currently on the market, you'll
 find that a good percentage of them are
 written in BASIC. In BASIC, you can make an
 efficient program that is a joy to work with.
 It depends totally on you.

RICHARD L. MULLER: I chose MBASIC
 (called MS BASIC by some people) for a
 project because I wanted to develop a small
 application for the TRS-80, but wanted to do
 the development work on my Morrow
 Designs micro, a Z-80-based system running
 CP/M 2.2.

BASIC is a good language for beginners and
 experts alike. It differs from most other
 languages in that it is usually interpreted
 rather than compiled. The plus for
 interpreting is that one can arbitrarily stop an
 executing program, see what it's doing to
 variables of interest (even change them if
 desired), and then resume execution without
 waiting for a recompilation. The negative side
 of the interpreter approach is that programs
 execute far more slowly than with a compiler.
 Microsoft's compiler gives one the advantage
 of good development environment
 (interpreted BASIC) complemented with a tool
 to create an efficient final product (the
 compiler).

I can strongly recommend Microsoft BASIC:
 It is a high-quality product. It works well and
 appears to be correct. Nevertheless, I would
 urge any potential purchaser to look too at
 CBASIC and CB80 from Digital Research, for I
 have friends who rave about them.

Programming the C-64 . . .

INSTA-SPEED

David Hughes; Commodore 64/128 and Atari
 400/800XL/65XE/130XE (both on floppy disk);
 copy-protected? YES; \$59.95; Cimarron
 Corporation, 1502 Brookhollow Dr., Santa Ana, CA
 92705; 714/241-5600.

JOHN SEWARD: Is anyone out there still
 developing software for the Commodore 64?
 If you are, or if you're just writing programs
 for your own use, it's still hard to find a
 decent development system for the
 Commodore. One of the best ways to get
 something going on the 64 is to use the
 INSTA-SPEED BASIC Compiler, distributed
 by Cimarron (aka Micro-Sci). It turns
 Commodore BASIC programs into real
 machine code that is about half as big and a
 lot faster than the source. It runs like a
 charm and claims to be 100% compatible
 with CBM 64 BASIC. So far I haven't come
 across any BASIC code it couldn't handle.

INSTA-SPEED has a lot of neat features, like
 a garbage collection routine that takes less
 than a second, the ability to handle chaining,
 shared variables, assembly language
 subroutines, and even extensions to BASIC.
 And the price is right. No royalties are
 required to distribute INSTA-SPEED compiled
 programs. It is necessary to include an 8K
 run-time library on the disk with the
 compiled programs. However if there are
 several chained programs on the disk, the
 run-time library is only loaded once. INSTA-
 SPEED is copy-protected and requires that a
 security key be plugged into one of the game
 ports in order to compile a program. You
 can make as many back-up copies of the
 disk as you like, but they won't work without
 the security key.

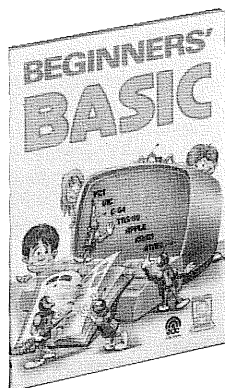
Quintessential simplicity . . .

BEGINNERS' BASIC

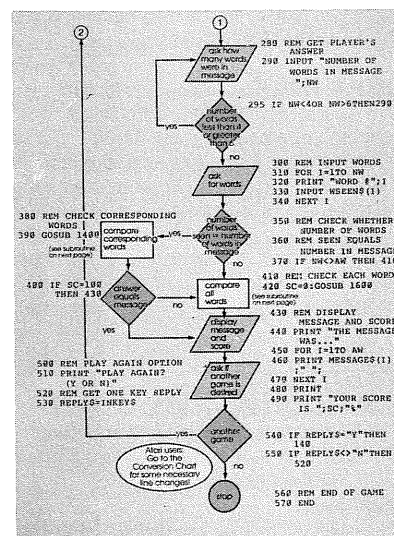
Beginner's BASIC; Peter Lear; 1984; 64 pp.;
 \$5.95; EDC Publishing, P.O. Box 470663, Tulsa,
 OK 74147; 800/331-4418 or, in OK, AK and HI,
 918/622-4522; or COMPUTER LITERACY.

JAMES STOCKFORD: My new favorite
 instruction book presents the concepts of
 BASIC programming in only 64 pages. The
 colors and pictures are comfortable and
 friendly. Explanations are quick and easy to
 grasp.

Written for children, great for adults, here is
 simple material, simply presented, without
 muddying the waters. An excellent book.



Beginners' BASIC explains all the fundamentals
 of BASIC programming, from flowcharting to
 subroutines, string handling to graphics, PEEKs
 and POKEs.



Slip right in . . .

BETTERBASIC

Ivar Wold, Charles Ehlin, and Bill Pittore. Version 1.1. \$199; street price \$175. IBM PC family/compatibles (180K). Summit Software Technology, Inc., 40 Grove St., Wellesley, MA 02181; 800/225-5800 or, in MA, 617/235-0729.

JOHN SEWARD: BETTERBASIC is really a different language from BASIC, more like C disguised as BASIC. It supports recursion, arrays of arrays, overlays, block structures, and even windows. If you're used to BASIC, you can slip right into coding in BETTERBASIC with only a slight feeling of dislocation. If you're used to switching between different versions of BASIC, you'll have no trouble at all. If you're a BASIC programmer and you'd like to extend yourself into the power of a language like C in a relatively painless way, this is for you.

However, BETTERBASIC is not a true compiler—you don't wind up with a machine-language program after the compilation process. Instead, you have a FORTH-like object code which is then interpreted, running much faster than normal interpreted BASIC. If you want to create executable .EXE modules, you need to buy the BETTERBASIC run-time system (\$250). The run-time system also permits overlays and chaining from program to program.

BETTERBASIC is an unusual BASIC compiler. It has no problem with double precision, and lets you use as much memory as you have in your machine, instead of keeping you in 64K like PC BASIC. It has local and global variables, and eight different data types including structures and pointers. In fact, it's hard to think of a feature of C or Pascal that has not been included in BETTERBASIC.

COBOL? On micros? . . .

NEVADA COBOL

Chuck Ellis; CP/M machines; 32K; copy-protected? NO; \$39.95;

NEVADA EDIT

John Starkweather; CP/M machines; 32K; copy-protected? NO; \$39.95;

both from Ellis Computing, Inc., 3917 Noriega St., San Francisco, CA 94122; 415/753-0186.

SHARON RUFENER: COBOL is an archaic mainframe computer language. So why bother to put it on micros? Here are several good reasons for implementing COBOL at the micro level: COBOL is the native tongue of most of the professional programmers in the world; most existing applications programs are written in COBOL; most of the programmers' jobs listed in the want ads require COBOL expertise. By knowing the language, you could write COBOL programs at home on your micro and then have them installed on the mainframe at work (why use the full might and heft of IBM to do a little job like debugging source code?).

Microcomputer enthusiasts sneer at COBOL. (They also display a snobbish attitude toward any but the latest language they have mastered.) They accuse COBOL of being clumsy and cumbersome. Not sufficiently oriented to the innards of any particular machine. Not sexy, chic, or *au courant*. Let's appreciate the fact that COBOL is a trusty old friend if you know it well. The source language is as portable as anything invented. It begs to be fashioned into structured and modular creations. And, when compiled, you have a tidy little bundle of machine language that will perform quite respectably.

NEVADA COBOL runs only on CP/M machines. You use your word processor or, better yet, NEVADA EDIT (also \$39.95) to create source code.

NEVADA COBOL is a decently documented compiler for producing plain vanilla batch programs in ANSI 74 COBOL. You can compile fairly large programs—2500-5000 lines of instruction, depending on available RAM—and include almost limitless lines of comments as well.

Now, for \$39.95 you know you're not going to get a lot of things. Approximately 20 percent of the standard instruction set is missing. NEVADA COBOL is set up to handle only data files that are sequential or direct access—nothing fancier. You don't get the SORT verb (that really hurts), which means you can't make your own tag files for homebrew file indexing, because you can't sort them!

And, strangest of all, NEVADA COBOL is not designed to let you write programs oriented toward a microcomputer's main input/output device, the monitor! You can do some clumsy interchanges of one data field at a time, using DISPLAY and ACCEPT statements, but that is inadequate for any serious data entry or display on microcomputer screens.

So what is NEVADA COBOL good for? It's a good tool for learning programming. It's student-priced and student-sized. It's also adequate for many small applications using pre-existing files, such as reports and file merges and extracts. It is mercifully free of the ornate complexities surrounding IBM mainframe programming. There is a certain clean elegance to this bare-bones compiler. If it can get you where you want to go, you couldn't do better.

Dartmouth duo does double duty . . .

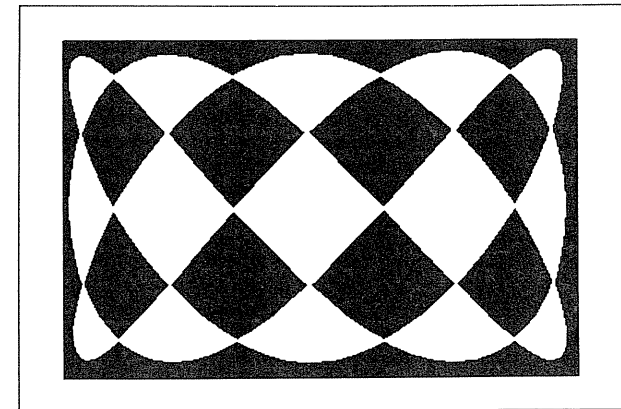
TRUE BASIC

Kemeny & Kurtz; version 1.0; IBM PC/XT/AT; PCjr; 192K; copy-protected? NO; \$150; Addison-Wesley Publishing Co., Inc., Attn: Order Dept., Reading, MA 01867; 617/944-3700.

MATTHEW McCLURE: When Dartmouth College decided to make computers easily available to its students, Professors John Kemeny and Thomas Kurtz designed the first fully functional time-sharing system and a new language to accompany it: BASIC, now the most widely used computer language in the world. It has also spawned more dialects than any other language, and they are mostly incompatible.

TRUE BASIC is an attempt to remedy this state of affairs by implementing a standard BASIC that is more advanced than "Street BASIC" but is still easy to learn and very powerful. It includes facilities for graphics subroutines, trigonometric functions and handy control structures like SELECT-CASE, DO-WHILE, and DO-UNTIL. It makes structured programming easier, and requires no line numbers.

TRUE BASIC is compiled rather than interpreted, so it produces compact, fast-running code (and gives you error messages before it begins to execute your program). Its manual is very clear and understandable, with lots of examples that show the power of the language.



TRUE BASIC has a number of graphics primitives, including boxes, simple windows, and plotting of points, lines, and areas.

Your Second Programming Language

GERALD M. WEINBERG: If you follow my recommendation and learn two languages simultaneously, try something a bit out of the mainstream for your second—something like FORTH, APL, SMALLTALK, Modula, LISP, or assembly language. Their approaches contrast sharply with those of the more commercial languages, so they will stretch your mind. One of my students, who cut her teeth on PL/I and APL, took a job as a COBOL programmer on Friday, studied COBOL over the weekend, and started work on Monday. Four weeks later, her bosses were so impressed with her work that they asked her to teach their Advanced COBOL course.

Compact, fast, extensible . . .

FORTH

MACFORTH; Macintosh; copy-protected? NO; Level 1, \$149; Level 2, \$249; Level 3, \$499; Creative Solutions, Inc., 4701 Randolph Rd., Suite 12, Rockville, MD 20852; 301/984-0262
MASTERFORTH; Apple II family; 48K • IBM PC and compatibles • Commodore 64 • Macintosh; copy-protected? NO; floating point \$40 additional; hi-res graphics \$40 additional; MicroMotion, 12077 Wilshire Blvd., #506, Los Angeles, CA 90025; 213/821-4340 • **MVP-FORTH PROFESSIONAL APPLICATION DEVELOPMENT SYSTEM (PADS)**; Apple II family • IBM PC/XT • IBM PCjr; copy-protected? NO; \$500; Mountain View Press, Inc., P.O. Box 4656, Mountain View, CA 94040; 415/961-4103 • **PC/FORTH**; Version 3.0; IBM PC compatibles; 128K; copy-protected? NO; \$100; PC/FORTH +; Version 3.0; IBM PC compatibles; 128K; copy-protected? NO; \$200; both from Laboratory Microsystems, Inc., 3007 Washington Blvd., Suite 230, Marina Del Rey, CA 90292; 213/306-7412. • **POLYFORTH II**; IBM PC compatibles; 64K; supports 8087 math coprocessor; copy-protected? NO; \$600-\$3200; FORTH, Inc., 2309 Pacific Coast Hwy., Hermosa Beach, CA 90254; 213/372-8493.

runs quite fast, which makes it a good language for games and for real-time applications involving control of other machines for industrial processes. It is not designed for simplicity of mathematical expression; I'd probably use another language if I were writing an accounting package or a complicated physics simulation.

FORTH is both a compiled and an interpreted language; you can give an instruction in FORTH and have it execute immediately, or you can write a long, complicated program and compile it for maximum speed and efficiency.

FORTH is also extensible. I've always wanted to be able to write a tool and then have it handy whenever I needed it. The freedom and power that comes from being able to create one's own language is common to all the fourth-generation languages—C, LISP, LOGO, and so on. Extensibility lets you have as much uniformity of expression and internal consistency as you please, since you define the input and output for every function you use. And since the programs tend to divide up into chunks, each one a FORTH word, even a large program can be reduced to a short series of words, each of which may represent a very complicated set of actions inside the computer.

FORTH gives you complete control over the machine, which is nice: anything you want to make the computer do, FORTH will let you. On the other hand, it is so wide-open that it also allows you to get away with poor programming practices. I actually find that well-chosen FORTH words create code that is easier to follow than many other languages, although, as in any language, it is possible to write incomprehensibly.

MATTHEW MCCLURE: A program in FORTH is like a tower made of building blocks. The blocks are FORTH's "words," smaller programs themselves made up of FORTH words. Whereas most high-level languages are somewhat abstract—dealing with variables, relations, formulas—FORTH feels very direct: you have a processor, some memory and some storage space, and your job is to prescribe the series of movements of data from the computer's memory into the central processing unit (CPU) and back into memory when the CPU is through. Somehow, I never acquired such a direct feel for the machine using ALGOL, FORTRAN or BASIC.

FORTH generates very compact code, so it is good for putting large programs in small space. Because most implementations of FORTH are nearly identical, programs can be transported largely intact from one FORTH system to another without recoding, except for machine-specific features like graphics, which may need modification. FORTH also

You too can have artificial intelligence . . .

LISP: A GENTLE INTRODUCTION TO SYMBOLIC COMPUTATION

LISP: A Gentle Introduction to Symbolic Computation; David S. Touretzky; 1984; 384 pp.; \$18.95; Harper & Row, 2350 Virginia Ave., Hagerstown, MD 21740; 800/638-3030; or **COMPUTER LITERACY**.

DAN DOERNBERG & RACHEL UNKEFER: Artificial intelligence researchers' favorite language for 20+ years, LISP attracts more and more attention as the AI work done in the universities receives more and more scrutiny from commercial software publishers. Touretzky's book is an excellent introduction to LISP for those who are curious to see what the language is all about. Though intended as an introductory text for non-programmers, the book has been very popular with experienced programmers as well. The book's semi-conversational tone easily holds your attention.

The editing screen from MVP-FORTH. Surrounding the code are the editorial instructions; once you learn them, you can turn them off and concentrate on programming.

The fact is that we have so many changes to do today because we didn't control the changes yesterday. Changes are like rabbits. They beget changes.

—W. Clyde Woods

Is it possible that software is not like anything else, that it is meant to be discarded, that the whole point is to always see it as soap bubble?

—Alan J. Perlis

I would rather write programs that write programs than write programs.

—Anonymous graffitor at MIT

Raise your IQ, artificially . . .

IQLISP

Bob Rorschach; version 1.7.1; IBM PC/XT/AT and compatibles; PCjr; TI Professional; 192K; copy-protected? NO; \$175; Integral Quality, Inc., P.O. Box 31970, Seattle, WA 98103; 206/527-2918.

MATTHEW MCCLURE: If you're interested in hands-on experience with LISP and can't afford a LISP machine, IQLISP is a fairly complete version for the IBM PC. Its performance may not match that of machines designed specifically to run LISP, but it'll give you a good feel for what it's like to process lists in the quest for artificial intelligence.

Real artificial intelligence on a micro . . .

MICRO-PROLOG

Version 3.1; CP/M-80 machines; 64K; \$125 • PC/MS-DOS machines; 128K; \$250; copy-protected? NO; Programming Logic Systems, Inc., 31 Crescent Dr., Milford, CT 06460; 203/877-7988.

ERNIE TELLO: The programming language PROLOG has become a buzzword since the Japanese chose it to be the machine language for the dedicated hardware in their celebrated "Fifth Generation" project.

PROLOG, which stands for PROgramming in LOGic, is a specialized tool for artificial intelligence programming that chooses a first-order logic calculus and list processing as its main approach to machine-intelligence problems. MICRO-PROLOG is a very full implementation of PROLOG and is suitable for research into expert systems, intelligent databases, and natural language processing. This is a serious tool for accomplished and aspiring computer scientists who know what logic and logic programming are and what they intend to do with them.

MICRO-PROLOG is primarily written in assembler and as a result runs very fast, considering all the very high level things it is ready to do right out of the box. A nice plus is that large programs can be broken up into segments that are split between memory and disk or RAM-disk.

MICRO-PROLOG is a very specialized tool. If you want to develop an expert system that does not involve heavy math processing, it would be hard to find a package more ready to work for you "as is." MICRO-PROLOG implements a logic of relations that lets you describe the relationships between objects and define these relationships recursively. However, there are no trig or other math functions, and the input/output are as minimal as you could ever find. The Z-80 version has an assembly-language interface for custom extensions to the system, but at this writing the one for the 8088 is not yet available.

It is still a very open question what one can do using a tool like MICRO-PROLOG on 16-bit microcomputers with a megabyte of addressable memory, such as the IBM PC. If the ambitious work currently being attempted with microcomputer implementations of LISP in this environment is any indication, there may be some surprises for the hard-core skeptics.

Good starting place . . .

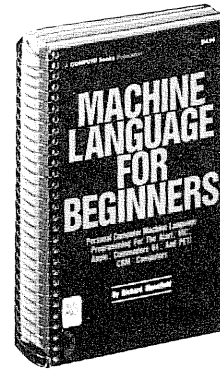
MACHINE LANGUAGE FOR BEGINNERS

Machine Language for Beginners; Richard Mansfield; 1983; 350 pp.; \$14.95; COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403; 800/334-0868 or, in NC, 919/275-9809; or COMPUTER LITERACY.

MATTHEW MCCLURE: The instructions the computer actually follows are a series of 0s and 1s, binary code, called machine language. An assembler translates assembly language, which is much easier to write than binary code, into machine language for the computer's internal use.

GERRY WICK: If you know BASIC and want to learn machine language, this is the place to start. The book covers the popular computers that use the 6502 chip for their central processing unit—Atari, VIC-20, Apple II, Commodore 64, and Pet. Building on your experience as a BASIC programmer, Mansfield very gently takes you through the fundamentals of machine language.

The appendices include assembler and disassembler programs for all the computers



listed above, as well as memory maps and monitor programs, so you don't even need to buy an assembler. The tables for the individual instructions are well organized and useful but incomplete. The best tables I have found and use are in **Top-Down Assembly Language Programming for the 6502 Personal Computer** (Ken Skier; 1983; 433 pp.; \$19.95; McGraw-Hill Order Dept., Princeton Rd., Hightstown, NJ 08520; 609/426-5254; or COMPUTER LITERACY). The reference and comparison to BASIC will make this book easy for the beginner. But be careful. There are some errors in the programs.

Three books from Don Lancaster . . .

ALL ABOUT APPLEWRITER IIe

All About Applewriter IIe; Don Lancaster; 1984; 102 pp.; \$14.50 postpaid; sold to members only; membership \$51/first year; A.P.P.L.E. Co-op, 290 Southwest 43rd St., Renton, WA 98055; 206/251-5222.

ENHANCING YOUR APPLE II

Enhancing Your Apple II, Volume One; Don Lancaster; 1984; 256 pp.; \$15.95.

ASSEMBLY COOKBOOK FOR THE APPLE II/IIe

Assembly Cookbook for the Apple II/IIe; Don Lancaster; 1984; 368 pp.; \$21.95.

Both from Howard W. Sams and Company, 4300 West 62nd St., Indianapolis, IN 46268; 800/428-7267; or COMPUTER LITERACY.

JAMES STOCKFORD: Don Lancaster has been called "The Father of the Personal Computer," for it was his books that pioneer designers such as Lee Felsenstein and Steve Wozniak referred to in the days of the Homebrew Computer Club. In a crusty, arm-waving writing style Don presents explanations that are clear, kind, patient, and fun to read. His two-volume **Micro Cookbook** is an excellent introduction to computer fundamentals for programmers (\$15.95 per volume; available from Howard W. Sams, address above).

Assembly Cookbook for the Apple II/IIe exhorts you to learn machine code so you can learn the Apple II system on a feeling basis. The first half of the book explains programming concepts, the second half shows you techniques, complete with model programs. Nowhere else is there such a combination of depth and clarity in an instruction book on this subject.

Enhancing Your Apple II is for the soldering set, tinkerers willing to switch wires, add transistors, and generally void the warranty in order to tweak the machine to higher performance. Here are instructions detailing a mixture of hardware and software modifications for your Apple II. Mix low-resolution and high-resolution graphics anywhere on the screen; create glitch-free animation; control screen scroll; say goodbye to occasional screen garbage and other annoyances. Of course, you have to know your machine code.

All About APPLEWRITER IIe begins with the claim that APPLEWRITER IIe outsells all other Apple II word processors, then proceeds to tear into the structure of the machine, its Disk Operating System, and especially APPLEWRITER IIe. APPLEWRITER IIe is built out of program modules collectively called "WPL"—essentially a programming language optimized for word processing. Don's intention is to teach you how to use WPL to modify APPLEWRITER II to fit like a glove, and in the process witness the intimate details of a well-written program. Absolutely perfect for the precocious teenager.

Operating Environments

GERALD M. WEINBERG: Until recently, your choice of hardware pretty much determined your choice of operating systems—and vice versa. The situation is changing rapidly, largely because of the influence of UNIX, which gave a new meaning to the term “portability.” For general use, there are other good operating system choices. For instance, if you’re running a small business, the PICK operating system (PICK SYSTEM FOR THE IBM PC/XT; Richard Pick; IBM PC/XT and compatibles; 256K; copy-protected? YES; \$495; Pick Systems, 1691 Browning, Irvine, CA 92714; 714/261-7425) deserves careful consideration. But if you’re serious about programming, UNIX is head and shoulders above the rest—even for developing software that will run in other environments. You may not be able to afford the machine resources, but those prices are coming down daily. Moreover, other operating systems are growing closer to UNIX with every new release, so whatever your programming environment is called, it may eventually be UNIX.

TOM LOVE: UNIX has three major advantages to programmers: portability, modularity—pipes, filters, etc.—and support for multiple users to communicate and coordinate their activities.

UNIX has a philosophy of sharing files, programs, and utilities among users—distributed data. Other environments have a philosophy of security. This openness turns out to be very important. What we’re seeing now is a temporary phase of computing; we’re just beginning to discover the advantages of distributed processing and communications, and this is where UNIX is appropriate. What we haven’t yet seen are the disadvantages of distributed data.

JASON REBECK: UNIX was created by software developers for software developers, to give themselves an environment they could completely manipulate. In addition to being a completely masterable environment, UNIX is totally addictive to certain kinds of people. UNIX makes them feel like God: They can do anything they damned well please. This, of course, is UNIX’s great strength and weakness.

Multi-user system made crystal clear . . .

UNIX PRIMER PLUS ★

UNIX Primer Plus; Waite, Martin & Prata; 1983; 416 pp.; \$19.95; Howard W. Sams & Co., 4300 W. 62nd St., Indianapolis, IN 46268; 800/428-7267 or, in IN, 317/298-5400; or **COMPUTER LITERACY**.

THE UNIX PROGRAMMING ENVIRONMENT ★

The UNIX Programming Environment; Kernighan and Pike; 1984; 357 pp.; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 201/767-5049; or **COMPUTER LITERACY**.

AUGUST MOHR: **UNIX Primer Plus** has a nice texture, both in writing and design. Of all the UNIX books I’ve seen, I’d hand you this one first. After three years of using UNIX, this book taught me things that I wish I’d known when I started.

MATTHEW MCCLURE: **The UNIX Programming Environment** applies the same dry wit to UNIX that Kernighan and his coauthors bring to C, software tools, and programming style. At the same time, of course, it is *the* definitive work on UNIX, written by some of the people most familiar with the beast. I use it for its index, which immediately points me to details I can’t find elsewhere.

The text is quite densely packed, designed to show as much of the power of the environment as possible in a very terse presentation. Whereas **UNIX Primer Plus** assumes no knowledge of programming, the reader should have a rudimentary knowledge of C to get the most benefit from **The UNIX Programming Environment**.

Turns a PC into a Macintosh . . .

GEM ★

Don Heiskell and Lee Lorenzen; PC/MS-DOS machines; Concurrent DOS machines; Atari ST (under GEM DOS); 256K; 2 disk drives; copy-protected? NO; GEM DESKTOP, \$49.95; GEM DRAW, \$249.95; GEM COLLECTION, \$199 (includes GEM WRITE, GEM PAINT, and GEM DESKTOP); Digital Research, 60 Garden Court, Box DRI, Monterey, CA 93942; 408/649-3896.

JOHN SEWARD: GEM is the Graphics Environment Manager; the DESKTOP, a GEM application program, uses GEM graphics capability to turn an IBM PC into a Macintosh. Pop the DESKTOP into your IBM PC and you have a color Mac: pull-down menus; icons; moveable, sizeable, overlappable windows—the works, all mouse-driven. GEM is an important step that takes us out of the hermetically-sealed universe of the Macintosh and into the open architecture of the IBM PC.

Not that GEM is in any way tied to the PC. It’s being bundled with the Apricot, is rumored to be in ROM on the new Atari ST, and can be ported to any machine that proves popular, including the Macintosh. If you want better resolution or more colors, you can buy a graphics board that has what you want and GEM will take advantage of it. It even uses a different font and set of icons when running on a higher resolution board.

The DESKTOP has a menu bar across the top and a few icons: a trash can to toss deleted files into, and little pictures of floppy diskettes or hard disks, depending on the machine’s configuration. Open a disk with your mouse button and get a window full of file folders and other icons representing the files, program, and directories on the disk. You can then run programs, look at files,

and perform other useful functions. Any MS-DOS program that fits in memory (GEM takes up 100K or so) can be run from the desktop and will be unchanged except that when the program is through, the user is returned, not to an MS-DOS prompt like A), but back to the DESKTOP. If you want to go back to DOS for some reason, you can select that option from one of the pull-down menus. Typing EXIT at the MS-DOS prompt will then return you to the desktop.

It’s possible to criticize and disagree with the whole mouse-icon-window theory of human-computer interactions, but it is difficult to fault GEM as an implementation of it. It takes up less memory than TOPVIEW; it’s fast, and as a windowing system it is vastly superior to TOPVIEW which doesn’t do graphics at all. How it will compare with MS-WINDOWS remains to be seen, but DRI’s low prices and cooperation with software developers could end the Windowing War before it begins, or make it irrelevant.

Owning a copy of TOPVIEW does not, after all, necessarily inhibit anyone from buying a copy of GEM DESKTOP, or GEM DRAW, or some other application that bundles GEM with it. Given sufficient memory, there’s no reason why the competing windowing systems couldn’t all be compatible, so that you could have a GEM application running inside a TOPVIEW window running inside a Microsoft window, ad infinitum, like images in a barbershop mirror.

Software developers need to buy the \$500 TOOLKIT to develop GEM programs, and pay a \$1,000/product/year license fee. They can then bundle GEM and the DESKTOP with their application program—the customer need not have already purchased GEM or the DESKTOP, and need not even know or care about GEM.

Conceptual THINKTANK . . .

DESIGNING STRUCTURED PROGRAMS

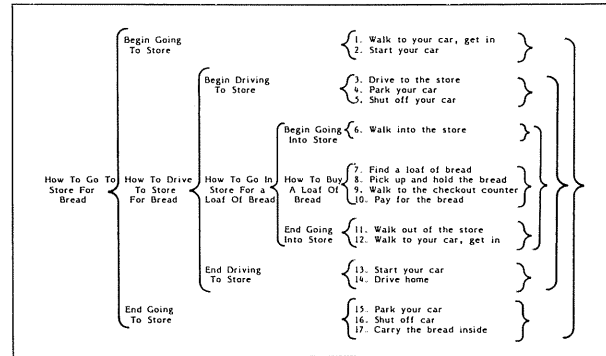
Designing Structured Programs; David Higgins; 1983; 240 pp.; \$14.95; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 201/767-5049; or **COMPUTER LITERACY**.

GEORGE BEEKMAN: **Designing Structured Programs** builds on Higgins' earlier book, **Program Design and Construction**—in its day, the clearest introduction to the art of designing structured programs using the techniques developed by Warnier and imported by Orr—to produce a book that is at the same time more accessible for beginners and more detailed for experienced programmers. There are more examples

with more substance, and more time is spent dealing with tough “real world” programming problems.

Warnier-Orr diagrams provide a powerful tool for program design. Instead of simply relying on indentation to show hierarchy, Warnier diagrams use expansion brackets. Visually, this makes program structures almost jump out at you. But it also allows the programmer to add layers of detail to design *without* starting over on a fresh sheet of paper.

I teach my programming students to use Warnier diagrams because they're the most forgiving of the paper design tools. I wish I could buy every one of them a Macintosh and a copy of THINKTANK (p. 92) instead.



A simple task like getting bread has more steps than one would expect, as shown in this Warnier-Orr diagram from Program Design and Construction (David Higgins; 1979; 189 pp.; \$21.95; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 201/767-5049; or COMPUTER LITERACY).

A Design Library

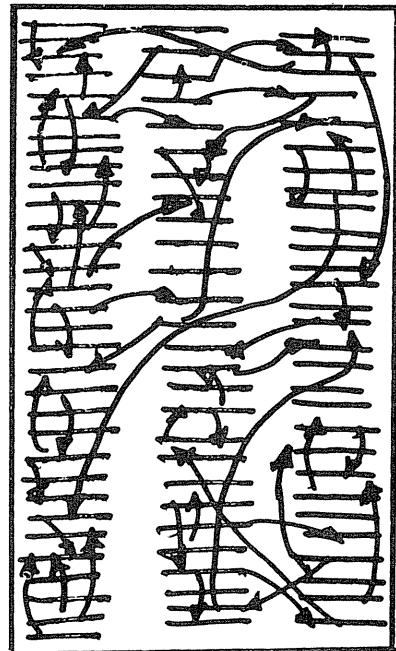
DENNIS GELLER: Almost anyone can learn to write a program of twenty lines, but a hundred-line program is not five times as hard to write; it's more like twenty-five. Writing a large program is a difficult intellectual task, and programmers need all the help they can get.

The past decade has seen increasing attention to the problems people have in developing programs. The study of programming as a human activity was brought to public attention by Gerald M. Weinberg in **The Psychology of Computer Programming** (see p. 170).

A host of later books built upon the lessons of Weinberg and others in proposing specific ways to avoid the problems which he pointed out. Among these are books on design—the process of figuring out what you want to do in a program before you sit down to do it. Design carries a certain mystique, and is sometimes used by programmers as it is by architects, to encompass the whole problem of creating a piece of software that will stand up, do the job, and blend harmoniously with the work environment and the people who use it. It's no wonder that an underground classic among program designers is architect Christopher Alexander's **Notes on the Synthesis of Form** (1964; 216 pp.; \$6.95; Harvard University Press, 79 Garden Street, Cambridge, MA 02138; 617/495-2480 or **COMPUTER LITERACY**). Alexander shows the deep correspondence between the form of a problem and the process of designing a structure that solves it—a lesson that applies at least as well to programming as to architecture.

Two simple concepts emerge from the literature on program design. First, programs that are designed as single monoliths tend to do mysterious and unpredictable things, like Arthur C. Clarke's creation in **2001**. To avoid this undesirable behavior, programs should be designed in small, understandable pieces. The second concept says to approach a problem slowly. Instead of rushing into details, the wise designer begins with a general statement of the program's function, then successively refines the statement to add more and more detail—in the process spinning off small, understandable pieces to perform well-defined tasks.

DENNIS GELLER: More complex problems call for complex approaches, such as that given in **Structured Design**, by Ed Yourdon and Larry L. Constantine (2nd edition, 1978; 464 pp.; \$27.95; Yourdon Press, 1501 Broadway, New York, NY 10036; 212/391-2828; or **COMPUTER LITERACY**). They start by looking at the structure of designs that have been developed by refinement, presenting a series of informal measures to evaluate the clarity and reliability of a design. Then they offer a unique method of developing a design by refinement. Rather than starting with the function of the program, they ask how data is to be transformed as it flows through the program. The parts of the program are then revealed as the transformations that change one form of the data into another.

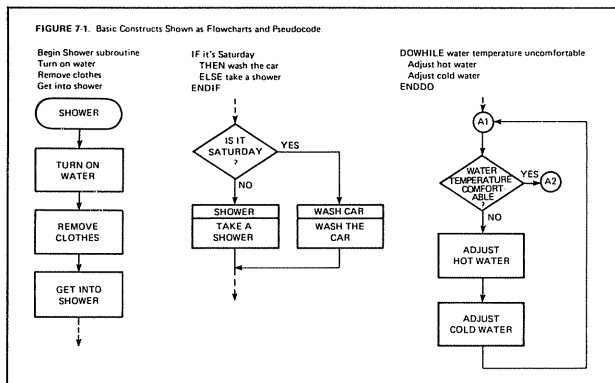


Structured Design illustrates the structure of a large program after modularization. Imagine the spaghetti that would result if it were less carefully designed.

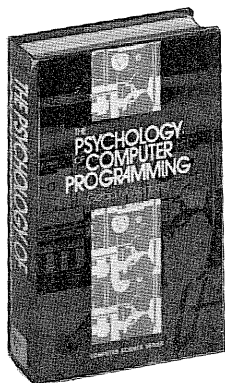
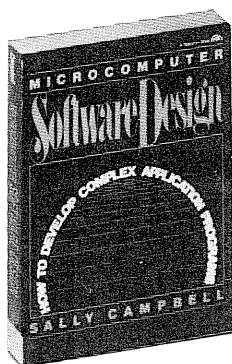
A careful exposition of program design techniques can be found in Robert C. Tausworthe's **Standardized Development of Computer Software** (Vol. 1, **Methods**; 1977; 379 pp.; \$32.95; Vol. 2, **Standards**; 1979; 548 pp.; \$32.95; or both volumes in one for \$54; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 201/767-5049; or **COMPUTER LITERACY**), originally written for the engineers at the Jet

(continued from p. 169)

Propulsion Laboratory and for computer science students. For people who don't want to study computer science before writing programs, there is a simpler introduction, Sally Campbell's **Microcomputer Software Design: How to Develop Complex Application Programs** (1983; 208 pp.; \$12.95; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 201/767-5049; or COMPUTER LITERACY). While I'd quarrel with some details in her material, Campbell's book is easy to read. Besides, any design is better than no design at all.



Looking at a shower as a programming task in *Microcomputer Software Design*.



DENNIS GELLER: Jerry Weinberg has all the technical credentials you might need to believe that he understands software, but since the publication of **The Psychology of Computer Programming** he has been giving most of his attention to the people side of software. Especially noteworthy in this regard are his **Rethinking Systems Analysis and Design** (1982; 208 pp.; \$25); and **Understanding the Professional Programmer** (1982; 288 pp.; \$22.95); both from Little, Brown

& Co., 34 Beacon Street, Boston, MA 02106; 617/227-0730; or COMPUTER LITERACY. I usually recommend these deceptively charming books as bedtime reading to people who want to get a little distance from their work. Each is a collection of short essays intermixed with little fables, like "The Natural History of White Bread," "The Goat and the Hippo," or "The Railroad Paradox." All in all, lots of fun.

But beneath the fun there is a deep, if not sinister, message: If we don't start doing things a lot better than we are now, we're not going to survive our own technology. Take the Railroad Paradox. When some suburbanites requested that a train passing through their station daily at 2:30 stop so they could go to the city, the railroad sent an observer to the platform every day for a week. Since there never were any commuters waiting for the train, the railroad declined to add the stop.

If you think the Railroad Paradox has nothing to do with computers, then you've never been near one. One of Weinberg's examples is the computer company that asked its engineers to investigate the addition of a new instruction that would make it easier for people to break their programs into subroutines. After some study, the engineers reported that almost none of the programs they examined ever used subroutines, so they saw no point in the modification.

Speaking of systems, I can't close without mentioning **On the Design of Stable Systems** (with Daniela Weinberg; 1980; 353 pp.; \$39.95; John Wiley & Sons; 605 Third Avenue, New York, NY 10158; 212/850-6000; or COMPUTER LITERACY), a book so good I can't describe it properly. If you've read people like Ross Ashby, Kenneth Boulding, or Gregory Bateson, you'll know what I mean when I say that this is about systems. It addresses the question, Why is it that some things—objects, organizations, procedures—seem to persist for a long time, while others don't? The answer is as much philosophy as science, as much art as technology. When you read it—and you must if you're regularly engaged in the design of systems—you'll see that there is a small number of strategies which every system, whether animate or not, uses to prolong its own survival in the face of a hostile environment. (If you don't think hardware and users make for a hostile environment, you've had a very easy life as a programmer.)

I can summarize much of Jerry's work, and probably his self-chosen life mission, with my favorite Weinbergism, which should probably be called Weinberg's Zeroth Law: "If architects built buildings the way programmers build programs, the first woodpecker to come along would destroy civilization."

THE PSYCHOLOGY OF COMPUTER PROGRAMMING

The Psychology of Computer Programming; Gerald M. Weinberg; 1971; 304 pp.; \$16.95; Van Nostrand Reinhold, 7625 Empire Dr., Florence, KY 41042; 800/543-2681; or COMPUTER LITERACY.

BEN SHNEIDERMAN: As a programmer, you're bound to be attracted to a book that lists a sense of humor as one of the "essential personality traits for programming." Jerry makes you laugh at the sometimes bizarre behavior of programmers as they wrestle with themselves, their colleagues, their managers,

and awkward software tools. But Jerry's goal in the book is more than laughter—he wants to make you a better programmer by helping you to understand the social structure in which programming is done.

In programming, independence has given way to interdependence. Jerry shows you why cooperation is a superior path, and explains how to collaborate effectively in "egoless" teams. When this form of communal utopia is attained, teamwork is a joy, productivity is high, and trusting relationships flourish. Building an effective team takes time, but many useful group processes, such as inspections and

walkthroughs, can be accomplished in hours or days.

Sometimes I see this book as a work of anthropology: the precise reports about a strange culture by a careful participant/observer/scientist. I especially appreciated the interdisciplinary style with the extensive annotated references to work in psychology, genetics, economics, sociology, feminism, general systems theory, mathematics, linguistics, and so on. If you are a programmer, work with programmers, or live with a programmer, this book will give you fresh insights.

Software Engineering

GERALD M. WEINBERG: Though software is a relatively new phenomenon, it is not exempt from the great systems laws that govern our universe, such as

Everything changes but change itself.
—Heraclitus

Growth produces bigness.—Boulding

Over time, well-structured little programs inevitably become muddled big systems. The mainframe users have learned this lesson the expensive way; micro users have the chance to learn from those experiences, which are summarized in the evolving set of practices called software engineering. If you want to see into your own future, take a look at Barry Boehm's monumental work, **Software Engineering Economics** (1981; 768 pp.; \$40; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 201/767-5049; or COMPUTER LITERACY).

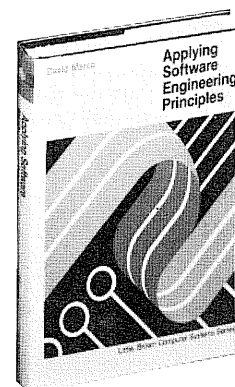
The survivors in software development will be those who adopt good software engineering practices **before** their need becomes painfully evident.

APPLYING SOFTWARE ENGINEERING PRINCIPLES

Applying Software Engineering Principles with FORTRAN; David Marca; 1984; 270 pp.; \$29.95; Little, Brown & Co., 34 Beacon Street, Boston, MA 02106; 617/890-0250; or COMPUTER LITERACY.

DENNIS GELLER: This concise, well-written book introduces the micro user to modern principles of software engineering. Each chapter contains a section called "For your next project," containing the author's suggestions for applying the chapter's lessons to an ongoing software development effort—either by adopting them on a small scale or by using them to evaluate the work being done. Too many books make the assumption that once you've read the material you'll be able to put it to work *in toto*. By avoiding this assumption, Marca actually increases the probability that his reader will do something useful with his lessons.

Although the coding examples are based on FORTRAN, Marca generally avoids clever tricks, so the book will serve as a good model no matter what language you happen to use. Marca teaches his reader the process of developing a program and its supporting documentation—everything from basing a design on stable building blocks to coping with the restrictions of a compiler. He also teaches technique—such as how to move program complexity out of the code and into the data structures.



A particular pleasure is the way Marca has mixed technical and human considerations at every level. He justifies his approach in terms of the human limitations that affect the programming task, and he also addresses the needs of the program's consumer, as in his chapter on "Building User Interfaces." Overall, this is a well-done effort with something to teach every programmer.

Software maintenance

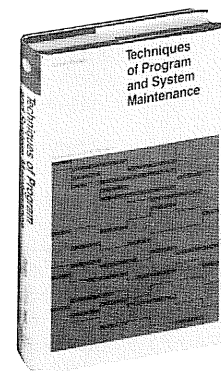
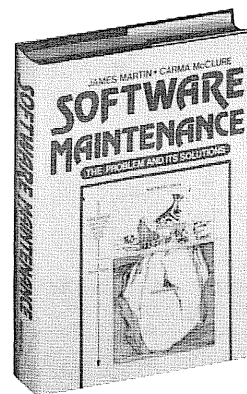
STEWART BRAND: Some people save money fixing their own car. Others extend their personality by customizing their vehicles. You can do that with software.

GIRISH PARIKH: Microcomputer software packages, distributed by the tens of thousands, create new maintenance problems not previously experienced by the mainframers: distributing updates or corrections, answering customer queries, training users to make their own custom modifications. These problems have not been solved, and the micro user would be well advised to take self-protective steps, such as reading one of the small number of books on maintenance:

Program Modification; Jean-Dominique Warnier; 1978; 152 pp.; \$25; Academic Publishers, 190 Old Derby Street, Hingham, MA 02043; 617/749-5262; or COMPUTER LITERACY.

Software Maintenance (The Problem and Its Solutions); James Martin and Carma McClure; 1983; 472 pp.; \$45; Prentice-Hall, General Publishing Division, Englewood Cliffs, NJ 07632; 201/767-5049; or COMPUTER LITERACY.

Techniques of Program and System Maintenance; Girish Parikh, ed.; 1982; 300 pp.; \$27.95; Little, Brown & Co., College Division, 34 Beacon St., Boston, MA 02106; 617/890-0250; or COMPUTER LITERACY.



Tutorial on Software Maintenance; Girish Parikh and Nicholas Zvegintzov; 1983; 360 pp.; \$20/members (Computer Society \$34/yr; IEEE and Computer Society \$90/yr), \$32/non-members, plus \$5 shipping; IEEE Computer Society Press, Order Department, P.O. Box 80452, Worldway Postal Center, Los Angeles, CA 90080; 714/821-8380; or COMPUTER LITERACY.

Another approach is to subscribe to **Software Maintenance News** (\$15/yr [monthly]; published for the Software Maintenance Association, Inc., 141 St. Marks Place, #5F, Staten Island, NY 10301; 718/981-7842). Nicholas Zvegintzov, the newsletter's editor, says, "We have a single idea that unites us—the enhancement, adaptation, and correction of existing computer programs and systems. We have to find each other. We have to learn each other's tools, techniques, tactics, experiences, plans, and dreams." Zvegintzov makes interesting reading out of a subject that has been highly unpopular, and even hated by many programmers.

Utilities

JAMES STOCKFORD: Utilities are handy little programs that help us run our computer better so that it can run our work better. For instance, they help organize our disk files, bail us out of trouble when disks fail, speed up other programs, resurrect killed files, and in general let us maneuver the way we had expected to before we bought the damn computer in the first place. On most computers, utilities relieve the built-in clumsiness of the operating system—the overall set of programs that takes care of the machine's housekeeping such as operating disk drives and shunting files around. Utilities are as useful, diverse, and as generally overlooked as kitchen utensils. Until some time far in the future when systems run smoothly without them, even beginners are better off learning to find and use these helping tools.

Disk doctor picks locks . . .

COPY II PLUS COPY II PC COPY II MAC COPY II 64

Apple II family • IBM PC compatibles •
Macintosh • Commodore 64; copy-protected? NO;
\$39.95; Central Point Software, Inc., 9700 S.W.
Capitol Hwy., #100, Portland, OR 97219;
503/244-5782.

KATHY PARKS: One of my first acts as librarian at the **Whole Earth Software Catalog** was to accidentally destroy the master disk for the library's APPLE WRITER IIe. COPY II PLUS kindled hope and trepidation—it would be great if it worked, but how do you use it? The manual turned out to be a clearly written, outlined guide which enabled me to salvage the disk.

COPY II PLUS proved so simple to use that I prefer its copy function to the one provided on the Apple DOS 3.3 disk, and I usually recommend it to people who ask me how to format or back up a disk. The onscreen instructions, user's guide, and frequently updated supplements make it almost foolproof, inexpensive insurance for anyone's software collection. Versions are also available for the IBM PC and Commodore 64.

GEORGE BEEKMAN: Central Point Software now sells a low-priced antidote to the Mac copy-protection blues called COPY II MAC. The disk contains two disk utility programs: MACTOOLS and COPY II MAC. MACTOOLS is a multi-function disk utility that provides many options not available through the finder. It can display a directory of all the files on a disk, including most "invisible" and protected files, and modify (with a click) the visibility and protection status of any of those files. An "Undelete" option can, in most cases, bring accidentally-murdered files back to life. (A personal testimonial: the night after I received the program I destroyed two hours of MULTIPLAN work by throwing away my new worksheet. Five minutes of MACTOOLing put me back in business.) Finally, MACTOOLS contains a ViewEdit option for peering at the innards of files without actually opening them; if you have the technical background, you can use ViewEdit to modify or repair damaged files.

Programming your text editor . . .

VEDIT

Version 1.38; CP/M and CP/M-86 machines; 64K;
• versions 1.39 or 1.17; IBM PC compatibles; 64K
• MS-DOS machines; 64K; copy-protected? NO;
\$150; Compuvision Products, Inc., 1955 Pauline
Blvd., Suite 300, Ann Arbor, MI 48103;
313/996-1299.

THOMAS MAYER: Life before VEDIT was like the Dark Ages. In its visual mode, VEDIT is a lightning-fast text editor with all the commands of a slick word processor. In the command mode, a text-oriented programming language enables you to perform tasks impossible with a standard word processor.

VEDIT provides ten text registers that allow you to save a phrase and insert it with two keystrokes, or to work on several files at once by moving text between the registers and the main work area. Text registers can also store command sequences, and since you can save text registers on a disk, you can develop a library of complicated commands. Some examples of my use of VEDIT:

- With a few keystrokes, I can take a directory listing and turn it into a batch command for my operating system to transfer a list of files from one machine to another.
- When switching compilers, I had to perform several nontrivial translations on 100K of source code in 30 files. I was able to write a command to take a list of files to be changed and make the changes in each file without intervention.
- If I need to reformat a text file, it is easier to use VEDIT than write a reformatting program. I also use VEDIT for composing program documentation. Since VEDIT works on standard text files, it is easy to upload them to another machine or read them from within a program as help files. And, of course, I use VEDIT for composing programs. This function alone would earn it a place in my programmer's toolbox. A fantastic product.

Janitorial services . . .

SWEEP

CP/M-80; CP/M-86; not copy-protected; \$10;
Public Domain Software Copying Co., 33 Gold
St., New York, NY 10038; 212/732-2565.

MATTHEW McCLURE: SWEEP makes disk management under CP/M almost fun. It lets you scroll through the directory and copy, delete, print, compress, rename, and view files, all without remembering any PIP syntax or even file names.

WASH

CP/M-80; CP/M-86; not copy-protected; \$10;
Public Domain Software Copying Co., 33 Gold
St., New York, NY 10038; 212/732-2565 • or for
IBM PC and compatibles: not copy-protected;
WASH (PC/SIG disk #9); W20 (PC/SIG disk
#141); \$6 per disk + \$4 shipping and handling
per any size order; IBM PC Software Interest
Group, 1030 East Duane, Suite J, Sunnyvale, CA
94086; 408/730-9291.

ALFRED GLOSSBRENNER: WASH (called W20 for DOS 2.0 and 2.1) is close to the ultimate disk file management utility. The program presents you with each filename on a disk, one at a time. You have the option of deleting it, copying it to another disk, displaying it on your screen, sending it to modem or other device, renaming it, or printing it out on your printer.

1DIR

Greg Harley; version 3.5; PC/MS-DOS machines;
copy-protected? NO; \$95; Bourbaki, Inc., P.O. Box
2867, Boise, ID 83701; 208/342-5849.

WOODY LISWOOD: 1DIR (pronounced "wonder") is a disk manager, a custom menu generator and operator, a DOS shell, and a general information and utility program. It makes reading and finding the files on a hard disk much easier.

1DIR shows the statistics for each disk or subdirectory—the total space devoted to the disk or subdirectory as well as the file space used so far and the remaining disk space. It also gives you the date and time, help files, current toggles, a display of various disk drives, and an option to change the way you wish the display sorted, use of the function keys, and the ability to display the time and date any file was created. You can mark up to 15 files for bulk copy, backup or erase functions. One of the best features is the ability to create custom menus allowing you to chain an unlimited number of secondary menus.

From a real expert . . .

THE NORTON UTILITIES

Peter Norton; most MS-DOS machines; 128K; copy-protected? NO; \$100; Peter Norton Computing, Inc., 2210 Wilshire Blvd., #186, Santa Monica, CA 90403; 213/399-3948.

DR. DOBB: Peter Norton is being promoted as a programming superstar, with his face in all his advertising. Nevertheless, he really does know a lot about the IBM PC, and has created a unique and useful package of utilities for the PC. If you want to change operating-system messages or recover from a disk crash, THE NORTON UTILITIES is just what you need.

Operating systems made easy . . .

POWER!

CP/M machines • PC/MS-DOS machines; copy-protected? NO; \$169; Computing! 2519 Greenwich Street, San Francisco, CA 94123; 415/567-1634.

DR. DOBB: POWER! is one of the "shell" programs that hide the operating system from the user. These programs are supposed to relieve the user of tasks like decrypting operating system language like PIP PUB: = b:[EFG2UV].

POWER! supplies a handy bundle of operating system facilities in a form that is comparatively easy for a novice to use. You can format and copy disks, examine the contents of disks, and do the other things you expect an operating system to allow. You can also undelete files you have accidentally deleted, isolate bad sectors on the disk, and arrange files on the disk in logical groupings.

One of the decisive advantages of POWER! over some of the alternatives is that POWER! requires no installation. It is also available for the IBM PC, but its PC version is less powerful than the CP/M version.

Dr. Dobb's Journal (p. 13) was founded in 1976 by Bob Albrecht and Dennis Allison (Dennis and Bob became Dobb) of People's Computer Company, a non-profit organization that sprang from the same Portola Institute that gave us **Whole Earth Catalog**. The Dr. Dobb who wrote here about utilities is another many-headed beast. Contributors to this section were Bob Blum, Dave Cortesi, Nancy Groth, Gene Head, Thom Hogan, Ron Nicol, John Prather, Steve Rosenthal, Mike Swaine, Reynold Wiggins, and Steve Willoughby.

You think you know when you learn, are more sure when you can write, even more when you can teach, but certain when you can program.

—Alan J. Perlis

Perfect for hackers . . .

DU

Ward Christensen; CP/M machines; public domain; Book 5, SIG M No. 91; catalog & sample disk \$12; New York Amateur Computer Club, Inc., P.O. Box 106, Church Street Station, New York, NY 10008; or local CP/M users' groups.

DR. DOBB: There is an ungodly number of utilities for CP/M systems, some atrocious but many excellent. One of the best is Ward Christensen's DU (stands for Disk Utility). A classic byte-level disk diddler, DU lets the wise and the unwary alike blithely finger the actual bytes of data stored on disk. With DU you can recover lost files, reconstruct scrambled disk directories, and read "unreadable" files. You can also lose files, scramble directories, and make readable files unreadable—somewhat scary symmetry.

The dangers inherent in the careless use of DU weigh heavily against recommending it to novices; on the other hand, it is tremendously useful. For example, you can use DU to recover a file you accidentally erased. It will run with little or no modification on virtually any plain-vanilla CP/M system. Christensen supplies the source code to the program, so you (or a hacker friend) can see just how it works, and modify it as you please. DU is not easy to use if you are not a programmer; its commands are cryptic and abbreviated. You may not be willing to spend time learning its logic and syntax. Get it anyway, and when you delete your entire electronic Rolodex, get your hacker friend to run DU for you. You can't beat the price.

Freeware file fix . . .

DISKIT

John Seward; PC/MS-DOS machines; copy-protected? NO; \$25 (user-supported); \$5 commission to registered users who make copies that get registered; Lifesaver Systems; 1550 California St., Suite 275, San Francisco, CA 94109; 415/868-2603.

BARBARA ROBERTSON: If you're writing a program, it's probably going to use data from a file, write data to a file, or both. DISKIT lets you see what data's on the disk and where, so you can tell if your program's doing its job properly. It's a simple program that displays the contents of the disk on the screen or the printer, in ASCII (readable by people), hex (readable by computers) or both. It'll also search for a character string and optionally replace it with another. All this by file name or by track and sector for programs like MVP-FORTH which bypass the MS-DOS file structure. Great for going into a program file and changing all occurrences of B: to C: when you acquire a hard disk.

For running light . . .

RUNNING MS-DOS

Running MS-DOS; Van Wolverton; 1984; 384 pp.; \$19.95; Microsoft Press, 10700 Northrup Way, P.O. Box 97200, Bellevue, WA 98009; 206/828-8080; or COMPUTER LITERACY.

MATTHEW McCCLURE: If your computing needs are simple, you may be able to accomplish much of what you want without buying dozens of applications programs. In any case, it's a good idea to know what you get as standard equipment with PC/MS-DOS. **Running MS-DOS** explains how to use pipes and filters, create batch files and simple databases, all using just DOS.

Suppose you want to find the customers in your DOS-based Rolodex file who live in the 707 area code, sorted alphabetically. FIND "CUST" PH: FIND "(707)" ! SORT) PRN will find them, sort them, and send the output to the printer.

Running MS-DOS is written in tutorial form ("Type this. Now type that"), which I find very helpful—examples showing solutions to problems are inspiring.

Two to defeat publishers' paranoia . . .

COPYWRITE

IBM PC and compatibles; 128K; copy-protected? NO; \$50 (U.S. dollars); Quaid Software, Ltd., 45 Charles St. E., Third Floor, Toronto, Ontario, Canada M4Y 1S2; 416/961-8243.

WOODY LISWOOD: COPYWRITE copies almost everything. It is revised monthly so that as new protection schemes arrive on the market, an owner can update to stay current. Combined with ZERODISK, makes a must combination for dealing with the paranoia of today's software publisher who is determined not to allow the business user to use software the way it was meant to be used.

ZERODISK

IBM PC and compatibles; 128K; copy-protected? NO; \$75 (U.S. dollars); Quaid Software, Ltd., 45 Charles St. E., Third Floor, Toronto, Ontario, Canada M4Y 1S2; 416/961-8243.

WOODY LISWOOD: ZERODISK comes in two forms, a DOS device intercept and as a .COM program. ZERODISK fools the copy-protection schemes which require that a key disk be in the A drive to run, making them think the disk is in the A drive when you have actually copied the program disks to your hard drive and are ready to run your hard disk without having to deal with floppies.

Organize your MS-DOS/CP/M computer environment . . .

PROKEY

Version 4.0; IBM PC compatibles; copy-protected? NO; \$130; RoseSoft, 4710 University Way N.E., No. 601, Seattle, WA 98105; 206/524-2350.

SMARTKEY II

CP/M machines • CP/M-86 machines • PC/MS-DOS machines; copy-protected? NO; \$49.95; Software Research Technologies, Inc., 3757 Wilshire Blvd., Suite 211, Los Angeles, CA 90010; 213/384-5430.

ART KLEINER: "Key-changers" are customizing tools. They'll organize confusingly diverse programs into a single syntax; they'll streamline strings of complex commands (macros) into one keystroke; they'll turn numeric keypads, like those on the Kaypro, into usable function keys; they'll toss in frequently-used bits of boilerplate text.

TONY FANNING: The simplest differences between programs can be deadly. I use two programs daily. In one, a CONTROL-Y restores deleted text; in the second, a CONTROL-Y deletes the line the cursor is in. How many times have I deleted lines forever when I thought I was bringing back text? Many. With PROKEY, I redefined what CONTROL-Y does so that now it always does the same thing.

ART KLEINER: We recommend two keychangers: PROKEY for PC/MS-DOS computers and SMARTKEY for CP/M systems. They're better documented and more flexible than KEYNOTE, KEYSWAPPER

and SPEED KEY. SMARTKEY runs on PC/MS-DOS computers, but the following comparison shows why we pick PROKEY. SMARTKEY does have two advantages: it's not copy-protected, and its manual is the first I've seen brilliant enough to make me want to credit the author—Paul Golding.

RICHARD PLATT: PROKEY uses about 10K of resident memory; SMARTKEY about 2.25K. Additional memory (in 1K increments) must be allotted as you add macros. Only if you create an extensive library of boilerplate paragraphs are you apt to run into trouble storing PROKEY in your memory.

Most of your macros will be created on the fly in the middle of a program; for boilerplate, use a separate word processor and store the text as a macro. SMARTKEY and PROKEY both allow you to do this, but with SMARTKEY, if you make a mistake in a particular string of commands, there's no turning back—you must start over. With PROKEY you can at least backspace and correct your error. And PROKEY lets you combine previously defined macros within your new one, another real time saver. What's more, you get instant feedback with PROKEY; your commands are interpreted and executed as you record your keystrokes. With SMARTKEY, you're never sure if you made a mistake until you use your macro later.

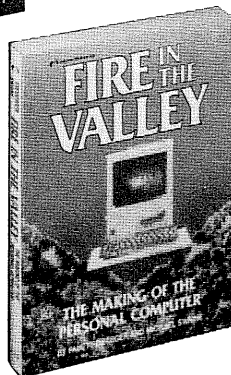
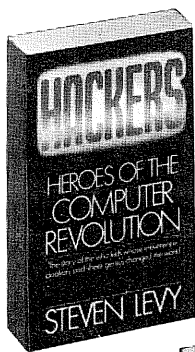
A unique feature of PROKEY is its "One Finger OFF/ON" mode, which allows disabled people with limited mobility (or just a mouth-stick) to, for instance, type control characters by pressing CONTROL, then (instead of simultaneously) the following key.

Speed freak's special . . .

FASTFINDER

Michael Lehman; version 2.8; Macintosh; 2 disk drives or hard disk and one disk drive; copy-protected? NO; \$50; Tardis Software, 2817 Sloat Rd., Pebble Beach, CA 93953; 408/372-1722.

PAUL FREIBERGER: This program is for speed freaks and others who have been frustrated by the sluggishness of the Macintosh. FASTFINDER replaces the Mac's user interface with a traditional text-based operating system. With FASTFINDER I felt catapulted back to the days of command line entry, although each command is also accessible from a menu bar across the top of the screen. Programs load more quickly and disks eject instantly. FASTFINDER supports batch files, a feature intended for programmers, but the rest of us can also use it to save time. Write yourself a program that will automatically load an application and move it to a RAM disk. Now we're talking speed. FASTFINDER isn't for beginners. The documentation leaves a lot to the imagination and to patience. However, if you want to speed up your Mac, it's a nice alternative. And maybe it will speed up Apple's efforts to improve the original.



The lure of lore . . .

FIRE IN THE VALLEY

Fire in the Valley (The Making of the Personal Computer); Paul Freiberger and Michael Swaine; 1984; 288 pp.; \$11.95; Osborne/McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710; 415/897-5298; or COMPUTER LITERACY.

HACKERS

Hackers (Heroes of the Computer Revolution); Steven Levy; 1984; 672 pp.; \$17.95; Doubleday & Co., 501 Franklin Avenue, Garden City, NY 11530; 516/294-4400; or COMPUTER LITERACY.

STEWART BRAND: *Fire in the Valley* is the most hilarious and thrilling book I've read in years. The national economy winds up pivoting on the misadventures, blind faith, and blind luck of a bunch of techie hobbyists and hippies with an obsession scorned by corporate America.

In *Hackers*, Levy does for computers what Tom Wolfe did for space with *The Right Stuff*. Both are behind-the-scenes tales of elite athletes pursuing potent new technologies; both are vividly written; both are inspiring.

Levy chronicles three generations of hackers—the minicomputer all-night users at MIT and Stanford in the '60s, the hardware hackers around the Homebrew Computer Club who made the first personal computers in the mid-'70s, and the myriad home-grown programmers on those computers as soon as they hit the market, who gave us the galaxy of consumer software from VISICALC to CHOPLIFTER! In the succession of generations Levy portrays a gradual degrading, commercializing of the Hacker Ethic, one of the noblest codes in history. Since the personal computer revolution is still in progress, it's not too late to join the rebel cause.

Both books show how programmers wind up programming the whole damn culture.

LEARNING

Robert Scarola, Domain Editor

ROBERT SCAROLA: This section examines learning software—not all learning software, but a selection of the best that exists within two fairly distinct boundaries.

The first boundary is the age of the learner. The majority of the programs reviewed here are best suited for students up to thirteen or fourteen years old. This limitation comes partly from my own experience as an elementary school teacher for five years and as a computer lab instructor for first- through eighth-graders. It comes partly from the fact that in my opinion the most creative learning software is being developed for the under-fourteen age group, with a few exceptions in the area of simulations for adults—for example, FLIGHT SIMULATOR (p. 33). Learning software developed for teens and young adults tends, at this point, to be oriented towards a specific learning goal (an example is STOICHIOMETRY: MASS/MASS by Microphys Programs, Inc., which explores mass/mass relationships in chemical reactions). There may well be applications for this kind of software for high school or college students taking courses in a specific topic, but it tends to leave most home computer owners at a loss (see the review of CATLAB, p. 185, for an example of the best of this breed of software). Adults, with or without children at their sides, will enjoy WALL \$TREET, ALGEBRA ARCADE, VOLCANOES, the

SEARCH series, CATLAB, M_SS_NG L_NKS, and probably many others.

The second boundary is subject matter. I believe the best computer learning software doesn't waste its opportunity duplicating on the computer screen standard presentations of math, reading, science, social studies, or other academic disciplines. The best software crosses and merges disciplines to help individuals learn by (1) engaging in an accurate simulation, (2) solving a problem, (3) practicing a skill in a new way, or (4) creating an individualized tool. The Learning section is therefore organized around those four themes. A fifth legitimate learning theme is challenges and adventures—see the Playing section of the **Catalog** for programs that offer learning substance in an adventure format.

Within those two overall boundaries I had further criteria for selection. I avoided—and I strongly urge readers to avoid—most programs characterized as “drill and practice,” “skill development,” “skills reinforcement,” and the like. They have titles like LONG DIVISION (Basics & Beyond), or PHONICS 1-3 (SRA), or ELEMENTARY ALGEBRA: POLYNOMIALS (Control Data), or COUNT AND ADD (Edu-Soft), or COUNT 'EM (Micro-ED), and on and on. They typically use beeps and blats, smiles and frowns, laser shots and flashing signals on the screen to get across a basic right-or-wrong-answer statement in a drill format.

(continued on page 176.)

THE MOST PATIENT OF TEACHERS

STEWART BRAND: Learning, especially in kids, is greatly hampered by pace problems. Students are impatient to *get* something, but it takes repetition, and teachers become impatient with the repetition that for them rapidly becomes mindless. Matched frustrations. Add to that the variety of individual student paces being brutally standardized into an overall class pace, and you've got school-as-prison.

You can make computers pretend to be frustrated, but they never really are. Their forte is precisely mindless repetition. They don't drum their fingers or roll their eyes or breathe audibly through their noses while you take a long slow time coming up with the wrong answer to something. Fact is, they do the best possible thing for learners—they reward mistakes. Mistakes are trivial with a computer, who doesn't care, so you go ahead and make them, and then steer by them. Steering successfully is the reward. You're hooked.

We don't have a one-student-one-computer situation yet in most grade schools, but we will soon. It's coming rapidly in the colleges. Meantime the home, that traditional frontier of education, is a fine place for superior programs to prove their superiority, for sustained one-to-one between clever instructors and self-paced students. The blur between home and school can be blurred further by computers, and please do.

BARBARA ROBERTSON: Robert Scarola stopped by our offices one day last summer to ask if we needed a review of

ROCKY'S BOOTS (p. 188). That review appeared in the first issue of the **Whole Earth Software Review** and began a continuing relationship leading to this section of the **Catalog**.

For the past three years, Robert has been teaching LOGO (p. 178), word processing and computer literacy to children and adults, and is currently working under a grant provided by the Marin County Computer Education Consortium to develop a science curriculum that uses computer software.

As a teacher (grades 1 through 6) in the alternative Pine Gulch School in Bolinas, California, Robert has an enthusiastic software testing lab readily available at school—and a second one at home where he vies for time on an Apple II with two sons ages 9 and 11. In addition, his ties to the

Consortium gave him access to information collected by all the local educators interested in Learning software. In return, our library is now often populated with teachers looking for new software to evaluate and recommend—absolutely delightful to walk by and see full-grown adults watching frogs jump from one lily pad to another, or trains chugging around a track. Almost makes me want to learn algebra again.



Robert Scarola

(continued from p. 175)

They are little more than workbook pages put on a computer screen—a waste of time, energy, and money. They not only distort the value and potential of the computer and misplace its power, they reinforce the idea of computers as routinizing machines. And they make up 90 percent of all learning software programs on the market today.

What I look for instead, and have recommended in this section, are programs that make me glad I own a computer and can do what it is I'm doing with it. I look for programs I can use for my learning purposes rather than those that use me for theirs. The best of these programs have clear instructions, easy-to-use documentation, and helpful screen menus that make it easy to understand and accomplish the program's objectives. They are adaptable—easily modified to suit each individual's needs and purposes. And they capture attention by responding accurately and imaginatively.

The best learning programs enhance creativity because they make the computer's powerful ability to control, calculate, store, and retrieve information wonderfully accessible. They can simulate—actively and accurately—events otherwise impossible for most of us to experience. They can turn otherwise dull drill-and-practice routines into enjoyable, lively, and interactive occasions, sometimes by giving us models of the real world that we can use to practice with (without fear of failure) before we engage in the real thing. They can create new worlds, microworlds, in which our problem-solving experiences become part of a complex, changing reality that's under our control.

The best learning programs permit things to happen in the world that simply couldn't be done, or couldn't be done as well, in any other medium.

Using this software will not and should not replace reading a book, hiking in the woods, being close with a friend or lover, or any of the tactile, emotional, imaginative, or spiritual experiences we have. But using such software can add significantly to those experiences by providing new ways to learn about life in this postindustrial, prerobotic late twentieth century.

Hardware

1. If you have the money, buy an Apple IIe or IIc with a color monitor and two disk drives (\$1000-1200 total, depending on where you shop). More quality learning software exists for the Apple than for any other computer on the market. The Apple IIe is tremendously versatile and expandable, with literally hundreds of devices and peripherals available to upgrade it as much as your wallet can stand over the years. The Apple IIe is easily repaired—almost every chip on the mother board is socketed for easy removal and replacement. (This contrasts with the cheaper Commodore or Atari, for instance, in which nearly all the chips are dip-soldered to the mother board; if something goes wrong the computer must be either shipped back to the manufacturer or serviced by a professional technician—a cost that can go as high as half the original price of the computer.)

2. A color monitor is a must for using most learning software. You simply won't get as much out of using the programs in black and white if they are simulations, graphics, or adventure programs. With some programs you can't even tell what to do unless the symbols or graphics appear in color on the screen.

Amdek and Commodore both make good color monitors at a reasonable price (\$300-400). Though home computers all work with standard TV sets, monitors offer far better resolution—more detail in the image. If you do intend to hook up to a color television, you can buy a module for the Apple for about \$40 that will do the job. But I would not personally want my children (or myself, for that matter) to sit twelve inches away from a regular color TV set for hours at a time. (For occasional use, however, it is a good cheap way to get access to a color screen.)

3. I suggest two disk drives for your Apple, since you will more than make up for the cost of the second disk drive (\$200-300) quickly because of the ability to make back-up copies of programs. You will also be able to conveniently run a wide range of word-processing and other programs that require a data file disk.

If you are buying the computer for children younger than twelve years old and don't intend to use it yourself for business or writing purposes, or if you can't spring for an Apple, I would recommend next a Commodore 64 computer (\$150-200). It is basically a "getting started" computer you can use for a year or two and let your kids explore on before you move up to the greater capacity and performance quality of something more expensive. Again, with the C-64 I strongly recommend the added expense of a color monitor and a disk drive.

The IBM PC, at around \$1500, is swiftly making inroads in the educational market. Although the IBM PCjr is no longer being manufactured by IBM, its brief appearance caused many software developers to write learning software for the IBM PC/compatible (MS-DOS) market. Most, but not all, of the learning software written for Jr will run on an IBM PC or compatible that has graphics capability. If, however, the package is clearly marked IBM PCjr, be sure you try it on a machine like the one you own before buying.

A joystick and a printer for any of these computers are great advantages for many learning programs. The joystick gives the learner easy control over the software and saves a lot of excited pounding on keys. Joysticks are inexpensive (\$15-20 for Commodore, \$35-75 for Apple and IBM) compared with the overall price of the computer or a service call for keyboard repair. Dot matrix printers make possible both graphics and text printouts. I recommend them for most learning uses, since they are faster, cheaper, and more reliable than letter-quality printers (which cannot print graphics), and most teachers will gladly accept papers written in dot matrix typeface. For the Apple, C. Itoh, Epson, and Okidata are my favorites (all in the \$500-600 range with cable and printer card), but check compatibility with your software. Commodore makes its own brand-name printer, which sells for \$200-300 and plugs into a port on the computer, thus eliminating the need for a printer card and cable.

For starting cheap, you can get a complete starter system with Apple equipment including one disk drive and a color monitor (but no printer) for around \$1000. A comparable system for Commodore would cost about \$700. If you forget about the disk drive on the Commodore and stick with cartridges, you can cut the price of your system by \$150-200. Skip the monitor and use a TV, and you're under \$200.

Magazines

Classroom Computer Learning [\$15.95/yr (8 issues); Peter Li, Inc., 2451 East River Rd., Dayton, OH 45439]. High-quality articles and reports that have changed my views on learning software.

Electronic Learning [\$19.00/yr (8 issues); Scholastic, Inc., P.O. Box 645, Lyndhurst, NJ 07071]. In-depth coverage of new ideas, methods, and technologies; particularly useful for keeping current.

CUE [(\$8.00/yr (6 issues); CUE, Inc., P.O. Box 18547, San Jose, CA 95158]. Computer Using Educators' Newsletter. Great resource for finding out what is best from professional educators' points of view.

LOGO: A Language for Thinking About Thinking

ROBERT SCAROLA: If Seymour Papert hadn't invented LOGO somebody would have to go out and do it now. For good reasons it has become one of the primary mechanisms by which novices learn how to program a computer.

A lot has already been written about LOGO as a computer learning tool. There have been both outrageous claims of success and outright cynicism. I suggest you ignore any outrageous claims—learning still takes effort, imagination, and attention, and nothing, not even LOGO, will enable anyone to attain overnight success. But I also suggest you ignore the cynicism. For two years, I have taught grades one through eight using LOGO, and my tempered point of view is that LOGO works.

The major reason is LOGO's unique ability to respond immediately to the programmer's effort, thus encouraging thinking about the very process of thinking and programming. In almost any other programming language—BASIC, Pascal, FORTH—the response is considerably delayed.

LOGO places on the screen before you an upward pointing caret called a turtle. As you write a program on the screen using commands such as `FD 20` (meaning Forward) 20 (meaning 20 defined units of space on the screen, 1 unit having the value of about 2 mm), the turtle moves forward. Tell it `BK` and a number and the turtle moves backward that far. `RT` or `LT` and a number get you right and left turns, the number in this case indicating the degrees of the turn. You thus draw a square by typing in `FD 20` (or any other number) `RT` or `LT 90` (degrees), four times. As you type in the program, the turtle draws a line on the screen.

Simple enough, but just the beginning. Using other commands you can instruct the turtle to repeat something an endless number of times; you can use variables to change your number limits; you can write a program that becomes a primitive procedure like `FD` or `RT` and can then be used in other programs (a building block or "modular" approach to both programming and problem solving). You can use an editor to modify your primitive procedures and variables; and you can save your programs on a disk. In short, you can

begin to get the feeling, very quickly, of the very powerful programming and graphics capabilities of the computer.

This basic format holds for any of LOGO's variations, whether you use Apple, Atari, Texas Instruments, Kaypro, Commodore 64, TRS-80, or IBM PC packages. (It is also the fundamental way in which Apple or Atari PILOT work.)

To get the full capability of the language you should spend the \$100-140 to buy a version of LOGO with the complete set of instruction manuals. Learning to program in LOGO will make you feel like you just learned how the engine works in your car. And that's worth knowing even if you have no intention of ever becoming a mechanic.

(LOGO, by the way, is not limited to graphics: as with any powerful computer language you can also use it to perform calculations and devise entire systems of lists and variables.)

For information on other languages, see the Programming section, pages 158 to 174.

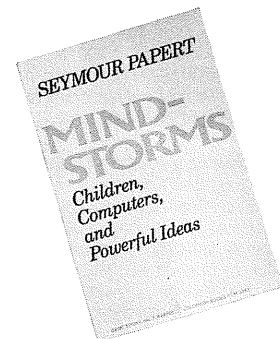
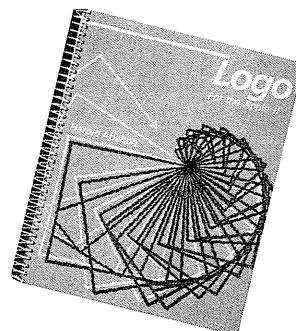
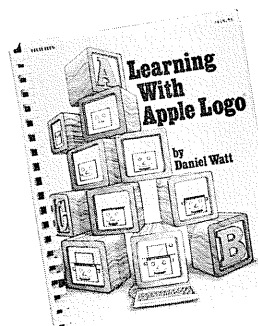
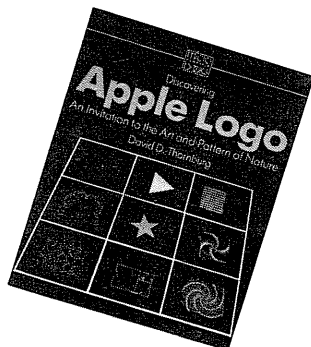
Books

Discovering Apple LOGO (An Invitation to the Art and Pattern of Nature) [David Thornburg; 1983; 145 pp.; \$14.95; Addison-Wesley Publishing Co., Reading, MA 01867; 617/944-3700; or COMPUTER LITERACY]. A wonderful exploration of the tie-in of LOGO graphics programming with the patterns of nature that underlie our existence.

Learning with LOGO [Daniel Watt; 1983; 365 pp.; \$19.95; McGraw-Hill Book Co., Princeton Rd., Hightstown, NJ 08520; 609/426-5254; or COMPUTER LITERACY]. Presents many practical problems and possibilities for using and playing with LOGO in a tested, clear, usable format.

Apple LOGO [Harold Abelson; 1982; 240 pp.; \$18.95; McGraw-Hill Book Co., Princeton Rd., Hightstown, NJ 08520; 609/426-5254; or COMPUTER LITERACY]. A practical guide to the intricacies of LOGO presented by one of the masters.

Mindstorms (Children, Computers and Powerful Ideas) [Seymour Papert; 1982; 230 pp.; \$6.95; Basic Books, Inc., 10 East 53rd Street, New York, NY 10022; 800/638-3030; or COMPUTER LITERACY]. The bible of LOGO, and, for that matter, the unmatched visionary statement of the potential of learning with computers. This is a revolutionary manual on how to think about thinking.



Thinking about thinking, and drawing . . .

LOGO, IN ALL ITS MANIFESTATIONS

The only, but good, choice for each . . .

ATARI LOGO

Version 1.0. All Atari home computers (16K). Optional peripherals: 810/1050 disk drive or 410/1010 cassette recorder; Atari printer. \$99.95. Copy-protected. Atari, 1265 Borregas Ave./P.O. Box 427, Sunnyvale, CA 94086; 408/745-4851.

COMMODORE LOGO

Commodore 64 (1541 disk drive). \$69.95. Copy-protected. Commodore, 1200 Wilson Dr., West Chester, PA 19380; 800/247-9000 or, in PA, 215/431-9100.

JIM McCAULEY: If you are committed to Atari or Commodore, you have but one choice in each case. Fortunately, these are both fine implementations, with the added bounty of multiple-turtle control and sophisticated music systems. ATARI is the only LOGO available on cartridge; that makes it the price bargain, since it does not necessarily require the purchase of a disk drive (except to store programs on).

For CP/M machines . . .

TLC-LOGO

Non-graphic version. All CP/M computers with Z-80 cards. \$100. Low resolution version. Kaypro 10, 2-84, 4-84. \$100. High resolution version. Epson QX-10, NCR Decision (color), Northstar Advantage. \$100. Not copy-protected. The LISP Company, P.O. Box 487, Redwood Estates, CA 95044; 408/354-3668.

Low resolution version. Kaypro 2-84, 4-84, 10, 2X, Robie. \$99.95. Deluxe color version. Kaypro 2, 4, 10, 2-84, 4-84, 2X, Robie. External monitor required. Includes color graphics board. \$199.95. Software alone: \$129.95. Board alone: \$145. Not copy-protected. MicroSphere, P.O. Box 1221, Bend, OR 97709; 503/388-1194.

JIM McCAULEY: TLC-LOGO comes in myriad versions. The non-graphics version has no turtles. Not recommended. The low-resolution version (100 by 160 pixels, or graphic points, on the screen) comes for all Kaypros except the original 2 and 4. The high-resolution (600 by 400 pixels) works on Epson and Northstar CP/M computers. NCR Decision and Kaypro owners can get it in color, but Kaypro owners will need the MicroSphere color board.

IBM PC LOGO . . .

DR. LOGO

Version 1.0. IBM PC/XT/AT and compatibles (192K; color graphics adaptor and graphics (RGB) monitor or monochrome display and display adaptor). \$149.95. Copy-protected. Digital Research, 60 Garden Ct., Monterey, CA 93942; 408/649-3896.

IBM LOGO

IBM PC/AT(DOS 3.0)/XT (128K) PCjr and Portable (DOS 2.1, 128K); 1 diskette drive; color recommended; \$175. Not copy-protected. IBM Entry Systems Division, P.O. Box 1328, Boca Raton, FL 33432; 800/447-4700.

PC LOGO

IBM PC/XT/AT/PCjr (color monitor), most graphics-dependent compatibles. 128K, graphics card. \$149.95. Not copy-protected. Harvard Associates, 260 Beacon St., Somerville, MA 02143; 617/492-0660.

JIM McCAULEY: There are three choices for the IBM PC, all good. LOGO beginners who are also new to computers will find that DR. LOGO allows the quickest and easiest start. It also has sophisticated windowing capabilities for debugging programs, a tremendous advantage.

PC LOGO has a better-organized manual than DR. LOGO, but it's written for a more sophisticated audience.

IBM LOGO is included because of its extra-powerful math. The manual includes an excellent introduction to programming with turtle graphics, but unfortunately lacks any tutorial on programming with words or lists.

LOGO for standard Apples . . .

TERRAPIN LOGO

Version 3.0. Apple II family; Commodore 64; Franklin Ace 1000. 64K, disk drive. \$99.95. Copy-protected. Terrapin, Inc., 222 Third St., Cambridge, MA 02142; 617/492-8816.

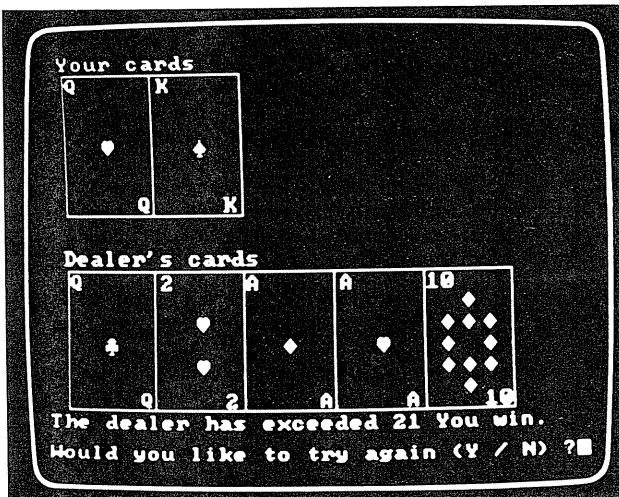
APPLE LOGO

Apple II family (64K; disk drive, color recommended). \$100. Not copy-protected. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.

APPLE LOGO TOOLKIT

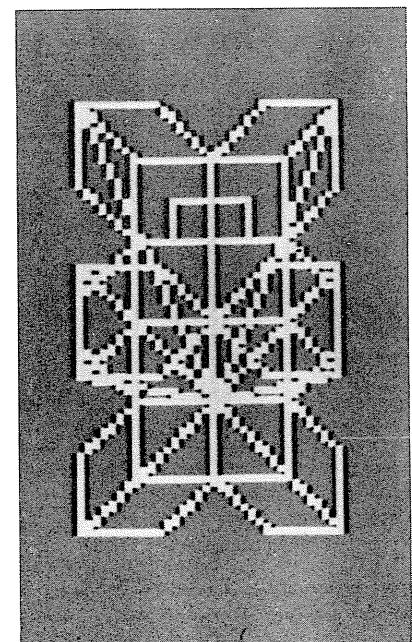
Apple II/II+ /Ile. \$12.95. Also available in Public Domain. Not copy-protected. Apple LOGO required. Logo Computer Systems, Inc., 555 West 57th St., Suite 1236, New York, NY 10019; 212/765-4780.

JIM McCAULEY: As usual, Apple owners face an embarrassment of riches. The differences in relative power between APPLE LOGO (with the APPLE LOGO TOOLKIT disk) and TERRAPIN LOGO are minuscule—choosing between them is a matter of style. My own preference is the APPLE LOGO combination because I appreciate the more consistent (hence less confusing) syntax. On the other hand, TERRAPIN LOGO is slightly less expensive and the documentation is more complete. I'd look at manuals for both and choose the more appealing. Both are well supported by independently published books.



Many people think of LOGO as a cute language for kids who want to draw flowers and squares on a computer screen. This animated blackjack game was written with DR. LOGO. Since it comes with the DR. LOGO package, you can look at the program listings and learn how to write sophisticated LOGO programs like this one.

Salt crystals, grown in APPLE LOGO. "We started with a crystal form (as in a cube)," said Robert Scarola. "Then the kids each developed a growth pattern of their own using LOGO. When the children build their own turtle crystals, the younger children create crazy quilts; the older children methodically seek out the relationships of figures." See photo at right.



DANCING TURTLES

BOB ALBRECHT: When people sell LOGO for use by young children, they're really selling turtle graphics—not LOGO's list-processing features. But turtle graphics can be implemented in any language, as it has in BASIC and Pascal.

I believe sprite graphics are the best way to introduce children eight years and younger to computers. With sprites, multiple turtles, and a little bit of text, I would gladly give up all of LOGO's other features—the recursive power, the list processing—which even most LOGO teachers don't understand.

Too many teachers start out teaching turtles because "they're good for you." But most kids, given the choice, will opt for sprites instead, and will apply what they learn about sprites to more formal turtle graphics later.

Unlike turtles, sprites are dynamic. The static turtle lives in the central processing unit and waits for your command before it can move. Sprites live outside, in their own separate chip. You select a sprite, then tell it what shape to carry, what color that shape is, what direction to move, and how fast to move. Thereafter, that sprite moves independently of anything else; you can sit there and write programs while all the sprites are going crazy on the screen. Sprites offer kids easy arcade-game action. In 15 minutes, I can teach a child who has never touched a computer to make sprites dance.

For the Apple IIc and enhanced Apple IIe . . .

APPLE LOGO II

Version 1. Apple IIe, IIc (128K; disk drive; color monitor, printer and mouse recommended). \$100. Not copy-protected. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.

JIM McCAULEY: If you own an Apple IIe and the extended 80-column card (which boosts memory to 128K) or an Apple IIc, you should get APPLE LOGO II. It's beautifully documented, has scads of workspace for huge projects (nearly as much as IBM LOGO), and includes a well-designed file system.

The visible program . . .

SIMULATED COMPUTER

Scott Steketee; age level: 12 and up; Apple II family; 48K • Atari; 32K • Commodore 64 • TRS-80 models I, III, 4; 16K; 1 disk drive; copy-protected? NO; \$39.95; EduSoft, P. O. Box 2560, Berkeley, CA 94702; 800/338-7638 or, in CA, AK, or HI, 415/548-2304.

JIM FRENCH: SIMULATED COMPUTER is the perfect introduction to the concepts involved in the inner workings of a computer. This program does not teach machine language or hexadecimal notation (those esoteric terms that refer to the on/off switching sequence by which the computer sends electronic signals

More Apple IIe fun . . .

SPRITE LOGO ★

Apple II, II+, IIe (DOS 3.3, 64K; color monitor recommended). \$199. (includes Sprite LOGO board). Not copy-protected. U.S.A. and Bermuda: Logo Computer Systems, Inc., 555 West 57th St., Suite 1236, New York, NY 10019; 212/765-4780. Elsewhere: 9960 Côte de Liesse, Lachine, Quebec, Canada H8T 1A1; 514/631-7081.

JIM McCAULEY: SPRITE LOGO is the most expensive LOGO (because it comes with its own sprite board) and the most feature-laden. It can do anything APPLE LOGO can do, and it has 30 turtles and more work space. It is more darn fun than any LOGO I've worked with yet. I recommend it for people with a particular interest in computer animation.

that transfer information). Instead, it uses the familiar decimal system to present graphically the components of the central processing unit (or CPU, the "brain" of the computer)—the accumulator, program counter, and instruction register. A limited number (twenty) of memory locations, instruction codes, and execution modes allow you to type in and then run simple programs while watching the whole process of fetching, incrementing, executing, and outputting your commands.

For the first time, using this program, I felt I really understood how it all works!

Great graphics, scientifically correct . . .

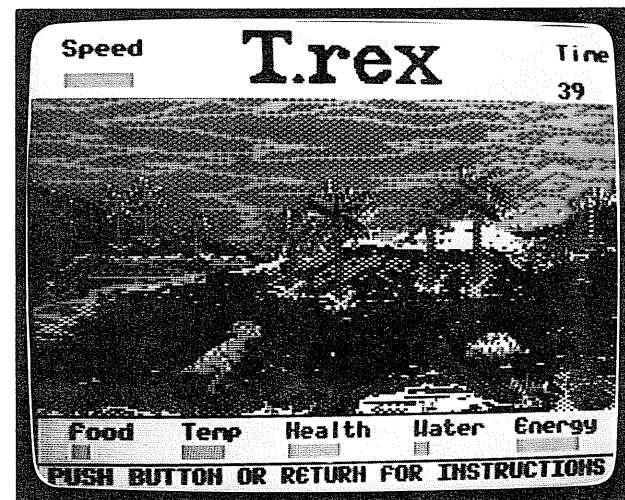
T. REX

KERON Productions; Apple II, II+, 48K • Apple IIc, 128K • Apple IIe, 64K • Apple III (in emulation mode) • Commodore 64 • IBM PC; copy-protected? YES; \$50; CBS Software, 1 Fawcett Place, Greenwich, CT 06936; 203/622-2525.

RICHARD DALTON: T. REX is a new direction for animated programs you maneuver with a joystick. This new focus is on simulation of natural science environments where you get to live out the daily challenges of being a dinosaur.

Dinosaurs had a tougher time than you imagine. *Tyrannosaurus rex* had to wrestle with: water supplies; where to find other dinos to feed on (and conserve energy while tracking 'em down); the ambient temperature; and even whether the terrain he crossed could support his bulky body. If that doesn't sound tough, then why did they disappear?

KERON Productions, Inc., developers of T. REX, leave that answer to you as you maneuver the beast through environments they have created with scrupulous scientific accuracy. That's what simulations are all about and why personal computers are becoming more interesting—they can provide experiences that aren't possible any other way.



Here's Tyrannosaurus rex in his prehistoric home futilely pursuing dinner (he started the attack too far away). Players learn this costs energy without increasing food intake—shown graphically at the bottom of the screen.

When an idea gets overworked by concerned educators, the excitement of the puzzle gets lost. Educational software will have a tough time of it if it is used as yet another vehicle to beat kids over the head with "the one way" of doing things.—Henry Olds



Tu es à la station Odéon.

PAT BUCK: *PARIS EN METRO* certainly beats the way I learned French years ago in high school with flash cards and endless, repetitious drill-in-unison days with bored classmates.

Alors, allons! . . .

PARIS EN METRO ★

Arlene Krane and Jersey Cow Software. Version 2.0. Copy-protected. \$81 (street \$65). Apple II family. Corvus version \$325. D.C. Heath & Co., DCH Educational Software, 125 Spring St., Lexington, MA 02173; 800/428-8071 or, in MA, 617/860-1860.

PAT BUCK: Ordinarily I'm not a booster of drill-and-practice software because it is so limited, and for the most part boring, but this program is colorful and musical, fun to use, and it teaches you several different things about the language and also about Paris.

The program uses the Paris Metro (their subway/public transportation system) as the "vehicle" to drill French articles (you remember—those were impossible!) and the

verb "aller" (equally impossible while at the same time being improbable!). Famous Paris landmarks, such as the Louvre, Notre Dame, and the Eiffel Tower become subway-system destinations. There are several lessons and, as a reward for your endeavors, a game. The graphics are superb. And the music can be turned off if you'd rather work quietly.

Although there is a good teachers' manual and the manufacturer includes classroom management suggestions, the only disadvantages to the program are in classroom situations: teachers can't add to or vary the lessons and there is no way within the program to keep track of a student's progress. Still, though, the program would be ideal in a beginning French class or in a conversational French class of travelers on the verge of going to Paris.

Railroading in the Old West . . .

TRAINS

Eric Podietz, Guy Nouri; age level: 8 and up; Atari 800XL, 48K • Commodore 64; \$26.95 • Apple II+, IIe, IIc, 64K • IBM PC; PCjr, 64K; \$29.95; 1 disk drive; joystick; color required; copy-protected? YES; Spinnaker Software Corp., 1 Kendall Square, Cambridge, MA 02139; 617/494-1200.

ROBERT SCAROLA: *TRAINS* presents a simulation of railroading in the Old West, complete with wonderful sound, graphics, and miniature steam engines. It also teaches basic principles of economics.

TRAINS has the catchiest musical/graphics introduction of any piece of software on the market—it immediately puts you in a mood to ride a train. Only you're the one running the railroad. You have to service industries in the Old West with your trains, moving from the easiest level to the hardest. On each of the

eight levels you have a new track layout, new scenery, and a larger territory, complete with plains, mountains, deserts, cities, and drifting clouds.

It is up to you to manage the railroad's money: set priorities and meet deadlines in order to get ore from the mine to the factory or lumber from the forest to the sawmill. As you use your resources to meet the needs of the various industries, you can build new sections of track for your railroad and advance to the next level of the game. On the other hand, you can lose money and track by not fulfilling industry demands. And when you're out of money and coal, you're out of business and the game is over.

Plan your route, toot your whistle (sounds just like a model train whistle), watch your market update, keep your coal dry, stay on the track and don't crash, and play *TRAINS*. It's a great learning simulation for anyone who likes steam engines and railroading.

Scientific method . . .

VOLCANOES

Age level: 12-adult; Apple II family; 48K; 1 disk drive; copy-protected? YES; \$50; Earthware Computer Services, P.O. Box 30039, Eugene, OR 97403; 503/344-3383.

JIM FRENCH: *VOLCANOES* is a classic simulation that works best with groups but can also work with the individual learner. In *VOLCANOES* students study, conduct various scientific investigations, and make predictions of likely volcanic eruptions in a mythical land called Wrangelia. Both the software program and the support materials promote an understanding of the scientific

method of inquiry and deduction, and both develop skills in record keeping and priority budgeting.

A player can gain a thorough understanding of the types of volcanic activity and methods of investigation with this well-thought-out simulation. As in real life, unpredictable events occur randomly that affect the playing of the game, including foul weather and a chance meeting with Bigfoot. I found *VOLCANOES* fascinating; it increased my own knowledge of what volcanists study and how they study it. Interacting with the software is easy, and the support materials include an excellent bibliography along with pre- and post-tests for students.

Group explorations . . .**SEARCH SERIES**

Tom Snyder Productions; age level: 10 to adult; Apple II family; 48K • TRS-80 Models III, 4; 32K; disk drive; copy-protected? YES; \$240 each (\$180 with school discount); McGraw-Hill Book Co., Webster Division, 1221 Avenue of the Americas, New York, NY 10020; 800/223-4180; modules available: Geology, Geography, Community, Archaeology, Energy.

JIM FRENCH: In the SEARCH series for geology, geography, community, archaeology, or energy, while the subject matter is different in each program, all share features that make them unique and unparalleled in learning software. Each simulation can be played by a single learner, but they are vastly more effective and fun in a group situation. I have run several of the simulations with as many as 40 adults at a time with great success and much glee.

The five programs all have the same organizational format. The group of learners is first divided into subgroups of three to six people. Each subgroup must accomplish a task, such as navigate a ship in search of new lands and riches (GEOGRAPHY SEARCH), manage a power-producing utility (ENERGY SEARCH), find a new homeland for the tribe (COMMUNITY SEARCH), and so on.

The unique feature of all the programs is that the information given on the computer is only on the monitor screen for a short 30 seconds or so, forcing a collective/cooperative effort on the part of the participants to gather quickly the information needed to make their decisions. As the action proceeds, the computer announces various random events, such as attack by pirates, drought, or other disasters. In some of the programs interaction among subgroups is possible. If poor decisions are made your team can miss turns, lose money, fail in its task, or go bust and be out of the game.

All of this creates an atmosphere of great excitement and interest, in which an unusual amount of learning takes place. Ideally, a classroom teacher would use lots of supplementary activities and information with each program. The publishers of the SEARCH series make this easy by supplying with each package a set of workbooks that introduce the situation and provide glossaries, record-keeping forms, and reading material with background information. A teaching manual describing suggested activities to enrich the presentation is also included. (However, I recommend as little "teaching" intervention as possible.)

The one drawback for this exciting educational product is its price—\$180 for each program in the series. Even though each comes with 20 workbooks and a teaching manual, the cost will discourage many people from acquiring a fine piece of learning software.

I wish I had a . . .**DREAM HOUSE** ★

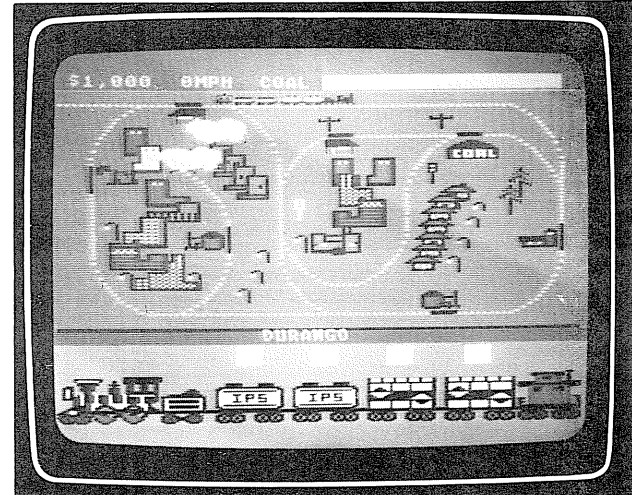
Joyce Hakansson Associates. Copy-protected. \$39.95 (street \$30). Apple II + /IIc/IIe; Commodore 64 (joystick required). CBS Software, 1 Fawcett Place, Greenwich, CT 06838; 800/227-2754 or, in CT, 203/622-2525.

ROBERT SCAROLA: When you were a child did you ever crawl inside one of those great collapsible wooden playhouses with miniature tables, chairs, people and animals, and live out your fantasies of future adulthood?

Joyce Hakansson must have. She and her associates have once again trespassed in the secret world of childhood imaginations and created a program that reaches into the fine heart of learning software. DREAM HOUSE is non-violent, open-ended, easy-to-use and magical.

DREAM HOUSE gives children four wonderfully detailed imaginary houses to play with onscreen: Colonial Farmhouse, Manhattan Penthouse, San Francisco Victorian and the Hideaway Cottage. The child begins outside or inside the house, moving through simple pictorial menus with an easy flick of the joystick, to play . . . landscape architect (creating different shapes of trees and plants and placing them around the house); master builder (remodeling with new shingles, windows, shutters, walls, etc.); or interior designer (painting trim, walls, floors, ceilings; rearranging furniture, clocks, lamps, tables, and pets). Pets? Yes, the child can play a little God, choosing a

Mom, a Pop and siblings, placing them in various rooms and even animating them. Masterpieces can be saved to disk and later loaded back in for more work. And, if our dreamer wants to, he or she can invite a friend over to play "hide and seek," painting over objects and people and then challenging the other child to find them.



DREAM HOUSE encourages creativity and problem-solving through a very rich simulation of "real life." Its strong, clear graphics, simple but detailed images, depth, and complexity challenge children for hours with the act (and art) of "dreaming up" their own fantasy living situation.

Knight in a shiny, white submarine . . .**THE GREAT GONZO IN WORDRIDER** ★

Joyce Hakansson and Christopher Cerf. Not copy-protected. \$39.95 (street \$32). Commodore 64; Apple II family. Simon & Schuster, Inc., Electronic Publishing Group, 1230 Avenue of the Americas, New York, NY 10020; 201/592-2900.

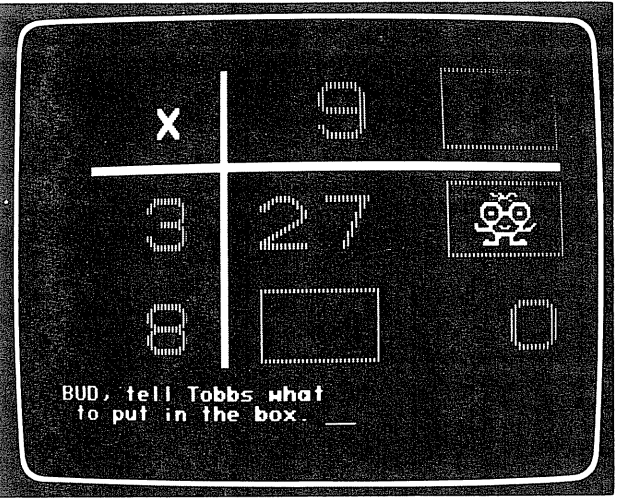
ROBERT SCAROLA: Introducing, for those of you under 10, the "Great Gonzo." Can he save the fair Camilla, held captive in the tower by the evil Swedish Chef? Depends. On whether he gets bombed by falling eggs, whether his boat is sunk by evil sharks, on how well he reads his road map.

Nice thing about Gonzo is that he does "eggsactly" what you tell him to do. But you have to be build the correct vehicle with the proper attachments for Gonzo to use to

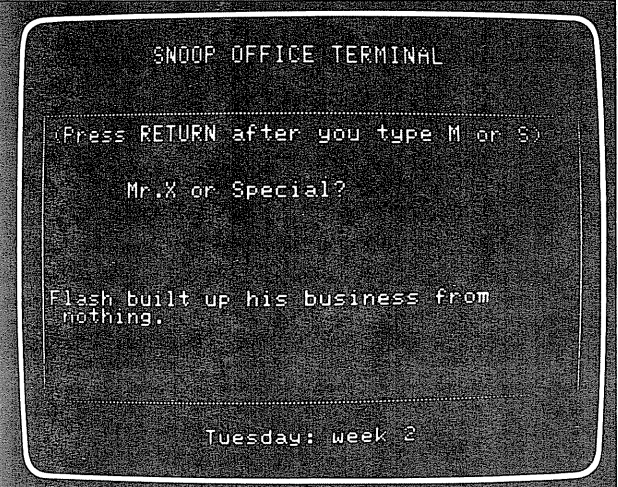
overcome the hazards on the road to the castle (past the guardian troll) so he will be tearfully and joyfully reunited with Camilla, and the Swedish Chef will be foiled again. You can choose submarines, boats, cars and planes with attachments like horn blowers, light makers, water squirters, stoppers, bumpers and catchers; moving them (and Gonzo inside) by easy joystick manipulation.

THE GREAT GONZO IN WORDRIDER is full of appealing graphics and interesting encounters. Another imaginative saga created by Joyce Hakansson Associates, it encourages creativity without resorting to gratuitous violence.

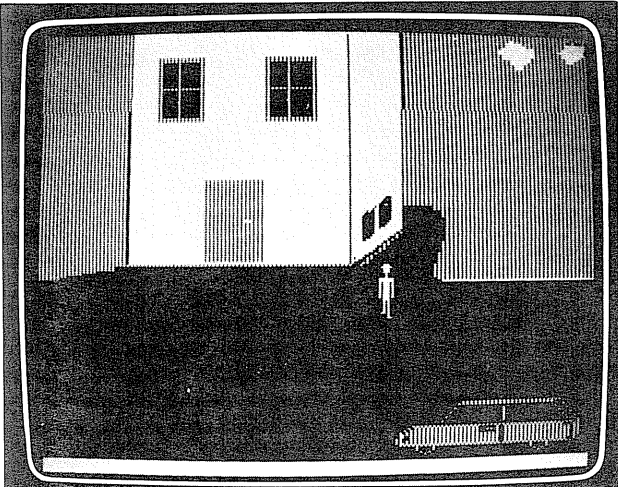
BARBARA ROBERTSON: Maybe next year they'll create THE GREAT CAMILLA IN WORDRIDER who rescues the Fair Gonzo from the evil "Japanese Mechanic."



Give Tobbs an answer that won't work and he shakes his head "No." But give him the one right answer and he does somersaults. This is the fifth TEASERS BY TOBBS level of difficulty. Sixth is tops.



As SNOOPER TROOPS Agent Number 2, you check the Snoopnet terminal to find an old clue in this cryptic phrase. Then, after a quick ride in the Snoopmobile, you arrive at the suspect's house and prepare to sneak in a downstairs window. Use your flashlight if necessary, but don't get caught.



Thinking about numbers . . .

TEASERS BY TOBBS

Dr. Thomas C. O'Brien; age level: 8-adult; Apple II family; 48K • Atari; 16K • TRS-80 Color Computer; 32K; • TRS-80 Models I, III, 4; 16K • Commodore 64 • Acorn; 32K; copy-protected? YES; \$49; Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570; 800/431-1934, or, in NY and AK, call collect, 914/769-5030.

JIM FRENCH: This award-winning software promotes the best use of the computer. In a game format, with a character named Tobbs, the program reinforces arithmetic skills of a very high order in a way that is greatly superior to textbooks.

The program begins by presenting the players (as many as four) an arena for practicing addition and multiplication problems with sums and products of less than 100. This takes place on a simple grid. However, the students encounter six stepped-up levels of complexity, so by level 4 they have to begin working backwards to solve problems. This, of course, introduces in a very intriguing way the concepts of subtraction and division. Learners must begin making distinctions among what "must be, can be, and can't be . . ." and construct quite complex chains of thought to develop answers. The computer provides the format, generates random numbers, checks responses, and keeps records of correct answers. Real thinking skills are developed rather than mere rote memory.

Civilization's basic skill . . .

MONEY! MONEY!

Jane Hartley; age level: 7-10; Apple II family; 48K; disk drive; copy-protected? YES; \$39.95; Hartley Courseware, Inc., P.O. Box 419, Dimondale, MI 48821; 800/247-1380, or, in MI, 517/646-6458.

AL MANN: Easy to use, imaginative, and effective, MONEY! MONEY! teaches a student to become proficient with money in fifteen lessons that move from recognizing and adding coins to buying from a clerk and counting change. The lessons begin with vocabulary reviews, and all have diverse and interesting scenarios. This package is ideal for working with disabled individuals (such as I am) because it contains a "mini-authoring" system that gives access to the graphics and enables a parent or teacher easily to design a lesson that meets a specific need. A record of each student's score is maintained for planning purposes, and limits can be placed on a program to reduce frustration or boredom.

You, as SNOOPER TROOPS Agent Number 2, are about to sneak through the window of a suspect's house in search of clues. If you're lucky, nobody will be home. Use your flashlight if you must, but don't give yourself away.

Socially approved gambling . . .

WALL \$TREET

Age level: 10-adult; Apple II family; 48K • Apple III in emulation mode; copy-protected? YES; \$24.95; CE Software, 801 73rd Street, Des Moines, IA 50312; 515/224-1995.

PAT BUCK: If you like Monopoly and acquiring fortunes you'll love WALL \$TREET. From one to nine players can play, though one to four is the ideal number to avoid cumbersome complications. Each player starts the game with \$10,000, using it to buy/sell 18 stocks in utilities, communications, oil, or manufacturing industries with real names—Apple, General Motors, RCA, and so on. The winner is the entrepreneur who accumulates the first \$1,000,000, has the most money at the end of the game, or goes bankrupt last.

You control the action at all times. You buy, sell, take out loans, and get tips about the next day's market (for a price) while performing calculations and making investments. The program lacks explosive graphic displays, but more than makes up for it by accurately representing the up and down challenges of real world stock market investing.

Detective skills . . .

SNOOPER TROOPS

CASE #2: THE DISAPPEARING DOLPHIN

Tom Snyder Productions; age level: 10-adult; Apple II +, IIe, IIc; 48K • IBM PC compatibles; 64K; \$32.95 • Atari; 48K • Commodore 64; \$26.95; disk drive; color monitor recommended; copy-protected? YES; Spinnaker Software, 1 Kendall Square, Cambridge, MA 02139; 617/494-1200.

ROBERT SCAROLA: Kids have a natural love for solving mysteries, and the SNOOPER TROOPS series by Spinnaker gives them the opportunity to play detective and use mapping skills to hunt down suspected criminals. The series goes far beyond duplicating a board game like Probe by making special use of the animating and interactive abilities of the computer.

CLAIRE ANN GOULD: In SNOOPER TROOPS Case 2 you are assigned to crack the Case of the Disappearing Dolphin. Someone has stolen Lily right out of her pool and it is up to you to find the culprit. You have a manual to assist you with your record keeping of times, dates, and places as you engage in your search, questioning witnesses and suspects in the sleepy town of Costa Villa. The program uses the computer's capabilities for excellent graphics, sound effects, and information storage and retrieval to teach you mapping, note-taking, classifying, organizing, and reasoning skills while you seek a confession from Lily's kidnapper.

Discovering patterns . . .

THE POND: EXPLORATIONS IN PROBLEM SOLVING

Marge Kosel & Mike Fish; age level: 7-adult; Apple II family; 48K • Atari (except 800XL); 32K; color • Commodore 64 • IBM PC compatibles; 64K; color graphics card • TRS-80 Color Computer; copy-protected? YES; \$55; Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570; 800/431-1934, or, in NY, 914/769-5030.

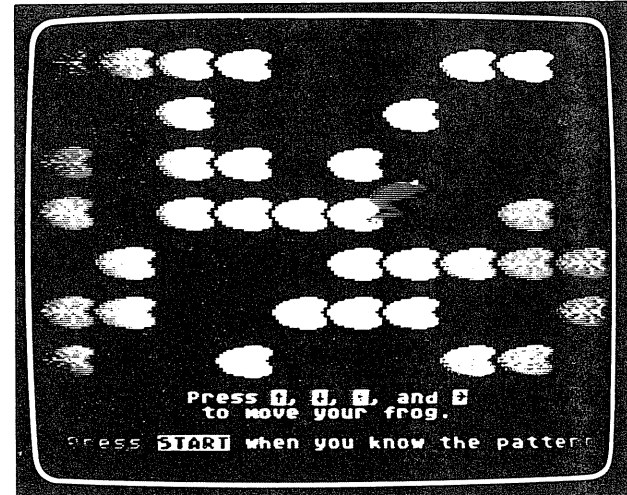
GEORGE RADDUE: Kids *love* this program. It's what I've been looking for: a concentrated activity that aims at building and honing an ability to detect and use pattern and sequence—that is, discovering logical steps in the solution of a problem.

In my primary school science classes much of our work is the construction of gadgets that exemplify concepts in the physical, biological, and behavioral sciences. Although these activities build critical thinking skills, most of the children I teach have had no prior experiences that help develop the concept of "knowing what to do next," and this inability poses one of my greatest challenges in helping the children construct their projects.

In THE POND, the goal is to learn a chosen pattern of lily pads well enough to program the leaps of a friendly frog from pad to pad without having him jump into the water (at which point he swims back to the beginning, and you have to start all over again). There is a practice mode for very young users and a more conceptual programming mode for older users. In the advanced mode, after a view of the presented pattern, the player must remember the number of leaps and their direction so the frog can make it to the final lily pad.

Last week I used THE POND with 160 kids from kindergarten through third grade. The kindergarten children had no difficulty using the program in the practice mode. The older children loved using their greater ability to decipher patterns in the programming mode. In one or another mode or difficulty level, the program was just right for all 160 little tigers.

There are two small problems: the player selects numbers by moving a cursor over a number on the screen rather than by pushing a number key—confusing for all the kids—and the instructions for how to leave the program and return to the main menu are hidden on the last page of the manual. But those problems are easily corrected and detract not at all from my strong feeling that this is the kind of learning software I've been waiting for.



That grinning frog is waiting to see if you've forgotten the pattern of lily pads and are going to dump him in THE POND. With practice you can get him all the way to that great pink lily pad in the lake. If you make it, you just learned a lot about predicting, sequence and logical ordering (not to mention the rudiments of programming).

Practice starting a business . . .

THE WHATSIT CORPORATION ★

Waterford School District, Waterford, MI. Copy-protected. \$55 (street \$45). Apple II family; TRS-80 Models I, III, 4; TRS-80 Network (not copy-protected). Sunburst Communications, 39 Washington St., Pleasantville, NY 10570; 800/431-1934 or, in NY, 914/769-5030.

JULIE ASKELAND: This challenging simulation is designed to teach children about business, but it's also an excellent test-run for adults thinking of opening a small business.

You begin the game with enough money to purchase and operate a one-product business for six months. During the six months you must make weekly and monthly decisions about inventory, advertising, hiring and firing salespeople, setting prices, borrowing money, paying principal, hiring accountants and outside consultants. In addition, you have to keep records, pay state sales taxes, contend with product shortages and late shipments.

Notes explaining the value of an economist and accountant are included in the package along with practice worksheets. A half-hour run-through of THE WHATSIT CORPORATION is enough to get a good sense of what operating a small business is like. If you take the time to study the additional materials, however, you'll find it a very complete introduction to the real world of small business and its intricacies.

JULIE ASKELAND: Using THE WHATSIT CORPORATION, I found out the hard way how important all the facets of a business are. Despite the advice in the program's notes, I went ahead and opened my "business" without consulting an accountant and went bankrupt at the end of the six-month period.

I was an early computer nut myself. Von Neumann's grand, historic, and immediately obsolete machine was built in a low, windowless brick building at the foot of Olden Lane, where I grew up in Princeton, New Jersey. Von Neumann—and his was a true genius the likes of which this world has rarely seen—had bought up a bunch of scrap components that were stored in an old barn at the edge of the Institute woods. Myself and one or two other ten-year-old "hackers" spent many, many days in there, monkeying around among thousands of microswitches, pigeons, and rats. There is

REPORT FOR MONTH 1	
Current sales force: 1	Total sales: 381
	Missing/Damaged: . . . 16
Total Revenue: \$ 5515.00	
Salary Expense:	\$ 1680.00
Whatsit Costs:	\$ 2700.00
Advertising:	\$ 0.00
Fixed Costs:	\$ 569.99
Unemployment:	\$ 0.00
Inventory Costs:	\$ 102.00
Interest on Loan:	\$ 32.50

an imagery there, and a smell I will never forget. And the joy, in those days of hard-wired electromechanical logic, of being able to sneak in there with our screwdrivers and crescent wrenches and take this stuff apart.

Well, I gave up on computers, in favour of canoes. My sister Esther, who kept clean of the hardware side of things, approached the computer business on a different track, and now owns and writes the RELease 1.0 Newsletter out of New York [recently sold to Ziff-Davis Publishing].

—George B. Dyson

For 6 to 8-year-olds . . .

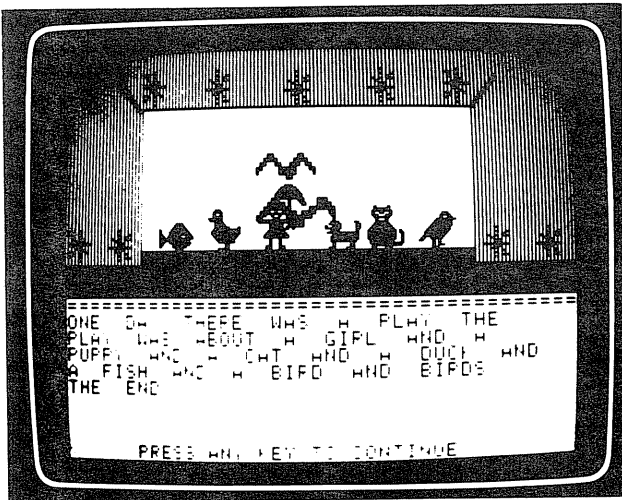
KIDWRITER ★

Jim and Jack Pejsa. Copy-protected. \$27-\$30 (street \$25). Apple II + /Ile/Iic; Commodore 64; IBM PC PCjr. Spinnaker Software Corp., 1 Kendall Sq., Cambridge, MA 02139; 617/494-1200.

ROBERT SCAROLA: KIDWRITER is based on a concept as old as teaching: draw a picture and write about what you draw. To "draw" a picture, storytellers choose from eight different background scenes (a theater stage, for example) and 99 different objects. The objects—stylized but fairly well-done graphic images (girl, boy, animal, cloud, tree, snowman, store, truck, bike, ship, jet, robot, etc.)—can be moved around the background screen; their colors and sizes are easily changed.

KIDWRITER's menus all show sensitivity for the capabilities of young children who need press only the first letter of each function to access it. D for done, for example, tells the program the picture is created and it's time to write the story. And this causes the bottom half of the screen to become a simple word processor with room for eight lines of prose.

The program has some flaws that children should be warned about: inadvertently pressing the E key erases everything, and pictures can't be changed once they're done, nor can they be printed out. But the program is fun, it stimulates creative writing, and what we see as flaws are often not as important to children. More than one child has said to me, after accidentally hitting the E key and losing everything, "Oh, it's okay. I'll just start over again."



In KIDWRITER, images and words have a direct relationship. Young children make a small picture, then write a very short story about it. As you can see, the result feels like they've just produced a play. The stage curtain was drawn by a kid—it's not a stock part of the program.

★ MEANS: NEW TO 2.0 EDITION

For 9 to 12-year-olds with Apples . . .

MILLIKEN WORD PROCESSOR ★

Suzanne L. Zemke, John A. Obershelt, and IOTA. Version 1.0. Copy-protected. \$69.95 (street \$55). Apple II family. Milliken Publishing Co., 1100 Research Blvd., P.O. Box 21579, St. Louis, MO 63132; 314/991-4220.

ROBERT SCAROLA: The MILLIKEN WORD PROCESSOR sits in the middle ground. It lies closer to full-featured word processors like BANK STREET WRITER, with similar command keys and menus, than to storytellers like KIDWRITER. MILLIKEN is easier to understand than BANK STREET WRITER—graphic icons are used alongside clearly labeled function menus—but, unfortunately, you must exit the actual writing screen and go to a separate screen to access the functions.

The writing screen is, at most, ten lines of widely spaced type with an oversized cursor that looks like a capital I. The limited viewing area causes words to scroll off the screen quickly, a problem for anyone older than twelve. But for younger writers, the expanded display is a plus. It minimizes the writing area, helps young children focus, and gives their writing an uncluttered feel. You can print out what you write and easily choose line length, spacing, and page numbers.

From literary classics in four languages . . .

M__SS__NG L__NKS: A GAME OF LETTERS AND LANGUAGE

Chomsky & Schwartz; age level: 7-adult; Apple II family; 48K • Atari 400/800; 48K • Commodore 64 (English Editor not available) • IBM PC; 64K • IBM PCjr; 128K • TRS-80, Models I, III, 4; 48K; disk drive required for all; choice of: Young People's Literature, Classics Old & New, MicroEncyclopedia, \$55 each; English Editor, \$65 each; Spanish, French, and German Editors, \$65 (available only for the IBM PC and PCjr); copy-protected? YES; Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570; 800/431-1934 or, in NY, 914/769-5030.

JIM FRENCH: The title gives away the format of this program. Separately purchasable disks present encyclopedia information, foreign-language entries, entries you can make up, or passages from children's and adults' literary classics. The passages are offered in up to nine formats with various vowels, letters, parts of words, or words missing. Players make educated guesses about what is missing and in the process draw on their innate (and often surprising) knowledge about word structure, spelling, grammar, and meaning in context. They also get a sense of the authors' styles and develop one of their own as they practice reading skills and extend their vocabularies. Without conscious effort they therefore gain many language-related

I use it . . .

BANK STREET WRITER

Apple, Atari and Commodore versions by Intentional Educations, Inc., The Bank Street College of Education, and Franklin E. Smith; IBM PC version by Bank Street College of Education, Franklin E. Smith; age level: 8-adult; Apple II family; 48K • Apple Iic; 128K • Atari; 48K; \$69.95 • Commodore 64; \$49.95 • IBM PC compatibles; 64K (PC DOS 2.0, 128K) • IBM PCjr; PC DOS 2.1; 128K; \$79.95; copy-protected? YES; Broderbund Software, Inc., 17 Paul Drive, San Rafael, CA 94903; 415/479-1170.

ROBERT SCAROLA: BANK STREET WRITER is not the most powerful word-processing program, nor the most versatile, nor the cheapest. But I believe it is one of the easiest to use if you are just beginning to learn about word processing. It smoothly incorporates all the basic word-processing functions, and the recently improved version offers adjustable margins, print formatting features, and a mouse option for the Apple IIe.

BANK STREET WRITER is already the choice of thousands of 10 to 15-year-old budding writers, and quite a few adults as well.

skills while the computer keeps score and records guessing accuracy.

The sources of the passages used in M__SS__NG L__NKS cover a wide range: they include the Bible, poetry, sports, animals, world records, and great literature in English, French, German, and Spanish. The software can be used by individual learners as a puzzle or exercise or by a group of students as a competitive/cooperative game. Either way, it achieves the author's purpose: "to help convey . . . some of the excitement and fun of Language."

I think it is no small matter that people can work through their dumbnesses—maybe even treasure them as paths to growth when they are using a computer as a tool. I think the computer will likely help us all be more patient with our learning selves.

—Henry Olds

Children have an easier time learning about computers than adults because they're not afraid to make mistakes. Children are used to making mistakes all day long and getting yelled at for it. So they're more willing to experiment with something that might intimidate them. Adults can't experiment because they won't risk mistakes.

—George Morrow,

Quotations from Chairman Morrow

Musical notes and fundamental math . . .

PIECE OF CAKE MATH

Age level: 7-11; Apple II family; 48K; disk drive • Atari; 16K; disk • Commodore 64; disk • IBM PC compatibles; 64K; color graphics card • IBM PCjr; copy-protected? YES; \$34.95;

FRACTION FACTORY

Age level: 8-12; Apple II family; 48K • Atari; 16K • Commodore 64 • IBM PC compatibles; 64K; color graphics card • IBM PCjr; copy-protected? YES; \$29.95;

MUSIC MAESTRO

Age level: 3-teen; Apple II family; 48K • Atari; 16K; disk • Commodore 64 • IBM PC compatibles; 64K; color graphics card • IBM PCjr; copy-protected? YES; \$34.95;

All from Springboard Software, Inc., 7807 Creekridge Circle, Minneapolis, MN 55435; 800/328-1223.

JIM FRENCH: In *PIECE OF CAKE MATH*, fundamental math drills take place in an imaginative simulated situation: a bakery. In the first level, the child's task is to keep track of how many cakes are baked and sold each day over a week's time. Next, the child is asked to predict the number of pieces there will be if the bakers cut up the cakes in a variety of ways, and the number of cuts necessary to make to get a certain number of pieces. If the child encounters problems, the computer gently divides up the cakes until the child can actually count the individual pieces to get the correct answer. In so doing, he or she catches on that multiplying and dividing are actually meaningful labor-saving operations—not an easy thing to convince some children of. A second level contains basic flashcard sequences of the four fundamental math operations. The final level is a game for up to four players called *Catchacake*. The faster the child's reactions, the higher the points add up. If the player

misses, another cake splats to the floor of Fumble's Bakery (which itself is fun, but the challenge of being the first to reach 1000 points overcomes the delight with splatted cakes).

FRACTION FACTORY is a practice program that sidesteps the familiar frustrations of learning fractions (cutting up paper pies just doesn't do it for some children). The program has five games that reinforce the concepts of fractions and sets, equivalency, finding fractions of a number, and both adding and subtracting unlike fractions. The child can select the game of choice from a picture menu, which means that even nonreaders can use the program. The adding and subtracting games are particularly well designed, graphically leading the child to the correct solution when wrong entries are made. It's a great help for children having trouble with the concept of fractions.

Finally, *MUSIC MAESTRO* is a program that assists children in learning about and generating music. For me, this is one of the computer's most exciting potentials. I have had even five-year-olds producing miniature symphonies and self-created duets using this program. *MUSIC MAESTRO* turns the computer into a simple practice and composing instrument. In the perform/record/playback mode, the child can play musical notes that appear on a piano keyboard by pressing the number keys on the computer. After creating a piece, the child can instruct the computer to play it back, edit it, modify it, and save it on a disk, all without a musical instrument or adult assistance. The child can also practice already created programs in a "Simon Says" format, learn musical notation using "Guido's Quiz," and even add a graphics display that fills the screen with randomly generated designs as he or she composes. Children won't learn intricacies of tempo or go much beyond one octave, but they will get a wonderful introduction into the world of music.

Genetically valid kittens . . .

CATLAB

Judith Kinnear; age level: 14-adult; Apple II family; 48K; color monitor recommended; copy-protected? NO; \$75; CONDUIT, University of Iowa, Oakdale Campus, Iowa City, IA 52244; 319/353-5789.

GARY PORTER: *CATLAB* is for students at least high school age or older who have been introduced to the basics of Mendelian genetics.

The simulation portion of the program visually represents the coat color and pattern resulting from the mating of domestic cats by producing on the screen a genetically valid litter of kittens. However, to use the program you must keep accurate written records of the mating cycle and use a scientific methodology to control your experiments carefully.

Otherwise, as in life, the variables will quickly get out of hand.

Used properly, *CATLAB* is an excellent tool for developing skills in understanding genetic ratios and recognizing the distinguishing features of inheritance of monogenic traits—dominant/recessive/codominant, autosomal/sex-linked. The program also develops skill in planning strategies for analyzing linkage, gene interaction, and multiple allelic systems.

ROBERT SCAROLA: Whew, that's a mouthful—but I figured we should recommend at least one excellent piece of learning software for high school and college students.

What are the chances of coming up with a litter like this one? Which colors are dominant, which recessive? CATLAB uses cat colors to teach the principles of genetics.

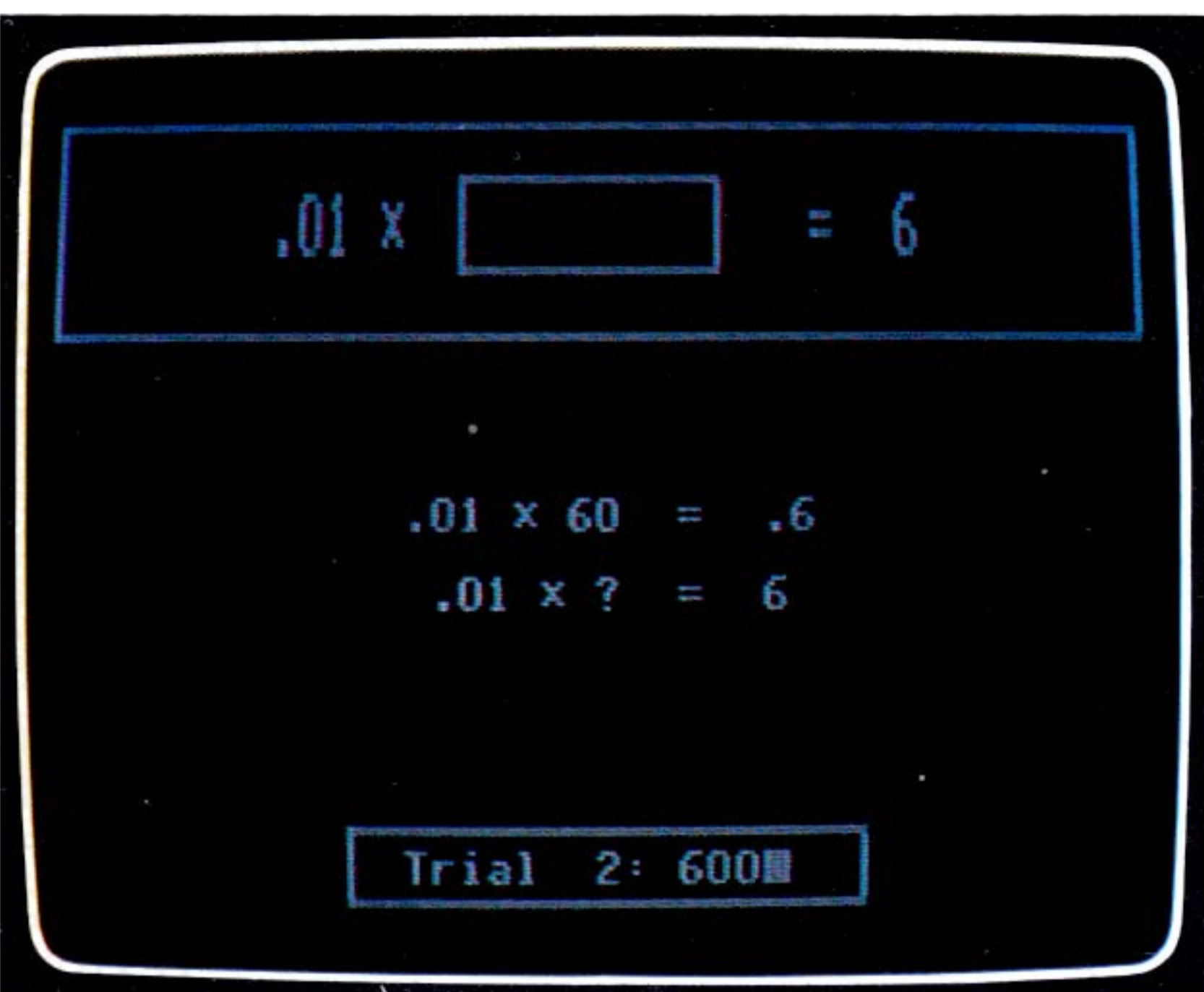


It's only Monday, but you've got to keep track of a whole week's worth of baking. When they start cutting up cakes, you'll have to use multiplication and division to keep track of each PIECE OF CAKE.

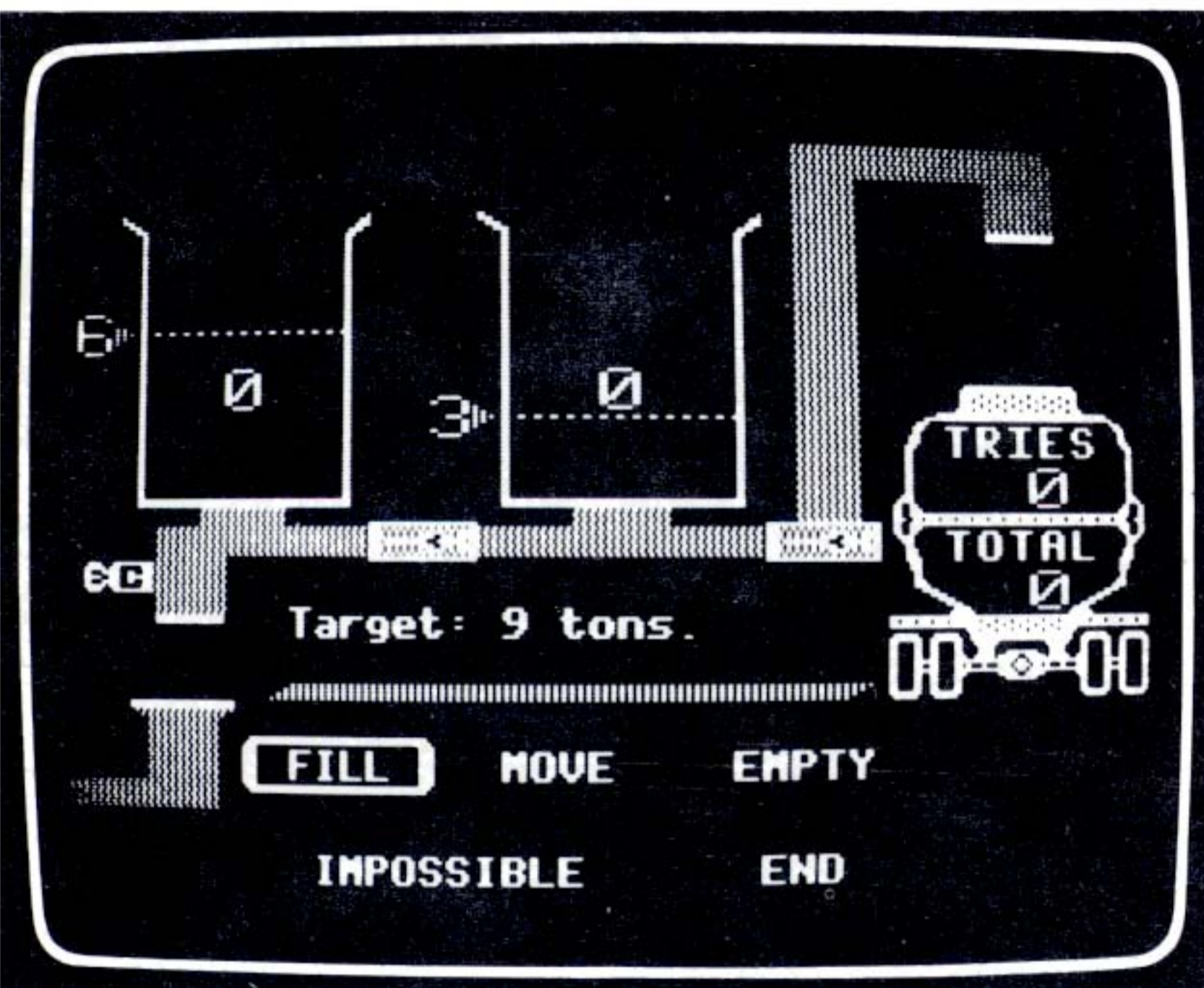


MUSIC MAESTRO presents the fundamentals of music and then leads you into simple composition. Guido's Quiz, named after the inventor of musical notation, teaches the notes of the keyboard, treble clef and bass clef.





Using hints and games, **GET TO THE POINT** teaches the secrets and power of decimal point placement.



Given an unlimited supply of a substance but only two **PUZZLE TANKS** containers for measuring, one that holds 3 tons and one that holds 6 tons, how do you measure out exactly 9 tons?



Intriguing drill and practice . . .

GET TO THE POINT ★

WORD QUEST ★

Education Development Center and Judah L. Schwartz. Copy-protected. \$55 each (street \$45). Apple II family.

PUZZLE TANKS ★

Thomas C. O'Brien. Copy-protected. \$55 (street \$45). Apple II family; TRS Models I, III, 4; TRS-80 Network (not copy-protected).

all from Sunburst Communications, 39 Washington St., Pleasantville, NY 10570; 800/431-1934 or, in NY, 914/769-5030.

ROBERT SCAROLA: Sunburst has recently produced a series of drill-and-practice software programs for elementary school children that achieves a delicate balance between intellectual challenge and enjoyment.

GET TO THE POINT offers practice in decimal-point notation. It successfully presents difficult concepts, like the idea that a three-digit number can have a lower value than a two-digit number, and sets up a variety of game formats that individual students can play. It can also be used by partners for a "binary search" method (continually cutting the search in half to logically reduce the choices) of finding answers.

The same search strategy is used in **WORD QUEST**, in which one student challenges another to guess the word entered into the computer. The program successively narrows the search interval with each guess.

PUZZLE TANKS, the third program in the series, adds a graphic representation of a tanker being filled with liquid to assist development of mathematical skills. Students must determine the correct proportions (from various storage reservoirs) required to mix the amount of punch or juice that exactly fills a tanker of given capacity. The program spices up the thinking process by including some problems that cannot be solved; the correct answer to these problems is "impossible." A good antidote to television commercials in which intricate problems are always solved in one minute with the right bar of soap.

Match words to pictures by inserting the correct letters; find the words with the same vowel sounds, fill the boxcars, and watch the train chug away. The theme in **READER RABBIT** is teaching reading skills with animated cartoons and toys—as non-threatening as being in a sandbox.

THE LEARNING COMPANY

ADDITION MAGICIAN

Dale Disharoon; age level: 6-10; Apple II family; 48K • Commodore 64 • IBM PC compatibles; color graphics card; IBM PCjr; 128K; disk drive; copy-protected? YES; \$34.95;

NUMBER STUMPER

Dennis Sorenson; age level: 6-10; Apple II family; 48K; color recommended • IBM PC compatibles; color graphics card; IBM PCjr; 128K; disk drive; copy-protected? YES; \$39.95;

READER RABBIT

Leslie Grimm; age level: 5-7; Apple II family; 48K • Commodore 64 • IBM PC compatibles; color graphics card; IBM PCjr; 128K; copy-protected? YES; \$39.95;

WORD SPINNER

Dale Disharoon; age level: 6-10; Apple II family; 48K • Atari; 48K • Commodore 64 • IBM PC compatibles; color graphics card; IBM PCjr; 128K; color monitor recommended; copy-protected? YES; \$34.95;

all from The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025; 415/328-5410.

ROBERT SCAROLA: The Learning Company has produced a series of software that goes well beyond the simple practice routines of most drill and practice products. As with its stunning problem-solving programs, such as **ROCKY'S BOOTS** (p. 188), The Learning Company's practice programs always focus on the learner's ultimate control over the program. The Learning Company's programs are characterized by marvelous use of engaging graphics and are highly interactive. My personal favorite is **READER RABBIT**, which I think gives children an excellent opportunity to practice word patterns and sounds by running machines like a labeler, sorter, or train (see p. 189 for a discussion of **MAGIC SPELLS**, The Learning Company's magical spelling practice program). Another favorite is **WORD SPINNER**, which has a very effective fill-in-the-letter format. A+ for The Learning Company.

For me, one of the most disturbing aspects of the microcomputer inundation is the term "computer literacy." By adorning a fuzzy notion in academic garb, we have managed to make millions of parents feel negligent unless they've at least bought their kid a Commodore 64. Colleges who wouldn't dream of making typing—another useful skill—compulsory are suddenly insisting on a half-a-year of "computer" before graduation.

—Bart Eisenberg

For young computer artists, graphic designers, and typesetters . . .

THE PRINT SHOP ★

David Balsam and Martin Kahn. Copy-protected. \$45-\$50 (street \$30-\$35). Apple II family. Atari. Commodore 64. Broderbund Software, 17 Paul Dr., San Rafael, CA 94903; 415/479-1170.

ROBERT SCAROLA: THE PRINT SHOP is to typing and computer keyboard skills what calligraphy is to writing skills. Students can use it to produce their own greeting cards, signs, letterheads, banners, and text with a wide selection of fonts, icons, borders, and graphics.

To learn mechanics you need to turn some nuts and bolts, twist with a wrench, make something run. To learn typing, why not set type, work with letters, make something print? The students I know much prefer to make their own important product rather than to practice for the sake of practice.

GARY ROSS: My wife, who has in the past refused to discuss "MY" computer, has done a complete turnaround. This resulted from watching my son (nine) and daughter (five) use their creative juices and THE PRINT SHOP to grind out: farewell banners for friends, birthday party invitation cards, banners and posters for school projects, holiday banners, and all kinds of graphic/text products just for the fun of it.

The program has also led to a general rebirth in our kids' involvement with computers as

Controls drawing speed and direction . . .

PICTUREWRITER

George Brackett; age level: 5-adult; Apple II family; 64K; disk drive; joystick; color, graphics printer recommended; copy-protected? NO; \$39.95; Scarborough Systems, Inc., 25 North Broadway, Tarrytown, NY 10591; 914/332-4545.

AL MANN: For these cerebral-palsied hands of mine, which occasionally spasm and create unwanted movements, PICTUREWRITER allows much more control over my drawing than the much-acclaimed KOALAPAD.

PICTUREWRITER has nearly every feature that the KOALAPAD has plus four additional features: First, PICTUREWRITER has a two-cursor system—one cursor tells me where I am while a second shows me where I am going. I can change the distance between the two cursors, thereby controlling my drawing speed. Another feature, Backup, allows me to erase my last steps. Edit lets me review my efforts and make modifications. Finally, with Redraw I can animate the picture. If you are a disabled individual, I highly recommend PICTUREWRITER for its ability to respond to your special needs.

tools. Our son, for example, has shown renewed interest in using word processing to complete homework assignments and to write letters to his grandpa. It has also resulted in the cry of "It's not fair!" when my daughter doesn't receive equal access to the computer and THE PRINT SHOP. She is only five years old, but because of the graphic menus that show what options are available and what they will look like, she was able to master the commands with little trouble. Once she was taught to recognize the words "Press RETURN," she had no difficulty picking out the border, graphic, print style, and format she wished to use in her masterpiece.

The only problem with THE PRINT SHOP is that it is so much fun to use that people tend to get carried away. It's a good idea to keep extra ribbons on hand for your printer, especially for those inevitable long banners. You'll find THE PRINT SHOP, with its multifaceted graphics capabilities and built-in editor, pre-defined fonts, and options for layout of end products, one of those productivity tools that survives well beyond its initial fascination. Especially because Broderbund has available a continuing library of graphic designs and fonts on separate disks.

THE PRINT SHOP's menus give clear choices for the budding typist and graphic artist. Menu choices can be mixed and matched. Kids love it for its simplicity.

Some of the many possible and useful results of a session with THE PRINT SHOP. Your creations, from personal stationery to 30-foot-long banners, can be printed on your dot matrix printer.



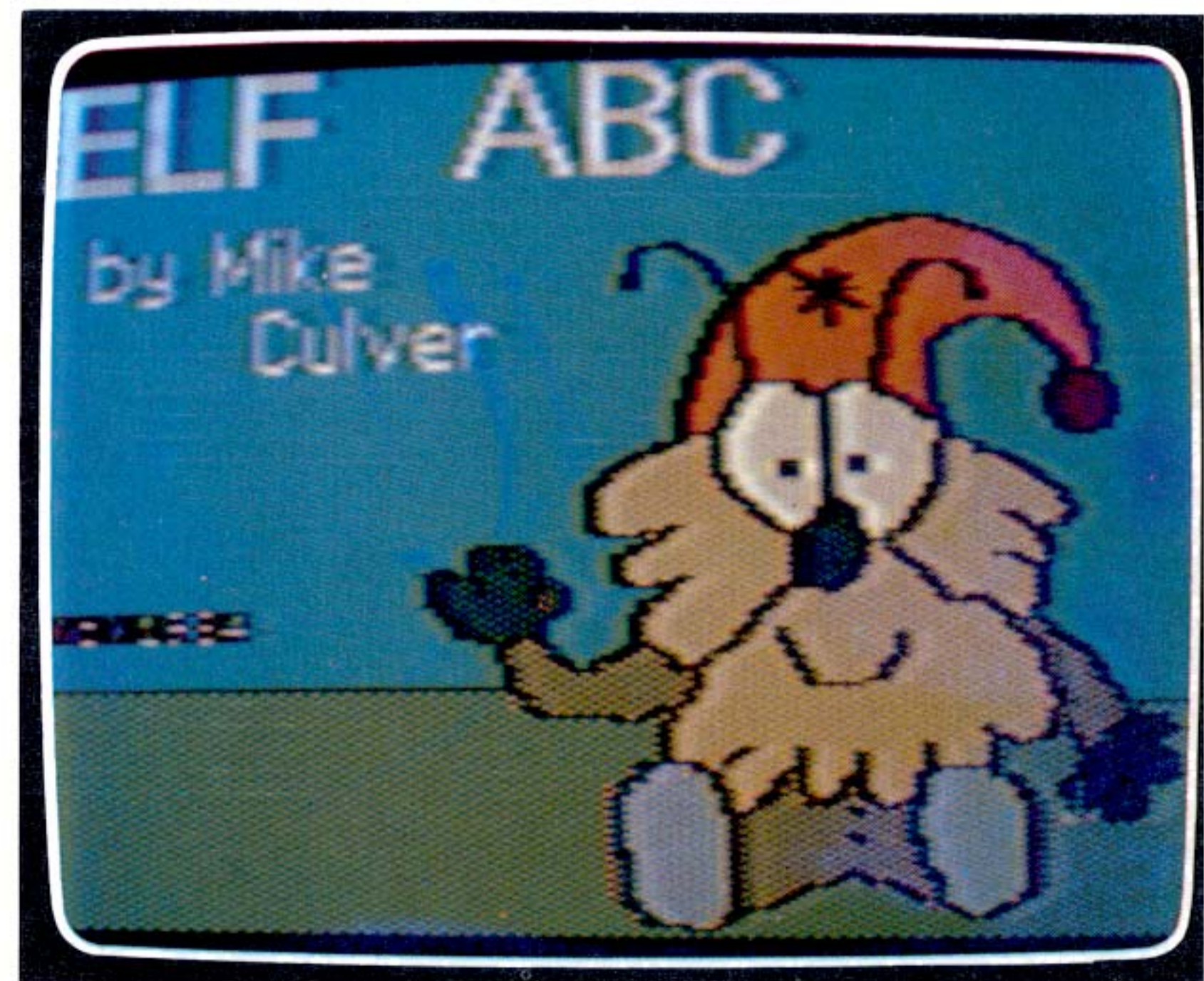
Learning the ABC's . . .

ELF ABC ★

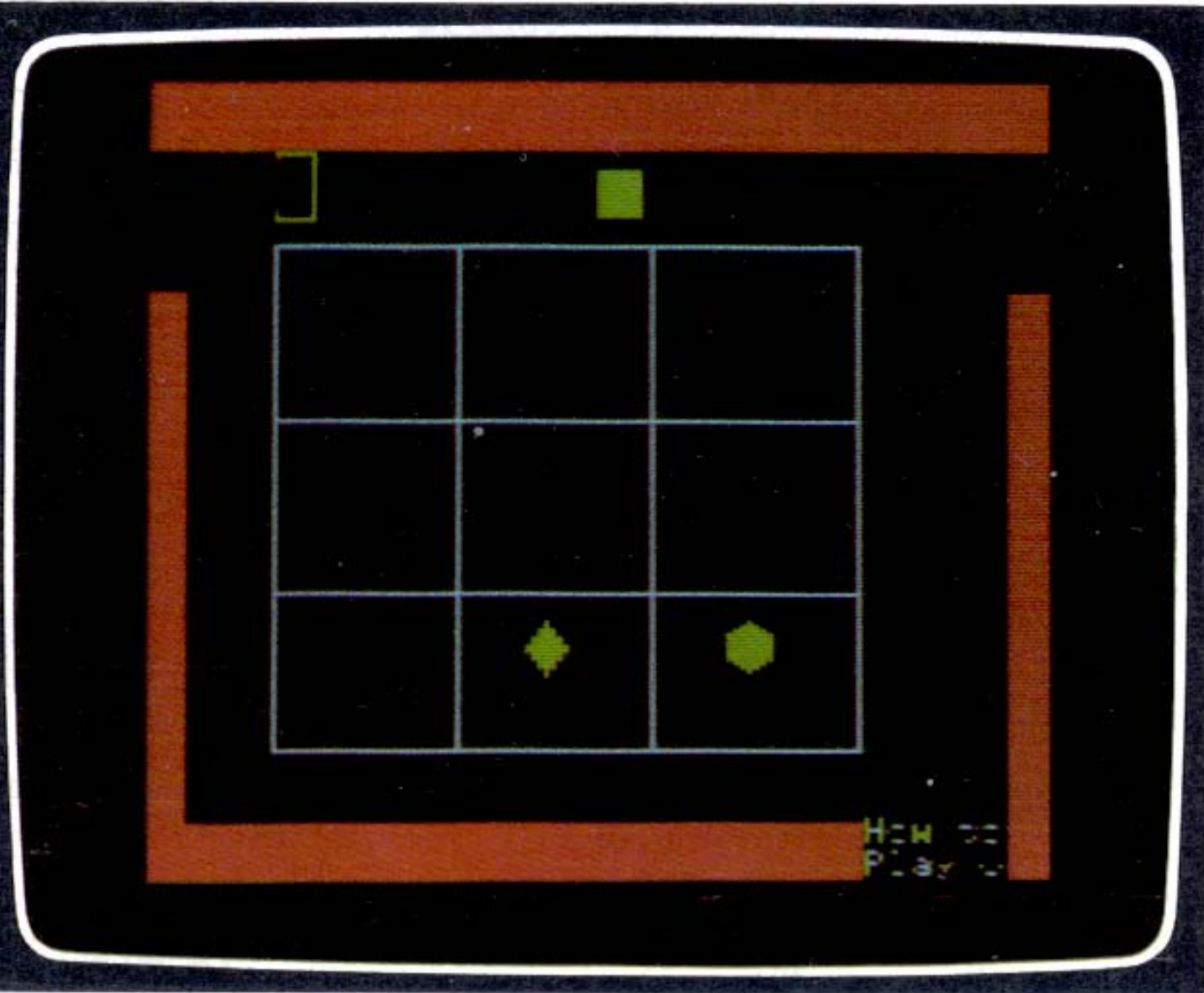
ELF COLORING BOOK ★

Mike Culver. Not copy-protected. \$17.50 each. Apple II family. Elfware, P.O. Box 118, Pollock Pines, CA 95726; 916/644-3300.

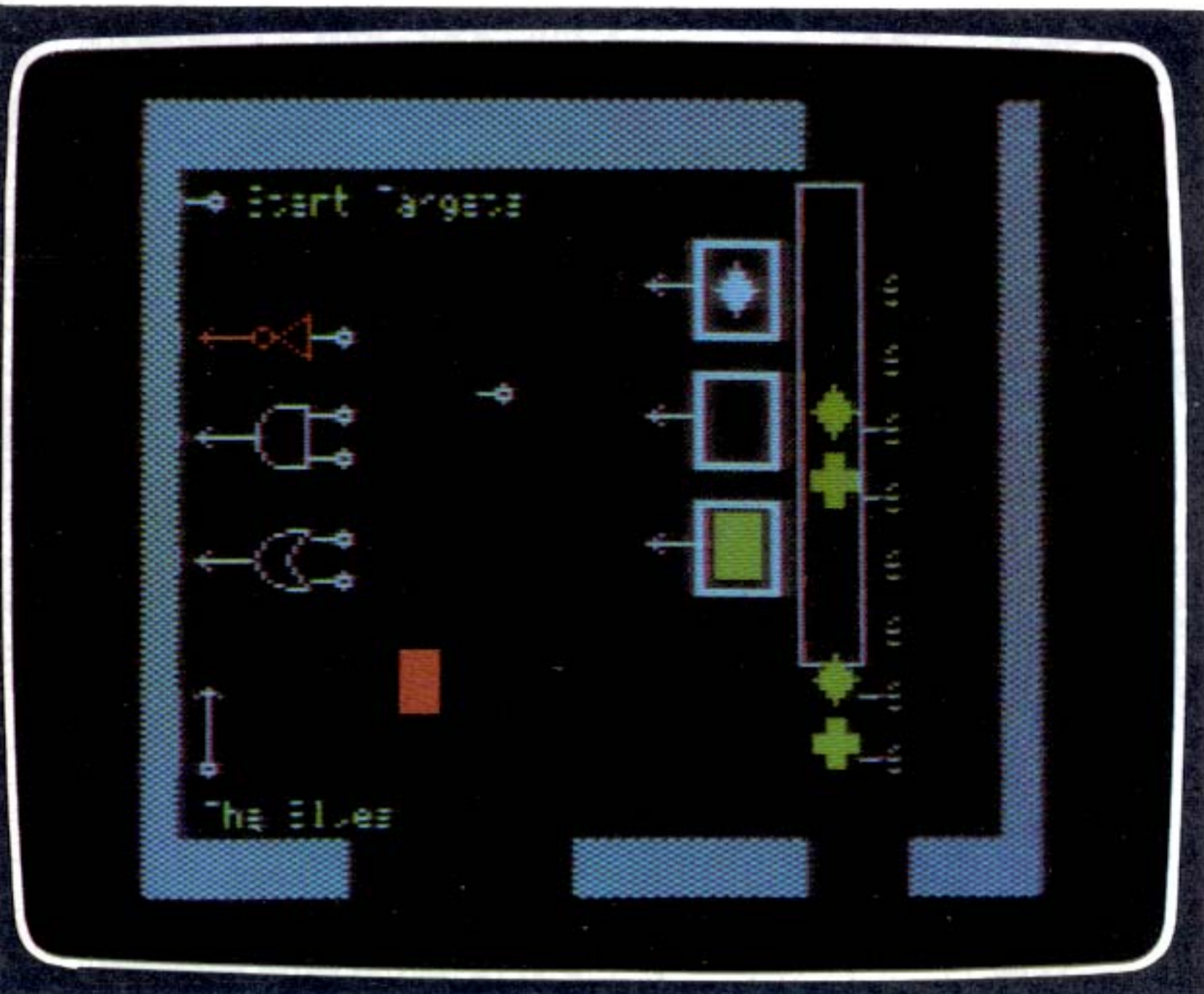
ROBERT SCAROLA: ELF ABC teaches the alphabet by illustrating letters with pictures in outline form (press c for "Cat") that children color in with a joystick-controlled color palette. There are fewer picture choices than in the Xerox STICKYBEAR series recommended in the 1.0 version of the **Whole Earth Software Catalog**, but these programs sell for less than half the price and actively involve children in the creation of the picture.



Here's the ELF himself. Nice color graphics draw the child into involvement with the learning process.



Gertrude flew away and brought back this set of shapes to play with. Move them around till they are in the correct order (go to the "How to Play" room if you need help). Subtle Gertrude teaches sorting, classifying and logical ordering with a minimum of instruction and a maximum of exploration.



ROCKY'S BOOTS makes it easy to solve problems and build all kinds of amazing machines that would otherwise be out of reach for kids to mess around with.



Patterns and puzzles . . .

GERTRUDE'S SECRETS

Teri Perl & Leslie Grimm; age level: 4-10; Apple II family; 48K; color required • Commodore 64; copy-protected? YES; \$45; from the Learning Company • IBM PC (color graphics card) and IBM PCjr; 128K; color monitor required; copy-protected? YES; \$45; from IBM.

BUMBLE GAMES

Leslie Grimm; age level: 4-10; Apple II family; 48K • Atari; 48K • Commodore 64; copy-protected? YES; \$39.95; from the Learning Company • IBM PC (64K) and IBM PCjr (128K; BASIC cartridge); color recommended; copy-protected? YES; \$40; from IBM.

The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025; 415/328-5410. IBM, Entry Systems Division, P.O. Box 1328, Boca Raton, FL 33432; 800/447-4700.

ROBERT SCAROLA: GERTRUDE'S SECRETS offers the same format for problem solving as ROCKY'S BOOTS, but instead of building machines the child must figure out the patterns of puzzles and then duplicate them by moving various shapes into a matrix of empty squares. The child accomplishes this with the aid of Gertrude, a friendly goose, picking her up by means of the floating cursor and moving her into the selected puzzle section, which contains arrays, trains, or loops. Gertrude then flies off to get a set of shapes that the child will use to duplicate the model pattern.

But that's not all. The child can also move into a separate room with the floating cursor and create new puzzles, or move into a third room and use the shape editor box to redesign the shapes used to make the puzzle patterns. GERTRUDE'S SECRETS thus gives the child the ability to control both the configuration of the problem and the selection of the tools used to solve the problem.

BUMBLE GAMES offers a series of simple thinking games in which the child finds a number on a scale or grid or plays tic-tac-toe using grid coordinates. What makes this program worth the money is the carefully designed musical and visual reinforcement and graphics, standard for most Learning Company programs. BUMBLE GAMES is the best of the firm's learning programs in this genre (much better than BUMBLE PLOT, incidentally, which also teaches grid coordinates but makes the unhappy error of introducing confusing negative numbers on the grid).

Rocky and one of his boots in the Game Room. When you've learned about FLIPFLOPS and LOGIC GATES, you're ready to play ROCKY'S BOOTS and try for a perfect score of 24.

Rooms filled with wondrous tools . . .

ROCKY'S BOOTS

Warren Robinett; age level: 9-adult; Apple II family; 48K; disk drive; color monitor; \$49.95 • Commodore 64; \$34.95; copy-protected? YES; The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025; 415/328-5410 • IBM PC and PCjr versions (128K; \$49.95) available from IBM, Entry Systems Division, P.O. Box 1328, Boca Raton, FL 33432; 800/447-4700.

ROBERT SCAROLA: ROCKY'S BOOTS has no stilted graphics, no "keyboared" page turning with a hidden agenda. It's not a program that holds back the answers and puts the learner through the uninspiring exercise of finding out what is already known.

Instead, ROCKY'S BOOTS creates an open, moving, and changing environment filled with color (the program works on a monochrome monitor but color makes a wonderful difference) and sound that encourages exploration. The child moves a large floating cursor "off the screen" from one environment to another. Each environment is a room entered through a magic doorway and filled with tools, various parts, machines, and other surprises. There are cutters, clackers, electric arrows, sensors, and/not/or gates, flip-flops, clocks, and delays. Any of them can be "picked up" with the floating cursor and then rearranged, linked together, hooked to a power supply, turned on and off—used in as many different ways as there are children to think them up.

The instructions are clear, thorough, and simple enough for any second grader—or, for that matter, any self-conscious adult—to grasp with a little practice. The variety of combinations and the range of challenging tasks and games offered by the menu leave room for all kinds of experimentation with currents, switches, lights, and the rest—experimentation that is based on basic scientific principles. ROCKY'S BOOTS offers the learner a chance to use the very problem-solving skills we are trying so hard to teach these days—intuition, logical thinking, sequential ordering, rechecking, and debugging.

Most children, including myself, do the obvious first—build a machine that turns on and works: moves, honks, clacks, lights up, carries current, does something interesting that could not be done in the real world without a lot of expense, safety precautions, and time. Then we move from the concrete to the abstract and from the simple to the complex, all through the process of making something actually work. The only other times I have seen children learn similar skills with computers is when they work on programming in a language like LOGO or BASIC.

ROCKY'S BOOTS moves into another dimension, one reflective of the magical world children live in.

*Tailorable spelling . . .***MAGIC SPELLS**

Leslie Grimm; age level: 6-10; Apple II family; 48K
 • Atari with BASIC; 48K • Commodore 64 • IBM PC
 compatibles; color graphics card • IBM PCjr; 128K;
 copy-protected? YES; \$34.95; The Learning
 Company, 545 Middlefield Road, Suite 170, Menlo
 Park, CA 94025; 415/328-5410.

ROBERT SCAROLA: MAGIC SPELLS meets my three criteria for good software in the practice genre.

First, it's engaging and clear. The letters are big, bold, and colorful; the graphics are simple but pleasing; instructions and command sequences are simple, effective, and accurate.

Second, it's friendly. The program gives students options: they can unscramble scrambled letters or use a simulated "flashcard" to learn correct spelling. Students are not rushed, and the program gently helps them spell words correctly. If the child misspells a word, the program shows the correct letters in the proper sequence

below the misspelled word, leaving spaces for missing correct letters to be filled in. Learners win from or lose to a very happy looking demon, who appears on the screen when he wins points. When the student has worked through the word list, he or she gets part or all of a prize from the "treasure room" as a reward.

Third, the program is adaptable to particular needs. It allows the student or teacher to create individual word lists. A separate data file disk can be created containing a whole semester's worth of words. These words can be easy or difficult, making the program applicable for grades from kindergarten through sixth, seventh, and possibly even eighth grade (although it might look too "childish" to the age-conscious pre-teen).

MAGIC SPELLS makes learning to spell words correctly more enjoyable and rewarding than it could be without the help of a computer. How else could you play at substituting letters in words until you found the right combination? Impossible unless you happen to have controlling interest in an eraser company.

*Absolutely wonderful . . .***DELTA DRAWING**

Computer Access Corporation; age level: 4-adult;
 Apple II +/Ile/Ilc; 48K; \$39.95 • Atari; 16K;
 cartridge; \$24.95 • Commodore 64; cartridge;
 \$24.95 • IBM PC compatibles; 64K; color graphics
 card; IBM PCjr; 64K; \$39.95; copy-protected? YES;
 Spinnaker Software, 1 Kendall Square,
 Cambridge, MA 02139; 617/494-1200.

ROBERT SCAROLA: Welcome, all you kids (and grownups who still believe in fairies, sprites, and kids) to Spinnaker's DELTA DRAWING. Just boot it up and watch a letter of the alphabet become a magician's wand worked by you, an instant maestro playing in a powerful graphics world.

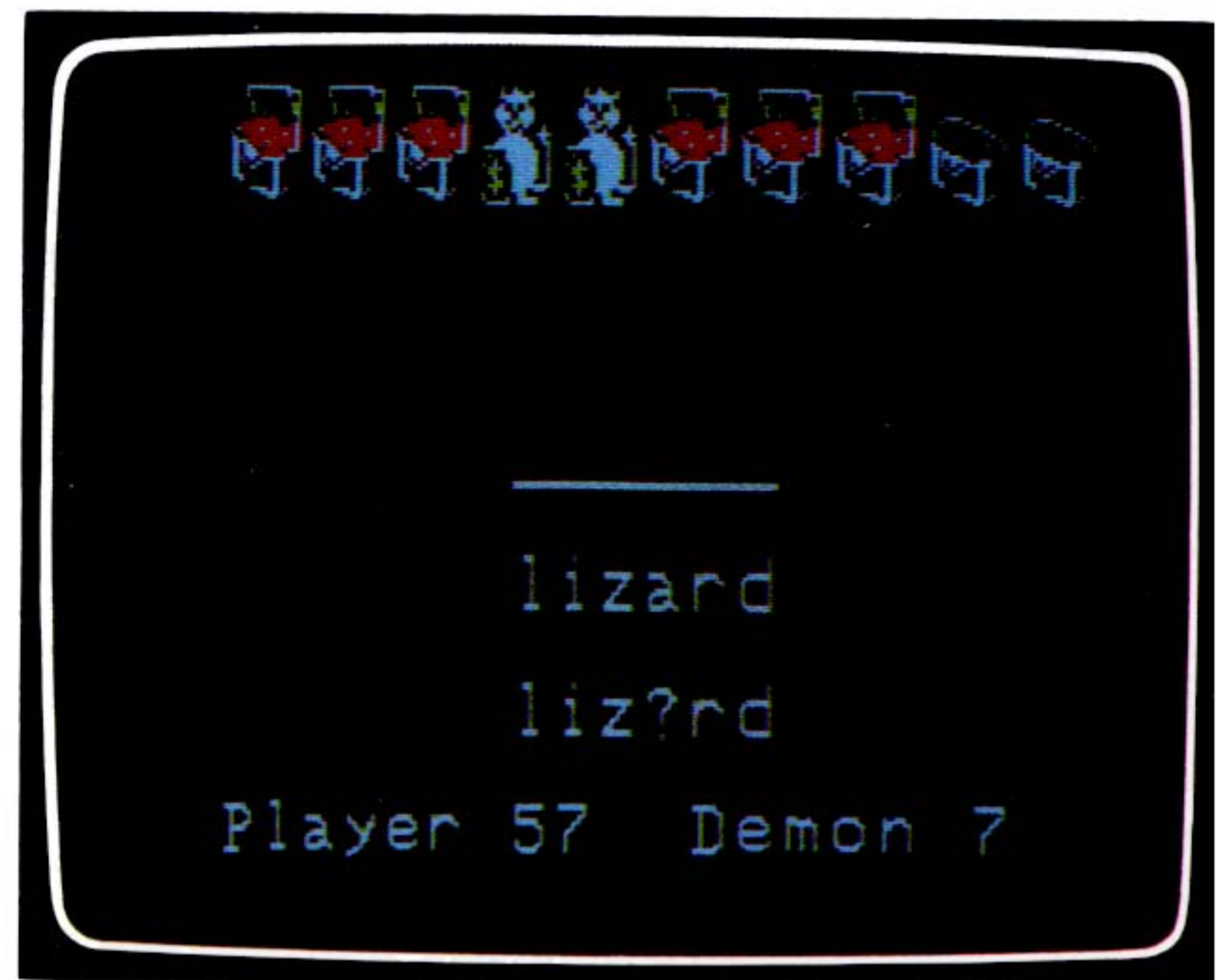
Hey, presto! Will a volunteer from the audience please step up to the keyboard? Thank you very much. Now, examine the keys closely. Check for hidden wires, invisible erasers, secret passages. Okay? Ready? Type D and watch the magic Delta draw a line. Type R. Ah ha, you just made a 30-degree right turn. Type M. Why, you moved without drawing a line. Type U and, whoops, you made a U-turn. Okay, try typing 4D,3M four times. A square is born (not you, of course). Now, press the 1 key. Hey, presto! The square disappears. Press 1 again. Hey, presto! The square reappears. Let's have a round of applause, ladies and gentlemen, for this very talented programmer from our audience. (What? You say you've never written a computer program before!!!!? Astonishing!! Another round of applause please and give the kid a silicon cigar!)

But don't stop now. Touch T and you can see the text of the program you wrote displayed on the screen. Type CONTROL-O and you can edit it. Try it! Nice, a quadrisomethingorother! Press the 2 and you just wrote another program! (Applause, applause.) Look, folks, he pressed 2 again on his own to make the program reappear! (The kid's a fast study.) CONTROL-F fills it in with any one of seven colors. (Purple? Yuk!) Ah, but never fear CONTROL-E and hey, presto! The screen is blank. CONTROL-Z and ZAP! so is everything else.

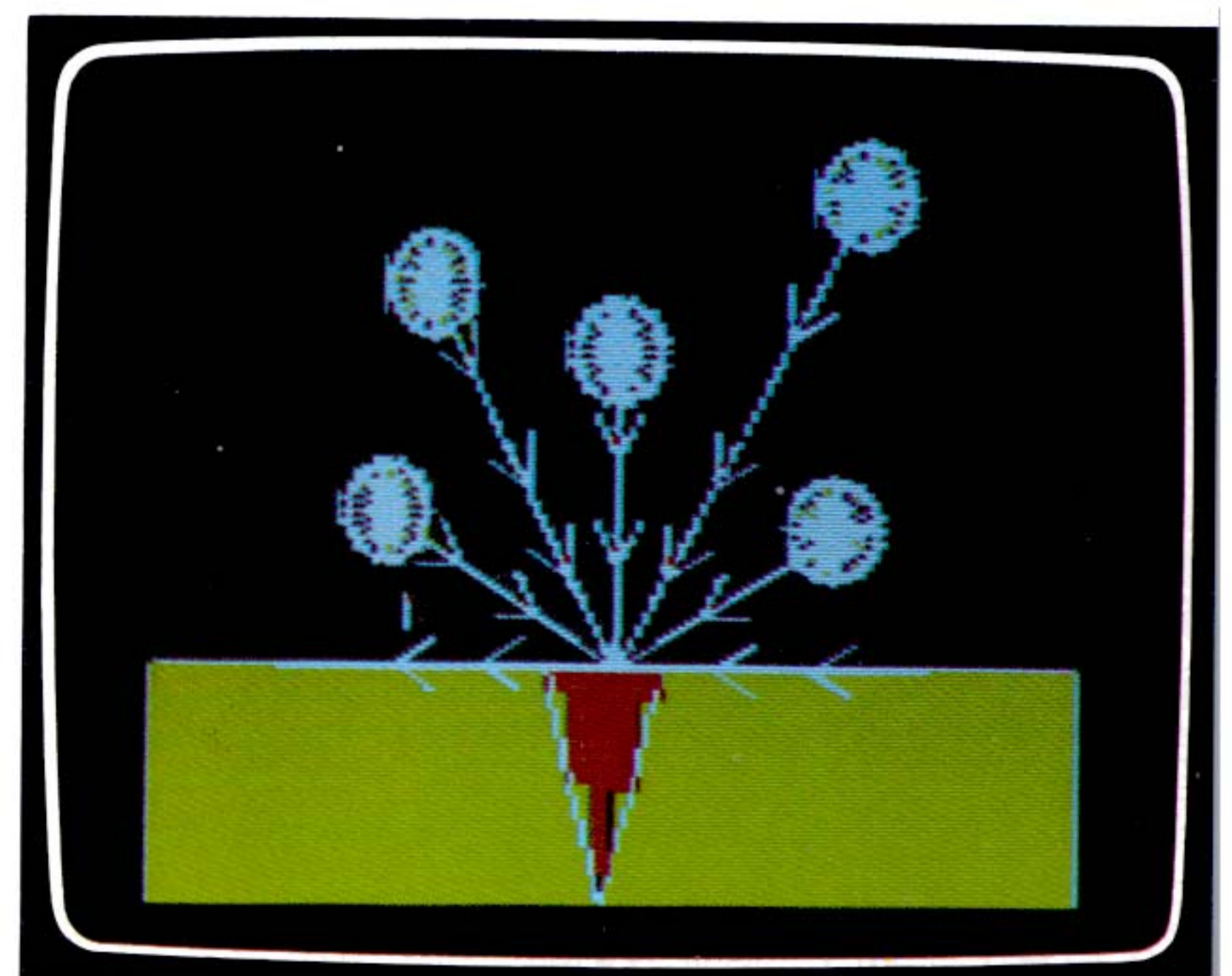
Let's have another round of applause and a second silicon cigar for . . . Oh, your mom doesn't let you smoke? Hey, a consolation prize for the kid. Give him a set of DELTA DRAWING Fast Start Cards so he can have all these magic tricks at his fingertips to impress his friends, amaze his teachers, and drive his parents nuts trying to figure out how their six-year-old just outdid Matisse.

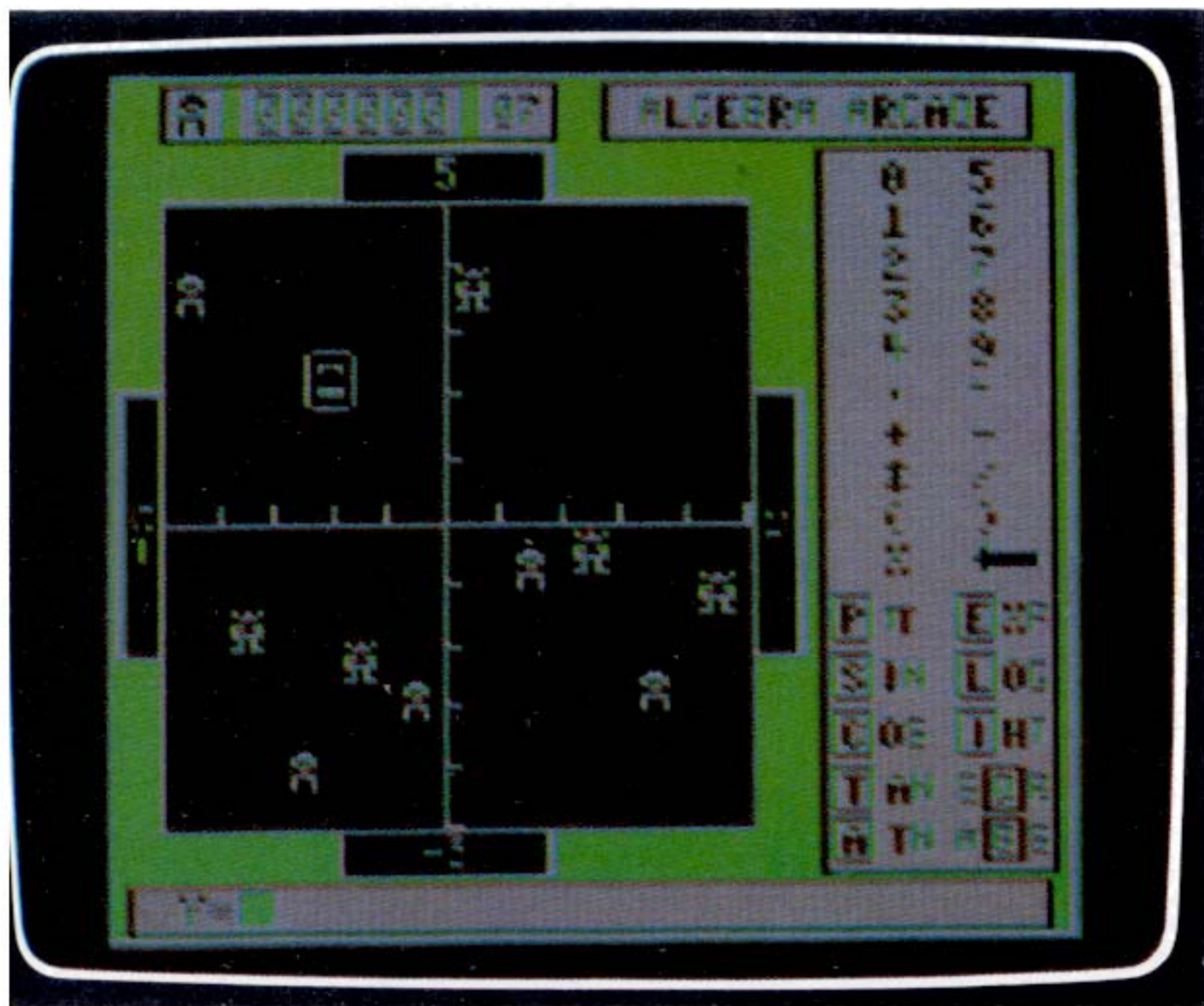
Eight-year-old Ben used one keystroke at a time to write the series of five programs that made this combination of arcs, circles and colors. (He couldn't duplicate it with paper and pen.) He can save it, modify it and print it out as easily as he wrote it. DELTA DRAWING is a simple but powerful child's programming tool based on LOGO (p. 177).

Kids who go into the basement to play with the computer all summer are probably living in a home where doing so is a good idea. Such comments say more about the home than about computers. —Henry Olds

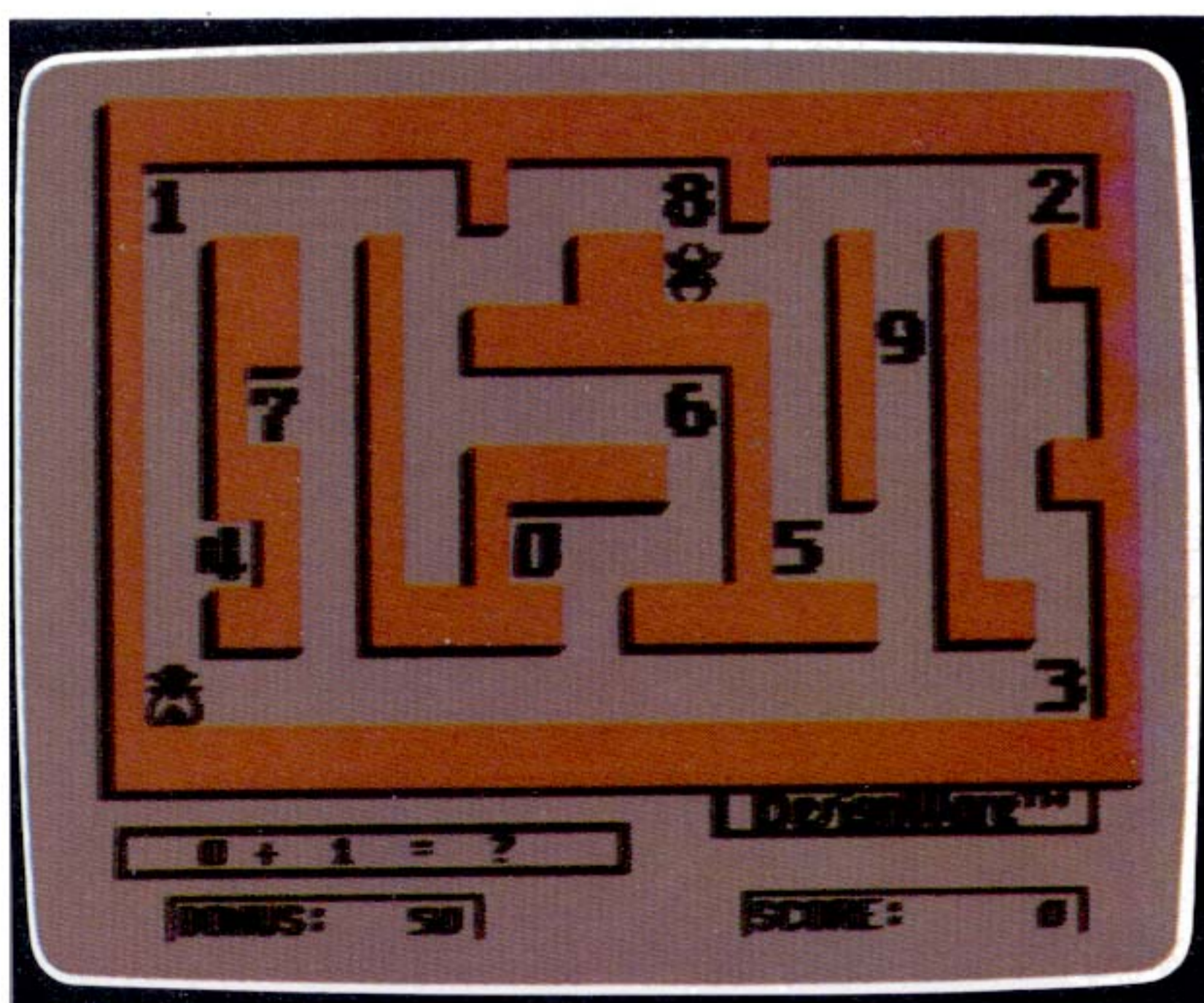


Enter the Castle of Spells and spell your way to the fabulous treasure by getting all the words correct the first time. A deliberately uncluttered format completely in the control of the child—MAGIC SPELLS is a compassionate way to practice spelling.





The Algebroids are all in position, but watch out for the Graph Gobbler. He'll gobble the snakiest sine curve you can invent. ALGEBRA ARCADE is a program that, at last, puts your equations in action. Math drill and practice without the drill.



"Come into my number parlor," said the lurking spider to the crafty fly. Basic math facts suddenly find themselves in a PAC-MAN world that kids enjoy being in. Arcade game meets learning, and maybe both can win in MATH MAZE.

Soaring equations . . .

ALGEBRA ARCADE

Mick, Konemann, O'Farrell & Isaacs; age level: 12-adult; Apple II family; 48K • Atari 800; 48K • Commodore 64 • IBM PC compatibles; 64K; copy-protected? YES; \$50; Brooks/Cole Publishing, 555 Abrego St., Monterey, CA 93940; 800/354-9706, or, in CA, 408/373-0728.

JIM STOCKFORD: This excellent game develops an intuitive understanding of algebra. You are given vertical and horizontal coordinates on your display monitor, and little Algebroids march out and arrange themselves at random over the display.

TOM MACH: You need to wipe out these electronic monsters by suggesting an equation that results in a plotted line—curved, straight, wavy—along which your friend, Whirlwind, can move to destroy Algebroids and earn you points.

You also have to avoid the ghost who turns into the Graph Gobbler and eats your graph, leaving you scoreless and him satisfied. Then the Committee can impose a loss-of-turn penalty on you, and you've only got ten turns to eliminate the Algebroids, get the ghost into hiding, and plot a curve to destroy his hiding place and so win the game.

JIM STOCKFORD: You quickly develop a feel for creating formulas that will let you hit the Algebroids. Each formula lets you discover the graphic representation of a different algebraic equation. The game gives you the wonderful soaring sense of power felt by the inventors of all mathematical equations.

Just one of many possible rubber FACEMAKER faces for kids to play with. Press the spacebar to program wiggles, winks, blats and frowns—an effective (and fun) way to teach elementary programming to the youngest child.

Animating Mr. Potatohead . . .

FACEMAKER

Designware; age level: 3-8; Apple II+ /IIe/IIc; 48K; \$24.95 • Atari; 48K; disk, \$20.95; cartridge, \$24.95 • Coleco Vision; 16K; cartridge, \$24.95 • Commodore 64; disk, \$20.95; cartridge, \$24.95 • IBM PC; 64K; color graphics card; \$20.95; IBM PCjr; disk, \$20.95; cartridge, \$24.95; copy-protected? YES; Spinnaker Software, 1 Kendall Square, Cambridge, MA 02139; 617/494-1200.

ROBERT SCAROLA: FACEMAKER gives the youngest children a chance to transform the solid adult world of serious faces into a crayon world they can control and change. In the process it gives them a chance to learn the computer keyboard, pick up a few simple commands, and achieve some sense of what programming is all about.

I like FACEMAKER because that's all it does. It's clean, simple, and easy, even for preschoolers.

FACEMAKER puts a featureless outline of a face on the screen and the child uses the space bar to select a feature to paint on the face—eyes, nose, ears, hair, mouth—each one in a dozen or so comical variations. Once the face is built, the child can change any features easily by going through the same process again.

In addition, and this is a stroke of brilliance, the child can then write a short program, using single-letter commands, to animate the face: make the eyes wink or cry; the mouth frown, smile, or stick out its tongue (and blat); and the ears wiggle. Once done programming, the child can go on to play a game in which the computer makes the face perform several movements or sounds and the child is asked to list the sequence in a program—a good test not only of memory but also of early programming comprehension.

Someone at Spinnaker has, happily, spent time with children as well as with computers.

Arithmetic on the fly . . .

MATH MAZE

Age level: 8-12; Apple II family; 48K • Atari 400/800/XL series; 48K • Commodore 64 • IBM PC compatibles; 64K; color graphics card; IBM PCjr; copy-protected? YES; \$39.95; DesignWare, Inc. 185 Berry Street, San Francisco, CA 94107; 800/572-7767, or, in CA, 415/546-1866.

JIM DERICH: The object of this enticing and challenging game is mentally to solve the math problems presented in the four basic arithmetic operations and then to negotiate a fly through a PAC-MAN-like maze. The fly's job is to get the correct answer by retrieving the necessary digits (0-9) randomly scattered throughout the maze. The faster you solve the problem and retrieve the digits, the higher

your score. You can select one of 40 different mazes provided on the disk or go to the maze editor to modify the maze you are using or create your own and save it on disk. Another option is to increase the difficulty level by introducing a spider into the maze. If the spider catches your fly, you return to the starting position and lose 40 points. You can further increase the difficulty by making the walls of the maze invisible. You still see the digits but can only detect a wall by bumping into it (incidentally, this program is easiest to play with a joystick).

MATH MAZE is a flexible, interactive, expandable, well-constructed learning program that has great potential to replace the rote memorization of math facts.

Enter the inventive culture of
Robotropolis . . .

ROBOT ODYSSEY I ★

Mike Wallace. Copy-protected. \$45.95 (street \$35). Apple II family. Color monitor required. The Learning Company, 545 Middlefield Rd., Suite 170, Menlo Park, CA 94025; 415/328-5410.

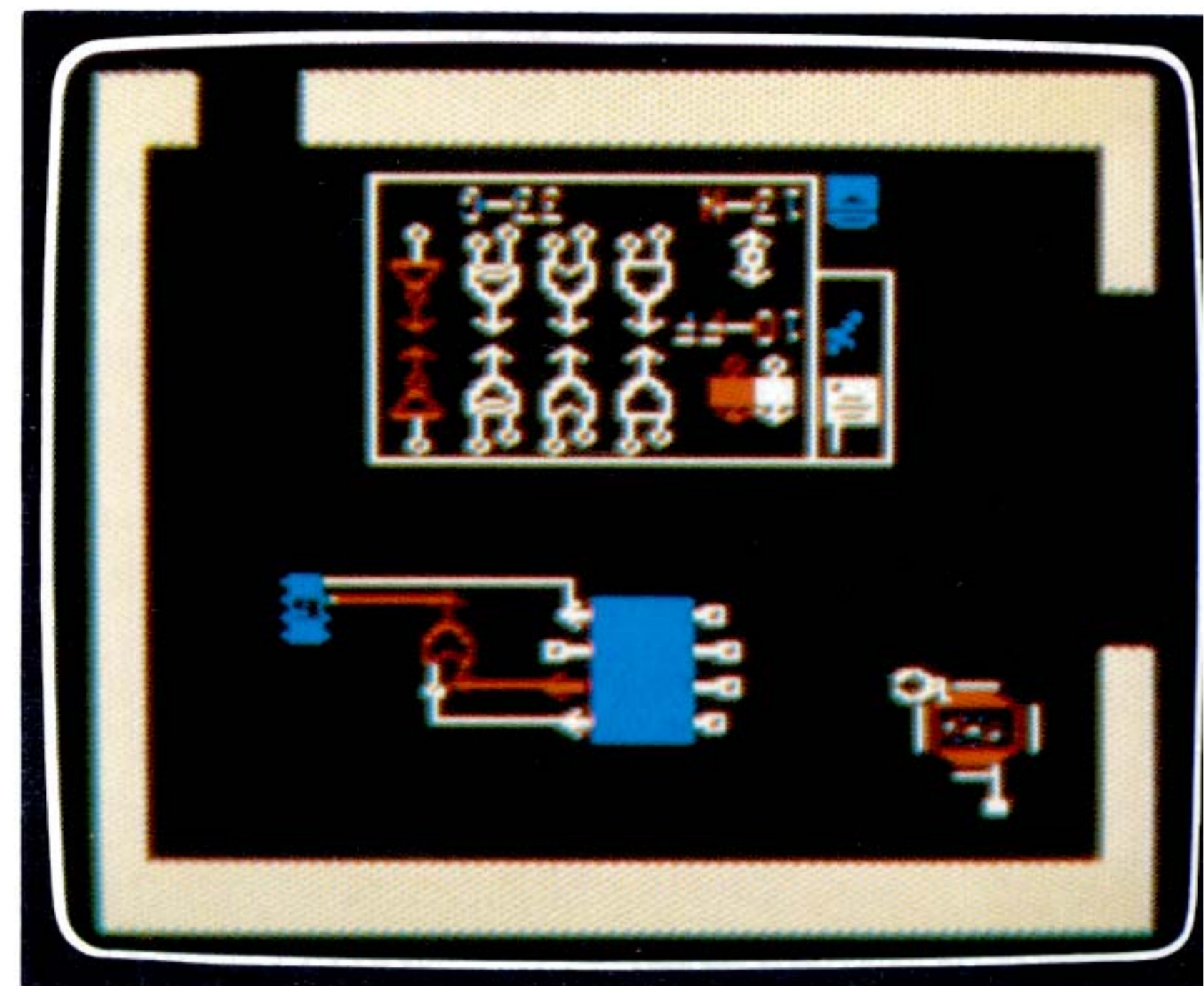
ROBERT SCAROLA: So you can't afford a \$2000-\$5000 robot? This program is more fun anyway and, besides, it won't fall down the stairs and break.

You enter an imaginative microworld in ROBOT ODYSSEY, one where you can invent, build, and operate your own working, adventuring "robots."

You begin by exploring the "Robot Tutorials" where you are introduced to the basics of Robot Anatomy, learn what's in your Toolkit, and find the "Solutions to Robot Circuits." If this sounds a bit like an adventure game to you, you're on the right track—but you've only just begun.

Enter the Robot Odyssey. There you are, a mere cartoon of yourself, dumped out of bed into the City Sewer beneath Robotropolis. You must get out. How? The robots, of course. There are three of them at the sewer's entrance. Use them. Evade sentries, avoid the "ampire 'bot," and scavenge for parts as you and your robot helpers wend through the labyrinth. Escape is via the transport chamber which takes you through five levels on your way to the City.

But it's more than just a tramp through a maze. New challenges await you at each level. You have to rewire a robot, design and redesign chips, and solve mapping puzzles along the way. Which means that the more you learn in the tutorials, the better off you'll be. It also helps to be familiar with basic electronic terms—"and-, or-, xor-, and not-gates," "flipflops," "input/output leads," etc.—concepts introduced in this program's precursor, ROCKY'S BOOTS (p. 188).



One of many obstacles in the "Subway," level 2 of ROBOT ODYSSEY. You must design and redesign the circuitry of your three robots so they carry you through a series of mazes. You and your other two robots are secreted inside the robot shown here, looking out through the periscope atop its body. If you find the token in the labyrinth and figure out how to carry it, you can ride the transport system up to the next level.

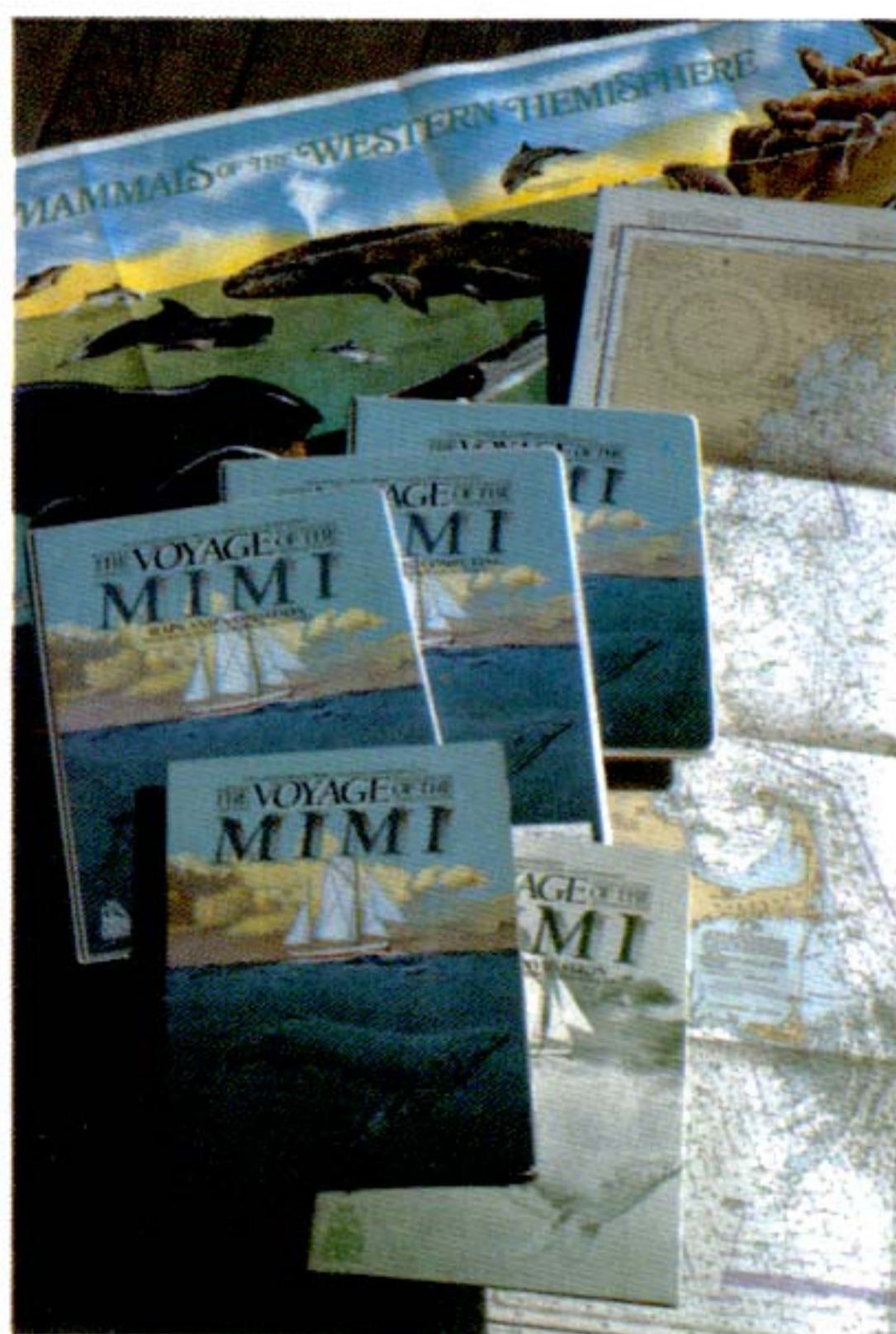
Real whales, real programming . . .

VOYAGE OF THE MIMI ★

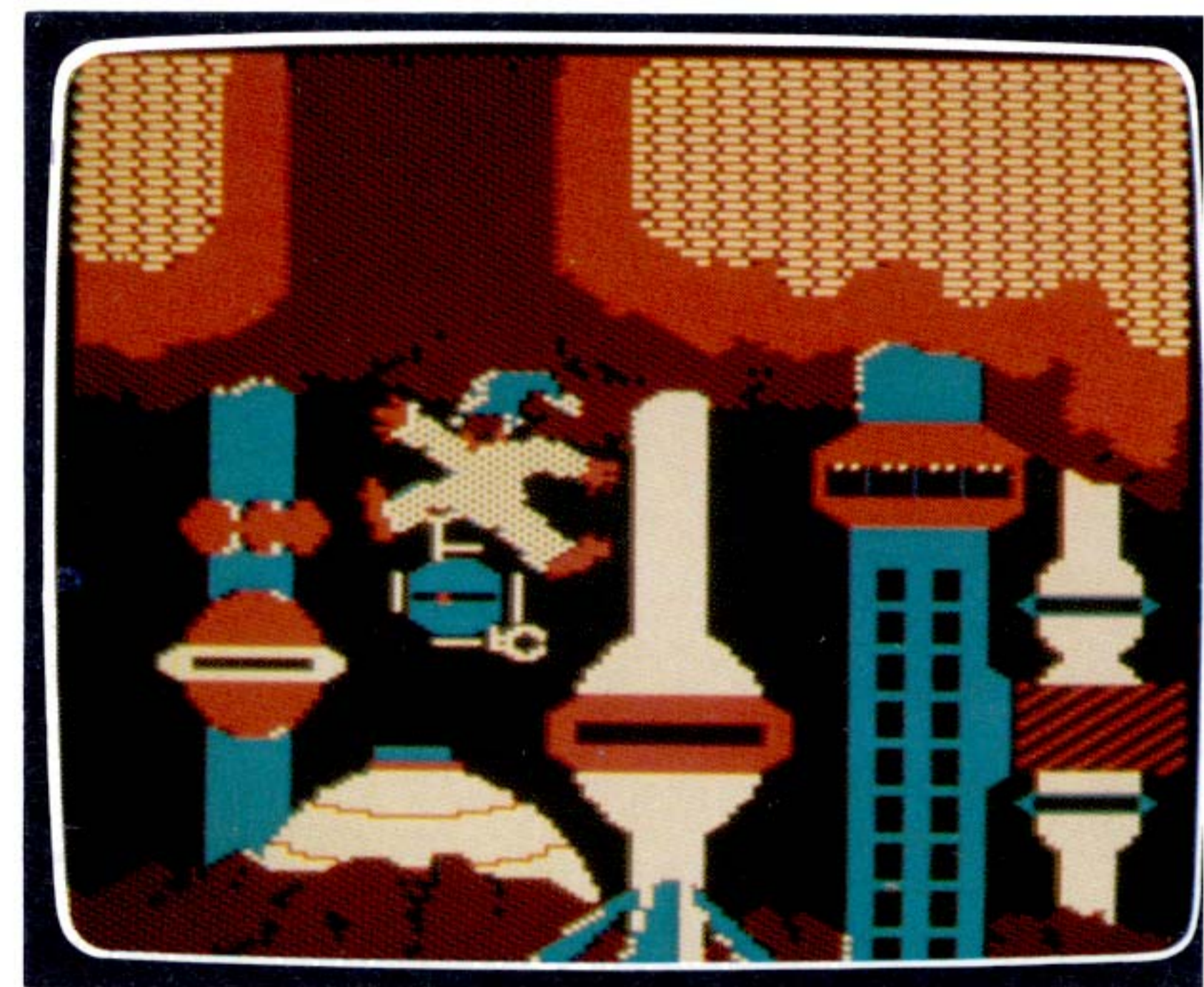
Copy-protected. \$988 (special discounted price available until 10/1/85). Includes video cassettes, 25 student guides, overview teacher's guide and four learning modules (each module includes 25 student guides). Apple II family (64K) Note: WHALES AND THEIR ENVIRONMENT (which includes the BANK STREET LABORATORY) will not run on the IIc. Available only to schools and other institutions. Holt, Rinehart and Winston, 383 Madison Ave., New York, NY 10017; 212/872-2000.

ROBERT SCAROLA: The idea is simple and unique. Send out a real sailing ship (the MIMI) with a mixed crew of adults, teens, and children on an expedition to track, observe, and catalog humpback whales off the Georges Bank in the Gulf of Maine. Videotape their adventures and create a series of 15-minute segments for broadcast on public television during the school day. Along with the physical drama of seeking out the humpback whales, learning to sail, encountering storms at sea, and learning to navigate and maintain a sailing ship, add the human drama of people learning to live with each other on a small ship at sea. Spice that with a grey-bearded captain and a deaf teen who teaches everyone sign language and you've got an engaging series for kids. Now, partner the series with a software and documentation package that has to rank as one of the best produced in 1984.

THE VOYAGE OF THE MIMI opens new territory in learning software. It attempts to merge two tools of the new technology, video and computer software, into a whole that is greater than the sum of its parts. I think it succeeds admirably as a first attempt, and is well worth the investment on the part of any school that wants to involve children in learning through both imagined adventure and practiced skill.



The VOYAGE OF THE MIMI package includes teaching tools from several media—software that teaches navigation, books, nautical charts, a whale identification poster, and video cassettes of a real whale-tracking expedition—all of which add up to a realistic and engrossing learning experience.



Listen in to ten-year-old Russell as he navigates ROBOT ODYSSEY's City Sewer: "I wonder what would happen if I hooked this thing up to that? Look, each chip has eight hookups! . . . All I've got to do is get inside a charged-up robot. Wait a sec, I've got to check something . . . I think I have to use the keyboard, it's more accurate. OK, robot . . . now I know where I'm going . . ."

People think computers will keep them from making mistakes. They're wrong. With computers you make mistakes faster.

—George Morrow,
Quotations from Chairman Morrow

ET CETERA

Barbara Robertson and Research Department, Domain Editors

STEWART BRAND: This is the "everything else" category, miscellaneous, unclassifiable, new, dubious, subversive, titillating. Where else would you put a slideshow control program, a genealogy chart maker, and a postage analyzer? The edges of the personal computer dissolve here, incorporating a home watcher, a bar code reader, interactive videodiscs, and all manner of music-making. Last year this section was sparse, this year it's crowded. Makes one wonder about next year.

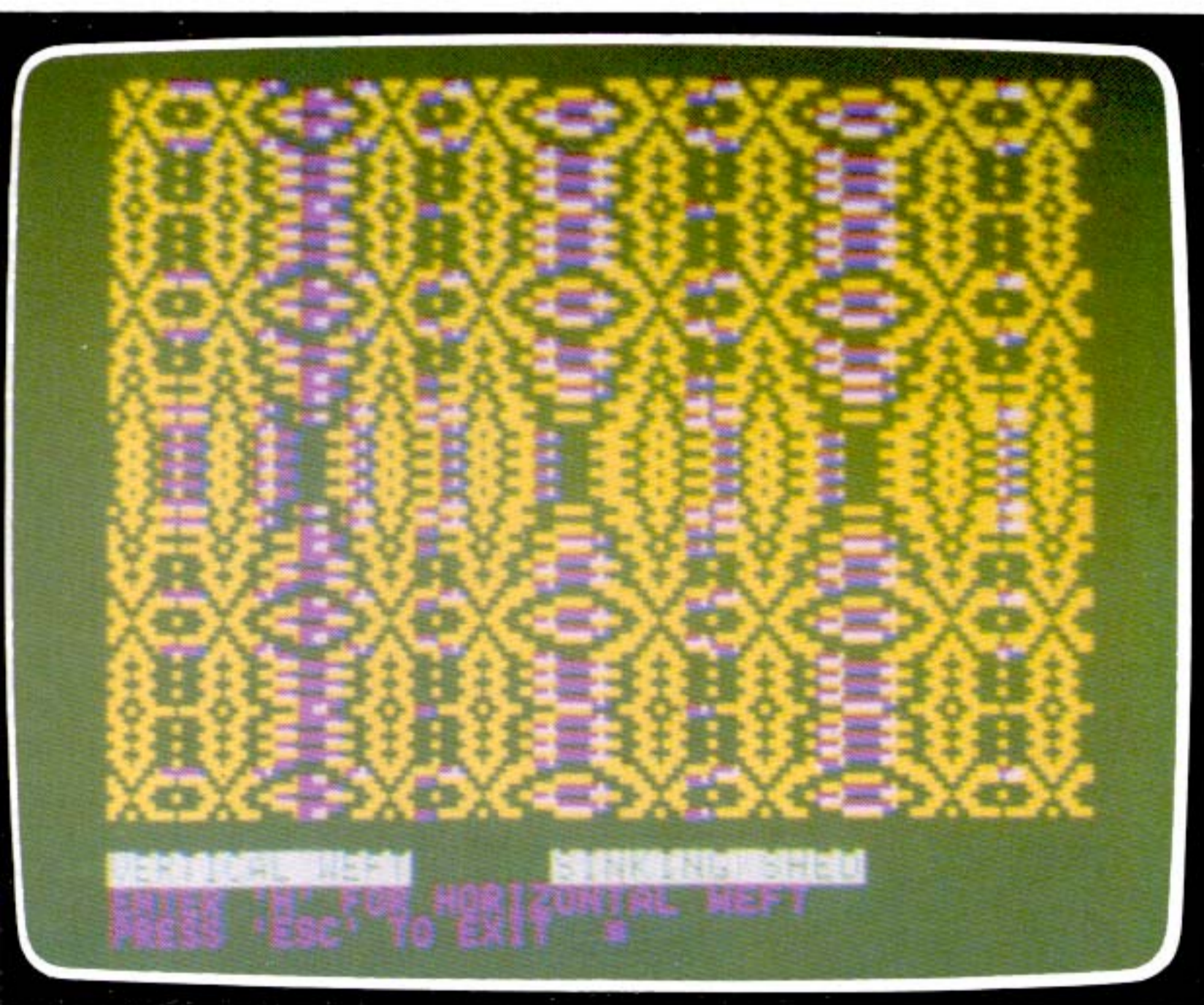
BARBARA ROBERTSON: Without the research staff, the **Catalog** would still be an impossible dream. If you marvel at the quantity of information in this small book, remember that for each program and book reviewed, we have half a dozen more on our shelves in the library. Each one of those programs and books got to us because someone made a phone call or sent a letter. Each has been cataloged and shelved, checked out for review—and in—and out again, has warranty cards and invoices filed, disks and cassettes carefully removed, logged-in and stored away, and a thank-you letter sent. Each has information about it collected, distributed, and filed—from

reviewers, from magazines (thank you Hank Roberts)—and perhaps the biggest task of all: each program and book that made it into the **Catalog** has access information. That little paragraph at the beginning of each review is the result of (sometimes many) phone calls to verify the facts. All of this, *all* of this, was done by the research staff. And more . . . they pay reviewers and send tear sheets to companies with products mentioned, take care of the hardware, answer the phones, distribute the mail, and somehow stay cheerful, enthusiastic, and interested. Why did they take on this section, too? For fun, and because no individual had the requisite range of interest.



Clockwise from front: Kathy Parks, Barbara Robertson, Matthew McClure, James Stockford, Lyn Gray, Cliff Figallo; center: Karen Hamilton.

Matt Herron



Onscreen warp and weft . . .

VIDEO LOOM II

Howard Harawitz; Apple II family; 48K; printer and graphics software recommended; copy-protected? NO; \$60 plus \$4 handling; Howard Harawitz, 1333 South Park St., Suite 1610, Halifax, Nova Scotia B3J 2K9; 902/429-3445.

A few keystrokes and the colors change in this traditional colonial overshot weaving pattern; threads can become thicker or the whole pattern can shift. With VIDEO LOOM II, the computer becomes a weaver's sketchpad for exact pattern drafting before struggling with looms and heddles.

KEVIN KELLY: This program weaves colored textile patterns on a video monitor. At the same time, it sews a nifty circle in computer history: One of the very first programmable machines built was a loom run by sets of punched cards. That was about 1800. Now, with the touch of buttons, you can change thread thickness, color, spacing, and threading draft on a simulated loom with 32 harnesses and 64 treadles. Alter a choice and a new fabric unrolls down the screen. The color range is unnecessarily rudimentary, hampering sustained use for serious textile artists, but the program is fine as a tool for weaving instruction.

Use your Apple to control a slideshow . . .

APPLE/GEMINI LEISURE TIME EXPANSION (LTE) PACKAGE

Thomas Wilson; Apple II/II+//IIe; 48K; copy-protected? NO; \$449;

GEMINI 2000 PROGRAMMER/DISSOLVER

Includes handbook, AC adaptor; \$549;

both from Pacific Micro Systems, 160 Gate Five Rd., Sausalito, CA 94965; 415/331-2525.

JAMES STOCKFORD: A slideshow set to music with voice overdubs can be a dazzling

way to present a story, sales presentation, or travelog. But a mighty spectacle requires a mighty lot of editing.

With this package you get a hardware device (the Gemini 2000 P/D) that controls one or two projectors, a printed circuit board for the Apple II, and software on a floppy disk. You use the software to create the slideshow instructions, which you save on a cassette tape—in sync with a sound track if you want. Put the tape in the tape player, plug the Gemini 2000 P-D into the tape player and slide projector/s, and you have an automatic slideshow with music. The software can control three Gemini devices for a total of six possible projectors. You can switch from one

projector to the other; set up a sequence of dissolves, cross-fades, and strobe effects; load slides from anywhere in any carousel in any order; control bulb intensity; cue timing to match music or speech; and repeat any of the sequence loops. Each instruction is called a cue—you're allowed 1500. Online help is available, as is an onscreen command page for reference. Works with Kodak and other projectors that have the same type of connectors. Compares favorably in price to LED-type single-purpose editing machines (Arion 828 at \$2795, AVL Coyote at \$1695), even when you add in the price of the Apple II—and is much more convenient, flexible, and powerful.

Interactive Video

FABRICE FLORIN: Interactive Video will give you good reason to turn your TV back on. The same videodiscs that play popular movies and, in compact size, rock and classical music, can be browsed at random or be connected to a microcomputer.

Rather than watching passively, slumped in an armchair, you drive this video software like a computer program. At the touch of buttons you scan through a storehouse of images and sounds much as you would flip through the pages of a book. With a microcomputer you can rearrange the display or have it branch in alternative paths for a teaching lesson or game. The largest drawback so far is that you cannot record images or sounds (without spending a fortune)—you can only play and reorder the prerecorded component images.

I used an LD-700 videodisc player to review the programs listed, courtesy of the folks at Pioneer. This, their state-of-the-art consumer model, retails for around \$800. Audiophiles may be interested in Pioneer's latest gadget, the LD-900, which plays both videodiscs and audio compact discs, giving you, at a thousand bucks, two players for the price of one. If that's a bit high for your pocketbook, you may want to look into bare-bones models such as the LD-660 (no search features) at \$299, or older models like the Pioneer 8210, which, although less fancy and somewhat slower, does the job for \$499 or less. You can also get a reconditioned industrial model (7820 Model III), or new players at wholesale prices, from American Technology Resources.

Pioneer Videodisc Players: catalog free from Pioneer Video, 200 West Grand Avenue, Montvale, NJ 07645; 201/573-1122. **American Technology Resources:** catalog free; 1245 North Providence Road, Media, PA 19063; 215/565-6434.

Really gorgeous pictures . . .

SPACE DISCS

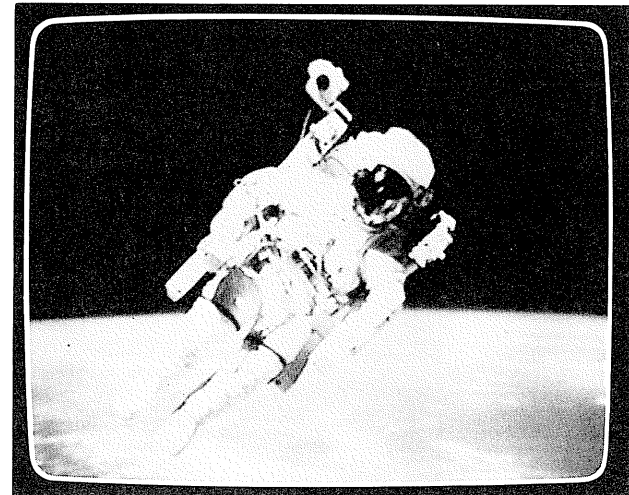
Space Archive Consumer Series: \$39.95 each (Space Shuttle Mission; Shuttle Downlink; Apollo 17; and Mars and Beyond); **Space Educational Series:** \$320-\$400 (Voyager; Apollo; Shuttle; The Sun; and Astronomy); **Video Vision Associates, Ltd.,** 7 Waverly Pl., Madison, NH 07940; 201/377-0302.

NASA's "home movies" from Apollo, Space Shuttle, Voyager, and other space programs, complemented with thousands of acquired films and slides of stars and planets. The **Apollo** series captures every major moment of the historic moon program, from astronaut training to final splashdowns. The **Shuttle** discs cover the first 13 Space Shuttle missions (test flights included), and are loaded with tidbits of information about life in orbit, as well as breathtaking space walks. The **Astronomy** disc is less dramatic, but contains a true wealth of high-res photos, computer simulations, and other information guaranteed to keep budding astronomers glued to the screen. The **Sun** and **Voyager** discs are more detailed versions of the same.

These images are offered in two versions: a condensed **Space Archive** series for consumers and an educational **Space Disc** series, higher-priced but more complete. Whichever you choose, this is the most universally appealing application of the videodisc medium that I've seen so far.

Also available: VAI// interface to the Apple II and IIe (\$140) and LASERWRITE interactive authoring program (\$75); allows you to create interactive computer lessons with structured branching routines—captions, questions—with or without a videodisc player online.

Other videodisc programs of interest include: **The Creative Camera** and **The History Disquiz** (\$29.95 each; Pioneer Video, Inc., 200 W. Grand Avenue, Montvale, NJ 07645; 201/573-1122); and **Gardening at Home** (\$29.95; XIRG, 206 Pine Creek Ave., Fairfield, CT 06430; 203/625-5680).



Experience the excitement of the High Frontier in the privacy of your own living room. Here, a NASA Shuttle Report takes you for a walk at 17,000 miles per hour.

Software classics...

SOFTWARE GOLDEN OLDIES, VOL. 1

Not copy-protected. \$29.95. IBM PC/XT/AT and compatibles; PCjr. Apple II family. Commodore 64. Macintosh. Software Country, 270 N. Canon Dr., #1297, Beverly Hills, CA 90210; 800/245-2057 or, in CA, 800/245-2056.

STEWART BRAND: The original ADVENTURE, which established a new literary and game genre. The original ELIZA,

psychiatrist-on-a-disk, which has inspired endless debate over the proper uses of computers. The original LIFE, which has set in motion whole new branches of cosmology and biology and math. The original PONG, Adam to the whole world of video and computer games.

With this bargain disk you can relive computer history and catch creativity at the flood. These programs had an original excellence which does not age any more than Homer does.

Serious information . . .

INTERACTIVE VIDEO

Interactive Video; Eric Parsloe; 1983; 290 pp.; \$16.95; **The Videodisc Monitor,** P.O. Box 26, Falls Church, VA 22016; 703/214-1799; or **COMPUTER LITERACY.**

FABRICE FLORIN: If you want to learn more about interactive video, this plain-vanilla paperback is the best introduction I know to the field. It is well organized and offers an intelligent overview of how interactive systems work, from consumer to industrial applications.

Simple programs for astronomers . . .

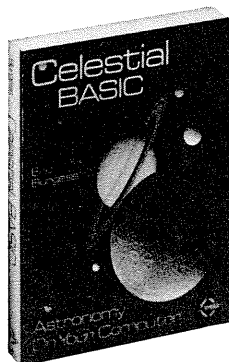
CELESTIAL BASIC

Celestial Basic (Astronomy on Your Computer); Eric Burgess; 1982; 300 pp.; \$16.95; Sybex, 2344 Sixth Street, Berkeley, CA 94710; 415/848-8233; or **COMPUTER LITERACY.**

JAMES STOCKFORD: This book is a labor of love. Its backbone is two dozen program listings in BASIC divided into groups dealing with planets, moon, calendars, conversions, meteor showers, constellations, etc. Accompanying text is informative and graceful, with references to ancient astronomical practices, fundamentals of armchair astronomy, and careful suggestions for programmers.

The beauty of the printed BASIC listings is that they work for any computer with little or no modification. Program lines are simple, not condensed, to make modification easy for the beginning programmer. Each program is loaded with the expertise and data of an expert astronomer and his friends: The CELESTIAL BASIC users' group now has

about 100 active members and publishes a newsletter, several cassettes for the Timex/Sinclair 1000, and a disk full of BASIC programs for the Apple II. Contact S & T Software Service, 13361 Frati Lane, Sebastopol, CA 95472, for more information.



Build a radio inside your software . . .

PC-USPICE

IBM PC/XT/AT and compatibles; 512K and 8087 co-processor; \$1050; copy-protected; Unit Software and Consulting, Inc., 2437 South Mulberry, Mesa, AZ 85202; 602/839-3496.

JAMES STOCKFORD: Now you can design a computer, a shortwave radio, a calculator, a hi-fi, anything that uses electronic circuitry, right on your micro. This program simulates the actual hardware so you can build, analyze, and test your design to see how well it works. Great for inventors, ham radio operators, anyone really interested in electronics.

PC-USPICE is not a toy. It is an unusual integrated software program that combines an equation solver with some database, graphics, and text functions as a very low-cost way to build, store, and link your circuit designs on a microcomputer. It will even work as a design tool for creating integrated circuit chips. It is very complex, but there is nothing else like it in the world.

Exploring outer space . . .

SKYTRAVEL: WINDOW ON OUR GALAXY

Copy-protected; \$35, street price, \$25; Commodore 64; supports joystick or keyboard control; Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380; 215/431-9100.

PC PLANETARIUM

Marilyn Davis; \$52; copy-protected? NO; IBM PC/XT/AT and compatibles; PCjr; printer recommended; Light Software, 369 Pine Street, Mezzanine, San Francisco, CA 94104; 415/788-4578.

CHUCK ELLIS: It's January 1, 1986, and you're in Washington, D.C., looking at the Southern sky at 4:15 in the morning; SKYTRAVEL displays the stars you see. Prefer somewhere else? Go anywhere in the world and to any time, plus or minus 10,000 years. Let the stars move from 1 to 64 times natural speed, or hold everything still while you ponder, for example, whether an unusual conjunction of Jupiter and Saturn

might have made a signpost to Bethlehem. But why be provincial? Open up "Deep Sky" mode and consider the galaxies, nebulae, clusters, clouds, and other globs of Way Out There. Reduce the field of view and you'll see certain stars that appeared single revealed as double.

This program features comets, eclipses, celestial coordinate overlays (good for printing sky maps), onscreen tutorials, star-finding, tracking, and more. For anyone at all intrigued by the swing of the Pleiades, eclipses of the sun, or the flickering connections between the lights in the sky and our quizzical race, it's a grabber. For anyone involved with spherical trig, astrology, or any form of navigation, it's a must.

JAMES STOCKFORD: PC PLANETARIUM is similar to SKYTRAVEL, but runs on the IBM PC and compatibles. The sky map is interactive: you can display one object or constellation, or build a sky by adding objects. It does not use a screen dump to print but rather calculates the printing for an accurate map.

Check on your house while you're away . . .

SENSAPHONE

\$250; Phonetics, Inc., 101 State Road, Media, PA 19063; 215/565-8520.

TOM ZITO: I live out in the country, far enough away from the neighbors so that my home is prime real estate for burglars, a few of whom paid an uninvited visit ten years ago. This resulted in the purchase of a burglar alarm system for about five grand and, more recently, a Sensaphone.

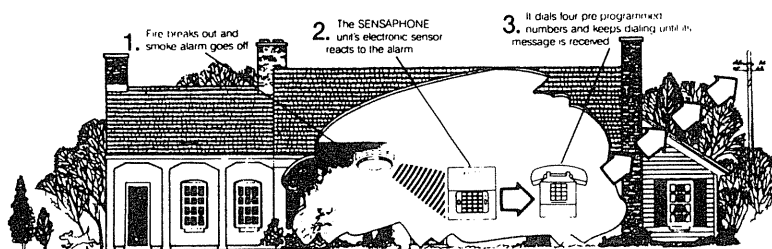
The Sensaphone is a dedicated little computer that you connect to your phone line. It monitors temperature, time, ambient sound level, and, with the help of two auxiliary sensors, the presence of water and the status of your alarm system (if you have one). If you call your phone number, the Sensaphone will talk to you in English—telling you whether the power is on, whether the 18-hour back-up batteries are okay, whether there's any water on the floor, and whether there have been any loud noises in your house (for instance, a smoke detector). It also lets you monitor the sound in your house for 15 seconds, in case you're

wondering whether Rover is howling at the moon.

The thing can be programmed to call up to four numbers and let them know that something has gone awry. So if your basement is flooding, it can call a neighbor and say so, even though you happen to be off in Tibet. Or it can call the police and say that somebody has just knocked down the back door. It's so smart that it holds off a bit in certain circumstances before dialing; e.g., until the power has been off more than five minutes. Then it keeps calling numbers until it reaches one.

If you're like me, you'll find yourself inexplicably calling this computer every few hours just to hear it talk. It comes with an instruction book that is a model of clarity, and the Sensaphone itself prompts your programming tasks with its built-in speech synthesizer chip. How come my IBM PC can't be this helpful?

The smoke alarm goes off, but you're not home. SENSAPHONE calls the phone numbers you program it to call as soon as it hears the high sound level of the alarm and, hopefully, saves your home.

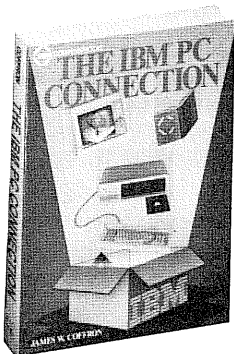
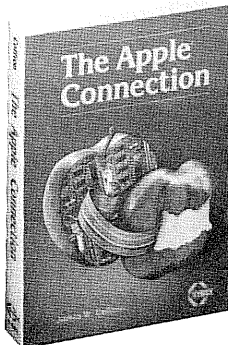


The SENSAPHONE 1000 talks to the receiving party and states the problem in English—sound level high. Emergency action can be taken at once.

Connecting your coffee pot to your computer . . .

THE APPLE CONNECTION

The Apple Connection; James W. Coffron; 1982; 264 pp.; \$7.95;



THE IBM CONNECTION

The IBM Connection; James W. Coffron; 1984; 264 pp.; \$16.95;

both from Sybex Computer Books, 2344 Sixth St., Berkeley, CA 94710; 415/848-8233; or COMPUTER LITERACY.

CLIFF FIGALLO: The computer is a digital creature, and though it lives on electricity, it cannot interact directly with the world of electrical switches and gauges. You can't plug an RS-232 cable into Mr. Coffee and program "turn on at 10:00." What you need is an *interface* between the computer's digital world and the analog world, where electricity is measured in volts instead of bits. A few software/hardware systems claim to provide home control, but I found none I could recommend. So far, if you want your computer to control the analog world, you'll have to arrange it yourself.

These books do a great job of clarifying the workings of digital systems and tell you how to program them to control the analog objects in your home. They are books for the seriously curious, not for the casual reader. And be forewarned that (1) the ability to write simple programs in BASIC is a prerequisite to making real use of these books and (2) the purchase of hardware is going to be another expense on the way to computer control in your home.

Virtually any job involving electrical switching, from turning on the lights at 9 o'clock, to designing a home-security system, to monitoring and maintaining critical environmental conditions in a greenhouse, can be handled using the fundamentals in these books.

★ MEANS: NEW TO 2.0 EDITION

Quick answers to common ailments . . .

HOME DOC ★

Apple II family; 48K; Copy-protected? NO; Comp Doc, Inc., 6538 South Jungfrau Way, Evergreen, CO 80439; 303/674-3726.

ELIZABETH MORGAN: Written by an M.D., this program provides general information on commonly asked medical questions. From colds and flu to cancer and heart disease, HOME DOC discusses the situation and gives basic advice, not to replace your doctor but to give a non-medical person some ideas about common ailments.

Mail handling . . .

POSTMAN

Version 2.21H; IBM PC and compatibles; 128K; Copy-protected? NO; \$100; \$10 (refundable) demo.

EMAIL ★

Version 1.10G; IBM PC and compatibles; 128K; Copy-protected? NO; \$50 (moneyback guarantee).

Both from Mom's Software, P.O. Box 19418, Portland, OR 97219; 503/244-9173.

LYN GRAY: POSTMAN helped me cut down on valuable time spent poring over the nine mail-service charts tacked to the mailing-area wall trying to determine the cheapest and/or timeliest way of sending letters, packages, and boxes.

It displays the best method to ship—with alternatives—in bar-graph form. When you enter the destination zip code and package weight, POSTMAN calculates cost, zone, and number of days to deliver by United Parcel Service, U.S. Postal Service, Federal Express and Airborne. It lets you know if a zip code is nonexistent or that certain services are unavailable (then it tells you what services are available thereabouts).

RACHEL UNKEFER: Anyone who regularly sends packages internationally knows that the charts for doing overseas mail are very confusing. Figuring postage is a real arithmetic challenge.

EMAIL eliminates the problem. The program asks you what country you're sending to. If you misspell, it shows you a list of possible names. It asks you the weight of your package and gives you a choice of methods by which to send it. Pick one and it gives you the rates, lets you know if insurance or special delivery is available and how much, and specifies the customs forms you'll need.

We have never had to look at the documentation, the screen prompts are so easy. It is really handy; we like it.

The first section provides all the health information, over 200 question-answer items, a "what to do" section, and summaries of topics for quick reference. The program will be updated periodically as medical information changes.

The second section handles your personal and family histories, records of examinations and tests, listings of current medications, names and addresses of doctors, dentists, and other health professionals, and health care expenses. It includes graphs, tables, and animation.

Keeping track of little things . . .

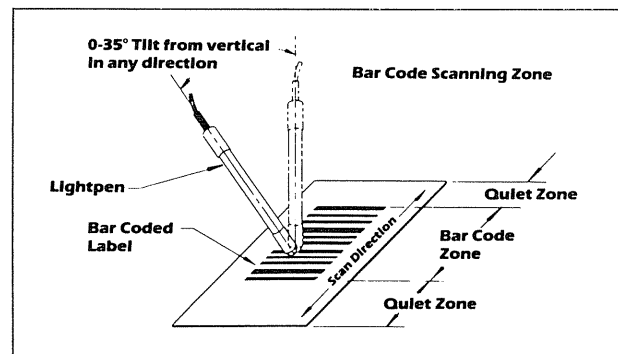
MAC-BARCODE ★

MAC-BARCODE: Macintosh; \$395; SCANSTAR-Mac: \$600; both from Computer Identities Corporation, 5 Shawmut Road, Canton, MA 02121; 800/622-2633 or, in MA, 617/821-0830.

KEVIN KELLY: This two-part device prints out and reads bar codes in any of the six common coding systems, including the ubiquitous UPC code found on store merchandise.

My sister, who helped this product get off the ground, reports that it is being used for ID cards, by health-care centers to track X-rays and medicines, by libraries to track books, and by small manufacturers who must meet the Department of Defense specification that all items be bar-coded.

The software prints bar code labels one at a time or in batches from data you enter. The Scanstar-Mac is a light pen with interface box that plugs into the keyboard hole so the Mac thinks you're typing in info each time you scan a bar code. The information can be manipulated by any Mac spreadsheet, database, or inventory program. It'll read any code style, and the labels the Mac prints can be read by any other scanner—such universality being the whole point.



Invented for big business users, MAC-BARCODE makes this convenient technology available to the small business user. Easy to set up; easy to use.

Easy to use, one-day nutritional analysis . . .

NUTRIPLAN

Apple II family; 48K • IBM PC compatibles; 64K; IBM PCjr; 128K; Copy-protected? YES; \$75; Micromedx, 15 Canton Street, East Northport, NY 11731; 516/735-8979.

ELIZABETH MORGAN: NUTRIPLAN calculates the nutrient content of food for a meal or for a day. It's easy to search, add to, or change the 400-item food list. You can enter any food, analyze what you've eaten for 21 nutrients, and compare the results to the Recommended Daily Allowance (RDA). You can compare two foods—say ice cream with skim milk, or soybeans with chicken. NUTRIPLAN lists nutrients for both choices and highlights the higher amounts. This program is clear, easy to use, and does a great job.

Sophisticated recipe searching . . .

MICRO COOKBOOK

Apple II family; 64K • IBM PC/XT/AT and compatibles; IBM PCjr; 128K • Commodore 64; Copy-protected? NO; \$40. Virtual Combinatics, Inc., P.O. Box 13323, Oakland, CA 94661; 415/530-1726; recipe disks available for wok cooking, bread, low fat and low sodium, microwave cooking, food processor and many others (\$12.95-\$16.95).

PAUL SCHINDLER: Until I saw MICRO COOKBOOK, I thought all cookbook programs were silly. What could they do that I couldn't do faster and better with a book? Well, the way I cook is to determine first what is fresh in the store or what spices I feel like having, and then search for appropriate recipes. MICRO COOKBOOK, really a database management system for recipes, works the same way. You enter a category, say Indian, and a spice, say curry powder, and it offers you a choice of all Indian recipes calling for curry powder.

The program is so well-designed I could use it immediately, without reference to the manual. You can print any recipe and a shopping list for selected recipes (and add items). Two reservations: It readjusts quantities when you change the number of servings, but doesn't convert them into more reasonable measurements (one teaspoon tripled is left at three teaspoons, not converted to one tablespoon). And it lets you add recipes more easily than any similar program I have seen or heard of, but limits you to 255 recipes per floppy. I know I have more recipes than that in my clip file.

BARBARA ROBERTSON: Paul uses MICRO COOKBOOK on an Apple II; the IBM PC version has a bit more power: There are 512 recipes on a double-sided disk, and the program searches through eight recipe files to find, for example, "all desserts that do not use sugar." I like it, too—I make up my own classifications, store my own recipes, and don't care about the 156 recipes they supply.

We were all surprised when NUTRIPLAN showed us that salmon was higher than veal cutlets in cholesterol; if you are what you eat, you might as well plan for it.

You are what you think you eat . . .

THE ORIGINAL BOSTON COMPUTER DIET

IBM PC/XT; PCjr; 128K • Apple II family; \$79.95 • Commodore 64; \$49.95; Copy-protected; The Scarborough Systems, Inc., 55 South Broadway, Tarrytown, NY 10591; 914/332-4545.

ELIZABETH MORGAN: This is one of the best nutrition-health education programs I have seen. Its goal is to motivate you to lose weight and then maintain the loss. Going far beyond just recommending a diet, it explores why you eat, what you eat, and when you eat. It gives you a way to look at your eating habits.

You choose one of three "counselors" who then acts as your personal guide, interacting with questions and information. Medical history, height, weight, and age act as your baseline, and from there you choose the rate of weight loss by selecting one of four diets. After your first session, it takes only 15 minutes a day to update the information.

A small manual provides clear instructions for running the program, adding to the 700-food-item database, recording daily meals, scoring nutrient values for several vitamins and minerals. If you wish, you can bypass the counselor and simply use the charts, graphs, food records, and so on.

Inspired fortune-telling . . .

THE BOOK OF CHANGE: I CHING ★

Les Crane and David Badley. Copy-protected. \$40. IBM PC and compatibles; most CP/M machines. Software Country, 270 N. Canon Drive, #1297, Beverly Hills, CA 90210; 213/278-8450.

STEWART BRAND: How appropriate that this ancient (since 3,000 B.C.) Chinese oracle and repository of Taoist wisdom has been translated into a computer program. It's had program qualities all this time—binary notation (yin and yang versus 0 and 1), tree structure, use of random numbers, and design as an applications tool.

I think Fu Hsi, King Wen, and the rest would approve of this version of their work. It is quietly elegant in the way it prompts you through the process of consulting the oracle and then studying the reading. Instead of yarrow stalks or coins, you use six taps on the space bar to build the hexagram, changes, and subsequent hexagram that constitute a reading. Screen by screen the pages of the text (nicely translated) are unfolded, and you're offered the choice of filing and/or printing the result.

In the tradition of psychologist Carl Jung's introduction to the famed 1950 Bollingen edition of the *I Ching*, I asked the oracle what it thought of being electronic. Reply: THE CLINGING (Shining twice . . . depend

on establishing a support system . . .," etc.) changing to DARKENING OF THE LIGHT ("You must learn to understand the nature of evil. Do not make peace with it . . ." etc.) Long in the tooth, the *Ching* still has its bite. How many computer programs even acknowledge evil? How many fewer have intelligent advice on the subject?

It's an adroitly done, dignified program, with a fine brief manual. You need no previous knowledge or experience of the *I Ching* book to get full value. As a bonus in the program there's also "Decision Maker," a succinct factor-weighting utility to help you sort your thoughts for choosing between alternatives of any kind. One banal, one profound—two levels of helping you decide.

Emotional hoe . . .

THE ART OF NEGOTIATING ★

Girard and Roy Nierenberg. Version 1.0. Copy-protected. \$495. Apple III; IBM PC/XT and compatibles; 256K; 2 disk drives or hard disk and one disk drive. Experience in Software, Inc., 2039 Shattuck Ave., Suite 401, Berkeley, CA 94704; 415/644-0694.

DAVID GARFINKLE: I look at everybody's life as mainly a series of negotiations. You may disagree, thinking, "that's true when it comes to arms control or wage agreements, but not in my own life." I'll come back with a simple question: how do the dishes get done in your home?

This program helps you think by allowing—no, by forcing—you to untangle and isolate

How'm I doin', Coach?

JAMES F. FIXX: THE RUNNING PROGRAM ★

Copy-protected. \$80 (without backup); \$100 (with backup). IBM PC/XT/AT and compatibles (128K); PCjr (256K). Requires 80-column display. MECA, 285 Riverside Avenue, Westport, CT 06880; 203/222-1000.

STEWART BRAND: Like a dedicated coach, this program nags and encourages and instructs, and first thing you know you're in good shape and inclined to get even better. I'm halfway through a 30-step schedule to build to three miles a day running; no book has managed that before. Something about proudly recording my progress and then having it analyzed and displayed from a half-dozen different directions—in relation to my diet, to the shape I was in when I started, to previous weeks, and to the goal—keeps me making progress to report.

The program is appropriate for anyone from a confirmed couch potato to a professional athlete. Answer its questions, and you'll find out about your personal heart-attack risk, your overall health, and the effect of your lifestyle on it. You'll take some tests (two-mile run, Harvard Step Test) that'll tell you what condition you're starting in. Also the program will analyze your diet, give you a handy way to keep track of it, and advise how to improve it. After two months of steady use, I'm still finding corners of the RUNNING PROGRAM that are new and enlightening.

many issues with a merciless rigor. In its methodical, calm way it pushes you to weed out the emotion from issues and rename them in ways that aren't emotionally charged, so you can deal with them. If it's your night to do the dishes and you have other plans, you might not keep such a cool head. When a large contract you're negotiating is at stake, you most certainly wouldn't.

The program is completely menu-driven and easy to learn. It builds a knowledge base from what you tell it, but makes few inferences, although I did run across one embarrassing feature: when I was attributing more "negative climates" to my opponent than to myself, the program asked, "Are you projecting?"

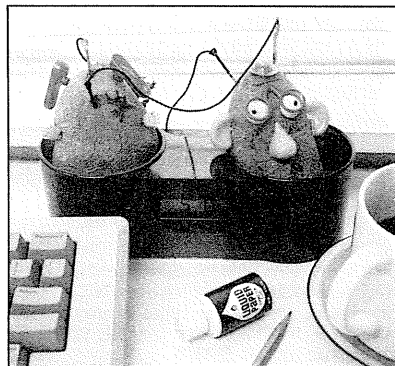
Batting averages on a disk . . .

CHERRYGARTH FARMS SPORTS STATISTICS ★

Merle Wagner; Apple II family; DOS 3.3; programs available: baseball/softball, basketball, football, track and field, ice hockey, soccer, field hockey, lacrosse and sports scheduling; \$49.95 each; Copy-protected? YES; Cherrygarth Farms Software, Inc., 101 S. Dewey St., Auburn, IN 46706; 219/925-1093.

GLYN E. REINDERS: After looking around for statistical programs to use in the athletic department of my high school, I decided to purchase several programs from Cherrygarth Farms.

The programs are menu driven and exceptionally easy to use—they all use the same commands and operate in the same way. You can enter data to keep track of many statistical categories in a very short period of time, and once entered, you can have the program sort and print the information in any way you want to use it (e.g., offensive and defensive game reports, defensive player reports). I found that it takes about ten minutes to enter all the data for one basketball game. Our coaches and players love the results.



Family trees . . .

FAMILY ROOTS ★

Steven Vorenberg. Not copy-protected. \$185. Most CP/M machines (64K). Most MS-DOS machines (96-256K); Commodore 64; Apple II family. Quinsept, Inc., P.O. Box 216, Lexington, MA 02173; 617/641-2930.

KEVIN KELLY: If Harry is Tom's brother-in-law, and Tom is Bob's father, and Bob is Harry's uncle, then who is Harry? This kind of headscratcher is commonplace when you're trying to map out a family tree. If there was ever a problem begging for a personal computer, then this is it. In fact computers are rejuvenating the field of amateur genealogy, enabling anyone to keep track of hundreds of relationships that make up their family tree. Dog and horse breeders also use the program to trace lines of genes. An agreed standard called GEDCOM will allow users of any genealogy software to swap files with each other, so that if you (or your dog) have an ancestor named McDonald you can tack on someone else's McDonald tree to your genealogy database.

FAMILY ROOTS organizes and stores information about your ancestors, then prints out pedigree charts. You can update, correct, or regroup descendants without having to erase and redraw your diagram. You can take, say, your Uncle Joe, and have a chart printed out with him in the center. Now he's all inspired to take some time and write down what he knows about his mom's brothers. An independent FAMILY ROOTS users newsletter offers wonderful support (Quinsept Newsletter; \$15/yr—6 issues; 102 Broadfield Lane, Spotsylvania, VA 22553).

BARBARA ROBERTSON: So why is the TWO POTATO CLOCK in the Whole Earth Software Catalog? Editor's privilege. It has a microchip (for the clock) and a liquid crystal display, so by stretching the point a touch, it qualifies for Etc. just as much as the SENSAPHONE, the GEMINI 2000 PROGRAMMER DISSOLVER, and the CASIO CZ101, except, of course, that this gizmo is powered by potatoes. How does the clock work? The potatoes (or cucumbers, bananas, cola, etc.) act as batteries. When you insert a zinc and a copper electrode into each potato a chemical reaction occurs—electrons are liberated at the zinc electrode and consumed at the copper electrode—and the resulting flow of electrons forms the electric current which drives the clock. (In one potato the zinc electrode connects to the clock. The second set of electrodes are connected to each other.) The TWO POTATO CLOCK is from San Francisco's Exploratorium, a hands-on museum of science where I go when I want to learn how image digitizing, holography, sound synthesis, music, or anything works. Every city should have one. (THE TWO POTATO CLOCK; \$18.50 postpaid; the Exploratorium Store, 3601 Lyon St., San Francisco, CA 94123; 415/563-3456. Potatoes not included.)—Suggested by Steven Dampier.

The Twenty-five Best Musical Products for Micros ★

JAMES STOCKFORD: 1985 will be remembered as the year musicians accepted microcomputers. Music stores now sell more software than guitars, much of it for non-musicians and hobbyists. You can create and record a composition, modify it, add to it, change its sound, or print it as sheet music. Drums, pianos, horns, choirs, and more are available on floppy disks. You can make your own sounds or record live sounds into RAM memory to analyze and modify them.

Because most new music products now accommodate the MIDI communication standard, your micro can control many music synthesizers, rhythm machines, lighting controllers, printers, and even video equipment and they can all work together. This means you can compose on a low-budget system and play back on an expensive system elsewhere. You'll need a MIDI interface card, a cable, and some software in order to use your micro as a MIDI controller.

We would like to thank the members of the music conference sponsored by the WELL (p. 148) for their evaluations: Daniel Sharp, David Julian Gray, Joe West, Jay Logan, Steve Cummings, Dana Pierce, and Chuck Fisher.

MIDI for serious musicians . . .

C-64:

DR. T's MIDI SEQUENCER PROGRAM helps the C-64 control MIDI instruments the way player piano rolls control player pianos, but in this case, you're the one who punches the tape, and DR. T's program makes composing on the C-64 easy. You can play your composition automatically through a MIDI instrument. C-64 owners who also own the Yamaha DX-7 can use DATA/7 to create sounds for their difficult but versatile instrument.

PERFORMANCE/7 lets you store your work in a library so you can instantly invoke a sound that might have taken you weeks to create.

DR. T's MIDI SEQUENCER PROGRAM: Dr. T. \$125. Commodore 64. Copy-protected? NO. Dr. T. 24 Lexington St., Watertown, MA 02172; 617/926-3564 • **DATA/7 AND PERFORMANCE/7:** \$125 each. Commodore 64; Apple II family; IBM PC; requires Passport or Roland interface, MIDI instrument, and audio amplifier. Copy-protected? YES. Mimetics Corporation, P.O. Box 60238, Station A, Palo Alto, CA 94306; 408/741-0117.

Atari:

MIDIMATE and **MIDITRACK II** is the only music game in town for Atari owners. This interface box and software let you compose and rearrange music with complete control. Play your composition on any MIDI instrument.

MIDIMATE and **MIDITRACK II:** Bob Moore. \$350. Atari 800XL or 65XE; requires MIDI instrument and audio amplifier. Hybrid Arts, Inc., P.O. Box 480845, Los Angeles, CA 90048; 818/508-7443.

Apple II:

Passport's three products, MIDI INTERFACE, MIDI/8 PLUS, and LEADSHEETER, work together reliably. You can compose, rearrange, control a MIDI instrument, and even print out melody lines and chords in standard music notation.

For Apple II owners who also own a Casio CZ type keyboard, CZ RIDER is special software. Arrange and rearrange compositions and customize the CZ keyboard's sounds, a difficult trick using the CZ alone.

DX HEAVEN is the best software we have found to create sounds for the Yamaha DX-7 and store sound libraries for instant retrieval.

MIDI INTERFACE: \$149.95; **MIDI/8 PLUS:** \$149.95; **LEADSHEETER:** \$99.95. Apple II family; requires MIDI instrument and audio amplifier. Commodore 64. Copy-protected? YES. Passport Designs, Inc., 625 Miramonte Street, Suite 103, Half Moon Bay, CA 94019; 415/726-0280 • **CZ RIDER:** \$149. Apple II family, requires Passport or Roland interface, MIDI instrument, and audio amplifier. **DX HEAVEN:** \$149. Apple II family; requires Roland interface, MIDI instrument, and audio amplifier. Both available from Cherry Lane Technologies, 110 Midland Avenue, P.O. Box 431, Port Chester, NY 10573; 914/937-8601 or 212/824-7711.

IBM PC/compatibles:

SEQUENCER PLUS is MIDI composing and rearranging software that is a very logically constructed imitation of a tape recorder with 64 recording tracks. If you're used to thinking in terms of tape recording techniques when you compose, this is for you. IBM owners who are serious about music and who want a composing software tool that prints high resolution sheet music will find nothing else that approaches the power of PERSONAL COMPOSER.

SEQUENCER PLUS: \$495. IBM PC and compatibles; requires Roland MPU 401 interface, MIDI instrument, and audio amplifier. Octave-Plateau Electronic, Inc., 51 Main St., Yonkers, NY 10701; 914/964-0225 • **PERSONAL COMPOSER:** Jim Miller. \$495. IBM PC and compatibles; requires Roland MPU 401 interface, MIDI instrument, and audio amplifier. Personal Composer, 14000 Edgewater Lane NE, Seattle, WA 98125; 206/364-0306.

Music contraptions . . .

Most decent synthesizers weigh a lot and cost a thousand dollars or more; The SUPER MUSIC SYNTHESIZER weighs about a pound and is just as good. It fits in a slot of your Apple II and comes with software so you can make the squeals and sounds of the high-cost units.

The DX-1 is an unusual and fun sound-making toy that fits in an Apple II slot. Connect a microphone to it and record any short sound around, then use its software to look at a picture of that sound, modify it, and play the modified sound back. You can connect a musical keyboard instrument to it and play your recorded (and modified) sound as one of the instrument's voices.

If you'd like to MIDI-fy your acoustic piano get the FORTE MIDI MOD installed and connect its cable to a MIDI instrument or to a MIDI interface card in your computer so you can have your MIDI instrument automatically play along too, and store and print out what you played on the acoustic piano without having to write it all down—kind of like magic.

SUPER MUSIC SYNTHESIZER: \$159. Apple II family. Copy-protected? YES. Applied Engineering, P.O. Box 470301, Dallas, TX 75247; 214/492-2027 • **DX-1:** Dan Retzinger. \$350. Apple II family; requires microphone. Copy-protected? NO. Decillionix, P.O. Box 70985, Sunnyvale, CA 94086; 408/732-7758 • **FORTE MIDI MOD:** \$475 to \$1495, depending on your piano, requires MIDI instrument or microcomputer with any MIDI interface card and software. Forte Music, P.O. Box 6322, San Jose, CA 95150; 415/965-8880.



Three keyboard instruments . . .

Low priced and capable, the Casio CZ 101 and CZ 1000 make a lot of sounds for the money. If you spend more, you'll get more with the Yamaha DX-7 keyboard, good enough for the hottest commercial recording artists. Finally, the Mirage is a keyboard with its own microcomputer, 3½ inch disk drive, disks with software and various instrument sounds ready to go, and a digital sampling capability built in so you can record sounds into its memory.

Casio CZ 101, \$495; CZ 1000, \$695; Casio, Inc., 15 Gardner Road, Fairfield, NJ 07006; 201/575-7400 • DX-7, \$1995; Yamaha International Corporation, P.O. Box 6600, Buena Park, CA 90622; 714/522-9262 • Mirage, \$1695; Ensoniq, 1 Great Valley Parkway East, Suite 10, Malvern, PA 19355; 215/647-3930.

For C-64:

MUSIC VIDEO KIT is the best C-64 toy we've found. You can create fantasy landscapes, spacescapes, and mindscapes, complete with music and sound effects. It includes 8 track composing and recording.

Sight and Sound makes a lot of very good programs that use the C-64 keys to make music. **THE INCREDIBLE MUSIC KEYBOARD** is a mechanical piano keyboard that fits over the C-64 typewriter keyboard so you can play the black-and-whites rather than the QWERTY. Comes with composing software.

THE MUSIC SHOP turns your C-64 into a composer's workbench with very good music printing capabilities.

MUSIC VIDEO KIT: \$39.95; INCREDIBLE MUSIC KEYBOARD: \$29.95. Both for Commodore 64. Copy-protected? YES. Sight and Sound, 3200 S. 166th St., P.O. Box 27, New Berlin, WI 53151; 414/784-5850 • MUSIC SHOP: Don Williams. \$44.95. Commodore 64. Copy-protected? YES. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903; 415/479-1170.

For Apple II:

MUSIC GAMES and **MAGIC PIANO** are playing, composing, and drill games that take you into the far reaches of music theory, where things are fun rather than tedious.

MUSIC GAMES. Lydia Bell. Apple II family; 48K. Copy-protected? YES. \$19.95. Howard W. Sams and Co., Inc., 4300 West 62nd St., Indianapolis, IN 46268; 800/428-7267 or, in IN, 317/298-5400 • MAGIC PIANO. Alan Sagan. Apple II family. Copy-protected? YES. \$49.95. Edusoft, P.O. Box 2560, Berkeley, CA 94702; 800/338-7638 or, in CA, 415/548-2304.

For Macintosh:

CONCERTWARE lets you compose and arrange music by selecting notes with the mouse, or experiment with sound by drawing shapes or creating a bar graph.

CONCERTWARE: \$49.95. Macintosh. Copy-protected? NO. Great Wave Software, P.O. Box 5847, Stanford, CA 94305; 415/852-2280.

Tips for the Disabled

CHUCK FISHER: It's possible to modify the Apple II using wiring diagrams from **Computers for the Severely Disabled**. Diagrams include ones for locking keys with indicator lights for one-hand or mouthstick operation (control, shift, repeat) for Apple IIe or II+; a single key to perform Control-Apple-Reset, normally a simultaneous three-key operation; and methods for replacing keys, joystick buttons, and KoalaPad buttons with air switches. You can also get a free password to the Santa Cruz Handicapped Information Data Base through the same organization. Please send a self-addressed stamped envelope or a donation. By the way, you don't need a set of plans to free Apple IIe keyboards. Just buy a long ribbon cable (up to 10 feet).

JAMES STOCKFORD: Two magazines of interest: **Aids and Appliances Review** treats a single class of assisting devices for the blind, with product evaluations and ordering information. It is helpful for professionals and also for tinkerers. Send in a 90-minute cassette tape and they will send you a recording of an issue at no charge. **Communication Outlook** has tools, services, and advertisements for those with communication handicaps due to neurological and neuromuscular disabilities.

Computers for the Severely Disabled, Easter Seal Society, P.O. Box 626, Santa Cruz, CA 95061 • Aids and Appliances Review; free (quarterly); The Carroll Center for the Blind, 770 Centre Street, Newton, MA 02158-2597; 800/852-3131 or, in MA, 617/969-6200 • Communication Outlook, \$12/yr (4 issues); Artificial Language Laboratory, Michigan State University, 405 Computer Center, East Lansing, MI 48824-1042; 517/353-0870. (Communication Outlook suggested by Debra Sue Heaphy)

Excellent references . . .**PERSONAL COMPUTERS AND SPECIAL NEEDS** ★

Personal Computers and Special Needs; Frank Bowe; 1984; 171 pp.; \$9.95; SYBEX Computer Books, 2344 Sixth Street, Berkeley, CA 94710; 415/848-8233; or COMPUTER LITERACY.

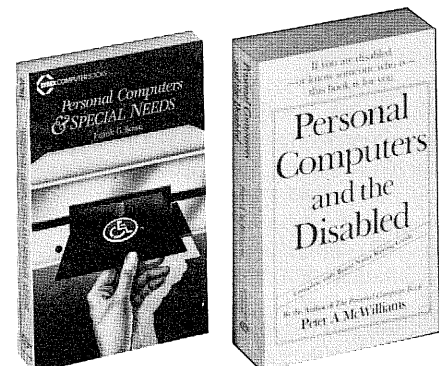
PERSONAL COMPUTERS AND THE DISABLED ★

Personal Computers and the Disabled; Peter McWilliams; 1984; 416 pp.; \$9.95; Doubleday and Co., Direct Mail Order, 501 Franklin Avenue, Garden City, NY 11530; 516/294-4400; or COMPUTER LITERACY.

MARK O'BRIEN: As Frank Bowe points out in **Personal Computers and Special Needs**, computers do more for more kinds of disabled people than anything ever made. Bowe, who is deaf, knows this in his gut. He knows, for example, that voice-to-print devices now being developed will improve his life dramatically because they will allow him to understand spoken conversation without a sign-language interpreter. His book conveys this sense of sharing exciting news.

Peter McWilliams' **Personal Computers and the Disabled** has more technical information than Bowe's book, including detailed critiques of every personal computer, printer, and electronic typewriter I've ever heard of

(and many I haven't heard of). Each book contains information lacking in the other, so I'd buy both if I could afford to, but Bowe if I were on a one-book budget.



INSIDE POINT

STEWART BRAND: Just because Point is a nonprofit foundation doesn't mean there aren't some potential conflicts of interest you should know about. A goodly amount of our working hardware was donated by the manufacturers—eight Kaypro 2s, two Kaypro 10s, ten Hayes Smartmodem 1200s, three Atari 800s, four Koala Pads. Other equipment we have on extended loan—a Hewlett-Packard 150 and HP ThinkJet printer and letter-quality printer; an IBM PCjr; a Coleco Adam; an Apple IIe and printer; a Dynax printer; an Infoscrite printer. Taking advantage of editorial discount (50%) we bought two Macintoshes and two Imagewriter printers. Some of these machines we praise in print, some we don't; all are put to good use and we're grateful for them.

Other confessions. One of our Board members, Doug Carlston, is president of a software company, Broderbund; he takes no part in our selection process. I own some stock in Apple Computer (worth \$1,500 when I bought it in Jan. '84, based on no inside information). My wife, Patricia Phelan, was a part-time software agent working with John Brockman Associates, which is also Whole Earth's literary agent. Some of Brockman's software clients are reviewed here, some aren't. Though we are opposed to copy-protected software, when our staff or software reviewers work with programs from our library, they may neither keep nor copy them.

In 1968 I started the original **Whole Earth Catalog** as one activity of Richard Raymond's Portola Institute, a nonprofit public education foundation in Menlo Park, California. In 1971 Portola begat Point, which took responsibility for the over \$1,000,000 that came in from sales of **The Last Whole Earth Catalog**. Most of the money was distributed in grants over the next three years. What little remained was used to found **CoEvolution Quarterly** (which continues as **Whole Earth Review**, see p. 11) and to make two more major incarnations of the **Whole Earth Catalog** in 1974 and 1980-81, all from Sausalito, California.

It's our custom to print—and try to explain—our finances in each of our publications. That is exceptionally hard this time, as you'll see.

What happens to the \$17.50 you paid for the book (same price as last year) is pretty straightforward. Roughly half, \$9.62, goes to the bookstore and its immediate supplier. Point gets 12.5%—about \$2.19. And the publisher Doubleday gets the rest, \$5.69, for printing, promoting, distributing, and risking. And for covering Point's costs of book production (\$60,000 last year, \$60,000 this year).

The project began financially in April 1983, with Doubleday's advance to Point of \$1.3 million for the **Whole Earth Software Catalog**, including subsequent editions. After agent's fees, that meant \$1,105,000 to Point in two installments, one on signing of the contract, the second on delivery of film for the book. That second payment came in July 1984, when Point was several hundred thousand in debt, having borrowed against the second payment to cover costs of the project. Point will see no more income from Doubleday until the advance has been paid off by sales. In 1984 and early 1985 Doubleday sold about 100,000 copies of the first edition, which translates to \$219,000 off the advance. Doubleday also sold \$200,000 worth of the 1.0 edition to book clubs, which is split 50-50, so

another \$100,000 came off the advance. That still leaves about a million bucks, or 450,000 copies yet to sell before we get past the advance. Doubleday would come out ahead well before that, as they should.

There was other income to Point from the project. For the British edition, published by Corgi, there was a 40,000 pound advance, which at the time translated to about \$42,000 when you took out agents' commissions. (The British edition sold poorly, about 5,500 copies; it turned out that the U.K. computer market is far leaner than the U.S. Apples and IBMs are too expensive for average computer users there, so most American software can't be used.) Point also got (and will get) some income from direct mail order sales of the **Catalog**. Between May 1984 and June 1985 we brought in \$57,453 (and spent \$38,574 buying **Catalogs** and fulfilling the orders, with a net income of \$18,879). We earned about \$26,000 of interest on the cash advances. For our magazine, the **Whole Earth Software Review**, we got \$161,145 in subscriptions, \$75,753 in distribution, and maybe \$5,000 in mailing list rentals. There was no money for advertising because we don't carry advertising.

So total cash into Point for the **Catalog** project by September 1985 will have been about \$1,535,000. Total cash out by then is just about identical; that we can tell by our bank balances. Assigning exactly where it went is difficult, because resources and expenses frequently bridged several projects. (It didn't collect in anybody's pockets; the largest salary Point paid at the peak was \$44,000/year, the largest now is \$36,000/year.) The major dubious expenses—always the most interesting, always the least reported—would have to be the costs of promoting (\$152,000) and printing (\$248,000) the three issues of **Whole Earth Software Review** before we blended it into our **CoEvolution Quarterly** to make **Whole Earth Review** last winter. We were promoting the **Software Review** into a dying market for computer magazines, and we printed a spiffy all-color magazine—without ads that would have paid for the color. I should have known better. The same desired effect of helping accumulate research and pre-publication toward the **Catalog** could have been accomplished with a modest newsletter. It was accomplished on another medium entirely—the EIES teleconferencing network (p. 147)—which cost us a mere \$16,600 over the entire two years from Spring '83 to Spring '85.

The rest of the expenditures are unremarkable—salaries, contributors, rent, equipment, research, phone (!), etc. They add up to a million-dollar book. Final research and production on this 2.0 edition will come to about \$100,000. I doubt if we'll break even on it, but the function of our non-profit business is service, and on that I believe we come out ahead. A good book got better.

POINT FOUNDATION

Business Manager	David Cohn (1984) Andrea Sharp
Board of Directors	Paul Hawken, Finance Officer Martin Rosen Huey Johnson Doug Carlston Stewart Brand, President

THE HARDWARE AND SOFTWARE THAT ASSEMBLED THIS BOOK

MATTHEW MCCLURE: People always ask, "Well, what do *you* use?" There's no short answer.

Hardware: The most common computer was the Kaypro, both the 2 and the 10, for word processing and telecommunicating. We used IBM PCs for word processing and software testing, and the Macintosh for quick writing—memos, notices, forms, and previewing the chart on pages 50-51. Jim Stockford used his TRS-80 Model 100 for writing, telecommunicating, and keeping himself organized. Kathy Parks used the Apple IIe both for keeping track of the library (PFS:FILE) and for writing reviews (APPLE WRITER IIe). Line Editor Suzanne Lipsett used WORDSTAR on her Morrow Micro-Decision to transcribe the edited version of the Playing section. Cliff Figallo spent most of Spring '84 in front of a Compaq and Datamac hard disk, maintaining our research database with RBASE:4000. Jerry Weinberg came to Sausalito and edited the Programming section on a Commodore 64 with PAPERCLIP, the same word processor he uses on his SUPERPET in Nebraska. Robert Scarola did the Learning section with BANK STREET WRITER on his Apple II + at home and brought the disk in for us to transform into typeset copy.

We did a lot of printing—draft after draft after draft. The Okidata Microline served me beautifully; so did Stewart's Gemini Star ("Not so beautifully" —SB) and the research department's Infoscrite 1100. We also used an Epson MX-80, an HP ThinkJet, an Apple Imagewriter, and the Dynax 15 made by Brother.

For telecommunicating, the Hayes Smartmodem 1200 was central to our operation, with an occasional assist from the Hayes Micromodem in the Apple IIe, the Visionary 100, and the VICModem from Commodore. We used EIES extensively, along with CompuServe and The Source. A Smartcable was indispensable for linking our Apple to the PC for transferring the Learning section to our standard format.

Software: Word processors WORDSTAR and NEWWORD were the mainstays, along with PERFECT WRITER (with PLU*PERFECT), THE FINAL WORD, and BUSINESSPAK + . For spelling checker it was THE WORD PLUS mostly. We used spreadsheets like MULTIPLAN, SUPERCALC2, and SUPERCALC3 to predict layouts and to design tables.

Since much of our writing was done in teleconferences, we used a lot of telecommunications programs; MITE, MIST, CROSSTALK XVI, and SUPERTERM were the main ones. Virtually all our typesetting was done by telecommunication from Sausalito to Mackenzie-Harris in San Francisco, using CROSSTALK on our IBM PC. Transforming text for this was one of the most interesting tasks in the production. For Jerry's Programming section, I used VIDTEX from CompuServe, uploading a file from the Commodore and downloading it to the PC. For Robert's Learning section, THE APPLE/IBM CONNECTION transferred the data, but slowly.

BARBARA ROBERTSON: This year found us relying on MS-DOS machines (IBM PC, Compaq) rather than last year's Kaypros. WORDSTAR, our mainstay word processing program last year, continued to be our standard despite its awkwardness at telecommunications (see p. 47). Clifford Figallo spent most of

this year in front of the same Compaq and Datamac hard disk maintaining our research database and compiling the index (with help from Nancy Rhine), but switched from R:BASE 4000 to THE SMART DATA MANAGER (p. 89). Clifford also managed the typesetting, done (as last year) by telecommunication from Sausalito to Mackenzie-Harris in San Francisco—but also, vice versa this year. In addition to sending new material, we retrieved last year's files via telecommunications and updated them. (A gigantic job since it turned out, somewhat to our surprise, that almost nothing in the book remained unchanged.) We continued to gather reviews and recommendations from our domain editors and others via national teleconferences on EIES (p. 147) and, this year, our own new teleconferencing network, The WELL (p. 148), which absorbed last year's managing editor, Matthew McClure. Lyn Gray, who doesn't use computers unless she has to, stepped into the breach and managed the flow of the hundreds of bits and pieces (e.g., replace this paragraph on page 93 with . . .) that make up this year's **Catalog**.

STEWART BRAND: As you can guess, the hardware and software tangle is a mild reflection of the complex information labyrinth we've been navigating. In our first year Barbara Robertson was the heroic intelligence in the middle of input traffic, while Matthew McClure was the heroic intelligence in the middle of output traffic. In the second year Barbara did it all, with the expert assistance of Lyn Gray, Kathy Parks, Cliff Figallo, and Hank Roberts. They made information that is trying to fly apart, fly together.

Without personal computers the task would have been approximately impossible.

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SOLUTION TO QUESTION ON P. 160:

The problem is in not checking the input: suppose we try the "triangle" (3, 1, 1), or suppose A, B, and C are all negative numbers: the program will fail. Good programming involves envisioning the kinds of problems the program will run into before the fact.

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LIFE AFTER DEADLINE

STEWART BRAND: Most of this book had completed its research by the beginning of June 1985. The following pages were finished around the middle of July 1985, with research going on up to the last keystroke.

The major reason for this supplement is the continual change in hardware. Some long-awaited machines (like the Atari ST and Commodore Amiga — see page 217) are just arriving on the market promising, as usual, the world and seeking to out-Mac the Macintosh. For "power users" there are new IBM PC AT compatibles. For transients, new laptop computers are appearing regularly.

Even as you're reading this, it's too early to fully evaluate the success of these machines. What we can offer is some early information, a strategy for gauging their worth as the market around them develops, and some gambler's guidelines for when and how to place a bet on a new system by hardware critic and computer fortune-teller Richard Dalton. This section also gives us a chance to include some late-breaking news about software, choreographed by Editor Barbara Robertson.

Looked at a year from now, this section is likely to be the most dated in the book — yesterday's news — while the rest of the book holds its flavor. For the present, it's essential to be as close to what's happening as possible. It's that kind of market.

CHRISTMAS SHOPPING

You can shop for yourself at Christmas but don't buy until after, when the prices have come down. Computer companies sell as much as 40% of their annual total in December. A sales slump (and cut-rate prices) immediately follows the holidays.

Wait until some friends have bought or been given new-new machines that will be aggressively advertised this winter. Wait until some probing reviews have come out in the computer press. Wait to see if the stores decide to re-stock their Christmas promotions and if decent software is available or still being promised.

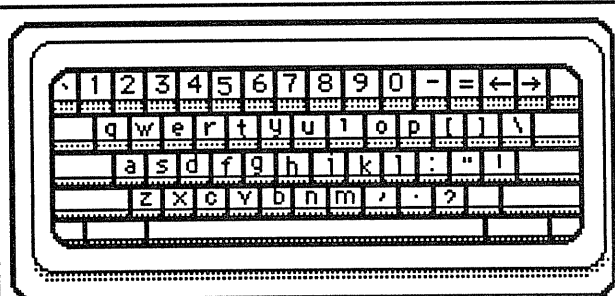
Then buy a nice elderly machine at a giveaway price from an exhausted and semi-desperate supplier in January or February.

You can't do that with kids, however, the holiday is too big a deal. So put 'em to work. They know far better than you what they want, what the other kids are using (or getting) so they can share software, and what is in good repute with kids.

If the major rationale for a home computer is its "educational value," the following from Learning Editor Robert Scarola may be helpful.

ROBERT SCAROLA: What I see happening is The Great Shift — away from programming, simulations, games, adventures, etc., as the major use of learning with computers. Away from these areas and towards application of the computer as a tool: word processing programs, spreadsheets and database applications. From the 7th grade on up there appears to be growing consensus that computers should be used by students the same way they are by adults: as practical tools.

STEWART BRAND: Even with this kind of sage advice, leave it up to the kids. Figure out what you're willing to spend on their computer stuff, set the limit publicly and leave it to them how the sum is divided — so much for computer, so much for peripheral gear, so much for software. If someone is giving YOU computer stuff, you could do worse than mark up a copy of this book and give it to your benefactor. Let Santa decide if you deserve a Bernoulli Box (p. 21, \$2300) or a subscription to InfoWorld (p. 10, \$31).



STAFF

BARBARA ROBERTSON: The remarkable thing about this section of the **Catalog** is how quickly it was produced by such a small group of people.
Witness:

Domain Editor:	Richard Dalton
Typesetting, Design, Illustrations, Production:	Jay Kinney
Production Liaison:	Dustin Kahn
Copy Editing, Proofreading:	Ted Schultz Hank Roberts Lyn Gray
Camera:	Don Ryan

Supplement to the

WHOLE EARTH SOFTWARE CATALOG FOR 1986**LAST GASP:
A Chance to Revise Recent History and
Anticipate the Near Future**

RICHARD DALTON: Welcome to the back of the book. To stretch a cliché to its breaking point, this section's medium carries its own message. We're dealing with late-breaking news that can't wait for the traditionally long-winded procedures used to prepare books like this.

Instead, we used a Macintosh hooked up to Apple's LaserWriter printer and some just-released software, PAGEMAKER, to create the pages you see here. The quality isn't as high as typesetting and manual layout, but it's getting there rapidly. Jay Kinney, our wizard behind this process, gives more details on the joys and frustrations he encountered on page 224.

This section covers two main areas:

- * brand new hardware and software (even some widely anticipated stuff not quite here yet) that doesn't fit comfortably in the rest of the book, since the **Whole Earth Software Catalog's** emphasis is on what has proved to be best, not just what's newest;
- * a strategy based on standards that are beginning to emerge from the still young microcomputer industry, since, otherwise, all the dizzy changes in the computer business make it tough to apply specific recommendations to buying decisions.

**STANDARDS:
Islands of Calm in the Churning
PC Seas**

Standards are a way to financially survive the fast-changing personal computer marketplace. They're a mixed blessing to be sure, but they're the best hedge there is against wasting money and time.

Standards develop for one primary reason: public support. The personal computer industry tries to establish standards with what they sell; you and I decide firmly and finally what climbs to standard status based on what we buy.

Think about music: standards (or "classics" or "golden oldies," depending on your musical tastes) exist because people buy, hum, and whistle Irving Berlin (or Beethoven or Bob Dylan).

Composers wrote symphonies for a specific orchestra

until about the 1600s. Then violin makers began to generally agree on the size, shape and tone of the various stringed instruments. As instrument standards became widespread, a symphony could be played by any orchestra. If you like the software products Lotus puts out, you can have a SYMPHONY if you own an IBM PC, but have to settle for less substantial JAZZ on the Apple Macintosh.

Enough of strained analogies. Ask a wholesale grocer what his inventory problems would be without the standard Universal Product Code legends that appear on every can, bottle or box at your market; how a banker would stay sane if every bank had come up with its own method for encoding checks instead of agreeing on the Magnetic Ink Character Recognition symbols that grace the bottom of your checks.

So far, most personal computer standards are particular to specific machines (see the chart on page 213). The industry is growing and maturing at a robust pace and we're still at the stage where software "compositions" are written for specific orchestrations of hardware. We might see the beginnings of software written for a variety of systems soon, but not yet. For the next one or two years, most programs will still run on only one class of system. And that's the scope of this section.

Anything beyond that time-frame gets into technology assessment (a.k.a. "guesswork") that's best left to Madame Olga's Palm Reading Parlor. If you have trouble figuring the future of this business, take heart. It tends to be just as confusing to "experts" who predicted events like the sale of 500,000 PCjrs (before the machine ever appeared on the market with unconsidered deficiencies like its original "chiclet" style keyboard).

To add another dimension to PC-watching, we've cast the industry leaders as players in a neoclassical myth (see page 216). This may not clarify anything, but it's probably as useful as taking the industry seriously.

I'll predict that we are going to continue with a multiplicity of equipment standards like the IBM PC, the Macintosh, and the others shown on the chart, plus the emergence of new ones — the Atari ST and Commodore's Amiga, which may generate new standards that complicate things; or operating "environments" like GEM (pp. 168 and 218) and UNIX (p. 168) that are attempts to get away from dependency on specific hardware.

Where Does All This Leave You?

This organization (and most others in the computer advice business) keep belaboring the point that a computer isn't worth a damn without software. It's true.

We focus on standard machines that have collected a wealth of software options. That means they continue to be valuable even though they aren't the latest technology, a theory proven by the Apple II and IBM PC. Standard machines also serve as benchmarks — to measure the inevitable flood of new hardware against. You can test whether a new machine offers enough advantages to make it worth a year or two of predictable software deprivation.

To make best use of these standards, think about your primary use for a computer: to run a small business, as an educational tool, to write with or draw charts. Note the word "primary" and expect to make some compromises, since nearly all of us wind up using a personal computer for more things than we initially expect.

A few software products have become standards: they have attracted large groups of buyers (meaning help can be found if you run into problems) and a wealth of supplementary products that expand their standalone value. That doesn't make them better than other programs (I hate WORDSTAR, p. 56, and don't have much use for 1-2-3, p. 68, or AUTOCAD, p. 135) but their widespread use gives them an added dimension and we've included these standards on the chart.

Standards, then, are yardsticks. Use them to measure both the products on the market now and new ones as they emerge. Even if you decide to buy a non-standard system, you need to know what you may be giving up. One of the most common laments in computerdom is "I wish I knew that before I bought my

STANDARDS IN THE REAL WORLD: One Man's Computer Family

RICHARD DALTON: My first personal computer was a Kaypro II, bought in 1982. At that time the Kaypro was a market leader, a flag carrier for the CP/M operating system standard. The Kaypro functioned flawlessly for a year, grinding out yards of text plus name and address files and a spreadsheet or two.

I got itchy about the limits of my CP/M software though, and started scratching around for replacements. By then, 16-bit computers like the IBM PC were rolling full-speed ahead. Software written for this more accommodating equipment set-up was clearly superior (quality and certainly quantity-wise) than what was available for the still-useful 8-bit Kaypro.

I've never been a big booster for IBM. They control too large a part of the computer industry, which can

SYSTEMS: Two Royal Families; Pretenders to the Throne

The IBM PC — Hard to Go Wrong

The Apple II was the first long-term success in personal computers. IBM's PC founded the second (and strongest) reign in the PC business when it brought large organizations into the market. Things have never been the same since.

It's easy to discount the importance of large-scale buyers but they have an immense impact on what is available for sale even at a neighborhood computer store. Big companies and government agencies (big by definition) have overwhelmingly selected IBM and compatible machines as the choice for personal computing. That riles a lot of people who view IBM as a juggernaut out to crush the little guy. But it doesn't change the facts.

Corporate America's affection for a PC built by the same monolith that made their mainframe computers has caused software developers to concentrate on the PC/MS-DOS standard — see page 14 for an explanation of this standard.

The result is critically important: the widest selection of word processing, spreadsheeting, data managing and other business-like software that has ever accumulated for any other computer. If you use a personal computer for business you need to explore this universe of software.

PC/MS-DOS is an example of why some standards endure while others fade. While IBM was developing a hardware family (the original PC, the hard-disk XT, ill-fated jr, and now the AT), the operating system was evolving in step. PC-DOS (IBM's proprietary version

stifle creativity from smaller companies afraid to joust with the Big Blue Monolith. So I bought a Leading Edge PC: faster and cheaper than IBM's version and adhering to the "IBM standard."

That was the theory. In practice, there were certain kinds of IBM PC programs that wouldn't run right away on the Leading Edge and some kinds of hardware add-ons didn't work. That wouldn't bother everyone, but since I do a lot of hardware and software evaluation, my irritation level kept increasing.

That's the standards problem in a nutshell. You trade off between innovative, often cheaper options and the original, less valuable standard-bearer.

You've already guessed the latest chapter of this saga — I swapped the Leading Edge for a pure vanilla IBM PC. Perhaps not the most courageous of moves, but how much excitement (or frustration) do you want to inject in *your* day-to-day business operations?

of the standard) has been through six major changes from version 1.0 to 3.1. Version 4.0, with its own new tricks including the ability to run a number of programs at one time, should appear late this year.

The collection of PC/MS-DOS software has been upgraded as hardware and operating systems improved with relatively little effort. This kind of "upward compatibility," while an imperfect process, is a sound survival tactic in a changing technological world and a key item shoppers should look for.

MICHAEL J. MILLER: Even the wildly successful IBM PC class of machines looks like it's about to be replaced by a new breed of machines that runs most old programs but also does more (including the IBM PC AT, Compaq 286 series, Kaypro 286i and the Texas Instruments Business-Pro).

RICHARD DALTON: The AT appears to have escaped its early production problems and is poised to become the new force behind this standard. Initially, a significant minority of programs written for the PC wouldn't run on AT equipment, but software publishers have quickly moved to adapt their offerings to this more powerful machine.

Price is always a concern. At one time, PC-compatible computers were fairly expensive, but as strong competitors like Compaq, Tandy, and Zenith emerged, and the standard expanded to include newer machines like the AT, the almost-4-year-old PC has become a commodity item.

Vendors like Apricot (with their new F1 system) and Tandy (see page 17) have already slipped below the \$1,000 base price level. I don't think anyone will be successfully selling a basic PC/MS-DOS computer for more than \$1,000 by the start of 1986. That makes this powerful, software-laden system price competitive with the Apple II and considerably cheaper than the Macintosh. Think about it.

When the long-anticipated PC II (probably a smaller version of the AT) arrives, the bottom will drop out of pricing for the original PCs, making them a spectacular value.

These are such compelling advantages for the person looking at a business microcomputer, I'm tempted to blurt out "buy an IBM PC or a clone and forget all the rest." Instead, I'll waffle with a rebuttable presumption: prove to yourself that a PC/MS-DOS system *isn't* your best choice before selecting another kind of machine.

PC INDUSTRY STANDARDS

Buying standard hardware can give you a greater selection of software; standard software offers a greater degree of mutual support and supplementary programs; standard peripherals are the easiest kind to connect to most systems. All of them together can ease the chore of shopping and the evaluation of new equipment or programs as they come on the market.

Standard	Type	Standard Bearer	Competitors
Large Business	System	IBM PC	IBM PC AT/Compaq
Small Business	System	Apple II	IBM PC/Macintosh/Kaypro
Multi-user	System	Unix	None close
Home	System	Commodore 64	Apple II/Atari XE/ MSX
Education	System	Apple II	Tandy/IBM PC
Portable	System	Tandy 100	None close
Operating Environment	Software	Command-driven	Object-driven
Analyzing	Software	1-2-3/VisiCalc	None close
Drawing	Software	MacPaint/AutoCad	None close
Managing	Software	AppleWorks	None close
Telecommunicating	Software	XMODEM	X.25/X.PC
Writing	Software	WordStar	AppleWriter/Word/ DisplayWrite
Organizing	Software	dBase II/III	RBase
Other	Software	None close	None close
Modems	Peripheral	Hayes	None close
Plotters	Peripheral	HPGL	None close
Printers	Peripheral	Epson	Diablo 630/IBM Graphics
Floppy Disk	Peripheral	5-1/4"	3-1/2"
Hard Disk	Peripheral	5-1/4"	3-1/2" /8"
Display - mono	Peripheral	Hercules	IBM Mono
Display - color	Peripheral	IBM Color	Plantronics/EGA/ 80-column card (Apple)
Printer Port	Peripheral	Centronics Para	RS-232C
Serial Port	Peripheral	RS-232C	None close

STANDARDS IN THE REAL WORLD: Psyching Out Your Options

CHARLES SPEZZANO, Ph.D.: As a student of Freudian psychoanalysis, I've discovered that training standards are the only way for any of us to have an identity within the profession. But these standards also become rigid criteria used by one group to control the careers and identities of others and to create a tight economic guild that keeps many good people outside. This isn't peculiar to psychoanalysis. Standards are a double-edged sword wherever they exist, including the personal computer marketplace.

When I started looking around for my first computer

Apple II Forever?

Apple has been on an even longer roll than the IBM PC with their II series — moving through the "+" to the "e" and "c" models. In computer terms, the II is a near-antique with its 8-year-old, 8-bit processor, relatively slow internal speeds and tiny disk drives.

So why do they continue to sell so well? The major part of the answer is, again, software — 8 years' worth. Unless you've been living in a remote Aleut Indian village, you've heard how VISICALC on the Apple II (with a self-evident analogue of paper spreadsheets) made computers comprehensible to hundreds of thousands of small business operators. And there's Apple II's pre-eminence in the education field.

VINCENT STECKLINE: What keeps Apple anchored in the elementary and high school is the weight of software already purchased. Buying a newer, faster system would mean making a lot of software obsolete. Also, most teachers are now comfortable with the IIe.

ROBERT D. ARMS: If IBM PC prices become the same as the Apple II's, I would *still* recommend Apple. It is easier to learn, especially for the non-programmer, and there are many readily accessible programs available for general-purpose family use. The PC is much more of a programmer's and business person's computer. Each has its purpose: home/family = Apple; business/programming = IBM PC.

RICHARD DALTON: The II family boils down to either the "c" or "enhanced e" models. My recommendation is the IIe, updated with MOUSE TEXT and double-high-resolution graphics since our review (see page 16) was written. This makes both the IIc and IIe functionally similar and the IIe lets you add new features more easily as they are announced. The IIc's "closed architecture" is easier to set up and use initially but you can't expand it.

This ability to enhance your original purchase is important by itself, as you only discover a computer's possibilities as you use it — often leading to more memory, disks and other requirements. It's doubly

late in 1981, what struck me was the obvious battle between Apple and IBM over which would set the compatibility standard for the field. Apple eventually lost. Maybe if they had won with the Apple II, we wouldn't have the Macintosh now — winners don't come out with many real innovations to improve on what's already working for them.

IBM's contribution to the field was a system with enough memory for programs like 1-2-3 (p. 68), a keyboard that sits on your lap so you can nap during writer's block and a standard that dominated things enough so owners of compatible machines could have their pick of the best software around. I don't expect much more from them for a while.

important with this system as Apple is due to announce memory expansion to as much as 1.5 megabytes for the IIe which, in turn, will encourage software developers to write more sophisticated and useful programs.

Apple seems committed to its slogan "Apple II forever." An on-going flow of products, including new 3-1/2" disk drives with 4 times the capacity of current drives and software upgrades will help to preserve the Apple II's value. A much-discussed new processor that provides both 8-bit and 16-bit capabilities may finally make an appearance this year, as well.

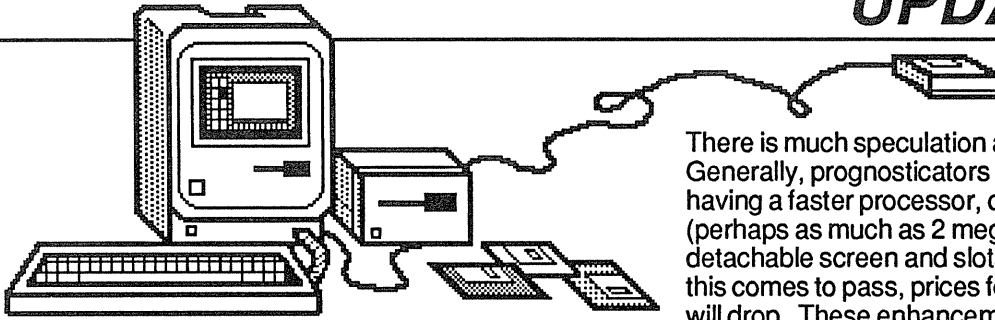
Will the Real Macintosh Please Stand Up?

Macintosh — half a leap forward; half a step backward. On one hand it's an admirable effort to open the personal computer experience to people who have no interest in technology, just results.

On the ever-present other hand are frustrations resulting in part from the problems any new system has (imperfect design concepts, inadequate software) and partly from constitutional difficulties (slow operations, primarily) that may never completely resolve.

The most critical deficiency — available software — is beginning to resolve. Mac's flashy operating environment that attracts so much consumer attention turned out to be a major hazard for the first year or so of its existence. Experienced software publishers like Lotus and Microsoft found that it took much more time than expected to learn how to deal with the Macintosh internals. Almost two years down the road, however, the software pipeline is rapidly filling with a breadth of applications.

Mac has largely escaped its initial Yuppie Toy designation with the appearance of solid business programs. Microsoft has produced a spectrum of competent programs topped by WORD (p. 60), Mac's first full-featured writing tool, and EXCEL, a startlingly swift and facile financial modeling program due for release in September.



Lotus's JAZZ and Paladin's CRUNCH are already available and should help convince the number-intensive types that Mac is for real. Excellent data management programs abound for the system, utilizing Mac's elegant graphics and windowing capabilities fully — see pages 78 to 93 for specific recommendations.

Writing on a Mac remains painful as far as I'm concerned. There are only two real word processors available and the keyboard is (cough)... uh, lousy.

Playing Editor Steven Levy is a staunch Macintosh advocate, a columnist for **Popular Computing** and contributor to numerous publications. I admired the objectivity in his response to my calling the Mac's ability as writing tool into question. Steven's message, sent electronically, was titled: "SIGH/ANOTHER DEFENSE OF THE MAC."

STEVEN LEVY: I find the Mac's screen resolution not only easy to read, but a constant delight. Phosphor letters always bothered me. The Mac screen is one of the best features of the computer. I think keyboards are a matter of taste. Personally, I love the Mac keyboard — better than the PC, the Apple II or any typewriter keyboard I can think of.

Slowness *is* a problem. I sometimes use a RAMdisk, but often don't bother. The hard disk alternative speeds things considerably, but as of now, it's not cost effective. The new ROM might also help.

Still, I find it a great writer's tool. I would appreciate it even more if I used drawings in my text or merged more text into databases. The real power of the Mac is that it's so damned easy to move things from one program to another, no matter who wrote the program.

Six months ago I wouldn't have recommended Mac to another writer. Now I think every writer considering a PC should play with the IBM (or some other good MS-DOS 100% compatible) and then spend some time with the Macintosh. A matter of personal choice.

RICHARD DALTON: A reasonable approach for the Mac-interested would be to wait. Prices have drifted down for Mac gear, but as Steven notes, things like hard disks remain expensive. You can now tie a 10-megabyte hard disk onto an IBM PC for less than \$500. Mac hard disks cost at least twice that much. Market pressures should change that if Mac continues to sell in volume.

There is much speculation about a new Mac version. Generally, prognosticators view this SuperMac as having a faster processor, capacity for more memory (perhaps as much as 2 megabytes), a larger, detachable screen and slots for expansion boards. If this comes to pass, prices for the current Mac models will drop. These enhancements and maybe some new software (plus the potentialities of the new Atari ST and Commodore Amiga) point toward patience.

Portability — Do You *Need* to Take It With You?

Closest thing to a standard in portable computing is the humble, utilitarian Radio Shack Model 100. It's dirt cheap and lovable for its sturdy performance on the road. I use one primarily as a lightweight terminal and business trip note-taker.

Beyond the Model 100, there's only a sprinkling of public support. Hewlett-Packard's powerful 110 portable has sold reasonably well and should do even better as the machine has been upgraded recently to a full size (80 character x 25 line) screen while the base price was reduced \$700.

Screens are a major issue—maybe *the* issue—with portables. LCDs are favored by manufacturers because of their low cost and power consumption and they're devilishly hard to read in other than perfect lighting conditions. Recently, there has been a movement toward LCD screens that are back-lit, providing much better viewing. Morrow Computer's new Pivot portable is a standout in this emerging category.

WOODY LISWOOD: Have found a winner in the PC portable market, the Morrow Pivot. It works, has two disk drives and a back-lit LCD screen you can read in any and all lighting conditions. I have tested all my PC business software and it runs fine.

RICHARD DALTON: Gas Plasma screens are now appearing on Ericsson Information Systems' portable and a new Grid Systems unit. These provide good viewing characteristics and direct compatibility with IBM graphics software but are still somewhat expensive and draw too much power for battery operation. If using a portable away from an electrical plug and purchase price aren't major considerations, give them a look.

Technology is moving fast in screen displays, low-power memory systems and data storage devices. The next two years will produce much better portable systems than are now available. If you don't have a screeching need for portability, I'd recommend you get a solid, fast desktop computer, supplement that with a cheap option like the Model 100 if necessary, and await future developments.

**MYTHS OF PERSONAL COMPUTING:
The Clonic Wars**

If you get frustrated by the gyrations of the PC industry and techno-babble that accompanies it, perhaps an excursion into mythology will help. After all, this business has its share of heroes, villains and kingdoms, noble and base behavior.

The map shows the mythical world of Microtopia. Most of the landscape is occupied by the powerful IBM Empire called Intelandia, which is ruled by a succession of leaders known as The Great Blue One, an ancient tribal honorific. Proconsul Ethridge, a recent ruler of PCDom, has been exiled to the Isle of Sorrows with the twin pretenders to the throne: Junioricus the Deformed and his sister, Portabulia the Obese. Muscular AT-tica has become standard-bearer for the region.

The Empire maintains its hegemony by weight of its marketing legions stationed in Corporatium, the Empire's spiritual and economic heartland. Mercenaries deployed at the fringe of the empire spread fear in the hearts of enemies while the obedient Subjugated Territories produce weapons for the never-ending wars. In Communicalia, pioneering forces push forward the frontiers. If all else fails, the Empire will fall back to its impregnable Mainframe Bastions.

Applonia is Intelandia's strongest rival. Powerful Clan Macintosh makes persistent forays across the Straits

of Icon seeking to penetrate the Empire's Corporatium stronghold. After many unsuccessful encounters, an uneasy truce exists.

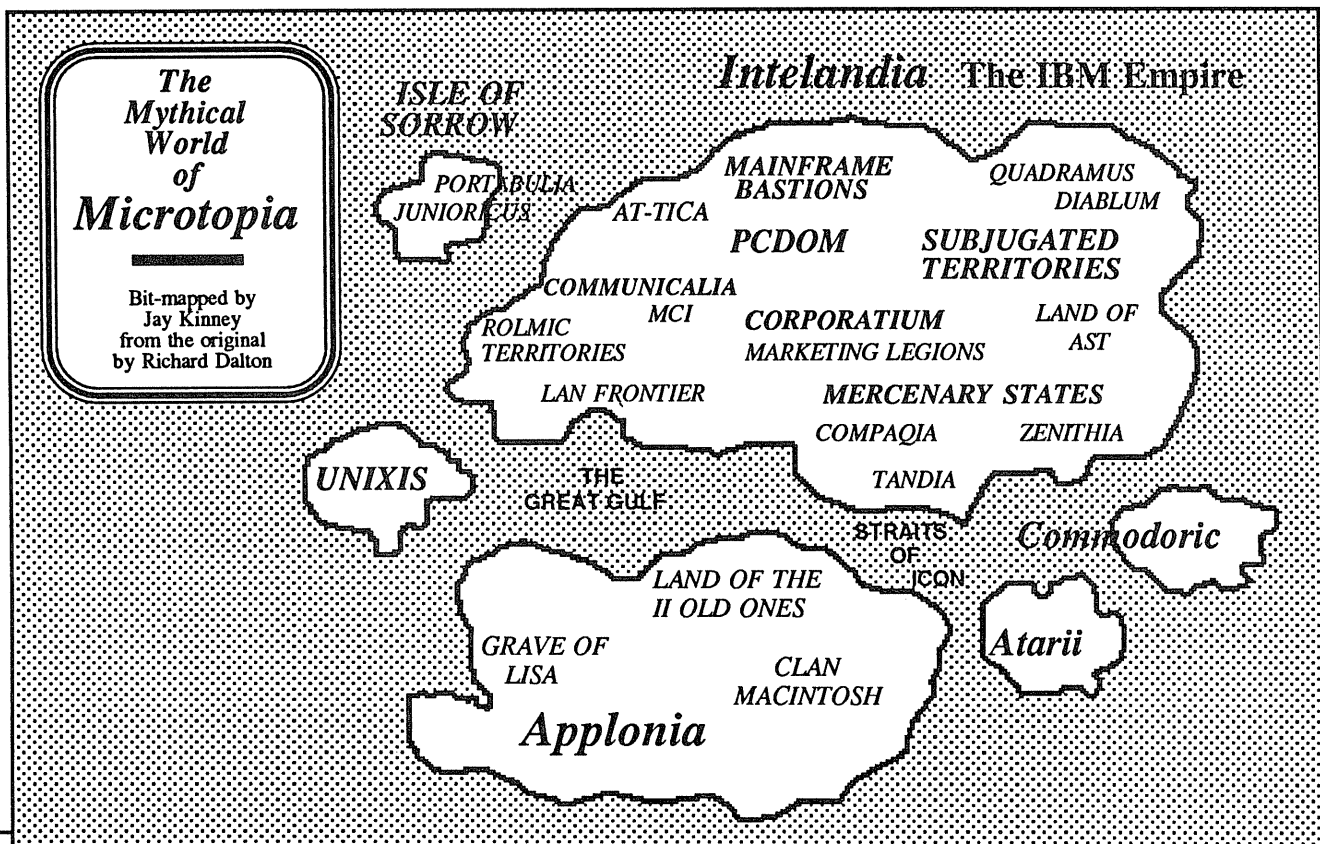
Applonia's defensive strengths lie, however, in the Land of the II Old Ones where learning, not brute strength, is the ethic. It is a dangerous time for Applonia. Newly crowned John the Skull has ordered deposed Prince Stephen to meditate on his future at Lisa's Grave, causing a rift with the subjects loyal to the Prince.

The smaller kingdoms of Atarii and Commodoric have for many years been content to sit in their homes. Recently aroused, they constructed frightening new weapons and the drums began to beat, lead by Atarii Chieftain Jack the Boisterous. Attacks are surely expected on Clan Macintosh. Perhaps ambition will carry them to the shores of the Empire itself.

The Unixim wait patiently on their small isle, ruled by the Crone of Telephony. Theirs is a war of attrition, relying on the others to wear each other down. The Crone appears nearly ready to cross The Great Gulf and assault the Empire through its thinly defended Communicalia frontiers. Rumors persist about an alliance with Applonia. The Crone has great reserves to draw on, yet seems addled by her years of isolation.

Minstrels pass freely among these kingdoms singing "someday the Empire must fall." The minstrels have been wrong before.

— Richard Dalton



COMMODORE AND ATARI Home Systems May Never be the Same

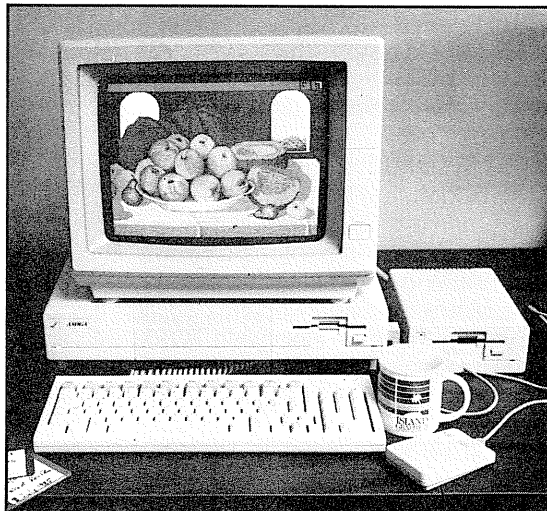
Atari and Commodore have been locked in a struggle to be kingpin of computing in the American home for some time. Apples and IBM PCs find their ways into many homes, to be sure, but Atari and Commodore are the home specialists and have sold millions of machines to prove it — perhaps as many as three million Commodore 64s alone.

Now that the C-64 and the Atari 600/800/1200 standards are waning (little new software; fewer new peripherals), the death knell may be sounded by each company's new generation system: the Commodore Amiga and Atari ST.

ERICK WUJIK: The old Atari computers are entering the "fire sale" point of economic life. Sears cleared out a bunch of stuff this weekend. I picked up an Atari 800XL (\$69.88), an 800 (\$69.95), a beat-up floor model 800XL (\$29.95) and a couple of 1050 disk drives (\$69.95 each).

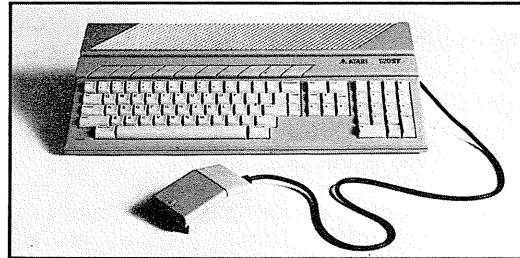
RICHARD DALTON: Once again in lock-step, both companies are bringing out their new efforts at the same time with striking similarities. Excellent graphics, smooth animation and sound are the hallmarks of both the Amiga and ST. Either machine will (with any help from the software community) make current computer games look a bit silly. Amiga seems to have the early edge in technical specifications; the ST in price.

It's far too soon to draw any conclusions about these systems except a presumption that they will both appeal more to the adventurer than the grizzled business type for a while. If that sounds similar to the Macintosh experience, it should. Like the Macintosh, the Amiga and the ST have proprietary operating systems. Quick translation: software written for any other standard will have to be rewritten for either the Amiga or the ST.



COMMODORE AMIGA

Keep an eye focused on these sparkling neophytes. The trend is decidedly toward machines that communicate graphically, and as the graphics bandwidth widens, new types of applications become possible, just like they have on the Macintosh. These machines are in the vanguard of that movement. Pray for lots of software — soon.



ATARI ST

ENVIRONMENTAL IMPACTS: How Many Things Can You Do At Once?

Most people's experiences with operating systems are less than jolly, since they usually start with command-driven types. ProDOS for the Apple II, Radio Shack's TRSDOS, CP/M (the first "universal standard" in op systems) and PC/MS-DOS are all command-driven operating systems:

The computer displays a "prompt" that looks something like:

A>

You respond with a command that tells the computer to do a specific task:

A>DIR

In this example, the computer would list all the files housed on the disk in drive A.

This doesn't seem all that difficult to experienced microcomputer operators, but then, they tend to forget how confusing those dozens of different commands were when they were first exploring their machines.

Command-driven operating systems, if you're willing to invest the time mounting their steep learning curve, are quick and efficient but they remain a significant barrier to many people, especially those who like the idea of a computer as a tool but aren't excited by the technology itself — and these make up the majority of the potential buyers.

Recognizing this, microcomputer makers have been working toward operating systems (operating "environment" is the current term) that show pictures of the various objects you use and manipulate to get a job done. For want of a better term, we'll call these object-driven.

We now enter the raging conflict being contested by the biggest names in microcomputer hardware and

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software: the fight to become *the* operating environment in the numerically most significant part of the PC business. Since object-oriented environments are based on pictures ("icons" if you insist), it's appropriate that we show you two of the leading contenders below. Digital Research's GEM (p. 168) and Microsoft's long-awaited and still unreleased (to the general public, anyway) WINDOWS.

The other leading contender is IBM's TOPVIEW, looked at by many as a Trojan horse that will lead to IBM announcing their own operating system, based on the substantial resources contained (but not yet implemented) within the program.

These programs have the same goal (to make it easier to live with a PC) but they differ in how they go about this task. To check out how they compare, peruse the following table. Some definitions first:

Multi-Tasking - just like it sounds. The environment allows you to have more than one program executing at the same time.

Bit-mapped - if you've seen the Macintosh, this is easy. Otherwise, you need to know that bit-mapped displays are constructed one dot at a time, allowing much greater flexibility in graphics and text fonts. The IBM PC under current versions of DOS (3.1 and lower) displays a single type of text character *or* graphics. You can create variable characters in graphics mode, but they tend to look funky.

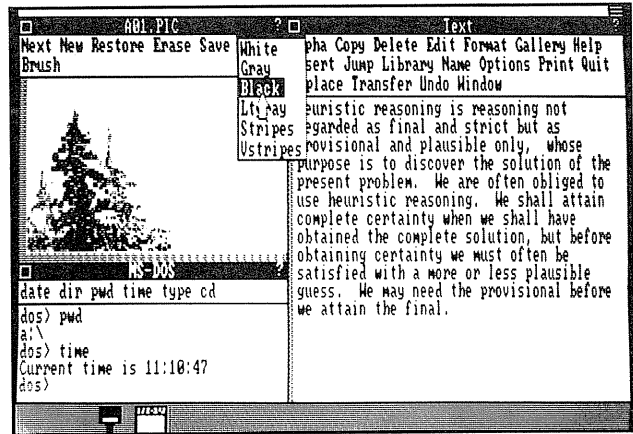
Windows - the real point of all this stuff. Allows you to carve up your screen into a number of mini-displays showing different information -- a disk directory in one, WORDSTAR in another, a clock showing the time of day in a third, for example. MICROSOFT WINDOWS is the first environment with "tiling." This means the windows displayed butt up against each other instead of overlapping. You don't obscure information with the overlap but you may have to juggle windows more to get an adequate-sized view of your data.

Memory - the amount required for the environment

COMPARISON OF GEM, MICROSOFT WINDOWS AND TOPVIEW

Feature:	GEM	WINDOWS	TOPVIEW
Multi-Tasking?	NO	YES	YES
Bit-mapped?	YES	YES	NO
Windows	Overlap	Tiling	Overlap
Memory (approx.)	110K	128K*	170K
Price	\$50	\$99*	\$149

* Estimated values. MICROSOFT WINDOWS has not been released as of this writing.



MICROSOFT WINDOWS

itself. Remember you have to consider the overhead for your operating system as well. Any memory left over can be used to run programs.

Some things become quickly clear. If you want multi-tasking, forget GEM for now. If a bit-mapped display is important, TOPVIEW can't qualify at present and isn't a good choice if you're anxious to conserve either memory or cash.

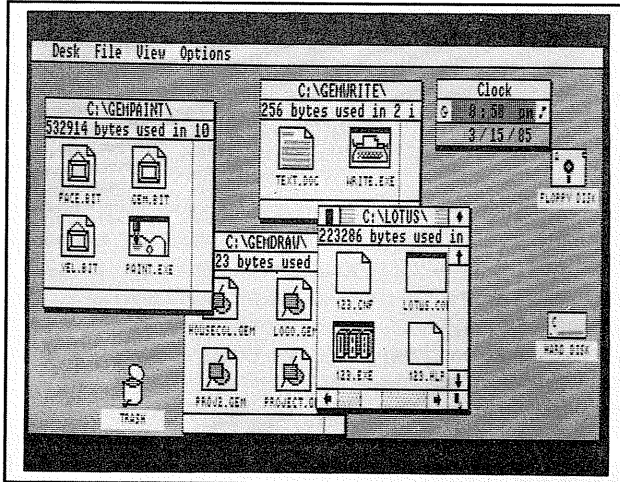
The bad news is that all three lack an essential ingredient at present: software modified to take full advantage of the features that make environments worthwhile. These include the ability to cut and paste from one file to another and, for MICROSOFT WINDOWS and TOPVIEW, conformity to the environment's internal requirements so that one application can run concurrently with another.

A major race is on to get software publishers to modify their programs while each environment's vendor is trying to convince the PC business that it will be the king of the hill.

It's hard to recommend any of these environments until that contest shakes out a bit. Also, each of them is deficient in some way (generally, they operate slowly and tend to freeze up at odd moments), a situation that will improve as new versions and clone-software reaches the consumer.

Dynamical Systems Inc. (Berkeley, CA) is developing a TOPVIEW lookalike that will cost less and use only about 64K memory. Quarterdeck Office Systems is modifying their first generation environment, DESQ, to be TOPVIEW-compatible while lowering its price. A new outfit, Matrix Software Technology, has a package called Synergy that runs alongside TOPVIEW, adds bit-mapped graphics, and occupies only 12K of memory.

SHARON RUFENER: What GEM and TOPVIEW and WINDOWS are really saying is that a new generation of operating systems is needed. Which means we'll be seeing just that in a year or so.



GEM

PAUL E. SCHINDLER, JR: When I first began using a computer, it was an 8-bit machine a friend sold me. Since he was a bug on the OASIS operating system, that was what I used. I was cut off from all CP/M software, but that was okay because all I needed was a word processor and BASIC, since I liked to write my own programs.

OASIS, to this day, is the world's finest microcomputer operating system, and a better environment to develop software in than most minicomputers offer. Software written under OASIS can be transferred to more computers than with either CP/M or PC/MS-DOS.

But the two small companies that market OASIS don't have the muscle to make it a standard. There are about as many application programs written for OASIS each year as there are written for PC/MS-DOS each day and the latter are usually cheaper and more flexible. I finally bought an MS-DOS computer because I got tired of writing my own programs.

UNIX – A Means to Share PC Resources

RICHARD DALTON: UNIX is a big, cumbersome operating system, beloved by programmers because of the wealth of utilities and features it offers. PC users need to care about UNIX if they are interested in having more than one person share a single processor or have access to the same information.

UNIX is the only real standard in multi-user systems. It's a bit of a curious standard however, as this comment from the Yankee Group research organization underscores: "Just as Bell Labs (home of UNIX) is 9,000 Ph.D.s connected by a parking lot, UNIX is almost 70 variations on a theme connected by a PR firm."

That's overstated some, but there are numerous options to complicate a UNIX quest. In micros, you can

get hold of AT&T's interesting new UNIX PC (p. 20) which runs System V. Or you can outfit an IBM PC AT with Xenix, a UNIX version from Microsoft that is supposed to merge with System V in the future. Alternatively, you can equip a PC with PC/IX, a form of UNIX III. Other UNIX mavens I know swear by Berkeley 4.2.

This complexity isn't the main problem. There is a dearth of software that will run under UNIX and that situation is likely to stay much the same until a volume of UNIX machines is sold. Back to the chicken/egg problem.

With all that said, UNIX still has a powerful pull. Matthew McClure, the **Whole Earth Software Catalog's** resident UNIX junkie and man in charge of **The WELL** (p. 148), Point Foundation's electronic network (UNIX-based), states his rationale:

MATTHEW MCCLURE: When work involves several people's efforts, file-sharing becomes an important facet of the computer tool. Local area networks are one way to share files; multi-user operating systems like UNIX are another.

I like the feeling of power over the machine UNIX gives me. I can have several programs running at once, all working towards one goal, or each a separate project. I have electronic mail among project team members so coordination can be faster and less cumbersome than with paper and telephone.

At the Hackers' Conference we held last year, Brian Howard made a strong case for providing kids with what he called "adequate computational tools" — not an Apple II or Commodore 64, but a full-blown UNIX system. Brian had worked on a project that involved a group of high school students who were given access to a UNIX machine. They computerized the school's record-keeping functions in the course of a school year: attendance, grades, seating charts, etc. They also came away with a firsthand appreciation of the computer as a tool.

You need a lot of money and big disk storage capacity to make effective use of UNIX. Fortunately, these resources are getting cheaper by leaps and bounds.

My advice? If you need this kind of tool, spend the money. If you can afford to wait until the prices come down further and software choices improve — wait.

RICHARD DALTON: Additional incentives to wait: future versions of PC/MS-DOS will almost surely include multi-tasking; many people are working to bridge the UNIX/DOS gap with hardware and software that allows UNIX to run PC/MS-DOS programs, yet retain its ability to serve a number of people; even the Macintosh is being talked about as a multi-user machine if a more powerful processor is added to the product line.

Finally, local area networks are a realistic alternative to a multi-user machine. Costs are dropping and they're improving rapidly — both technically and in terms of software support. LANs should get equal attention if you're embarked on multi-user research.

How Much Memory is "Enough"?

Each microprocessor used in a personal computer is designed to address a finite number of bytes or characters. The IBM PC's Intel 8088 processor, for example, can address one million bytes. "Address" is computerese for the maximum number of characters the processor can directly look at before going to other storage (like a disk) for more. When this happens, the data in memory is replaced. You only get to have so many bytes before you run out of room.

A vendor may restrict the maximum available memory even further. Using the PC again, we find that IBM has reserved 360K for its own use: to store part of the BASIC language compiler, instructions that control the writing of information to the display, and other internal housekeeping routines.

Acting on IBM's specifications, Microsoft developed the PC/MS-DOS operating system so it could address a maximum of 640K. IBM's announcement came in an era of 8-bit computers like the Apple II, TRS-80 and various CP/M machines — all with 64K memory limits. Few people understood what you could possibly do with all that open space.

Four years later IBM PC users are loading programs each morning that remain memory resident, like SIDEKICK (p. 114) and PROKEY (p. 174). PC DOS itself has gotten more obese as it has evolved. Many "power users" want RAM disks (a chunk of memory set aside to avoid going to disk so often) or print spoolers that let you move on to another job while printing continues.

As we've just seen, the trend is toward operating environments, many of which will be able to execute more than one program at a time. That's great and potentially more productive, but only if you have enough memory to house a number of programs and data files — all at once.

In the wings are programs that use elements of artificial intelligence. These will help take the decision-making burdens of personal computing off our backs, but they will require even more memory than the simpler kinds of programs currently on the market.

We're seeing the computer equivalent of the Blivet, which we all recall is five pounds of something in a four-pound bag.

Lotus and Intel got together recently and announced a way out of this bind. They have come up with a standard method to implement a technique called

"bank-switching" that swaps 64K pieces of programs and files in and out of memory. This effectively fools the computer into using up to 8 million bytes of memory for programs and data. The impact of all this swapping around on program execution speed is an unknown quantity at this time.

As is often the case in the early stages of a standard, however, everything is not rosy. To make use of the Lotus/Intel bank-switching scheme, application programs need to be modified to recognize what's going on. Lotus, not surprisingly, has announced that both its major products, 1-2-3 (p. 68) and SYMPHONY (p. 111) will work with the scheme. A few other software vendors have made similar commitments.

Perhaps worse, a number of memory board manufacturers like AST, Quadram and Thesys have grumbled that the Lotus/Intel approach isn't the best way to do bank-switching and have announced their own "super-set" of the Lotus/Intel standard. Microsoft has also been giving broad hints that PC/MS-DOS version 4.0 will have a memory expansion technique embedded in it — maybe compatible with Lotus/Intel, maybe not.

One of the oldest computer gags is that you can always tell the pioneers: they're the ones with arrows in their backs. That's why I continually counsel caution when dealing with a new development in this business.

In this case, my cautionary goes something like this: if you don't have a proven need to go beyond 640K, wait at least until DOS 4.0 appears. Then you'll know which direction the people behind your operating system plan to go, and some reading should be available about the number of programs that will be adapted to bank-switching. Maybe IBM will have even made *their* commitment to a memory expansion standard by then.

If your family name is Rockefeller, however, forget the above, load up your PC with pricey memory boards and have some fun!

SOFTWARE STANDARDS: Few and Far Between

For reasons best left up to the psychologists, numbers have done more for personal computers than anything else. VISICALC was a minor social rage when it was first released: a program that looked like the columnar accounting pads most of us have seen. VISICALC has been credited with selling more than 100,000 Apple IIs, all by its lonesome.

Then Lotus popped 1-2-3 for the IBM PC. Omigod . . . You not only had the familiar columns and rows, but pie charts and graphs! Lotus has become a near-\$200 million company, largely on the strength of that single concept.

In becoming the strongest current software standard, 1-2-3 has accumulated a wealth of support programs: "templates" that enhance basic 1-2-3 to handle specific tasks like employee benefit calculations; programs that improve the graphics; printing routines that twist the spreadsheet sideways so you don't have to glue separate sheets of 8-1/2 x 11 together to get the complete picture.

You can hardly open your mailbox without being assaulted by ads for yet another "1-2-3 Secrets Seminar" or go to a PC users group that doesn't have a subsection swapping arcane tricks for 1-2-3 improvement.

The Achilles heel is its popularity. Recently, Mosaic Software announced TWIN, a 1-2-3 actalike that is purported (not in our hands at the time of this writing) to do all the Lotus gyrations, read the same files, produce better graphic output, and cost less -- \$145 vs. \$495 for the original. That may sound like bad bananas if you're a Lotus shareholder. It's positively invigorating if you're a computer shopper with a need for financial analysis. Other clones are sure to follow.

Ashton-Tate, another micro software pioneer, pulled off a similar coup with their DBASE II (p. 85) data management program. DBASE II was pre-eminent but cranky; Ordinary Humans found it difficult to understand. As other vendors (particularly Microrim, parents of R:BASE, p. 87) began to encroach on DBASE turf, Ashton-Tate wisely produced DBASE III (p. 86), a simpler, yet just as powerful, data manipulator. I have heard that the III version is currently accounting for 75 percent of organizing software revenues. The standard continues.

Frankly, I don't understand the popularity of DBASE II/III. Most people don't have anything more complicated than their name and address book to organize in the first place. So why go through the cost (\$695) and tedium of learning fancy database management? The organizing section of this book has a number of simpler, more cost-effective answers (pp. 78-93) for the casual user. And even simpler solutions are appearing.

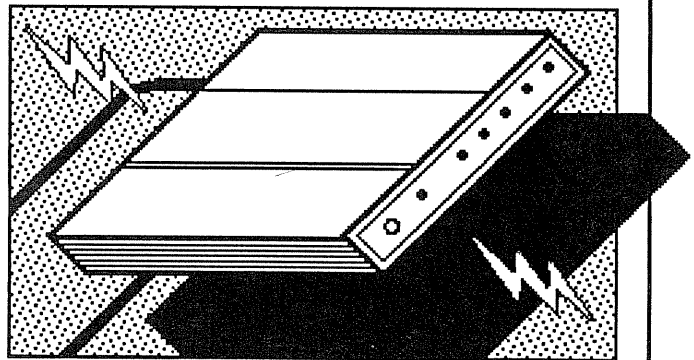
You can probably get into a hairier argument about a computer owner's favorite word processor than about his or her alma mater. That theory applies doubly to the more than one million people who use WORDSTAR (p. 56). Avid WORDSTARites will defend its double-clutching, control-key commands, and undeniable breadth of features to the near-death.

Doesn't matter: WORDSTAR remains the standard in writing tools, although a number of newer (and sometimes simpler) programs are beginning to challenge its status. WORDSTAR creates files like no one else's. If you want to move these files to another program, you generally need to translate it into a more common format. It's a tribute to WORDSTAR's popularity that

so many programs contain WORDSTAR-specific translation routines.

Then there are hundreds of add-on programs to do things like proportional spacing or juggle WORDSTAR's menus around, and clones like NEWWORD (p. 56) that give you the original plus some new twists for less money.

Apple II owners generally gravitate to APPLEWRITER, a startlingly powerful word processor for a machine of the II's dimensions, or they use the writing part of the fine integrated system package APPLEWORKS (p. 108), one of the hottest-selling programs on the Apple or any other market. The WP part of APPLEWORKS isn't powerful, just simple and straightforward.



TELECOMMUNICATING

ART KLEINER: The telecom standard is Hayes. I suspect that a modem would have to be *really* good to be recommendable if it isn't Hayes-compatible, for reasons of communications software compatibility. Thus the success of Anchor's Volksmodem (p. 155), the cheap Hayes-compatible.

XMODEM is sort of a file transmission default standard (p. 156), but I don't see any candidates for replacing it soon. It's slow and you can't see the text as you transmit — so if it breaks off or snags, you don't see where that took place in the file.

RICHARD DALTON: Modems are moving up from 1200 to 2400 bits per second and the 300 bps modem, so popular a couple of years ago, is being somewhat squeezed by rapidly declining prices: Cermetek recently announced a 1200-bps, Hayes-compatible unit for a hair below \$200, the latest example.

It'll take a while before 2400 bps is all that useful, however. Few commercial information services support it yet and there are a number of different ways to transmit at that higher speed. Manufacturers haven't reached a consensus on which method to use yet. You'll also encounter a greater number of transmission errors at the higher speed.

STANDARDS IN THE REAL WORLD: Making Connections

JACK POWERS: Standards are funny things. In the electronics business, you'd think the ones carved in stone and honed down to a gnat's eyelash would be something you could take for granted, like getting power when you plug in a toaster.

It turns out the reverse is often true. If your computer has a connector for a modem or serial printer, it is probably designated an "EIA RS-232." EIA RS-232 is a standard, published by the Electronic Industries Association and very carefully written. Through no fault of the EIA, claims of compatibility with this standard should be taken with a grain of salt, a bit like the term "high fidelity" . . . when you hear it, it's a clue that the subject is somehow related to audio, but that's about all.

There are so many ways that so-called RS-232 devices wind up incompatible with each other that a whole industry has grown up to design and sell matchmaker devices: from unisex connectors to cables with logic that try to adapt to the devices on either end. Equipment manufacturers have freely adapted RS-232 to their whims and claims of compatibility are almost meaningless.

RICHARD DALTON: Anyone who has tried to use an RS-232 port to hook up a serial printer (as I did for an entire week one time) will encourage, maybe plead with you to buy a computer with a Centronics parallel port and a matching printer. About the only standard in serial devices is that they both have 25 paths to carry signals or electrical current. What winds up on each of those paths is wildly variable.

GRAPHICS: A Special Problem, Getting Bigger

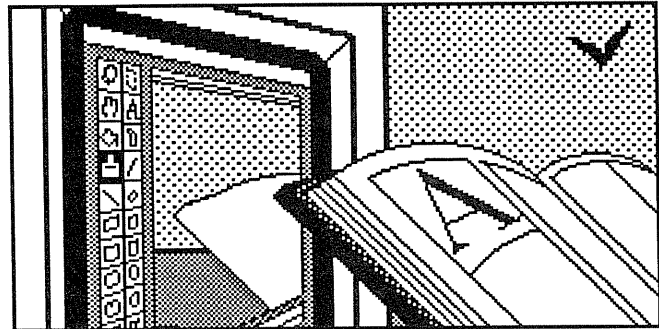
The entire field of computer-generated graphics is presently in a state of upheaval. MACPAINT (p. 127), the lovely concept that launched a hundred thousand Macs, has become more of a classic than a standard. Its use of a mouse to "pick up" paint cans, sprayers, various sized brushes, and geometric shapes, flip them around the screen and create instant art is a landmark in personal computing.

If you haven't tried MACPAINT or one of its copycats (easy to do, since clones have been developed for almost every computer), you haven't discovered an important dimension of the desktop computing machine. Buy one of this genre even if you only use it briefly as a concept-expanding device.

Graphics standards are hard to come by: the Apple II has three graphics modes; the IBM PC started with three, then added two recently (the Enhanced and Professional Graphics Adapters) and a number of third parties offer their own proprietary "standards"—most prominently Hercules on the monochrome side of things.

GEM and MICROSOFT WINDOWS have their own standards and the Amiga offers another (the Atari ST uses GEM). What's a software developer to do? Follow his nose straight to the cash register, of course, developing software for the standards that sell best; adapting to other standards if there's time.

Even though standard color graphics on the IBM PC are relatively wretched, hundreds of competent graphics programs exist to exploit as much as possible. I think the Enhanced Graphics Adapter (p. 124), with its better-than-double improvement over standard IBM color graphics, will finally take off. It's slower than it should be and IBM will likely find a way to



correct that problem. The increase in the number of programs announcing support of the Enhanced Graphics Adapter has been striking in the last two months.

If you want the output elegance a plotter can offer, the decision's easy: get a plotter that is 100 percent compatible with Hewlett-Packard's Graphic Language commands. HP has been a leader in the plotter field for years and their HPGL is recognized by everyone.

Printers that spew out pie charts are a little trickier. We cited two printer standards: the Epson and the Diablo 630 (p. 124). These are printers that show up more frequently than any others on software menus used to select printer options. The Diablo won't help much with graphics as it is a typewriter-like device, but an Epson or Epson-compatible should present no problems to graphics programs.

PURE FUTURES

Some items don't fit neatly in the standards categories we established, leading to this unruly grab bag of likely future events. One of the most exciting is optical storage — reading and writing on a special disk surface with a laser beam. The version that you only read data from is called a Compact Disk - Read Only Memory: CD-ROM to its friends.

STANDARDS IN THE REAL WORLD: Re-skilling the Skilled

JAMES DEEN: As an aging draftsman in a world increasingly populated with 15-year-olds who can do amazing and productive things with computers, fear set in. I had to have a computer-aided drafting system to place myself in a position to compete with those little job-robbers.

The IBM PC at home had plenty of potential, but building it into a viable CAD system seemed a prohibitive task. What hardware could I afford and was it supported by the various CAD software programs? I needed a software standard to build from, and after much experimentation and many graphic trade shows, settled on AUTOCAD (p. 135).

It didn't end there. I still had to decide what graphics card was affordable, had good graphic resolution, and still provided software compatibility — other software

for word processing, databases, and accounting. And I needed a matched monitor: it doesn't do much good to buy a graphics card with 720 x 348 dot resolution and hook it up to a monitor that can only reproduce 640 x 200. Standards and cross-standards.

There were many other decisions: which plotter (how fast; how big a sheet of paper would I need); and which digitizer; how to lace all the gear together with the right cables. All this happened a piece at a time with much trial and error and many forays into the uncharted wilderness of the PC's insides. Tiny DIP switches also had to be reset each time I added something to the PC's gut or took something out.

In the end, I trust it was all worth the effort, although I've yet to see dollar one come from all my labors. The grim fact is that drawing by computer is a lot slower than drawing by hand, until you have built up a number of files from which you can pull repetitive drawings. I wish someone had told me that to start with.

TOM HARGADON: A CD-ROM utilizes the same technology as the popular audio compact disk, providing up to 600 megabytes of read-only storage. Like the audio CD, the information (digital, image or voice) must be recorded and then recorded like a phonograph record before it can be read.

The CD-ROM standard has been developed by Philips and Sony. First uses are to store large document files for businesses (a kind of super-microfilm) and encyclopedias or atlases for home use. Several legal and medical data bases will be available on CD-ROM soon and next-generation computer games are being developed by Spinnaker and others for release early next year.

Prices for CD-ROMs are about \$250-600 to manufacturers; about double that at retail. Write-once CD-ROMs should be available in 1986 for about \$3,000. These are like tapes used for logging transactions or large hard disk backup. Fully erasable CD's, that work the same way hard disks do but not as fast, should be out at a similar price the following year.

RICHARD DALTON: Atari has announced a \$500, 540-megabyte CD-ROM that may be available by the time you read this. Plans are to also give it audio capabilities, so you can listen to Mantovani when not computing. IBM should have a CD-ROM on the market by year-end with Apple not far behind.

Speed... Glorious Speed

Everyone wants to get past the training wheels stage and start zipping down the hill with their electronic 10-speed. Faster software is the cheapest, easiest way to do it. If you've made solid software selections, you're dealing with a company that regularly updates their products — including their operating speed.

Some examples:

Writing programs seem unlikely candidates for speed-up maneuvers as they largely sit around waiting for the next keystroke, yet they can have irritatingly slow features. I use VOLKSWRITER DELUXE (p. 58) regularly. It's about as swift as word processing can be, since text is all kept in memory. Still, it has slow features, like loading and storing files.

The latest version (2.2) of VWD improves things greatly. This article, for example, took only 15 seconds to load vs. 29 seconds with version 2.1. Similar savings result when storing the file back on disk.

Other writing programs have similar speed improvements: SAMNA WORD III, version 3.0 (400 percent speed-up in some functions) and FREESTYLE, version 1.5 (claims 150 percent faster performance overall.) None of these upgrades cost much, so the time saved (or frustration avoided) pays dividends. (Upgrades: SAMNA WORD III, \$100; FREESTYLE, \$50.)

WOODY LISWOOD: If you have the 8087 co-processor on your PC and use 1-2-3 for monster spreadsheets and/or things like standard deviations, logs and stuff, RECALC+ speeds things up zip-zip-zip. The vendor claims it's 128 percent faster for standard deviations and 3,689 percent faster for nested square roots. A 400K spreadsheet of mine that uses look-ups and simple math recalculated in 26 seconds and took 48 seconds without RECALC+. (RECALC+: IBM PC/XT/AT and compatibles; copy-protected? NO; \$95, 1-2-3 version; \$149, SYMPHONY version; GNP Development Corp., 1244 East Colorado Blvd., Pasadena, CA 91106; 800/832-6467 or, in CA 800/ 633-8467.)

MATTHEW MC CLURE: I got a prerelease demo of FRAMEWORK II today. Bigger spreadsheet; faster, with all kinds of sorting. Overall, it looks like they took Framework I (p. 110), made it quicker, and smoothed the integration with the telecom package. Should be available about October 1.

RICHARD DALTON: Software is at best, only half the speed-up story. IBM's PC AT announcement caused millions of users to question the speed of their PCs & XT's. Enhanced processors (operating 2-3 times faster) have been available for some time on the Apple II.

Expect to see a fusion between processor enhancement and the new memory expansion standards over the next six months. This is being pushed by even faster processors waiting in the wings: a 80386 (note the "3") for the IBM PC series; a 16-bitter to hang on Apple IIs; a faster, true 32-bit processor for the Macintosh — plus Atari and Commodore's fast, cheap machines.

NAPLPS — A Universal Standard for Graphic Communication

LOUIS JAFFE: Imagine creating a graphic on an IBM PC and displaying it, without modification, on an Apple II or a Macintosh. Software that permits this is based on the NAPLPS standard — the acronym stands for North American Presentation Level Protocol Syntax, a joint standard of the United States and Canada.

NAPLPS (pronounced "nap-lips") is designed to replace the aging ASCII standard used for text communication. If you receive ASCII text on a NAPLPS machine, it is directly readable and NAPLPS allows new uses of the ASCII character set. It adds foreign language and scientific characters, font sizes, block and high-resolution graphics and color, yet it typically requires only 1/6 the disk space needed for a "bit-mapped" file.

Support for NAPLPS is slowly growing in the computer industry. Major companies like Boeing and DEC have adopted the standard for their internal communications. NAPLPS software exists for most micros and soon, NAPLPS-on-a-chip will permit building the standard into future equipment at low cost. For the standard to really catch on will take NAPLPS-based paint/chart programs, priced like and as good as, MACPAINT (p. 127) and CHART MASTER (p. 129).

Last Last Round-Up

RICHARD DALTON: Some subtler, still-important expectations: more use will be made of custom-designed processors (like the ones that muscle graphics and sound on the Commodore Amiga), especially as computer-aided chip design improves; the first of the RISC machines (Reduced Instruction Set Computers) from the likes of IBM, HP and DEC,

will appear as hot engineering and scientific workstations; co-processors will become more evident, allowing most any computer to utilize software written for another; and 1-megabit memory chips will open new possibilities — like much improved portables.

The personal computer industry isn't through with innovation just because some standards have emerged — they're building blocks that needn't be discarded as the future unfolds. That's the standards lesson, and it's a valuable one for each of us to remember as we try to make sense of this significant new resource.

How This Update Was Produced

JAY KINNEY: The preceding 15 pages are the product of a process that would have been impossible even six months ago. The material was written and compiled on an IBM PC (some reviews were downloaded from the EIES Network) and handed in on disk. It was copy edited and uploaded with a Compaq onto the WELL (p. 148). I downloaded it at home on my 512K Macintosh, reformatted the copy with MACWRITE, and "poured" it into PAGEMAKER, where I typeset the text in 10 pt. Helvetica, embellished it with boxes, hairlines, and screens, pasted in MACPAINT drawings, and printed out the 15 pages on the Apple LaserWriter at Krishna Copy in San Francisco. The printouts were then pasted up on boards and photos added. Considering all the steps along the way the process went amazingly well, though not without some surprises. (To list just two: what you see on screen with PAGEMAKER — or with other Mac programs — is not always what the LaserWriter chooses to print out. On charts, especially, the column tabs can go astray between screen and print-out. Secondly, the prerelease version of PAGEMAKER I used (v.993) was still not quite bug-free and I had a close call when my 15-page file crashed and trashed itself 20 minutes before I was due to run off to print it out. Thank God I had just made a backup copy shortly before.)

With 15 full pages (which took up over 135K of disk space) PAGEMAKER was pretty well pushed to its limits. One drawback of a file that size is that saves-to-disk took over 5 minutes each time as the pages mounted up. A file that size also required its own file disk which meant that, even with two disk drives, I was drawn into long bouts of disk swapping. On my last night of work I wised up and split the file into two smaller files which speeded things up nicely. Such aspects aside, I found PAGEMAKER to be a generally elegant, easy-to-use program with more capabilities than other Mac desktop-publishing software such as MACPUBLISHER and READY SET GO (p. 126). Its arrival close to deadline both made this final Update possible and prevented us from giving PAGEMAKER even more review space. These pages are a quick demo of its power. (PAGEMAKER: Version 1.0; Macintosh; 512K; external disk drive required; hard disk recommended; copy-protected? YES; \$495; Aldus Corp., 616 First Ave., Suite 400, Seattle, WA 98104; 206/467-8165.)

For new computer users these days the most daunting task is not learning how to use the machine but shopping. Hence this book.

—Stewart Brand, Editor in Chief



COMMENTS ON THE FIRST (1984–85) EDITION
OF THE **WHOLE EARTH SOFTWARE CATALOG:**

"If you own a computer or are thinking of owning a computer, I cannot think of a better place to invest \$17.50 than in this book."

—Peter McWilliams, Author of **The Personal Computer Book**; Syndicated column

"Any reader who reads the 'Catalog' will get rich in computer information. . . . I grew so intoxicated by my browsing that I found myself desperately wanting a dozen programs."

—Christopher Lehman-Haupt,
The New York Times

"Unlike most people who write computer books and magazines, Stewart Brand and his collaborators haven't lost their command of that great preprogramming language, English. They write with grace and wit."

—Adam Hochschild, **Mother Jones**

"The ultimate software guide."

—Steven Levy, **Rolling Stone**

"The Whole Earth Software Catalog must be considered the state of the art in the world of software cataloguing. It is hard to imagine that another entry will combine the careful research, the honest evaluation, the comparative depth, the appealing visual design, and the welcome ease of use."

—Richard Dufour, **Management Technology**

"A gourmet's guide to the electronic banquet."

—Bruce Shechter, **Discover**

". . . The same critical and comparative insight and the same energetic mix of social iconoclasm and philosophical hopefulness that distinguished [the earlier Whole Earth Catalogs]. . . . The work remains timely, candid, explicit and informed. . . . Would-be buyers will manifestly be repaid in full for using it."

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—**Data Processing Digest**

